ELECTRICAL CONTACT FOR EQUIPMENT USED IN THE ELECTROLYTICAL PRODUCTION OF METALS, PARTICULARLY COPPER
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ABSTRACT OF THE DISCLOSURE

An electrical contact between moving and stationary conducting elements, in particular for equipment used in the electrolytical production of metals, such as copper in the form of plates, which eliminates the wearing of the contact points, the voltage drops, the overheating of the movable contact and other inconveniences. This contact essentially comprises a mercury bath contained within a number of beads of flexible and electro-insulating material, and the inside face of a metallic belt rotateably mounted around pulleys. In this bath is immersed a conducting bar spaced from said belt by means of paws in anti-friction insulating material in order to prevent the direct contact between the bar and the rotating belt, eliminating the voltage drops in the contact zone between the moving elements and the fixed elements.

Still another important object of the present invention is that of avoiding overheating of the carrying belt.

A last but not least object is that of obtaining a decrease in the current from the center of the belt toward the edges, in such a manner that uniform thicknesses of metal plate are obtained as desired.

These and further objects are obtained by means of an electrical contact for equipment used in the manufacture of electrolytic metals in plate form, particularly copper, in accordance with the invention, suitable for bringing into electrical contact movable elements and fixed elements, and characterized by the fact that it comprises metallic elements, a mercury bath, means for spacing said metallic elements, as well as means for containing said bath.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be fully understood from the following detailed description of a preferred but not exclusive embodiment of an electrical contact illustrated by way of a non-limiting example only, with reference to the annexed drawing in which:

FIG. 1 is a cross-sectional view of a device for obtaining electrolytic metal in plate form provided with an electrical contact according to the invention; FIG. 2 is a cross-section along the line II—II of FIG. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the mentioned figures, the electrical contact according to the invention, indicated overall with 1, is arranged within a metal belt 2 of steel, wound around pulleys 3, keyed onto shafts 4 which are rotatably mounted on fixed supports 5. The lateral edges of said belt 2 are provided with rims of flexible insulating material 6. These rims are acid-resistant and are adapted to prevent the spreading of the electrolytic liquid 7 onto the internal face of said belt 2. Said electrolytic liquid 7 is contained in a tank 8.

The electrical contact 1 according to the invention, consists of a conducting bar 9, immersed in a bath 10 of mercury, which is contained in a space confined by beads 11, of flexible and insulating material, which beads are in contact with the inside part of said belt 2. The conducting bar 9 can be for example of copper plated with nickel or other metal, that mercury does not attack.

Between said conducting bar 9 and said belt 2 there are placed paws 12 in anti-friction insulating material, of such nature (for example in plastic type "Teflon") which is not attacked by mercury, said paws having the function of spacers for said metallic conducting bar 9 and said belt 2 to prevent the possibility of local overheating and burning, in the event of direct contact. Said beads 11 are extended over the entire internal perimeter of said belt 2, but for obvious reasons of gravity, the mercury bath 10 is limited to the bottom zone of the space defined by said beads 11 and the inside face of belt 2. On the bottom of tank 8 there are placed pieces of metal 13, for example copper, which are to be deposited electrolytically, in sheet or tape form 13a on the face of belt 2, which is immersed in bath 7. In the electrochemical process, the metallic bar 9 serves as cathode, while the function of insoluble anode is assumed by a conductor layer of lead 14, on which the pieces of copper 13 are placed. Said bar 9 and said conductor layer 14 are connected, through conductors 15, to a generator of electromagnetic force, not shown in the figure.

The operation of the electrical contact according to the invention is simple. The mercury bath closes the
circuit comprising said electromotive-force generator, said conductors 15, bar 9, belt 2, electrolytic bath 7, the pieces of metal 13, and the lead conductor layer 14. During the operation of the machine, the mercury 10, thanks to its high specific gravity as well as to its poor adhesive forces, does not follow the movement of the belt 2 but always remains in the lower position of the space defined by the beads 11 and the inside face of belt 2. In this manner the electrical contact is always assured, since bar 9 permanently remains immersed in mercury bath 10.

