J. R. HALL.

ELECTRODE HOLDER.

APPLICATION FILED MAR. 6, 1918.

1,318,992.

Patented Oct. 14, 1919.

2 SHEETS—SHEET 1.

Fig. 1.

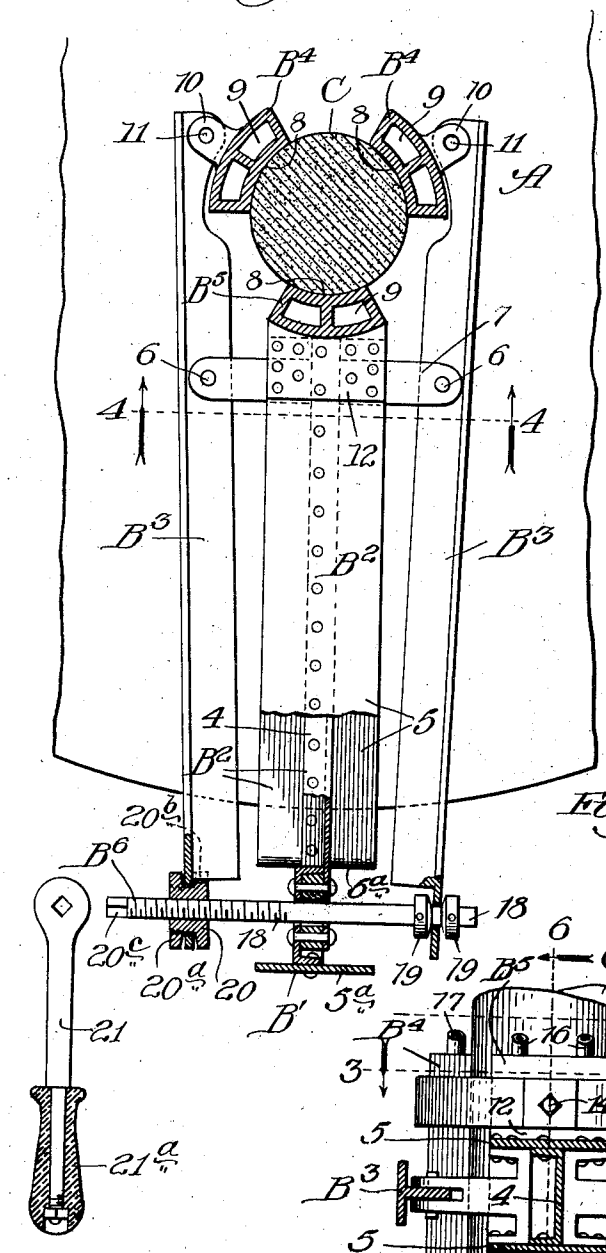


Fig. 2.

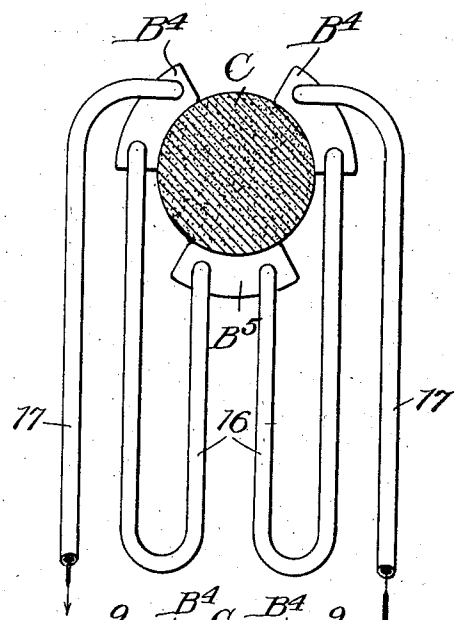


Fig. 3.

