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ELECTRODE FOR ELECTROLYTIC RECOVERY OF METALS FROM SOLUTIONS.

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1,373,273. Patented Mar. 29, 1921.

Fig. 2.

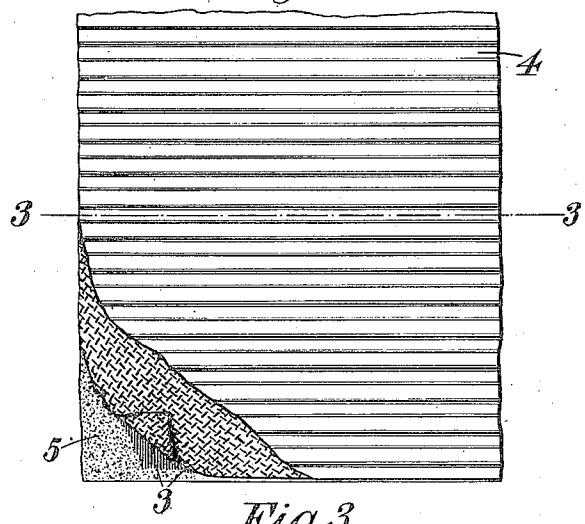
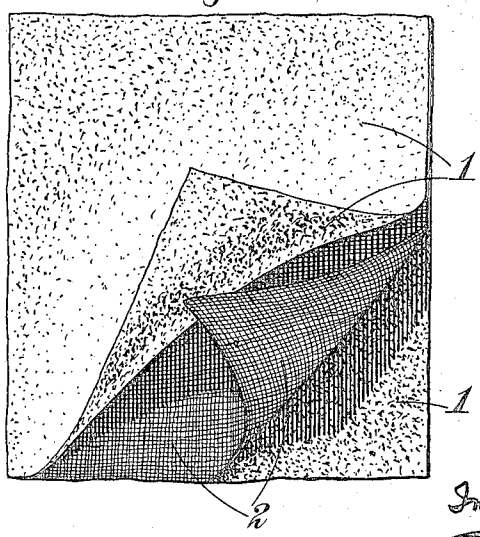


Fig. 3.



Fig. 1.



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UNITED STATES PATENT OFFICE.

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ELECTRODE FOR ELECTROLYTIC RECOVERY OF METALS FROM SOLUTIONS.

1,373,273. Specification of Letters Patent. Patented Mar. 29, 1921.

Application filed November 4, 1919. Serial No. 335,596.

To all whom it may concern:

Be it known that I, URLYN CLIFTON TAINTON, a subject of the King of England, residing at Martinez, Contra Costa county, State of California, United States of America, have invented certain new and useful Improvements in Electrodes for Electrolytic Recovery of Metals from Solutions, of which the following is a specification.

The present invention relates to apparatus for electrolytically precipitating gold and other metals from their solutions, more particularly solutions derived from the cyanid process; said apparatus being of the kind in which the pregnant solution is caused to pass through a permeable cathode, the interstices of which are very small. Apparatus of this kind is referred to in the specifications of British Patents No. 19669 of 1913, and No. 11336 of 1915, which describe a cathode formed of filter cloth or paper supporting a deposited cake of powdered graphite. The object of the present invention is to provide a novel form of permeable electrode which is more convenient and reliable for use as a cathode than those hitherto used.

According to this invention, the cathode consists of a sheet of paper or felted fiber in which comminuted conducting material is incorporated. As a conducting material graphite has been found suitable; and it is preferred to use graphite prepared in the electric furnace. The graphite is preferably incorporated by mixing it with the pulp from which the paper is made. The proportion of graphite to fiber is as high as possible consistent with reasonable mechanical strength of the completed sheet; and in practice it has been possible to make a satisfactory sheet containing 85% by weight of graphite powder to 15% by weight of fiber.

As regards the fibrous material from which the paper is made, generally speaking any vegetable fiber capable of felting to produce a coherent sheet, may be employed; but it is for practical reasons desirable to select a material of which the individual fibers are susceptible of being readily coated by the graphite. The extent to which the fiber possesses this characteristic can readily be ascertained by microscopic examination of a torn section of the completed sheet.

In practically carrying out the invention where no paper-making plants exist, I have made such sheets by re-pulping previously made paper, and the most satisfactory results have been attained by the use of a common grade of filter paper such as is used in cyanid clean-up presses. This paper is cut up into strips, boiled with plain water, and disintegrated in a vessel fitted with revolving arms. Graphite powder is then added and mingled with the paper pulp by further operation of the arms. The thin pulp thus produced is poured on to a sieve frame and suction is applied to the underside of the sieve to accelerate the draining off of the water. A sheet of paper results which, after being dried, is ready for use, and in substance and strength it somewhat resembles thick blotting paper. A depolarizer, such as powdered ferric oxid, may advantageously be incorporated by adding it to the pulp.

