

# UNITED STATES PATENT OFFICE.

TURNER D. BOTTOME, OF HOOSICK, NEW YORK, ASSIGNOR TO JOHN B. TIBBITS, OF SAME PLACE.

## PROCESS OF DESILVERIZING LEAD BY ELECTROLYSIS.

SPECIFICATION forming part of Letters Patent No. 442,661, dated December 16, 1890.

Application filed January 2, 1890. Serial No. 335,732. (No specimens.)

*To all whom it may concern:*

Be it known that I, TURNER D. BOTTOME, a citizen of the United States and a resident of Hoosick, in the county of Rensselaer and State of New York, have invented certain new and useful Improvements in the Process of Desilverizing Lead by Electrolysis, of which the following is a specification.

This invention relates to an improved process for refining pig-lead containing silver as an impurity, and also to the simultaneous production of white lead by the use of electricity.

Heretofore lead has been desilverized principally by the cupellation process; but it is now generally admitted that the cupellation process cannot be economically carried on in the case of lead which contains less than eight ounces of silver to the ton. For refining lead containing only a small quantity of silver, the usual process is to melt the lead and then allow it to cool until crystals of lead form. These crystals are then removed and the molten liquid that remains now contains the greater part of the silver. It is then cupelled in the ordinary way to obtain the silver, in the free state. It is obvious that methods similar to the above can only extract a certain proportion of the silver, and that they are attended with considerable expense in order to get out the last traces of the silver.

The object of my invention is to completely desilverize lead and to obtain the silver pure in the solid metallic form, ready for the market, in one operation, and to simultaneously produce basic lead carbonate from the remaining lead.

My objects are obtained in the following manner: It being known that lead carbonate is insoluble in a dilute solution of ammonium carbonate, while silver, on the other hand, is soluble in the same. Hence an electrolyte that will dissolve both lead and silver by the use of an electric current, and one that is synergistic to a chemical such as ammonium carbonate will accomplish the purpose.

In order to carry my invention into practical effect, it is necessary that the chemical

solution or electrolyte shall be composed of chemicals that will not decompose one another under the influence of the electric current. I have found that a solution composed of one quarter of a pound of ammonium nitrate and the same quantity of ammonium carbonate dissolved in one gallon of water will best answer my purpose, although acetate of ammonium and the carbonate of ammonium in similar proportions will answer as well. There are other solutions that may be used for accomplishing the same result; but they all depend on a chemical that will precipitate lead and yet dissolve silver in the presence of carbon dioxide. Ammonium compounds do this in the highest degree, although the soluble thio-sulphates have the same action. Taking, for example, a solution composed, as above described, of carbonate and nitrate of ammonia and immersing therein pigs of lead connected, as anodes, to the terminals of an electrical generator and having suitable cathodes, also electrically connected and immersed in the solution, upon the passage of an electric current the leaden anodes are dissolved, the lead and silver both going into the solution, but the lead is immediately precipitated by the presence of free carbon dioxide, which is continually injected into the bath during the working of the process. The silver instead of being precipitated is deposited in the metallic state upon the cathodes.

I do not limit myself to the exact proportions of the ingredients used to prepare the electrolyte, nor do I limit myself to any particular chemical compounds in the preparation of the same.

What I claim as my invention is as follows:

1. The process of refining lead, consisting in subjecting argentiferous lead to electrolysis while immersed in an electrolyte composed of ammonium salts kept saturated with carbon dioxide, substantially as and for the purpose described.

2. The process of refining lead containing silver, consisting in electrolytically dissolving the said lead in an electrolytic solution composed of ammonium or synergistic compounds dissolved in water and kept saturated

with carbon dioxide, whereby lead carbonate precipitates and silver deposits upon cathodes, substantially as described.

3. The process of desilverizing lead and  
5 forming white lead simultaneously, consisting in electrolytically dissolving anodes of the said lead in a chemical solution composed of solvents of silver and precipitants of lead compounds while saturated with carbon di-  
10 oxide, substantially as described.

4. The process of desilverizing lead, consisting in subjecting anodes of the said lead to the electrolyzing action of an electric cur-

rent while they are immersed in a solution having a chemical affinity for both silver and 15 lead, but which precipitates lead when saturated with carbon dioxide, substantially as described.

Signed at Hoosick, in the county of Rensselaer and State of New York, this 31st day 20 of December, A. D. 1889.

TURNER D. BOTTOME.

Witnesses:

GEO. H. MYERS,  
D. V. JONES.