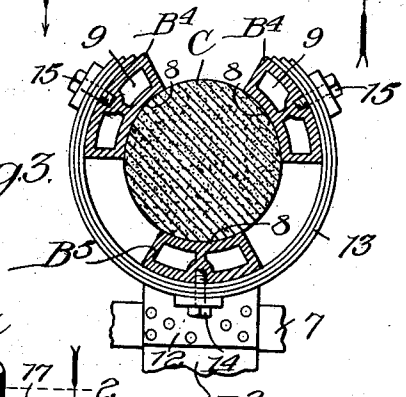
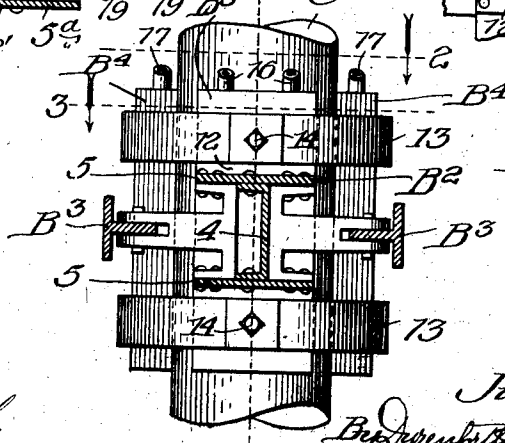


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5.

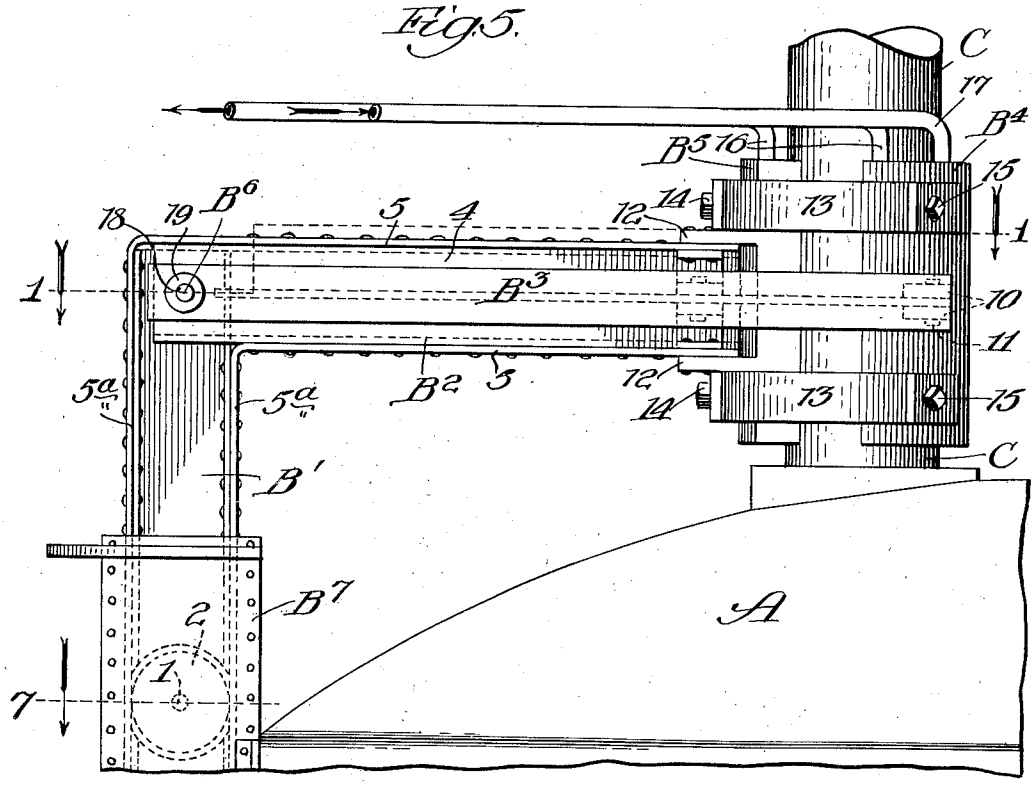


Fig. 7.

