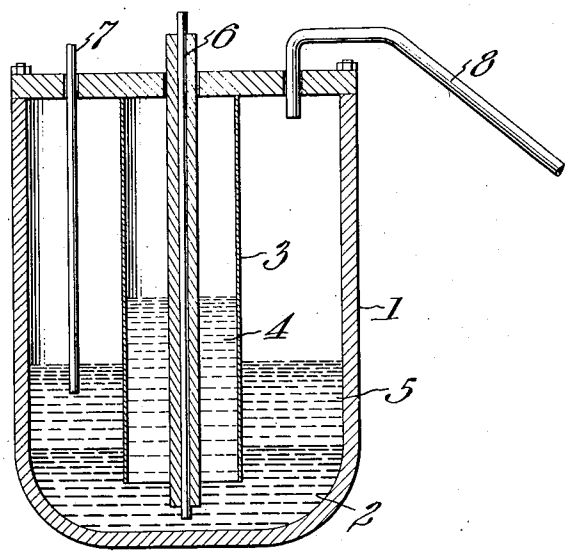
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PROCESS OF DETINNING ALUMINUM

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PROCESS OF DETINNING ALUMINUM

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The object of the present invention is a process of detinning aluminum.

It is known that aluminum is not miscible or is only slightly miscible with a number of metals, such as for example lead, cadmium, bismuth, sodium, potassium and thallium in the liquid state, whereas tin forms completely miscible alloys with said metals in the liquid state.

If stanniferous aluminum is treated with such metals, and afterwards caused to deposit in the liquid state or if it is caused to solidify, the tin disperses in the two phases and in different ratios according to the various metals used.

When stanniferous aluminum is treated with lead for example, the partition coefficient of tin between the two phases is approximately unity, so that when employing equal weights of both aluminum and lead, approximately one half of the tin remains in the aluminum and the other half enters the lead. It is therefore generally not possible to remove the whole of the tin from aluminum in one operation. By repeating the process however, the aluminum may be detinned to any desired extent.

The tin which is present in the non-aluminum phase, can be recovered therefrom according to known methods. Moreover the tin lead alloy thus produced for example may be employed without further treatment.

I have found that a considerable improvement of the process can be effected if instead of employing the detinning metal (such as lead) in the pure state, a substance is added thereto, which is adapted to form a compound with the tin. Such substances are for example the alkali metals such as sodium. An addition of this character effects a considerable increase of the partition coefficient in many cases. For example, when employing a lead-sodium alloy containing 10% of sodium the said coefficient is increased to about 3, with the result that the tin may be removed very considerably from the aluminum with the use of this alloy with fewer repetitions of the process.

In order to avoid the necessity of always employing fresh quantities of detinning metal, according to a further feature of the invention the purifying of the aluminum can be combined with that of the detinning metal and moreover at the same time and in one and the same vessel.

To this end, according to the invention, an arrangement of the plant is employed as shown, for example in the drawing.

In the drawing 1 depicts an electrolyzing vessel. 2 is the molten detinning metal, in the present case lead, with which the stanniferous aluminum layer 4 communicates by means of a tube 3 open at the bottom. A molten layer of lead chloride 5 is arranged outside the tube 3 upon the layer of lead 2. A cathode 6 dips into the lead layer 2, whilst anode 7 dips into the lead chloride layer. 8 is a tube for leading off volatile products.

The process is carried out in this apparatus as follows:—

The tin of the stanniferous aluminum 4 distributes itself according to the partition coefficient between the aluminum and the lead on the one hand and between the lead and the lead chloride on the other hand until a state of equilibrium is reached which is represented in the latter case by the equation:

$$Sn + PbCl_2 \leftrightarrows Pb + SnCl_2$$

This equilibrium continuously disturbed by electrolysis and by the removal of the tin as stannic chloride, which is distilled off from the lead chloride phase through the tube 8, with the result that fresh quantities of tin are continually transferred from the aluminum phase into the lead phase and from the latter into the saline phase, being distilled off from the saline phase as stannic chloride, until both layers of metal are practically free from tin.

The process may be carried out either continually or also in batches.

Claim:—

A process of separating tin from a mixture containing aluminum and tin which comprises treating the said mixture in a molten condition with a metal of the group consisting of lead, cadmium and bismuth to which an alkali metal has been added.

In testimony whereof I affix my signature.

WALTER FRAENKEL.