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METHOD OF TREATING CATHODES FOR ELECTROWINNING MANGANESE

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2 Claims. (Cl. 204—105)

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This invention relates, generally, to the electrowinning of manganese and it has particular relation to the treatment of cathode plates to facilitate stripping the deposited manganese therefrom.

Prior to the present invention, it has been common practice to spend a great deal of time and effort in preparing cathodes on which manganese is to be electrolytically deposited. They are usually buffed carefully to provide a smooth, polished surface. The purpose of this has been to facilitate stripping and remove as large an amount as possible of the deposited manganese. It has been necessary to repeat the buffing operation after each stripping operation. In some instances, the manganese has been stripped by heating the cathodes and, afterwards, flexing or vibrating them.

Even though the foregoing operations are carefully performed, there has been a substantial loss of the deposited manganese, because of its adherence to the cathodes. It has been necessary to remove the adhered metal by the use of acid, and it has to be recovered again. Moreover, there has been some loss as a result of some of the manganese dropping off the cathodes while they are in the cell or being transferred therefrom for the stripping operation.

Accordingly, an important aim of this invention is to reduce the loss of manganese after it is electro-deposited on the cathodes. Another important aim of this invention is to facilitate the stripping of the manganese from the cathodes. Sill another aim of the invention is to increase the amount of manganese that can be readily stripped from the cathodes on which it has been deposited by electrolytic action. Another aim of this invention is to reduce the amount of buffing or polishing operations in the preparation of cathodes for the electro-deposition of manganese. A still further aim of the invention is to avoid the necessity for treating the cathodes with acid to remove substantial amounts of the adhered manganese. Another aim of the invention is to accomplish the foregoing desired results by providing on the cathodes a thin film of material of such nature that it does not interfere with the deposition of the manganese but does facilitate stripping of the manganese therefrom.

Other aims and objects will appear in the following description, to which reference is made for a more complete understanding of the nature and scope of the invention.

In accordance with this invention, there is provided on the properly prepared cathode plates

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a film which, while permitting the electro-deposition thereon of manganese and sufficient adherence thereto to avoid loss, greatly facilitates stripping of the deposited manganese. When the present invention is used it has been possible to strip off readily in excess of 98% of the deposited manganese.

The cathodes are first buffed and polished to provide a mirror-like surface. They are then washed with a suitable detergent such as sodium or potassium hydroxide, carbonate, phosphate, or soap to remove whatever grease and dirt that may remain. With the detergent there is preferably included in the solution a soluble alkali silicate, such as sodium or potassium silicate. The washed cathodes are then thoroughly rinsed with water to remove any excess silicate. It is contemplated that alkyl silicates may also be used.

If desired, the silicate can be applied separately, instead of with the cleaning solution, as set forth above. In either case, the cathodes should be rinsed sufficiently to remove excess silicate but not to such an extent that the thin film is completely removed or destroyed.

The electrolyte, from which the manganese is deposited, should be neutral or slightly alkaline so that the thin silicate film will remain on the cathodes. It has been found that, when the pH of the electrolyte is maintained at from 7.8 to 8.6, the film remains on the cathodes even after several successive deposits of manganese have been stripped therefrom. It has not been necessary to treat the cathodes with an acid after each stripping operation to remove substantial amounts of manganese, or to buff and polish them each time. Rather, the cathodes can be used several times without further polishing after each stripping operation, but must be treated with the silicate solution after each use.

Excellent results have been obtained using stainless steel cathodes. In particular, it has been found that cathodes of stainless steel alloy of type 316, containing approximately 18% chromium, 8% nickel and 2% molybdenum, when treated as herein set forth, admit of 98% or better stripping of the deposited manganese. Other stainless steel alloys, such as 18% chromium, 8% nickel, can also be used with satisfactory results. It is also contemplated that the cathodes may be made of other kinds of steel or aluminum for practicing the invention.

By way of a specific example, cathodes of stainless steel alloy of the type 316, were used. They were first buffed and polished to provide a mirror-

like surface over each side. Then they were washed with a detergent to remove any residual dirt and grease. Next, the cathodes were immersed in a 2% to 5% solution of sodium silicate. This was followed by rinsing with a water spray for from five to ten minutes and then they were dried. There was then left a very thin film of undetermined composition on the cathodes which greatly facilitated subsequent stripping.

The cathodes were then placed in a cell in which the electrolyte contained 10 to 15 grams, per liter, of manganese in the form of sulphate and approximately 125 to 175 grams per liter of ammonium sulphate. During the electro-deposition of the manganese on the cathodes the pH of the electrolyte was held at 7.8 to 8.6.

The cathodes were removed from the cell and the manganese was readily stripped therefrom. The stripping of the deposited manganese resulted in a recovery of 98% of the metal.

By way of comparison, when the foregoing steps were carried out using cathodes of 18–8 stainless steel, 85% of the deposited manganese was stripped off. It is evident that superior results are obtained when the cathodes are of 18–8 molybdenum steel.

In order to demonstrate the effect of the silicate film, the foregoing steps were followed, except that no silicate was used. When the cathodes were of 18–8 molybdenum steel, there was stripped only 39% of the deposited manganese. Under similar conditions, when 18–8 stainless steel cathodes were employed only 15% of the deposited managanese was stripped off.

When it is desired to again deposit manganese on the cathodes on which a silicate film has been formed, as set forth herein, it is unnecessary to repeat the polishing operation immediately. It has been found that the cathodes may be used for the deposition of manganese for as many as five times without repeating the buffing or polishing operation. However, it is preferable to provide the silicate film on the cathodes after each deposition of manganese thereon and the same is stripped therefrom. After each stripping operation the cathodes may be treated with sulphuric acid to remove the small remainder of manganese. The silicate film is then restored each time in the manner herein set forth. The excess silicate is removed by the rinsing step. One reason for this is to prevent premature stripping of the deposited manganese either in the cell or before the cathodes are removed to the place where the stripping operation is performed.

As hereinbefore indicated, the silicate can be combined with the detergent solution so that it

will be unnecessary to employ separate steps in washing the cathodes and forming the silicate film thereon. While the cathodes should be subsequently rinsed to remove the excess silicate, the rinsing operation should not be carried out for such length of time or under such conditions as will completely remove the silicate film.

It will be understood that the foregoing description is merely illustrative of the invention and is not to be construed as limiting it, except as set forth in the appended claims.

What is claimed is:

1. In the method of electrowinning manganese from an alkaline electrolyte and employing stainless steel cathode plates; the step which consists in polishing and cleansing the surfaces of the cathodes; then coating the cleansed surfaces with very thin adherent films of a dilute solution of alkali silicate; removing any excess silicate which does not readily adhere to the surfaces; submerging the film-coated cathodes in the electrolyte; and depositing the metal thereon without destroying the films to facilitate removal of the metal and eliminate the necessity of buffing and polishing the cathodes when they are used again.

2. The method, as set forth in claim 1, wherein the films on the cathodes are formed by coating them with a dilute sodium silicate solution and wherein the coated cathodes are rinsed in water to reduce the thickness of the coatings and leave the very thin adherent films on the surfaces.

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