(No Model.)

H. R. CASSEL.

APPARATUS FOR SEPARATING METALS BY ELECTROLYSIS.

No. 264,927. Patented Sept. 26, 1882.

Fig. 1.

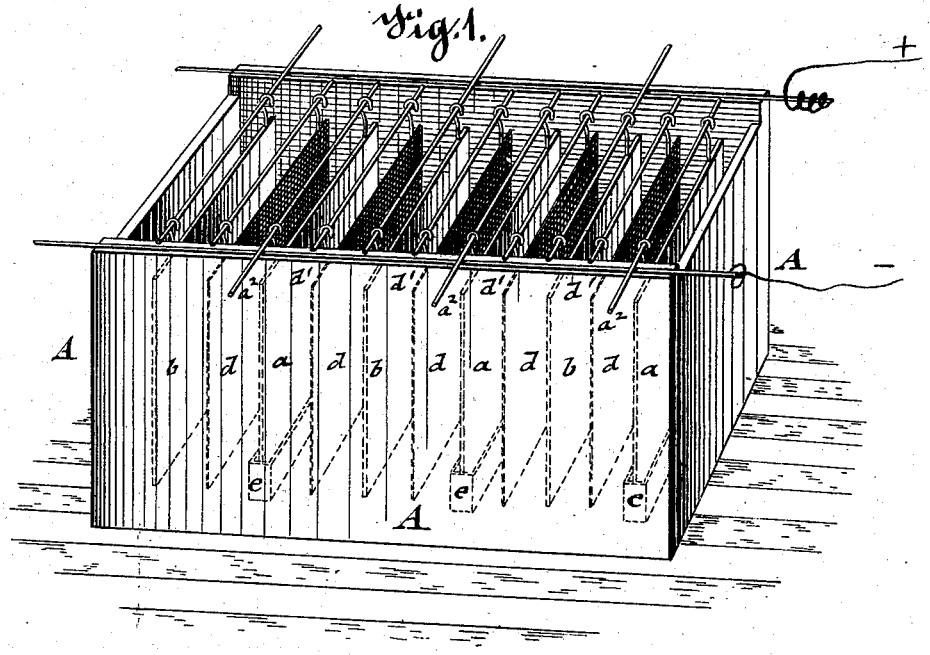


Fig. 2.

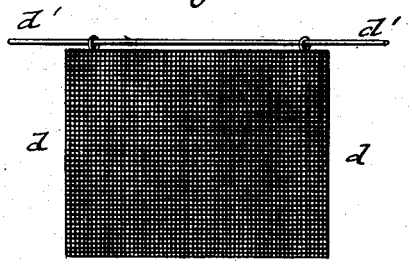


Fig. 3.

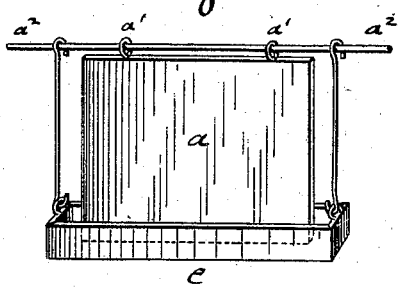
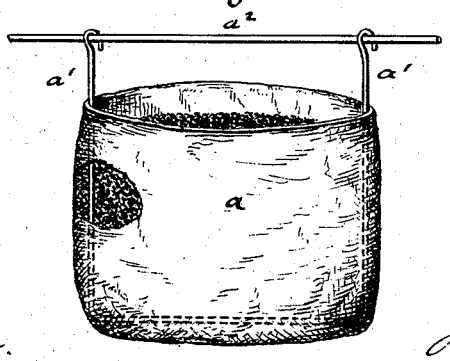


Fig. 4.



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APPARATUS FOR SEPARATING METALS BY ELECTROLYSIS.

SPECIFICATION forming part of Letters Patent No. 264,927, dated September 26, 1882.

Application filed April 15, 1882. (No model.)

To all whom it may concern:

Be it known that I, HENRY R. CASSEL, of the city, county, and State of New York, have invented certain new and useful Improvements in Apparatus for Separating Metals by Electrolysis, of which the following is a specification.

This invention relates to the separation of metals by electrolysis, and more especially to the refining of base bullion by separating therefrom the copper, silver, and gold contained therein.

