May 11, 1937. M. SCHLÖTTER 2,080,234

ANODE FOR ELECTROPLATING BY HAND

Filed March 28, 1935

Fig. 1.

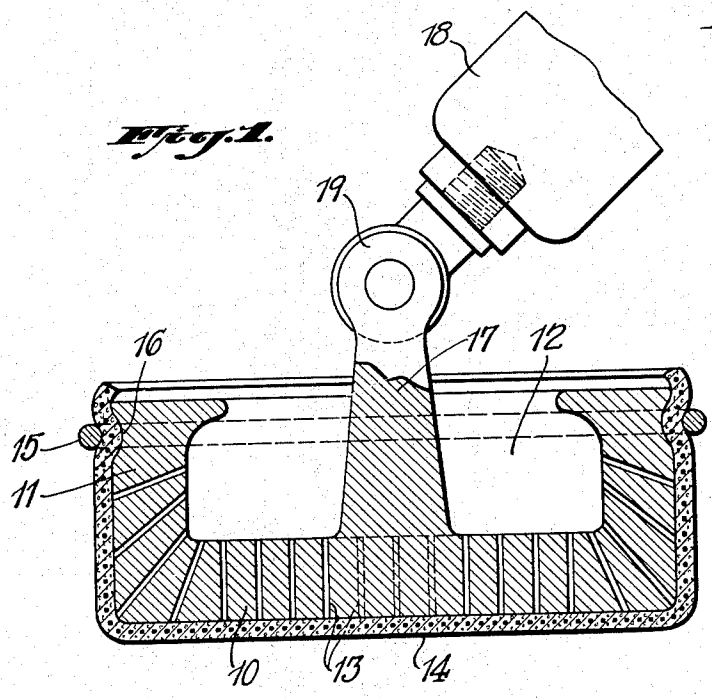


Fig. 2.

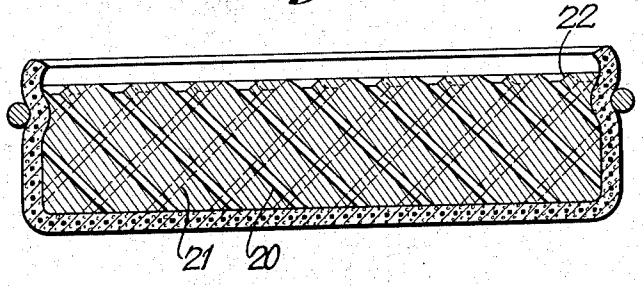


Fig. 3.

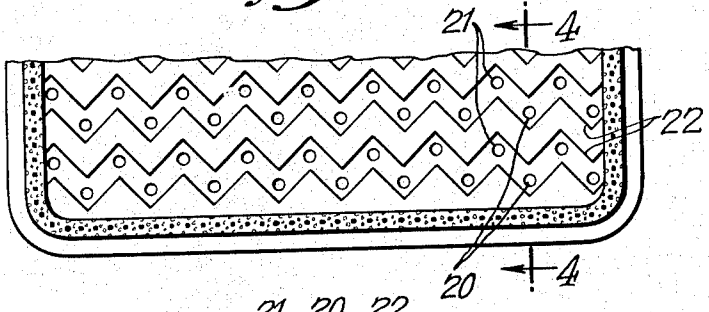


Fig. 4.