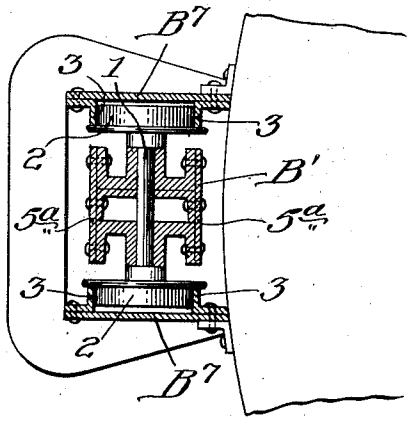
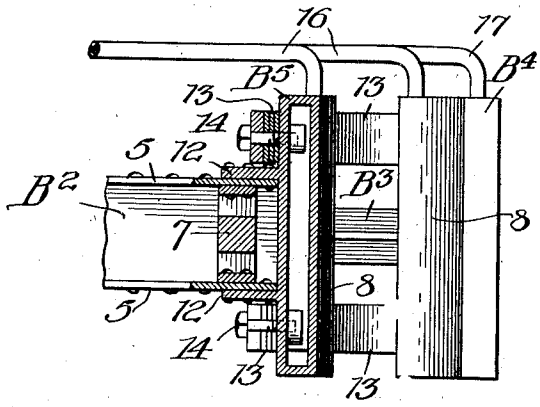


Fig. 6.



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UNITED STATES PATENT OFFICE.

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ELECTRODE-HOLDER.

1,318,992. Specification of Letters Patent. Patented Oct. 14, 1919.

Application filed March 6, 1918. Serial No. 220,702.

To all whom it may concern:

Be it known that I, JULIUS R. HALL, a citizen of the United States, residing at Oak Park, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Electrode-Holders, of which the following is a specification.

This invention relates particularly to electrode-holders for use in connection with electric furnaces.

The primary object of the invention is to provide an electrode-holder for furnaces which will securely grip and support the electrode, which will provide good electrical contact between the electrode and the grippers, and which will afford a staunch and reliable construction with proper provision for a reliable electric circuit.

While not limited thereto, the invention is especially desirable in electrode-holders of that type in which the electrode is adjustable from the side of the furnace.

It may be stated here that an objection to the use of side holders as heretofore constructed has been that difficulty has been experienced in securing good electrical contact between the holder and the electrode, owing to the unevenness or lack of true symmetry of the electrode. Good contact between the electrode and the electrode-grippers is desirable, not only to prevent mechanical injury to the electrode, but also to prevent undue heating, which may be caused by imperfect contacts. Electrodes are generally designed to be round in cross-section, smooth of surface, and straight throughout their length. Practically, however, they are not truly symmetrical, their surfaces are apt to be uneven, and they are sometimes warped and irregular in cross-section. Efficiency requires good contact between the electrode and the holder, even if the holder be water-cooled; and it is desirable to provide for water-cooling of the electrode-grippers, even where the construction is such as to provide for proper contact between the grippers and the electrode. Again, excessive heat from the electrode may cause a water-cooled holder to crack or break, and this is a further reason for providing for perfect contact, even where the electrode-grippers are water-cooled.

The desired objects are attained by the invention illustrated in the accompanying drawings. In this construction, there are preferably employed a pair of relatively movable gripper-supports, on which are mounted grippers, some, at least, of which are self-adjusting, that is, capable of adjusting themselves with relation to the electrode in the closing operation; and means are provided for effecting relative movement between the gripper-supporting devices, such means being operable from the side of the furnace.

