Oct. 9, 1956

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2,766,198

ANODES FOR ELECTROWINNING OF MANGANESE

Filed March 5, 1953

Fig. 1.

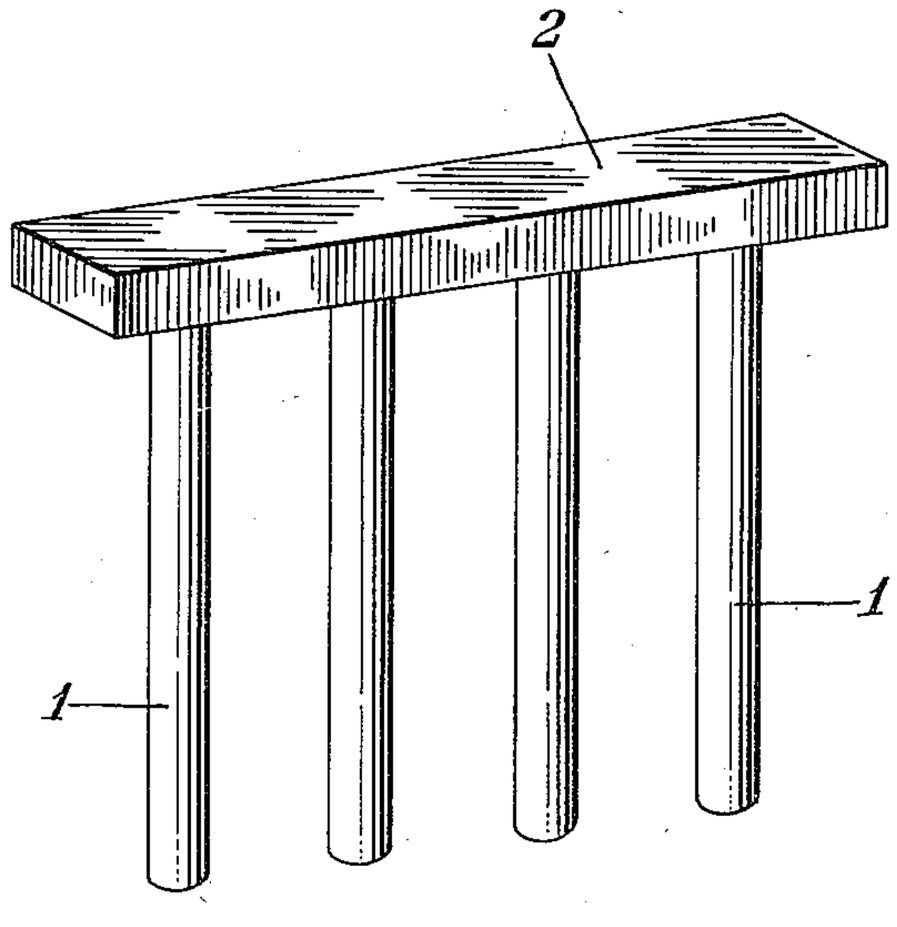
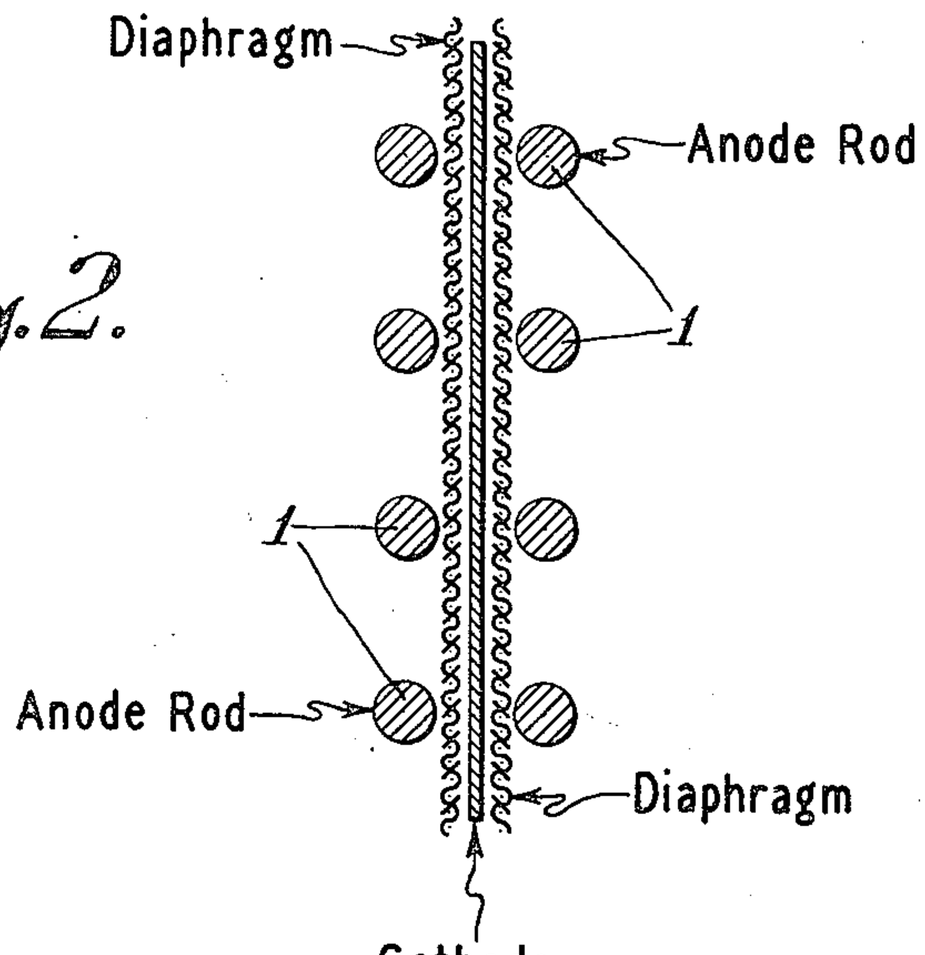


