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PRODUCTION OF CATHODE FORMING SHEETS.

APPLICATION FILED DEC. 22, 1914.

1,163,337. Patented Dec. 7, 1915.

Fig. 1.

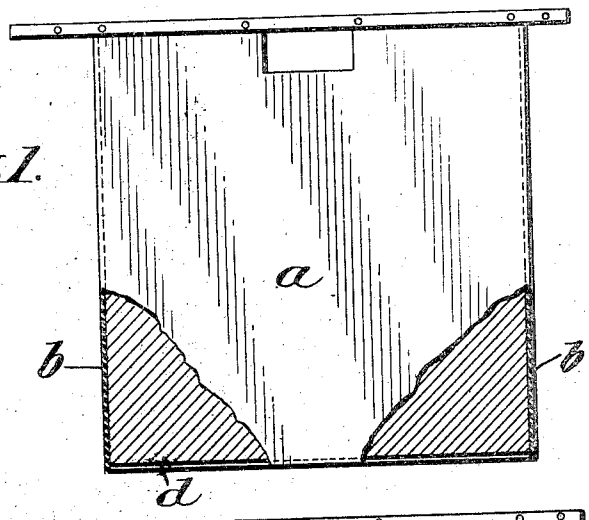


Fig. 2.

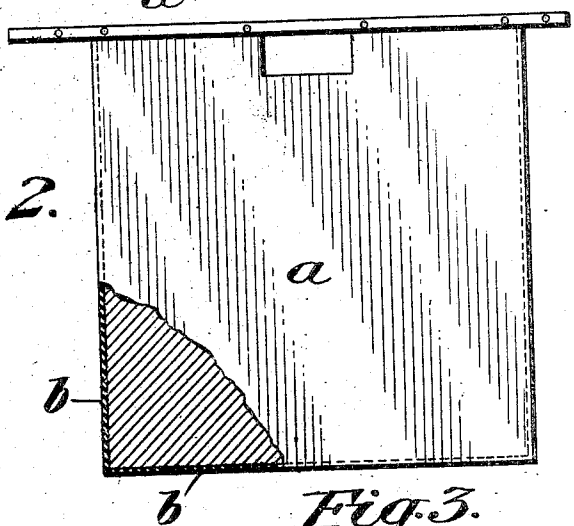
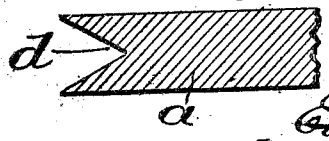


Fig. 3.



Fig. 4.



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UNITED STATES PATENT OFFICE.

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PRODUCTION OF CATHODE-FORMING SHEETS.

1,163,337. Specification of Letters Patent. Patented Dec. 7, 1915.

Application filed December 22, 1914. Serial No. 878,489.

To all whom it may concern:

Be it known that I, EDMOND A. GUGGENHEIM, a citizen of the United States, residing in the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in the Production of Cathode-Forming Sheets; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to the electrolytic production of cathode starting sheets and particularly to the cathode blank employed in the production of the starting sheets.

To prepare the cathode blank upon which the cathode starting sheet is to be deposited, it is customary in the art in most cases to give the blank an extremely thin coating of a suitable grease or the like, that is to say, a coating sufficiently thin to permit the passage of the depositing current, and yet of a character appropriate to subsequent stripping of the deposited starting sheet from the surface of the blank. Suitable greases for this purpose are well known, as well as their manner of application to the blank and need not be further referred to herein.

In order to assist in the stripping of the deposited cathode starting sheet from the blank, and particularly to permit the starting sheet to be detached in such manner as to preserve its uniformity of outline along its edges, it has been heretofore proposed to provide the cathode blank with a scratch-groove. In practice, this groove is made upon both surfaces of the blank, and at a short distance from the outer edges thereof. The groove is made of a sufficient depth to permit a skilled operator to detach the deposited starting sheet along the line of the groove. In so doing, there is left upon the blank, outside of the scratch-groove, a quantity of undetached deposited metal, which is subsequently stripped from the blank and which is thereafter remelted as scrap. It represents an extra expense of considerable amount in large operations, as, for instance, in the electric deposition of metallic copper from its solutions.