The invention is illustrated in the preferred embodiment in the accompanying drawings, in which—

Figure 1 represents a plan sectional view taken as indicated by the arrows on line 1—1 of Fig. 5; Fig. 2, a broken sectional view taken as indicated at line 2 of Fig. 4; Fig. 3, a broken sectional view taken as indicated at line 3 of Fig. 4; Fig. 4, a broken vertical sectional view taken as indicated at line 4 of Fig. 1, this view showing the horizontal arm of the electrode-support, and showing brokenly the electrode carried by the grippers mounted on said arm; Fig. 5, a broken elevational view of a furnace equipped with the improved electrode-holder; Fig. 6, a broken vertical sectional view taken as indicated at line 6 of Fig. 4; and Fig. 7, a broken horizontal sectional view taken as indicated at line 7 of Fig. 5.

In the embodiment illustrated, A represents the body of an electric furnace; B, the improved electrode-holder; and C, a vertical electrode supported by the holder B.

The electrode-holder B, in the form illustrated, comprises a vertically adjustable standard B′; a horizontal arm B^2 extending from the upper end of the standard B′ and projecting over the top of the body A of the furnace; a pair of levers B^3 pivotally mounted on the arm B^2; self-adjusting electrode-grippers B^4 pivotally supported on the inner ends of the levers B^3; a fixed electrode-gripper B^5 mounted on the inner extremity of the arm B^2 and co-acting with the self-adjusting grippers B^4; and a device B^6 serving to actuate or adjust the lever B^3 and thereby shift the grippers B^4 with relation to the gripper B^5.

The standard B′ is adjustable vertically in a fixed guide B^7, which is firmly secured to the body of the furnace, and which is equipped with means (not shown), of any desired construction, for vertically adjusting the standard B′. In Figs. 5 and 7, the standard B′ is shown provided with a horizontal shaft 1 equipped at its ends with wheels 2, which are confined between tracks afforded by angle-members 3, which constitute portions of the guide B^7.

The horizontal arm B^2 is rigidly mounted on the upper end of the standard B′. As shown in Fig. 4, it comprises, in the construction illustrated, a channel-member 4, to whose upper and lower flanges are secured copper bars, or conductors, 5, which extend about the elbow and downward, as indicated at 5^a, to form a part of the standard B′.

The levers B^3 are connected, by vertical pivots 6, with brackets 7, which project laterally from the rigid arm B^2, near the inner extremity thereof.

The electrode-grippers B^4 are in the form of vertically-disposed segmental blocks having concave inner surfaces 8, which conform to the surface of the electrode, and which are cored or provided with water-chambers 9. The gripper-blocks B^4 are equipped centrally on their outer circumferential surfaces with pivot-lugs 10, which are connected, by vertical pivots 11, to the inner extremities of the levers B^3. The pivotal connections just described are sufficiently loose, or free, to permit self-adjustment of the gripper-blocks B^4 throughout the vertical length of the blocks, as well as to permit swinging of the blocks on their pivots to enable the blocks to adjust themselves radially with relation to the electrode. Thus, the blocks B^4 have, in practical effect, a universal connection with the levers B^3, and, nevertheless, are so mounted that when the inner ends of the levers B^3 are swung away from the electrode, the blocks will remain properly mounted on the levers.

The electrode-gripper B^5 is also in the form of a segmental block provided with water-cooled passages 9. The gripper-block B^5, as shown in Fig. 6, is equipped on its outer side with a shank, or flanges, 12, which receive the inner end of the arm B^2, the parts being securely riveted together.

Resilient copper bands, or bonds, 13, have their central portions embracing the outer surface of the block B^5, and have their extremities embracing the blocks B^4. These bonds are located near the upper and lower ends of the gripper-blocks, and thus are above and below the pivot-lugs 10 of the blocks B^4. The bonds are secured to the blocks B^5 by bolts 14, and are secured to the blocks B^4 by bolts 15. The bolts 15 are in the vertical plane of the pivots 11. The flexibility of the bonds 13 is such as to permit the blocks B^4 to adjust themselves to the electrode in the operation of clamping the electrode. The resiliency, or stiffness, of the bonds 13 is, however, sufficient to add to the stability of the mounting of the blocks, that is, to supplement the pivotal supports at 10 and 11, and steady the blocks, when they are swung away from the electrode.

