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CATHODE FOR ELECTRODEPOSITION

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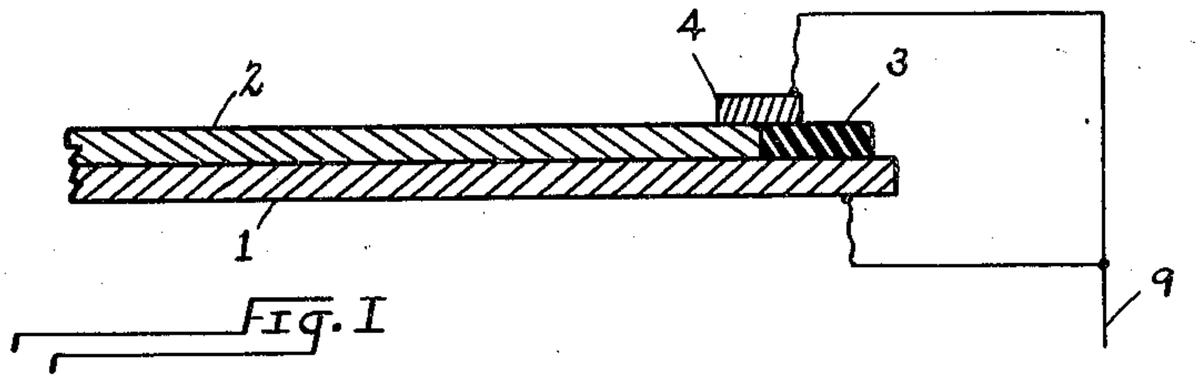

Fig. I

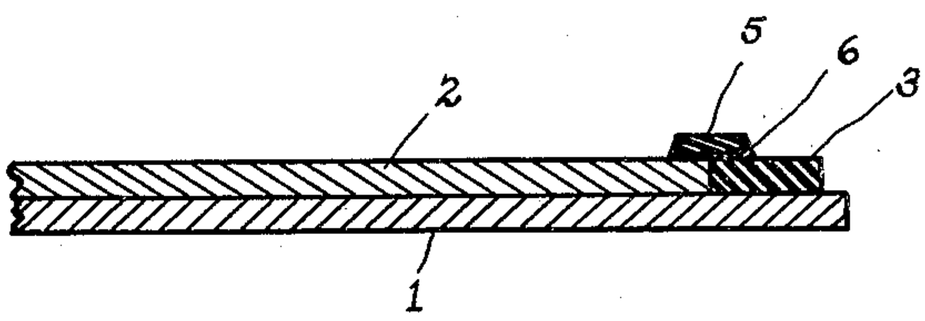

Fig. II

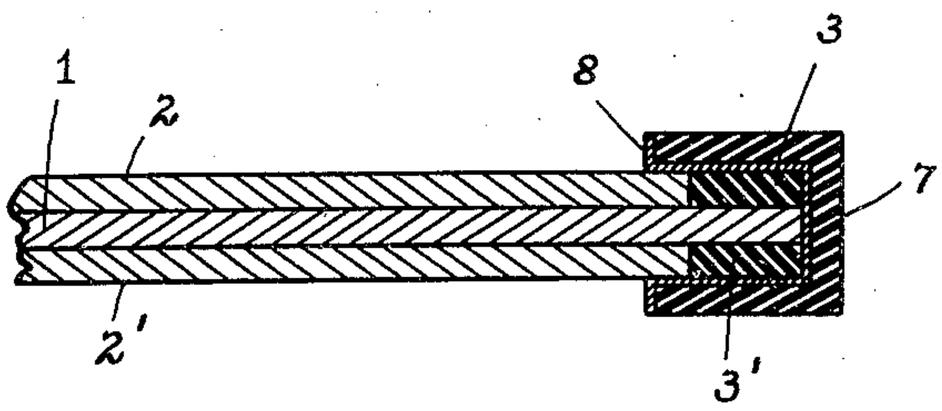

Fig. III

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CATHODE FOR ELECTRODEPOSITION

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3 Claims. (Cl. 204—6)

This invention relates to the electro-deposition of sheet metal, and consists in cathode structure. The object in view is such control of deposit at the edge of the stripping surface as to avoid damage to the deposited sheet when being stripped from the cathode.

In the accompanying drawing Fig. I is a fragmentary view in section of a cathode in which the invention is embodied; Fig. II is a similar view illustrating a modification in detail; and Fig. III is a similar view in which to the showing of Fig. I a structural feature is added that adapts the cathode to particular conditions of service.

Referring first to Fig. I, the essential part of a cathode of practical form is shown, consisting of or including a supporting body 1, that may be understood to be a sheet of metal (iron or copper), and a sheet 2 of suitable metal (chrome steel, for example), borne by and facing the body 1, whose exposed surface is the stripping surface. Ordinarily the current for carrying on the operation of electrolysis will be supplied through the supporting body 1; and in such case not only will the body 1 be of metal, but the sheet 2 will be electrically as well as mechanically united with it. The two bodies 1 and 2 may extend in planes, or they may (and ordinarily will) be of cylindrical shape, the sheet 2 surrounding the supporting sheet 1.