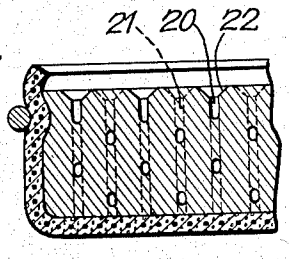
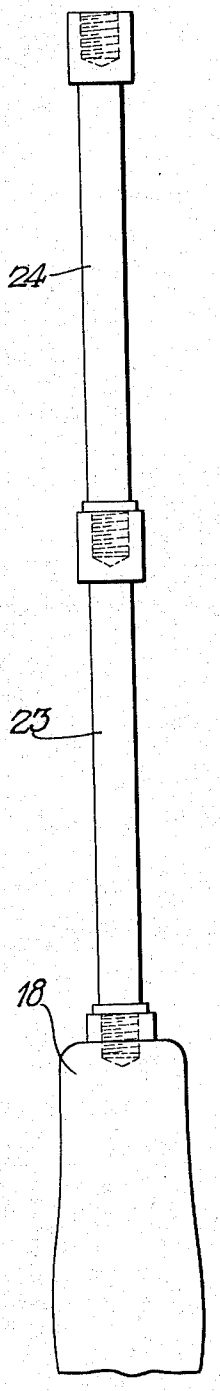


Fig. 5.



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ANODE FOR ELECTROPLATING BY HAND

Max Schlötter, Berlin, Germany

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In Germany April 13, 1934

2 Claims. (Cl. 204—5)

My invention relates to an anode for electroplating surfaces, such as worn spots on containers, with tin or other plating metal.

Heretofore in localized plating of this type the electric current was passed from an anode of the metal to be plated through an electrolyte carried in a fibrous material, such as cloth or felt saturated with the electrolyte, to the surface to be plated which served as a cathode. The anode, which is movable, may be moved together with the fibrous electrolyte carrying layer over the surface to be plated so as to uniformly coat the area or surface to be coated. The fibrous or cloth electrolyte carriers have the disadvantage that they do not sit firmly on the anode but crumple very easily, and as the solution of the anode progresses tend to cover it irregularly so that the resistance between the electrodes is not uniform throughout their surface, but varies from place to place. This varies the current density and produces an irregular electrolytic deposit forming a spongy deposit where the current density is too high, and a thin deposit where the density is low.

Moreover electrolyte carriers of felt or cloth do not wear well so that their life is short and fibers and threads become loosened or pulled from their surface, particularly if the cathode surface being plated is rough. Wherever these fibers or threads adhere to or get caught on the cathode they form an insulated spot which is not plated, or in which the plating is defective.

These various disadvantages and defects are overcome in my present invention which provides a porous electrolyte carrier of insulating material of good wearing quality that fits the anode closely and without wrinkling or crumpling and which avoids the use of fibers that may become loosened or deposited on the cathode surface.

In accordance with my invention I provide an electrolyte carrier made of a porous or microporous elastic resilient material, such as rubber. Inasmuch as rubber resists wear well and provides a smooth even surface it may be made relatively thin and thus decrease the resistance to a minimum and cut down voltage losses.

Moreover as the path of travel of the metal ions is shortened by the use of a thin electrolyte carrier the drop in concentration of these ions between anode and cathode is correspondingly decreased.

The electrolyte carrier of a thin porous or microporous rubber sheet also has the advantage that it may be stretched tautly on the surface of the anode so that as the anode is dissolved away the rubber contracts so it still is drawn tightly and smoothly on to the surface of the anode in contrast with the non-stretching non-resilient fabric carriers which would thus become loose and wrinkle.

Any suitable type of porous or microporous rubber may be employed. For example the porous or microporous rubber made from latex or provided in making with a multitude of minute passages or pores may be employed, or sheet rubber in which openings or pores are mechanically formed may be employed.

The anodes that are covered with the porous rubber sheet are preferably bent upwardly at the edges to form a container-like or basin structure and are provided with a number of capillary ducts through which the electrolyte may be supplied to the porous rubber material thereby assuring a supply of electrolyte. The rubber sheet is preferably turned up over the edges and side surfaces of the anode so that the latter may fit into angles and plate surfaces at an angle to each other. Electrolyte supply ducts are provided in the anode either perpendicularly or at an oblique angle to the surface.

For the production of satisfactory metal deposits metal ions other than those of the metal to be deposited should be excluded; therefore, in my invention all metal parts which come in contact with the electrolyte are formed of the metal to be deposited or of a nobler metal, that is, one that is lower in the electromotive series.