The water-chambers of the gripper-blocks are connected by flexible pipes, or tubes, 16, thus placing the water-chambers of the blocks in connection with each other, and flexible pipes, or tubes, 17, serve to conduct water to and from the blocks.

The device B^6 for adjusting the levers B^3 comprises a shaft 18, which extends freely through an opening in the arm B^2 and through openings in the outer extremities of the levers B^3; collars 19 secured to one end-portion of the shaft 18 and freely embracing the end of one of the levers B^3; and a nut 20 connected with the outer end of the other lever B^3, and through which extends the threaded portion of the shaft, or rod, 18. The nut 20 extends loosely through a perforation in the lever with which it is connected, and is held loosely in place by a small nut, or internally-threaded collar 20^a. The nut 20 is prevented from turning by providing its flange with a groove, which engages the extremity of the horizontal flange of the lever B^3, as indicated at 20^b. One end of the shaft 18 is made angular, as shown at 20^c, and is adapted to receive a wrench, or actuating handle, 21, which may be provided with an insulating handle-portion 21^a. The connections between the screw-rod 18 and the levers B^3 are sufficiently loose to permit the levers to swing on their pivots 6.

From the description given, it will be understood that the electrode C may be secured between the gripping-blocks by adjusting the levers B^3 through the medium of the adjusting device B^6. As the inner ends of the levers swing toward each other, the blocks B^4 crowd the electrode against the stationary block B^5. In this movement, the electrode is centered between the gripping blocks and is adjusted to the gripping-block B^5 to make contact therewith throughout the length thereof; and at the same time the blocks B^4 automatically assume both a radial and longitudinal adjustment with relation to the electrode. Thus, the electrode is properly centered between the three gripping blocks, and the gripping blocks, by reason of the self-adjustment of the blocks B^4, assume a full-length contact with the electrode, without placing undue strain either upon the electrode or the gripping blocks.

The construction described is simple and thoroughly effective for its purpose.

The foregoing detailed description has

been given for clearness of understanding only, and no unnecessary limitation should be understood therefrom, but the appended claims should be construed as broadly as permissible, in view of the prior art.

What I regard as new and desire to secure by Letters Patent is:

1. An electrode-holder of the type described, comprising a plurality of vertically pivoted gripping blocks.

2. An electrode-holder of the type described, comprising a plurality of vertically pivoted gripping blocks and means whereby said blocks may be adjusted into clamping engagement with an electrode from a point distant therefrom.

3. An electrode-holder of the type described, comprising a plurality of vertically pivoted water-cooled gripping blocks.

4. An electrode-holder of the type described, comprising a plurality of vertically pivoted gripping blocks, means whereby a cooling medium may be circulated therethrough, a plurality of electric conductors, means for securing said conductors to said blocks and means for adjusting said blocks into clamping engagement with an electrode.

5. An electrode-holder of the type described, comprising a plurality of pivoted gripping blocks, cooling chambers in each of said blocks, flexible couplings connecting said chambers whereby a cooling medium may be circulated therethrough, electric conductors held in contact with said blocks and means for adjusting said blocks into clamping engagement with an electrode.

6. An electrode-holder of the type described, comprising a plurality of gripping blocks disposed above the furnace and means at the side of the furnace for operating said blocks to effect a clamping of the same about an electrode.

7. In an electrode-holder of the type described, means positioned above the furnace for gripping an electrode, and means at the side of said furnace for operating said gripping means.

8. An electrode-holder for electric furnaces, comprising a plurality of water jacketed current conducting members arranged to contact directly with the electrode and a single means for causing all of said members to grip said electrode simultaneously.