It manifestly is desirable that the electrolytic deposit be limited to the stripping surface of sheet 2, and the proposal to that end has been made to set a band of insulating material (of such material, for example, as that phenolic resin known as bakelite) along the edges of the stripping surface. This proposal has, however, been found inadequate. It has been found impossible under practical operating conditions to provide such a limiting band of insulation and not have a seam between the meeting surfaces of the band and of the sheet,—a seam into which the electrolyte will penetrate. Upon the metal wall of that seam there will be an electrolytic deposit of such mass and so intimately united with the wall of metal that, when afterward the finished electro-deposited sheet is being stripped from the cathode, this unintended and undesired deposit in the seam will interfere with the stripping operation and will tend to cause breakage of the deposited sheet along its edges.

In Fig. I of the drawing a limiting band 3 of insulating material is shown abutting the edge of sheet 2, and it is in the seam between the meeting surfaces of these two bodies that (lacking further preventive provision) the undesired and prejudicial deposit occurs.

The invention lies in the discovery that if to the assembly of sheet 2 and band 3 a second band 4 of conducting material be added—a band that shall overlie the seam specified, and that shall make contact with the face of sheet 2 at the margin thereof and that shall itself be included in the electrolytic current—the band 4 will steal away the current that otherwise would flow through the electrolyte and to the metal wall of the seam, and that there will be no appreciable deposit on that wall. The electrolyte will penetrate: that is practically inevitable. But the body of electrolyte that so penetrates will, in consequence of the presence of the band 4, be so far relieved of current flow that no appreciable or significant electrolytic action will there occur. It follows that a serious practical difficulty in cathode structure is corrected and overcome, and the stripping cathode for the forming of sheet metal electrolytically is rendered notably more effective and practicable.

In Fig. I I have indicated diagrammatically a conductor 9 for the electrolytic current, and have shown the band 4 to be included in circuit with the bodies 1 and 2.

Necessarily the band 4, becoming in the manner described in effect part of the cathode, will itself be coated with an electrolytic deposit, but in the stripping of the deposited sheet from the cathode there will be a line of weakness following the angle formed by and between the stripping surface of sheet 2 and the band 4, along which line the marginal deposit will break away, leaving the desired sheet entire.

There will, however, be waste, in that the deposit formed over the surfaces of band 4 will be undesired and futile. Accordingly, the band may advantageously be modified, and formed as shown in Fig. II. Here the band 5 is formed of insulating material, and faced only with a metallic facing 6. The facing 6 overlies the seam formed by and between sheet 2 and band 3. As in the first-described case, the facing 6 is included in the circuit of the electrolytic current. The effect is the same, in that the current does not in any substantial degree reach the metallic seam face, and there is no disturbing deposit laid down in the seam. At the same time, the amount of metal inevitably deposited upon the band is limited to the exposed metal surfaces, and they are (as compared with the structure of Fig. I) of relatively small extent.

Figs. I and II show the edge portion of such a

cathode as may be arranged to stand vertically in a cell, with one edge of the band 3 and one edge of band 4 rising above the surface of the electrolyte. In certain cases the cathode may be submerged, and then further protection must be provided for the otherwise exposed portions of body 1. Such further protection is indicated in Fig. III by a strip 7 of insulation having a facing 8 of metal that is extended around the edge of the body 1, and overlies both the seam between the sheet 2 and the band 3 (as already described) and similarly overlies the seam between a second sheet 2' and a second strip 3' similarly applied to the opposite face of body 1. (The cathode in this case is of plane-surfaced extent, not cylindrical.)

The angle at which the band 4 (6, 8) meets the stripping surface may be a right angle, as in Fig. I it is shown to be, or it may be an oblique angle, as in Fig. II; and, being oblique, it may, manifestly, be acute or obtuse and of such degree of obliquity as may be found preferable.

I claim as my invention:

1. A stripping cathode for an electrolytic cell including a body of conducting material provided with a stripping surface, a body of insulating material abutting upon the body of conducting material at the edge of such stripping surface, and a band of conducting material overlying the seam formed by and between the two bodies aforesaid and in contact with the stripping surface of the body of conducting material at the margin thereof and presenting a surface adjacent to and angularly disposed to the adjacent portion of said stripping surface, the said band adapted to be included with the body of conducting material in the circuit of the electrolytic current, whereby as operation progresses a continuous deposit weakened at the angle is formed upon said stripping surface and upon the adjacent angularly disposed surface of said band.

2. A stripping cathode for an electrolytic cell including a body of conducting material provided with a stripping surface, a body of insulating material abutting upon the body of conducting material at the edge of such stripping surface, and a metal-surfaced band of insulating material overlying the seam formed by and between the two bodies aforesaid and in contact with the stripping surface of the body of conducting material at the margin thereof and presenting a conducting surface adjacent to and angularly disposed to the adjacent portion of said stripping surface, the said band adapted to be included with the body of conducting material in the circuit of the electrolytic current, whereby as operation progresses a continuous deposit weakened at the angle is formed upon said stripping surface and upon the adjacent angularly disposed surface of said band.

3. A stripping cathode for an electrolytic cell including a body of conducting material provided with a stripping surface, a body of insulating material arranged adjacent the said body of conducting material, and means for preventing substantial electrolytic deposit within the seam, such means including a band of conducting material overlying both the body of conducting material first named and the body of insulating material, the said band being included with the said body of conducting material in the electrolytic circuit, the arrangement being such that access of electrolyte to the seam formed by and between the body of conducting material first named and the body of insulating material is through the seam formed by and between the body of conducting material and the overlying band of conducting material.

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