The object of the invention is to provide an apparatus which is economical, easily adjusted, and which will secure a rapid and effective decomposition of the metals.

The invention consists in the combination of a vat, a series of anodes composed principally of silver and copper, a series of cathodes of copper, copper diaphragms interposed between the anodes and cathodes, and suitable supporting-frames and conducting-wires, the anodes and cathodes alternating with each other, with the diaphragms distributed between them, whereby the anodes and cathodes are brought in close proximity to each other, a large active surface obtained, and the dissolved silver precipitated in a fine metallic state.

In the accompanying drawings, Figure 1 represents a perspective view of an apparatus by which my improved process of separating metal by electrolysis is carried on; and Figs. 2, 3, and 4 are detail views, respectively, of the separating wire-netting of the anode, with its collecting-receptacle, and of a bag with granulated base bullion, which may be used as an equivalent for the anode.

Similar letters of reference indicate corresponding parts.

In carrying out my invention one or more ordinary lead-lined vats of a suitable size are filled with a slightly-acidulated solution of sulphate of copper. The conducting copper wires for the electric current are arranged in the ordinary manner alongside of the vat and connected with a dynamo-electric machine or other source of electricity. The base alloys or base metals which are to be separated are first cast into plates *a* of the desired dimensions; or they may be granulated and placed into a strong bag or box of a suitable fabric or perforated material, as shown in Fig. 4. The anodes *a* are suspended by means of hooks or eyes a' from copper rods a^2, which extend transversely across the vat in such a manner that one end of the copper rod is connected with one of the conducting-wires, while the opposite ends of the copper rods rest upon a wooden strip provided for this purpose. In case the base bullion is exposed in a granulated form in bags or boxes to the action of the current, the bags or boxes have to be suspended in the same manner, in which case one or more copper rods or strips of metal have to be placed into the granulated bullion and connected to the transverse suspension-rods in order to insure a perfect connection. The plates or bags of base bullion form the anodes, while the cathodes are made of copper plates *b*, of corresponding size. The cathodes are connected with the negative pole, while the anodes are connected in the usual manner with the positive pole of the source of electricity. Intermediately between each anode and cathode are interposed one or more diaphragms, *d*, of fine copper netting, which are suspended in the solution from transverse rods d' without being connected to either pole. In place of the copper netting, a bag or box filled with small pieces of copper or other metal may be used, or simply a series of vertically-suspended wires, or any other equivalent means, though I prefer the copper netting, as the same occupies but little space and is easily handled. By the action of the electric current the silver and copper contained in the anodes are dissolved, the copper being deposited upon the surface of the cathodes, while the silver is prevented from being deposited thereon by the interposed diaphragms *d*, and is precipitated in a fine metallic state on the bottom of the vat. If the diaphragms *d* were not used, a large portion of the silver dissolved would be deposited upon the cathodes, whereby the process would be rendered of no value for refining purposes; but by the interposition of the separating-diaphragms the precipitation of the silver in a fine metallic state is secured.

If the anodes contain some gold, lead, and other materials, it is necessary to make provision for separating the gold from the other

metals, as it would otherwise drop to the bottom and mix with the silver precipitated thereon. To prevent this I use narrow boxes *e*, made of thin wood saturated with paraffine, or of metal, gutta-percha, or rubber, or in place of the boxes bags which may be varnished or coated with paraffine. These boxes or bags are suspended below the lower part of the anodes in any suitable manner, and made preferably about two inches in height and wide enough for the bottom of the anodes to be placed therein, with sufficient space left all around the same so as to intercept the gold and prevent it from dropping to the bottom of the vat. If desired, the boxes or bags may be made large enough to cover the anodes partly or entirely.

By means of this process and apparatus base metals may be separated by electrolysis without the employment of complicated vats and machinery, and the separation be accomplished in a very simple and effective manner with the usual appliances now in general use by electrotypers.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

The combination of a vat, a series of anodes of base metal, consisting principally of silver and copper, a series of cathodes of copper, the anodes and cathodes alternating with each other, copper diaphragms interposed between the anodes and cathodes, means for suspending the anodes, cathodes, and diaphragms, and suitable electric conductors, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

HENRY R. CASSEL.

Witnesses:

PAUL GOEPEL,

SIDNEY MANN.