A number of factors contribute to the amount and extent of the loss referred to. For instance, the stripping of the scrap from the cathode blank, after the main body portion of the cathode starting sheet has been detached is an operation which itself involves the employment of skilled labor, and, in practice, is found to occupy about one-half of the time required for the complete stripping of the plate. Furthermore, it occasionally happens that, in spite of the presence of the scratch-groove, the skilled operator is unable to successfully detach the deposited starting sheet along the line of the groove, so that, at times, a starting sheet will be broken or ruptured along its edges or otherwise so as to become unutilizable for the purposes for which it is intended. These and other difficulties are cumulative in actual practice and represent an important total expense in the general operation. To this should be added the cost of remelting the scrap and the damaged sheets. This remelting usually takes place in the reverberatory furnaces employed for melting the metal from which the anodes to be refined are cast. It involves the loss of time incident to the collection and transfer of the scrap to the furnaces and the charging of the furnaces therewith and cuts down the capacity of the furnaces for their regular operation. It has also been heretofore proposed to provide the outer edges of the blank with a scratch groove similar to that employed in practice upon the surface of the blank. In actual operation, however, the scratch groove at this location has heretofore been found ineffective as a means for insuring the stripping of the deposited starting sheet from the blank. The reason for this I believe to be that because of the density of the current along the outer edges of the blank, in the usual installation, it has been impossible to avoid the bridging over of the metal along the outer edges of the blank to such a degree as to firmly unite the metal deposited upon one surface of the blank with the metal deposited on the reverse surface thereof; so that the scratch-groove as thus employed was unable to subserve its intended function.

The present invention entirely avoids the difficulties hereinbefore referred to. Its main characteristic feature is that it wholly eliminates the production of scrap. It permits the entire sheet of metal deposited upon both surfaces of the blank, to be stripped therefrom, without the aid of highly skilled workmen, and it obviates the labor, cost, and delays incident to the strip-

ping of the scrap and its subsequent reutilization. Furthermore, it lengthens the durability of the blanks themselves, by reason of the readiness with which they are stripped and the moderate vicissitudes of wear and possibility of injury during the stripping operation.

In the accompanying drawing, Figure 1 represents in side elevation and partial section a cathode blank embodying my invention; Fig. 2 represents a view similar to that of Fig. 1, of a modification of the cathode blank; Fig. 3 represents, on an enlarged scale, a cross-sectional view of a portion of one of the cathode blanks, this view being taken along the side edges of the blank of Fig. 1 or along the side or bottom edges of the cathode blank of Fig. 2; and Fig. 4 represents, on an enlarged scale, a cross-sectional view of a portion of the bottom edge of the cathode blank illustrated in Fig. 1.

In order to obtain the cathode starting sheets, I employ a series of cathode blanks *a* of suitable material, such as, for instance, rolled copper, of suitable dimensions, as, for instance, of a thickness of say $\frac{1}{8}$ of an inch and of appropriate height and width (say 3′x3′ or 3′x4′). It will, of course, be understood that I do not limit the size of the cathode blank to these particular dimensions, but may alter them to suit particular conditions of use.

The novel cathode blank of the present invention is provided at or in its peripheral edges with insulation of a suitable nature and thickness to substantially prevent deposition thereon and bridging thereover, during the electro-deposition upon the side surfaces of the cathode blank. This insulation is advantageously of an adhering nature, securely held in place at the edge periphery of the blank. In the cathode blank of Fig. 1, insulation is provided only at the side edges of the blank, while in the cathode blank of Fig. 2, it is provided at both side and bottom peripheral edges. In the embodiments of the invention illustrated, the edges are provided with a recess or depression, of such a configuration as to receive and retain a suitable insulating material *b*, of a kind which will adhere firmly to copper, as, for instance, asphaltum, asphaltum mastic, Chatterton compound, or the like. As illustrated in Fig. 3, the groove or recess is of an undercut configuration, such that the insulation is held securely in place.

