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DEVICE FOR ADJUSTMENT OF ANODE BOLTS IN ELECTROLYSIS FURNACES

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FIG. 1.

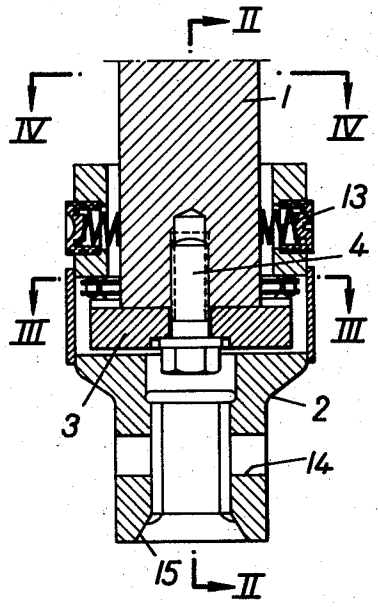


FIG. 2.

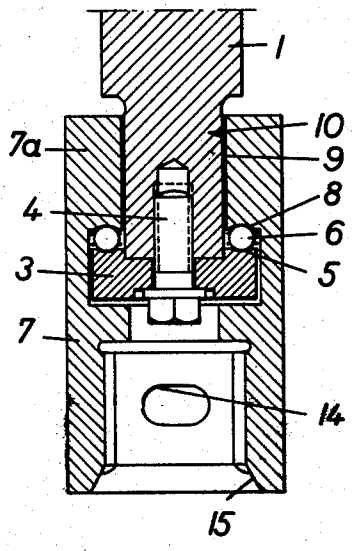
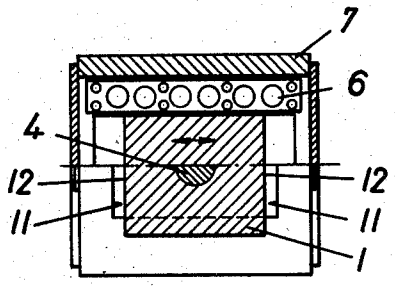


FIG. 3.



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DEVICE FOR ADJUSTMENT OF ANODE BOLTS IN ELECTROLYSIS FURNACES

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3 Claims. (Cl. 294—86)

In the later types of electric furnaces for production of aluminum by melt electrolysis where the furnaces are equipped with Söderberg anodes, the anode is usually suspended by means of contact bolts which are vertically inserted in the anode from above. These bolts are rigidly connected to the bus bars which are placed above the anode and the bolts have thus the double function of suspending the anode and transmitting the current to it.

As the anode is gradually consumed during the electrolytic process, the distance from the bolt tips to the bottom surface of the anode will gradually decrease and the bolt tips will at last reach their lowermost permissible position from which they will have to be raised to a higher level to prevent contamination of the molted bath. This operation is below referred to as adjustment of the anode bolts.

The head of each bolt is usually square with a hole right through it in transversal direction.

When the bolt has to be raised, there is used a piston rod which is suspended from above. This rod is at its lower end equipped with a key-head and a locking bolt which can be inserted into the hole in the head of the contact bolt, when the piston has been lowered so much that the key-head hits around the head of the contact bolt. When the piston rod has been fixed to the bolt head in this way, the piston is raised by suitable means whereby the contact bolt, which is now disconnected from the bus bar will be raised relatively to the anode. The piston rod and appurtenant driving device is usually located on a travelling crab, which runs on a crane bridge, so that the keyhead can according to requirement be brought into position over any one of the anode bolts in the electrolysis hall. However, adjustment of the crane bridge and the travelling crab takes much time and causes heavy wear on the driving machines and operating organs of the cranes and crabs. This is because large tolerances cannot be allowed for the clearance between the keyhead and the bolthead, as, before the bolt can be adjusted, it must be turned on its axis, to loosen it from the surrounding electrode mass.

The object of the present invention is to lighten the work of adjusting the crane and crab, and to reduce the wear on these and accessory parts. This is, pursuant to the invention, attained by the arrangement that the keyhead is mounted, so as to be horizontally movable on the piston rod.

A further simplification of the work is attained by the arrangement that the holes in the keyboard have an elongated shape transversally to the locking bolt. The keyhead can suitably be provided with a bevelled edge for facilitating insertion of the bolt head into the keyhead. In this way it is possible to attain the end that crane bridge and crab only need to be adjusted with an accuracy of, for example, 10–15 mm., in relation to the anode bolt, while more exact adjustment, for example, in the longitudinal direction of the furnace is effected by moving the keyhead in relation to the piston rod. In

such case no fine adjustment is needed in transversal direction of the furnace owing to the oblong holes for the locking bolt.