Fig. 2.



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2,766,198

Patented Oct. 9, 1956

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ANODES FOR ELECTROWINNING OF MANGANESE

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Application March 5, 1953, Serial No. 340,556

1 Claim. (Cl. 204—105)

The present invention relates to the electrowinning of manganese from aqueous manganese-bearing solutions and, more particularly, to the construction of anodes for use in such electrowinning process.

Heretofore, it has been discovered that it is beneficial, in the electrowinning of manganese from aqueous solutions, to employ anodes formed of 99% lead-1% silver alloy. Originally, when this alloy was employed in sheet form as an anode, it was found that corrosion by the anolyte posed a serious problem. In an effort to solve this corrosion problem, portions of these anode sheets were removed by punching many circular or rectangular holes in the sheets. This resulted in an anode sheet having a lattice-like structure and, although these structures reduced the corrosion rate, they were found to encourage a non-uniform corrosion due to the concentration of current flow around the removed portions of the anode sheet.

It is, therefore, the main object of the present invention to provide anodes suitable for the electrowinning of manganese which corrode uniformly, but which, at the same time, have a relatively high corrosion resistance.

Other aims and objects of the present invention will be apparent from the following description and the appended claim.

In the drawing:

Figure 1 is a perspective view of an anode in accordance with the present invention;

Figure 2 is a horizontal cross-sectional view of the two anodes in accordance with the present invention positioned on opposite sides of a cathode and separated therefrom by diaphragms, as would be the arrangement in a cell for the electrowinning of manganese from aqueous solutions.

In accordance with the present invention, anodes are provided (of approximately 99% lead-1% silver alloy) in the form of a plurality of cylindrical rods 1 positioned substantially equidistant from each other and having their longitudinal axes parallel and in the same plane. Joining the tops of the plurality of rod-shaped elements 1 is an electrically conductive crosspiece 2 which serves to connect all rods electrically and to hold them firmly in place, as is shown in Fig. 1 of the drawing.

It has been discovered that when employing anodes in accordance with the present invention the anode current density can be increased by a factor of about five times that obtainable with an anode in sheet form. It has also been found that, by using an anode comprised of a plurality of rod-shaped elements, all irregular contours that might serve as focal points for corrosion are eliminated and the corrosion-rate is reduced to a remarkable degree.

The following table gives relative data showing the end anode current density and corrosion rate for three types of anode construction. In each case the cathode current density was maintained constant at 45 amperes per square foot.

Table

Anode Configuration	End Anode Current, Density amps./ft.^{2}	Oz. wt. loss/ anode/week
sheet	25	129.0
lattice-like sheet	90	3.7
plurality of rods	135	0.86

From this table it can readily be seen that by employing the anode of the present invention a higher anode current density and correspondingly lower corrosion rate is obtainable.

Anodes in accordance with the present invention have shown a much longer useful life by reason of their lower corrosion rate and uniformity of corrosion.

What is claimed is:

In a process for the electrowinning of manganese from an aqueous solution containing a manganese salt, the steps comprising providing in a cell a plurality of alternate anolyte solutions and catholyte solutions separated by solution-permeable diaphragms; employing cathode sheets in each of the catholyte compartments; employing in each anolyte compartment an anode comprising a plurality of substantially cylindrical rods having their longitudinal axes parallel and coplanar, said anode rods being composed of approximately 99% lead-1% silver alloy; and applying a voltage between each of said cathodes and said anodes to deposit metallic manganese at said cathodes at high current densities and reduced anode corrosion.

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