In the cathode blank of Fig. 1, the bottom edge is provided with a V-shaped groove *d*, of relatively considerable depth as compared with the thickness of the blank. This groove is illustrated in detail in Fig. 4, as of a depth substantially equal to the thickness of the cathode blank, and I prefer to make it of at least this depth in order to realize its best advantages. In Fig. 2, the recess or depression along the bottom edge of the cathode blank is filled with a body of insulating material.

It will be seen that with recesses or depressions such as indicated in Fig. 3, which shows one of the many forms which can be used, the insulating material will be securely held in place in the edge periphery of the cathode blank.

As a result of the insulation at the edge of the cathode blank, instead of forming a strong cohering deposit over the edges of the cathode and thereby locking to the blank the metal deposited upon the opposite sides thereof so that detachment of the metal without rupturing is prevented or made difficult, such deposition and bridging over the edge of the cathode blank, is substantially prevented. As a result, the deposit upon each side of the cathode blank is found to be more readily detachable, even by unskilled labor. Any such stray deposit as may form at the edge of the blank is of such a character that it does not materially interfere with the clean and satisfactory stripping of the deposit from the flat surfaces of the blank in the form of unruptured cathode sheets.

It will be understood that I do not restrict myself to any particular insulating filling, nor even to a filling of a plastic material, inasmuch as a suitable wood, hard rubber, bakelite, vulcanite, or like insulating insert may be used to fill or close the recess or depression in the edge of the blank.

The provision of insulation at or in the side edges or both side and bottom edges of the cathode blanks introduces sufficient resistance locally in the current path to substantially prevent any deposit and consequent bridging across such peripheral edges of the cathode blanks, as has been already pointed out.

While I have illustrated and described the embodiment of my invention which I have found in practice to give particularly good results, it is believed to be broadly new to prevent any substantial bridging across the peripheral edges of the cathode blanks by the provision, at or in such edges, of an adhering body of insulating material securely held in place at the edge periphery, and of a suitable nature and thickness to substantially prevent deposition thereon and bridging thereover. It is also believed to be broadly new to provide such a cathode blank with insulation secured at or in its side peripheral edges, so arranged as to leave the side surfaces of the blank free and unobstructed, and of a suitable nature and thickness to prevent deposition thereon and bridging thereover. The appended claims are accordingly intended to have a correspondingly broad interpretation.

What I claim is:

1. A cathode blank for cathode-forming sheets, provided with insulation secured at or in its side peripheral edges, said insulation being of a suitable nature and thickness to substantially prevent deposition thereon and bridging thereover, and being arranged to leave the side surfaces of the blank free and unobstructed, whereby clean stripping of the deposit from the full side surfaces of the blank in the form of unruptured cathode sheets can be effected; substantially as described.

2. A cathode blank for cathode-forming sheets, provided with an adhering body of insulating material securely held in place at or in the edge periphery of the blank, said body of material being of a suitable nature and thickness to substantially prevent deposition thereon and bridging thereover, whereby clean stripping of the deposit from the side surfaces of the blank in the form of unruptured cathode sheets can be effected; substantially as described.

3. A cathode blank for cathode-forming sheets, provided in its peripheral edges with a groove or depression filled with insulating material; substantially as described.

4. A cathode blank for cathode-forming sheets, provided along its edge periphery with a groove, the groove at the side edges being undercut and having a filling of insulating material; substantially as described.

5. A cathode blank for cathode-forming sheets, provided along its side and bottom edge peripheries with an undercut groove having a filling of insulating material; substantially as described.

In testimony whereof I affix my signature, in presence of two witnesses.

EDMOND A. GUGGENHEIM.

Witnesses:

FREDERICK A. COLLINS,

THOMAS E. FELL.