The invention includes also automatic devices for locking the keyhead to the bolthead.

In the following pages the invention will be described more fully in connection with the drawing, which illustrates some embodiments of the bolt adjusting device according to the invention.

It the drawing:

Fig. 1 shows an axial section through the lower end of the piston rod with appurtenant keyhead, according to one embodiment of the invention.

Fig. 2 is a similar section along the line II—II in Fig. 1.

Fig. 3 shows in the upper half a horizontal section along the line III—III of Fig. 1, and in the lower half a horizontal section along the line IV—IV of Fig. 1.

In Figs. 1–3, **1** denotes the lower end of the piston rod, **2** is the keyhead, **3** is a bearing plate which by means of a screwbolt **4** is fastened to the lower side of the piston rod **1**. The bearing plate projects a little way outside at least on two opposite sides of the piston rod and forms here rollerways **5** for balls **6**. The keyhead is formed with upward directed walls **7** above the head proper. These extend along the outside of the sides of the bearing plate **3**, where the rollerways **5** are located, and are in relation to the balls **6** provided with inwardly directed shoulders **8**, which rest against the balls in such a way that the kedhead is suspended from the piston rod **1** and is easily movable. The inner walls **9** of the upper areas **7a** of the walls **7** lie close to the plane-parallel side faces **10** of the lower end of the piston rod **1**, so that an effective transmission of the turning movement from the piston rod **1** to the keyhhead is obtained, and thereby to the anode bolt.

In centered position of the keyhead relatively to the piston rod the inside **11** of each of the other walls is situated at a distance, for example, of 10 to 15 mm. outside the corresponding outer wall **12** of the lower end of the piston rod, in order to allow of the desired movement of the keyhead, as indicated by arrows in Fig. 3.

In order under normal circumstances to keep the keyhead centered, springs **13** may suitably be fitted, as shown in Fig. 1.

In the keyhead itself, which has an internal cross section corresponding to the cross section of the bolthead, two holes **14**, standing diametrically opposite to each other, are provided for the insertion of a locking bolt (not shown). These holes are, according to one feature of the invention, made elongated in a direction transverse to the rollerways **5**, so that it is unnecessary to effect any fine adjustment of the keyhead in relation to the bolthead.

The bevelled insertion edges **15** enable the keyhead, when lowered, to slide automatically into place, even if the position relatively to the bolt is not perfectly correct.

By use of a bolt adjusting device, executed according to the embodiment of the invention described, the crane bridge and travelling crab are so adjusted that the keyhead comes approximately over the anode bolt to be drawn up. For this purpose a tolerance can be allowed of, for example, 10–15 mm. in both longitudinal and transversal direction of the furnace. When the keyhead is lowered relatively to the bolt, the insertion edge has the effect that the keyhead automatically comes into its place on the bolthead, until it can be lowered on to the bolthead. No finer adjustment of the keyhead in a direction transversal to the rollerway **5** will, as stated above, be necessary, owing to the elongated holes **14** for the locking bolt.

We claim:

1. A device for drawing up an anode bolt in electrolysis furnaces comprising a vertically movable and axially pivotal piston rod of square cross-section, a horizontal bearing plate secured to the lower end of said rod extending beyond two opposite sides thereof forming extensions, raceways upon said extensions, anti-friction elements on said raceways, a keyhead located at the lower end of said rod so as to be lowered upon the bolthead of said anode bolt, said keyhead having side walls extending above said bearing plate, two opposite walls of said side walls having inwardly directed shoulders having raceways thereon bearing upon said anti-friction elements while the surfaces of said two side walls above said shoulders lie close to the walls of said piston rod and the other two side walls are spaced from the walls of said piston rod to permit said keyhead to have a horizontal movement with respect to said rod.

2. A device as set forth in claim 1 wherein resilient means are provided between said side walls which are spaced from the walls of said piston rod and said piston rod to normally maintain said keyhead centrally located with respect to said rod.

3. A device as set forth in claim 1 wherein said anode bolt is provided with a transverse aperture in the bolthead thereof and said keyhead is provided with two diametrically oppositely located apertures therein which are elongated in a horizontal direction transversely to the axis of said aperture in said bolthead.

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