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PROCESS FOR PURIFYING IMPURE LEAD

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It is well known that most of the molten alloys give when slowly cooled a series of solid products the composition of which varies in a continuous manner from the beginning to the end of the solidification.

Only eutectic alloys do not follow this rule.

It is thus often possible to modify the composition of an alloy and to obtain a more or less complete separation of its constituents through a partial solidification with a separation of the solid and liquid phases which are in presence, in well determined conditions.

This property has been used for a long time in metallurgical processes for the refining of metals.

It has already been proposed to amplify this phenomenon and to render more efficient the separation of the constituents by adding to the molten alloy, prior to the partial solidification, certain elements conveniently selected.

Thus, by adding a sufficient quantity of zinc to molten argentiferous lead it has been possible to obtain, by cooling in the neighbourhood of the temperature of solidification of the lead, a floating solid crust which it is easy to separate and which carries with itself the totality of the silver pre-existing in the lead.

More recently it has been tried to separate the lead from its alloys by using additions of alkaline or earth-alkaline metals.

Now it has been found, according to this invention, that additions of small quantities of sodium and of zinc to impure leads in a molten condition (containing more particularly arsenic and/or copper and/or antimony) render it possible to separate by cooling in the floating crust almost the totality of the arsenic and/or the copper and/or the antimony which were contained in the treated lead.

If the treated lead contains tin, silver and gold, the content of these metals is not substantially modified.

Of course, if the lead under treatment already contains zinc, it will be possible to use only a simple addition of sodium (if the quantity of zinc in the lead is sufficient); or it will be sufficient to complete the desired quantity of zinc through a smaller addition of this latter metal.

Zinc and sodium separate in the floating crust with the impurities which have been eliminated.

Sodium and/or zinc may be added to the treated lead, in the form of a pure metal or of an alloy.

As a nonlimitative example of a method for carrying the invention into practice, by treating a working lead (containing 0.1% of arsenic, 0.07% of tin, 0.4% of antimony, 0.05% of copper and 0.1% of silver) in a molten condition through 0.7% of zinc and 0.5% of sodium, there is obtained after skimming at 330° C. (626° F.) a lead which still contains 0.07% of tin and 0.1% of silver, but contains less than 0.01% of arsenic, less than 0.02% of antimony and less than 0.005% of copper.

This process can also be used for purifying an alloy of lead and tin and for eliminating from the said alloy impurities such as: arsenic, antimony and copper, in order to obtain an alloy of lead and tin which is practically pure.

Thus, by way of example, an alloy of lead and tin with 10% of Sn, 0.05% of As, 0.1% of Sb and 0.02% of Cu was purified by adding to it 0.8% of zinc and 0.4% of sodium.

After the known treatment with water steam, for instance in order to eliminate the excess of sodium, an alloy of lead and tin was obtained which contained 9.8% of tin and only 0.002% of arsenic, 0.005% of antimony and 0.001% of copper.

This process can be combined with any other known process for purifying lead.

This process can be combined more particularly with the process which is the subject matter of the patent application and with the known process (known as Parkes' method) for desilvering lead through zinc. Thus a complete purification of lead will be obtained.

Thus, as a nonlimitative example, a molten working lead containing 0.5% of arsenic, 0.7% of antimony, 0.05% of copper and 0.07% of silver has been treated first by an addition of 0.5% of sodium. After skimming and treatment with water steam the lead contained no more than 0.01% of arsenic, 0.005% of copper. Its antimony content was still of 0.7% and its silver content was still of 0.07%.

The lead then was treated by the Parkes' method and a lead was obtained which contained less than 0.002% of arsenic, less than 0.001% of copper, less than 0.001% of silver and always 0.7% of antimony. The zinc content of this lead was of about 0.6%. A new addition of 0.5% of sodium gives, after skimming at about 330° C. (626° F.) and treatment with water steam, a soft lead having approximately the following composition: arsenic less than 0.0002%; antimony less than 0.002%; copper less than 0.001% and containing less than 0.001% of silver.

What I claim is:

1. The method of purifying impure lead containing antimony and at least one of the group consisting of copper and arsenic with or without

other impurities, which consists in adding sodium and zinc in predetermined proportions to the bath and allowing the bath to cool whereby substantially all the antimony, copper and arsenic present will be separated from the lead.

2. The method of purifying impure lead containing tin and at least one of the group consisting of antimony, copper, and arsenic with or without other impurities, which consists in adding sodium and zinc in predetermined proportions to a bath of said impure lead, allowing said bath to cool down, whereby substantially all the antimony, copper, and arsenic present will be separated from the lead and tin.

3. A process for purifying impure lead containing antimony and silver, which consists in treating the lead in a molten state by the Parkes process in order to remove the silver therefrom, treating the lead thus freed from the silver with sodium in the presence of the zinc remaining in the lead after the completion of the Parkes process, said sodium and zinc being simultaneously present in predetermined proportions, cooling the bath, and removing the crust formed on top thereof.

4. Process for purifying impure lead containing antimony, substantially no silver but containing imbibition zinc which consists in adding to a bath of the said lead sodium and zinc allowing the bath to cool down and separating from the purified lead a crust which is formed on top of the bath.

5. Process for purifying lead containing metallic impurities and such an amount of tin that it can be considered as an impure lead-tin alloy, which consists in treating a bath of the said lead by means of sodium and zinc, allowing the bath to cool down until a crust is formed on top of the bath, which contains practically all the metallic impurities, and separating the said crust from the purified lead-tin alloy.

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