9. An electrode-holder for electric furnaces, comprising a plurality of electrode gripping members, means for adjustably mounting said members whereby they may move in any direction to adapt them to irregularities in the surface of said electrode, and flexible conductors connected to said gripping members whereby the latter may conduct current to said electrode in any position of adjustment.

10. An electrode-holder comprising a plurality of electrode contact members, and means for causing said members to simultaneously grip the electrode, said means serving also to withdraw one of said members to insure relaxation of said grip.

11. An electrode-holder comprising a plurality of electrode contact members and means for positively moving certain of said members toward and away from the electrode to cause said members to grip and release said electrode.

12. An electrode holder for electric furnaces comprising a plurality of water jacketed current conducting members arranged to contact directly with the electrode and means for positively withdrawing said members from said electrode to release the same.

13. An electrode-holder comprising a pair of relatively movable supporting devices and co-acting electrode-grippers mounted on said supporting devices, some of said grippers being self-adjusting during the operation of closing the grippers upon the electrode.

14. An electrode-holder comprising a pair of relative-movable supporting devices and coacting electrode-grippers mounted on said supporting devices, some of said grippers being loosely mounted on vertical pivots to enable the grippers to adjust themselves both radially and with relation to longitudinal lines of the electrode.

15. An electrode-holder comprising a pair of relatively-movable supporting devices, means for adjusting said supporting devices, with relation to each other, and co-acting electrode-grippers mounted on said supporting devices, some of said grippers being self-adjusting during the operation of closing the grippers upon the electrode.

16. An electrode-holder comprising a stationary arm equipped at its extremity with an electrode-gripper, gripper-supporting means movably mounted on said stationary arm and equipped with adjusting means, and a self-adjusting electrode-gripper carried by said movable gripper-supporting means.

17. An electrode-holder comprising a stationary arm equipped with an electrode-gripper, a pair of levers, means for adjusting said levers, and self-adjusting electrode-grippers mounted on said levers and opposed to said first-named grippers.

18. An electrode-holder comprising a stationary arm equipped with an electrode-gripper, a pair of levers pivotally supported on said arm, means for adjusting said levers, and electrode-grippers mounted on said levers and opposed to said first-named electrode-gripper.

19. An electrode-holder comprising a stationary arm, means for supporting said arm in position above the body of the furnace, a pair of levers pivotally supported on said arm, means operable from the side of the

furnace for adjusting said levers, and grippers mounted on said stationary arm and the inner extremities of said levers.

20. An electrode-holder comprising a stationary arm, a pair of levers pivotally mounted thereon, co-acting grippers carried by said arm and said levers, and a screw-rod operative to adjust said levers.

21. An electrode-holder comprising a pair of electrode-grippers mounted on vertical pivots, and a resilient bond connecting said electrode-grippers.

22. An electrode-holder comprising a fixed electrode-gripper, electrode-grippers mounted on intermediately disposed pivots, and flexible resilient bonds having their intermediate portions secured to the fixed gripper and having their end-portions secured to the pivotally-mounted grippers, said bonds being located one above and the other below the pivotal connections.

23. An electrode-holder comprising a vertically-adjustable standard equipped with an arm extending at an angle thereto, an electrode-gripper mounted on said arm, gripper-supporting means movably associated with said arm, and self-adjusting grippers mounted on said gripper-supporting means.

24. An electrode-holder comprising a pair of relatively movable supporting devices, co-acting electrode-grippers mounted on said supporting devices, including grippers which are self-adjusting during the operation of closing the grippers upon the electrode, and means for circulating water through said grippers, regardless of the position of adjustment.

25. An electrode-holder comprising a horizontal arm equipped with an electrode-gripper, a pair of levers pivotally supported on said arm and equipped with self-adjusting electrode-grippers, a screw-rod extending freely through said horizontal arm and having connections with said levers, whereby said levers may be actuated on their pivots, and means for acuating said screw-rod.

JULIUS R. HALL.