Feb. 19, 1935. J. BILLITER 1,991,838

CURRENT FEED FOR ELECTROLYTIC APPARATUS

Filed Aug. 17, 1932

Fig. 1.

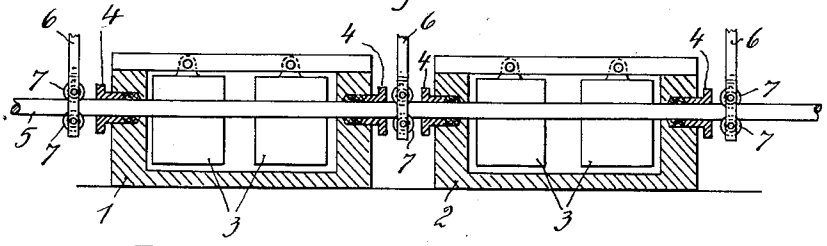


Fig. 2.

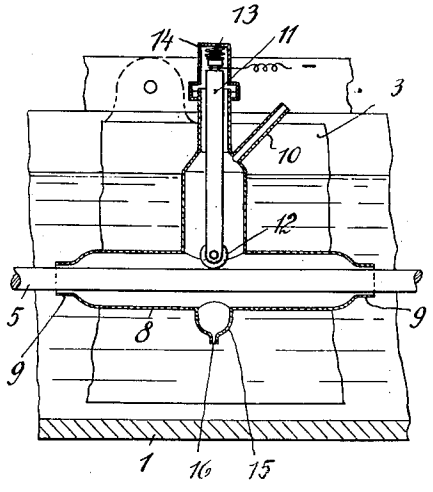
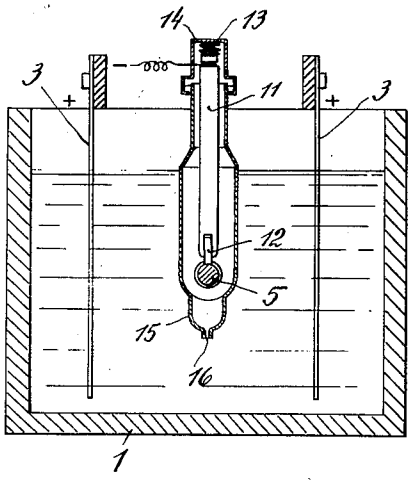


Fig. 3.



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CURRENT FEED FOR ELECTROLYTIC APPARATUS

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In Germany August 25, 1931

6 Claims. (Cl. 204—5)

My invention relates to the electrolytic deposition of metals on wires, rods, tubes or strips and more especially to means for feeding the current to the cathodes.

It is an object of my invention to provide means whereby the electric current can be fed to the wires, rods, tubes or strips travelling in or through the electrolyte in a simpler and more efficient manner than was hitherto possible.

In the art of depositing metals by electrolytic action on wires, rods, tubes or strips, these wires etc. are commonly connected as cathodes and caused to travel in or through the electrolyte in axial direction. In this manner metal cathodes and more especially steel or lead wires or tubes have been coated with coatings or jackets of copper, nickel or the like. If readily fusible metals, such as lead, are thus coated, these metals can be removed from the finished product by applying heat and melting and the elctrolytic deposit remaining over will then form a tube. In products of this kind it is important to produce metal deposits having an absolutely uniform thickness and in order to attain this I have suggested in my copending application for patent of the United States of America, Serial No. 501,569, to cause the lengthwise travelling wire, tube or the like to simultaneously revolve about its axis.

In all these cases considerable difficulties are experienced in maintaining a uniform current density in the portion of the wire, tube or the like, which is exposed to the electrolyte. With electrolytic cells of greater length and also with thin cathodes of inferior conductivity the arrangement of current feeds in front and to the rear of the cell does not suffice in view of the drop of voltage arising in the cell and it is therefore necessary to employ intermediate current feeds contacting with that portion of the cathode wire or tube which is submerged in the electrolyte. These intermediate current feeds involve the drawback that the metal deposited in the electrolyte will cover and coat also the current feeding means, thereby causing disturbances and rendering necessary a repeated replacing of the current feeding means. I succeed in avoiding these drawbacks by providing intermediate current feeding means which do not come in direct contact with the electrolyte, being disposed in separate air spaces below the level of the liquid in the cell. I thus avoid any undesirable deposition of metal on the conductive part of the current feeding means and I thereby render it possible to pass the wire, tube, strip or the like through the cell without any change in the direction of travel, which is obviously important in the case of tubes, thick wires or the like.

In a preferred form of my invention I enclose the conductor serving as current feed in a non-conductive casing provided with an inlet and outlet for the cathode, compressed air being forced into and passed through this casing in order to prevent the entrance of the electrolyte. In order to enable any electrolyte which might still enter the casing to be expelled again, I may provide in the bottom of the casing a sump having a narrow opening, through which any liquid, which may have entered the casing together with the cathode will be expelled by the action of the compressed air.

In the drawing affixed to this specification and forming part thereof two forms of current feeds embodying my invention are illustrated diagrammatically by way of example.

In the drawing,

Fig. 1 is an axial section of two electrolytic cells arranged in series with a wire-, rod- or tube-shaped cathode travelling lengthwise through both these cells in the axial direction.