Various features of the invention are illustrated in the accompanying drawing in which

Fig. 1 is a vertical section of an anode embodying my invention; Fig. 2 is a section of another embodiment of the invention; Fig. 3 is a face view of a portion of the face of the anode of Fig. 2; Fig. 4 is a partial section taken along the axes of ducts in the anode of Fig. 2, and Fig. 5 is a side view of an extension handle for the anode.

Referring more particularly to Fig. 1, the anode comprises a plain sheet or layer of metal 10 which may be of circular, rectangular or other shape and having upturned sides 11 thus forming a central receptacle space 12 in which a small quantity of electrolyte may be carried. Capillary ducts 13 are provided in the sheet 10 and the upturned sides 11 extend from the receptacle space 12 to the outer surface of the anode. A sheet 14 of porous or microporous rubber is stretched over the outer surface and upturned sides of the anode and is secured near the edges of the latter by an encircling band 15 of rubber

or metal which is contracted into an annular recess 16 in the anode.

The capillary ducts 13 are sufficiently small to prevent the ready leakage of electrolyte but serve in the manner of a wick to supply this electrolyte to the sheet 14 and maintain the latter filled at all times with the electrolyte. This prevents the electrolyte carrier 14 from becoming inactive through loss of electrolyte. A supply of the electrolyte may be contained in the container space 12.

The anode is provided with an upstanding bracket or post 17 to which a handle 18 is secured by means of a joint 19. This joint may be a ball joint, or a flat joint which will permit the anode to tilt and adapt itself to contact with surfaces at various inclinations. This enables the anode to be used on surfaces that would otherwise be inaccessible, and enables it to plate corners and inclined spaces.

In the modification shown in Fig. 2, inclined ducts 20 and 21 are employed. These ducts are oblique to the surface of the anode but extend alternately in reversed directions. That is, one row will extend obliquely in one direction and the adjacent row obliquely in the opposite direction. This has the advantage that if the anode is held vertically the electrolyte cannot flow out of all of the ducts. In case one row of ducts tilts downwardly, the next adjacent row being at an angle of 45 degrees thereto will extend upwardly and retain the electrolyte. This enables the ducts 20, 21 to be somewhat larger inasmuch as the outflow of electrolyte by gravity is prevented.

These inclined ducts may be used with a hollow anode, such as shown in Fig. 1, but the provision of a hollow or container space is not essential when such ducts are employed. In the modification shown in Fig. 2, therefore, the anode consists of merely a flat plate or mass of anode metal.

In order that the electrolyte flowing out of a downwardly inclined row of ducts may not be lost, zig-zag grooves 22 may be formed in the outer surface of the anode, indicated in Figs. 3 and 4. It will be apparent that in this arrangement electrolyte flowing out of one set of inclined ducts 20, for example, will flow through the groove 22 into the next adjacent duct 21, for example.

When plating the inside of hollow bodies as, for instance, milk cans, it is of advantage to extend the distance from the handle to the anode. This may be accomplished as shown in Fig. 5, by providing sectional extensions 23, 24, one of which may screw into the handle element 18, or may replace the handle 18. By screwing the end of one extension into a socket provided in the end of an other, a handle of any desired length may be obtained.

Through my above invention, therefore, I provide an anode having an electrolyte retaining covering that is tightly and smoothly held to the anode metal and which eliminates imperfections due to wrinkling, crumpling, and avoids loosened fibers or particles on the surface being plated.

What I claim is:—

1. Electrolytic apparatus comprising a metallic anode and a sheet of porous rubber stretched over the exposed surface of said anode, said anode having capillary ducts opening into contact with said porous rubber sheet and extending obliquely in groups in different directions.

2. Electrolytic apparatus comprising a metallic anode and a sheet of porous rubber stretched over the exposed surface of said anode, said anode having capillary ducts opening into contact with said porous rubber sheet and extending obliquely in groups in different directions, said anode having grooves communicating with the ducts of said different groups.

MAX SCHLÖTTER.