It is generally desirable mechanically to strengthen the sheet by a suitable reinforcement and for this purpose I first form one thickness of paper in the frame, and then place on this a sheet of coarse muslin and then pour on a further layer of pulp, which is drained as before, producing a sheet of paper with the muslin sheet in the center of its thickness.

My invention is illustrated in the accompanying drawings, in which:

Figure 1 is a plan view of a portion of one of the electrodes with the superposed layers folded up.

Fig. 2 is a similar view of another form of electrode; and

Fig. 3 shows a section along the line 3—3 of Fig. 2.

In Fig. 1, 1 represents two external layers of paper containing comminuted graphite, with a sheet of muslin 2 interposed between them.

A cathode sheet prepared as described can advantageously be utilized in the filter press type of electrolytic cell described in the specification of my British Patent No. 11336 of 1915. In that specification there is described a corrugated cathode leaf the face of which is covered by a filter cloth over which is placed a sheet of wire gauze, the cathode being completed by depositing a cake of comminuted graphite on the wire gauze. The present sheet provides a ready prepared permeable cathode, and its substitution in the apparatus in question is illustrated in Figs. 2 and 3. A sheet of wire cloth 3 is first laid on the corrugated sur-

face of the leaf, 4 and the paper sheet 5 is laid over said wire cloth. The latter not only mechanically supports the paper sheet but also forms an electrical connection for the whole area of the same.

In working the process, the current density is kept sufficiently high to cause the gold to be deposited in a porous condition; and this porous deposit of gold itself becomes the actual cathode. When the deposit has accumulated to an extent which materially reduces the flow of liquid, the sheet is removed and the gold recovered in any suitable manner. For example the sheet may be ignited and the gold recovered by fusion; or the gold may be dissolved by aqua regia after which the sheet material is repulped for making fresh sheets.

A somewhat modified form of electrode is made by sewing wire cloth to a filter cloth and making the paper on the wire cloth so as to incorporate the latter. Such an electrode can be applied directly to the corrugated filter leaf, the electrical conductor being connected to the wire cloth.

What I claim as my invention and desire to secure by Letters Patent is:—

1. The herein described permeable electrode for the electrolytic precipitation of metals from their solutions which comprises a paper sheet in which is incorporated a comminuted conducting material.

2. The herein described permeable electrode for the electrolytic precipitation of metals from their solutions which comprises a paper sheet in which is incorporated comminuted graphite.

3. The herein described permeable electrode for the electrolytic precipitation of metals from their solutions which comprises a paper sheet in which is incorporated a comminuted conducting material and a depolarizer.

4. The herein described permeable electrode for the electrolytic precipitation of metals from their solutions which comprises a felted fiber sheet in which is incorporated a comminuted conducting material and a woven re-inforcement united to the sheet.

5. The herein described permeable electrode for the electrolytic precipitation of metals from their solutions which comprises a felted fiber sheet in which is incorporated a comminuted conducting material and a metallic woven re-inforcement united to the sheet.

6. The herein described permeable electrode for the electrolytic precipitation of metals from their solutions which comprises a paper sheet in which is incorporated comminuted graphite and a woven re-inforcement united to the sheet.

7. The herein described permeable electrode for the electrolytic precipitation of metals from their solutions which comprises a paper sheet in which is incorporated comminuted graphite and a metallic woven re-inforcement united to the sheet.

8. The herein described permeable electrode for the electrolytic precipitation of metals from their solutions which comprises a paper sheet in which is incorporated a comminuted conducting material, a metallic woven re-inforcement throughout the substance of the sheet and a textile united to the sheet.

9. The herein described permeable electrode for the electrolytic precipitation of metals from their solutions which comprises two or more paper sheets in which is incorporated a comminuted conducting material and a textile layer between the sheets.

10. The herein described permeable cathode for the electrolytic precipitation of metals from their solutions which comprises a cathode leaf, a woven metallic element thereon and a paper sheet in which is incorporated comminuted graphite upon said metallic element.

11. The herein described process for making a permeable electrode for the electrolytic precipitation of metals from their solutions, which comprises incorporating comminuted graphite in paper pulp, and preparing a paper sheet therefrom.

In testimony whereof I affix my signature.

URLYN CLIFTON TAINTON.