Fig. 2 is an axial section and

Fig. 3 is a cross section of part of an electrolytic cell, drawn to a larger scale, which is also traversed by a wire- or tube-shaped cathode and in which the current is fed to the cathode by means of current feeding means submerged in the electrolyte.

Referring to the drawing and more particularly to Fig. 1, 1 and 2 are the two cells and 3 are the anodes suspended therein. 4 are stuffing boxes mounted in openings of the end walls of the cells and 5 is a wire- or rod-shaped metal cathode forced or pulled across the cells by suitable means (not shown), this cathode entering and leaving each cell through the stuffing boxes 4.

Current is fed to the cathode by means of conductors 6, one of which is arranged in front of the first cell, another one being disposed between the two cells, while a third one is arranged to the rear of the second cell. Each conductor is provided with a pair of rollers 7 which partly embrace the cathode, which is thus supplied with current below the level of the electrolyte in the cells, so that any necessity of changing the direction of travel of the cathode is avoided.

Obviously the rolls 7 or one of them may be applied against the cathode by gravity action or by spring action. Any number of cells may be provided and current may be supplied to the cathode, in the manner described, between each two cells.

In the modification illustrated in Figs. 2 and 3, 1 is the cell, 3 are anodes and 5 is the cathode. 8 is a tubular casing of inverted T-section, the horizontal branch of which surrounds part of the cathode wire or tube in the electrolyte with a clearance, while the vertical part of the casing extends upwardly through and beyond the level of the electrolyte. The ends 9 of the horizontal branch of the casing taper so as to closely surround the cathode without however preventing it from travelling freely in axial direction. The part of the vertical branch of the casing which extends above the liquid level is provided with a feed tube 10 to be supplied with compressed air. In the ascending branch is disposed the current feed proper having the form of a conductor 11, the bottom end of which rests with the roller 12 on the cathode, while a pressure spring 13 interposed between the cap 14 closing the vertical branch of the casing and the top end of the conductor 11 forces the roller 12 into intimate contact with the cathode. 15 is an extension mounted on the bottom of the casing 8 and formed with a narrow open neck 16. The compressed air entering through pipe 10 and filling the casing 8 prevents the electrolyte from entering the casing through the gaps existing between its end sleeves 9 and the cathode. Any liquid which may nevertheless enter the casing or which may drip onto the casing bottom from the wet cathode passing through the casing will collect in the extension 15 and will be expelled through the neck 16 by the action of the compressed air.

Instead of supplying the casing with compressed air to avoid the entrance of liquid, the part of the casing extending above the level of the liquid might also be open to the air, however in this case the extension 15 should extend to and through an opening in the side wall or bottom of the cell in order to allow any liquid which may have entered the casing to escape without coming in contact with the current feeding means.

Instead of supplying current to the cathode in front and to the rear of and between the cells, I may also feed current to the cathode in the cell itself without resorting to the casing 8, by arranging in the cell one or a plurality of pairs of partitions, a chamber devoid of liquid being created between the partitions of each pair and current being fed to the cathode between these partitions.

Obviously current feeding means such as disclosed in Figs. 2 and 3 might also be used in connection with cathodes submerged in the electrolyte, which are stationary in the axial direction, being either immovable or merely revolving about their axis.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described for obvious modifications will occur to a person skilled in the art.

In the claims affixed to this specification no selection of any particular modification of the invention is intended to the exclusion of other modifications thereof and the right to subsequently make claim to any modification not covered by these claims is expressly reserved.

I claim:—

1. Electrolytic apparatus comprising a cell, a body of electrolyte in said cell, a cathode submerged in the electrolyte and means extending into said electrolyte for feeding current to and contacting with said cathode, said means being out of contact with said body of electrolyte at its point of contact with said cathode.

2. Electrolytic apparatus comprising a cell, a body of electrolyte in said cell, a cathode submerged in said electrolyte, a conductor extending through said electrolyte and in contact with said cathode, a casing surrounding said conductor and the adjoining part of said cathode with a clearance and means associated with said casing for preventing liquid entering said casing from coming in contact with the contact end of said conductor.

3. Electrolytic apparatus comprising a cell, a body of electrolyte in said cell, a cathode submerged in said electrolyte, a conductor extending through said electrolyte and in contact with said cathode, a casing surrounding said conductor and the adjoining part of said cathode with a clearance and means for supplying a compressed gas to said casing.

4. Electrolytic apparatus comprising a cell, a body of electrolyte in said cell, a cathode submerged in said electrolyte, a conductor extending through said electrolyte and in contact with said cathode, a casing surrounding said conductor and the adjoining part of said cathode with a clearance and means for collecting any liquid which may still have entered said casing.

5. Electrolytic apparatus comprising a cell, a body of electrolyte in said cell, a cathode submerged in and travelling axially through said body of electrolyte, a casing of inverted T-section, embracing said cathode with a clearance and extending beyond the level of the electrolyte, a conductor in said casing, means for forcing said conductor in contact with said cathode and means for supplying a compressed gas to said casing.

6. Electrolytic apparatus comprising a cell, a body of electrolyte in said cell, a cathode submerged in the electrolyte, and means extending into said electrolyte and contacting with said cathode for feeding current to said cathode, said means being entirely out of contact with said body of electrolyte.

JEAN BILLITER.