

# UNITED STATES PATENT OFFICE.

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METHOD OF PREPARING CATHODES FOR ELECTRODEPOSITION OF METALS.

SPECIFICATION forming part of Letters Patent No. 630,796, dated August 8, 1899.

Application filed May 3, 1898. Serial No. 679,609. (No specimens.)

*To all whom it may concern:*

Be it known that I, HERMANN BECKER, engineer and chemist, a citizen of the Swiss Confederation, residing at Paris, in the Republic  
5 of France, have invented certain new and useful Improvements in Methods of Preparing Cathodes for the Electrodeposition of Metals, of which the following is a specification.

The invention hereinafter described relates  
10 to the preparation and use of cathodes enabling the layer of metal deposited under the action of the electrolytic current to be easily detached therefrom. These cathodes are capable of being used both for refining metals  
15 and for precipitating metals from solutions which have served for the lixiviation of ores and also for the manufacture by electrodeposition of articles of various forms. These cathodes are of metal covered with a polished  
20 layer of sulfid of the same metal formed by the combination of the metal of the cathode with sulfur. The cathodes may be of any suitable metal coated by one of the ordinary processes with a layer of another metal capable of forming by combination with sulfur  
25 a sulfid insoluble in the electrolytic bath. The sulfuration of the metal of the cathode may be produced in any suitable manner either by rubbing it with powdered sulfur or by exposing it to the vapor of sulfureted hydrogen.  
30 Whatever method of sulfuration is employed the layer of sulfid obtained must be polished. The more it is polished the more the metal electrolytically deposited thereon will be capable of being freely detached. In order to  
35 render the surface of the sulfureted cathodes polished and brilliant, the metal may be first polished and then slightly sulfureted by rubbing it with powdered sulfur, or it may be  
40 first sulfureted strongly in any suitable manner and then the sulfid coating polished. The first method of operation is principally employed for galvanoplastics, the second only for the larger electrometallurgy—that is to  
45 say, for refining metals and treating ores. The polish of the layer of metal deposited by electrolysis is precisely the same as that of the cathode on which this deposit has been formed. These cathodes, when they are in-  
50 tended for the preparation of polished articles, are preferably of polished silver or silvered metal. In this case the sulfuration of

the cathodes is produced mechanically by rubbing them with flour of sulfur or precipitated sulfur. This method of producing the  
55 sulfuration preserves the polish of the silver and gives a layer of sulfid excessively thin and even. Silver sulfureted in this way has a slight golden tinge. A skin or coating of sulfur so thin as to be imperceptible to the  
60 eye and not to modify the color of the silver suffices, however, for preventing the adherence of metals deposited. I have selected silver as the metal of which to make these  
65 cathodes as being the metal which is capable of taking the finest polish, the least oxidizable, and the best conductor of electricity. It also furnishes a sulfid of high conductivity and which does not oxidize in the air. Silver  
70 is also the most electropositive metal which can be made use of and the easiest to coat regularly with sulfid while preserving its polish. By means of these cathodes objects  
75 having the polish of silver may thus be obtained in metals difficult to polish, and the said objects may be of pure metal or of alloys or be formed by the superdeposition of several layers of different metals.

In large electrometallurgy where it is not  
80 sought to obtain the polish of the metal deposited, but simply to recover the latter and to reutilize the cathodes, these latter are formed of ordinary metals instead of silver or silvered metal; but it is essential to obtain as polished a layer of sulfid as possible,  
85 so as to be able to freely detach therefrom the metal deposited. The sulfuration may be produced in various ways, but the mechanical operation with flour of sulfur or precipitated sulfur gives the best results and  
90 is the most convenient to use, because there is no release of sulfureted hydrogen. In the electrolytic treatment of cyanid auriferous and argentiferous solutions arising from the  
95 lixiviation of gold and silver ore these cathodes are preferably formed of sheets of iron, copper, lead, nickel, or the like or sheets of iron tinned, coppered, nickeled, or the like, the said sheets being sulfureted and polished, as has been hereinbefore described. 100

It may happen in the electrolytic treatment of solutions having served for the lixiviation of gold and silver ores that the layer of precious metal is too thin to be pulled off



and must be removed by vigorous brushing. This drawback only arises in the treatment of gold ore and not in that of silver ore, where the quantity of metal is always sufficiently  
5 great to yield deposits thick enough to be stripped off. In the case of gold ore in order to collect the ore deposited on the cathodes a layer of another metal—such as copper, for instance—may be deposited electrolytically  
10 ally on this gold in order to have a sufficiently thick metal layer to be stripped off. It is needless to state that a layer of an ordinary metal may also be deposited first on the cathodes before proceeding to the electrodeposition of  
15 the gold. In this case the layer of precious metal will be above the layer of ordinary metal instead of being below it. A salt of quicksilver, copper, or silver may also be added to the auriferous solution before its  
20 passage into the electrolyzing apparatus, so that the gold is deposited in the form of an

amalgam or alloy and forms consequently a thicker layer.

I declare that what I claim is—

The herein-described method of obtaining, 25  
by electrolytic deposition, metallic articles having polished surfaces, and easily detachable from the cathode, which consists in preparing a cathode, of any desired shape, composed of silver or silvered metal, with a highly- 30  
polished surface, then rubbing such surface with powdered sulfur, producing a polished surface of sulfid of silver, and then depositing the desired metal upon the cathode by electrolysis.

In witness whereof I have hereunto signed my name, this 21st day of April, 1898, in the presence of two subscribing witnesses. 35

HERMANN BECKER.

Witnesses:

JACQUES CONDOMY,  
AUGUSTE FOURNOL.