It has been found in practice how the electrical contact according to the invention eliminates the inconveniences encountered in the known types of electrical contacts of the creeping type and similar between fixed and moving members. In fact, employing the electrical contact of the invention, all the phenomena of wear and tear of the contacts, voltage drops, overheating and burning of the steel support belt and the like, shown by the usual contacts do not appear. Further very important fact, it has been found that the electrical contact employing mercury, according to the invention, assures a distribution of electrical potential on the entire surface of belt 2 with a high degree of uniformity. It has been found that it is preferable for the metallic carrying bells to be constructed of rolled steel (not annealed) with a high ultimate stress. This is for the purpose of having a high degree of elasticity, so that when the belt turns on the pulleys it will not retain the curved form of the pulley but will assume a straight form upon leaving same.

If, on other hand, annealed belts were used having little elasticity, the metal winding around the pulley would have a tendency to retain the curved form; it would then be straightened out as a result of the pull exerted by the tension of the belt on the pulleys. In this case, however, the belt would be subjected to a succession of transverse bends, which would be produced at every revolution, locally causing greater and greater work-hardenings at every bend, inevitably leading to breakage.

It is therefore necessary that the carrying belt shows those characteristics of hardness and elasticity that are found only in rolled steel in the non-annealed state. This new type of contact thus permits to maintain unchanged these characteristics, which on the contrary, in case of other types of contact would be modified owing to the local overheatings causing the annealing of the steel.

Thanks to the new contact according to the invention, it is possible to operate with high currents, no longer being subjected to the limitations imposed by the creeping type of contact, operation of which gets worse as the current increases.

The great advantage of this invention is that the productivity of the apparatus is increased, the production being proportional to the current. By using the contact according to the present invention the limitations of current intensity, and thus of production, for the devices using creeping contacts of the conventional type, is overcome.

The invention thus conceived is susceptible to numerous changes and variations, falling all within the scope of the present invention as defined by the appended claims.

It is obvious that the materials used, as well as the dimensions, can be any that are desired in accordance with the requirements and, furthermore, all the described parts can be replaced with others that are technically equivalent. Thus for example the mercury can be substituted by a conducting substance of suitable analogous characteristics.

What I claim is:

1. For use in apparatus for the electrolytical production of metallic plates, an electrical contact assembly comprising a stationary electrically conductive bar, an electrically conductive conveyor belt adapted to move relative to said bar, the belt being adapted to receive on a first surface thereof the electrolytic metal of which the metallic plate is formed, said bar being spaced from said belt, means for containing a mercury bath, said mercury bath in continuous contact with a second surface of said belt, at least a portion of said bar being immersed in said bath, said bar being adapted to be connected to an electromotive force generator.

2. An electrical contact assembly as defined in claim 1 wherein said belt is made of rolled, non-annealed steel.

3. An electrical contact assembly as defined in claim 1 wherein said bar is plated with a metal which mercury does not attack.

4. An electrical contact according to claim 3, wherein said metal for plating said bar is nickel.

5. An electrical contact assembly as defined in claim 1 including means for spacing said bar from said belt.

6. An electrical contact assembly as defined in claim 5 wherein the spacing means comprises a plurality of paws of anti-friction and electrical insulating material.

7. An electrical contact according to claim 1, wherein said means for containing said mercury bath comprises means for securing said means for containing said mercury bath.

8. An electrical contact according to claim 6, wherein said means for securing said means for containing said mercury bath comprises a plurality of paws of anti-friction and electrical insulating material.

9. An electrical contact according to claim 8, wherein said mercury is confined in the space created by said means of fixing and insulating material and by said second surface of said belt, in such a quantity as to fill only the part of said space that is adjacent to said second surface of the section of said belt, which is immersed in an electrolytic bath.

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