This invention relates to improvements in the electro-deposition of zinc.

In hitherto known processes for such electro-deposition, a solution of zinc, generally in the forms of an electrolyte, is subjected to electrolysis using anodes consisting either of lead alone or of an alloy consisting chiefly of lead with small amounts of silver or tin.

The principal disadvantage of the prior processes in question is that minute quantities of lead are transferred from the anode to the cathode, thus reducing the purity of the zinc obtained. Also, however, the anode corrodes comparatively rapidly and a scale consisting of a mixture of various substances forms on it, with the result that the efficiency of the processes is considerably reduced if the anodes are not relatively frequently cleaned.

It is an object of the present invention to provide a process for the electro-deposition of zinc in which the codeposition of lead is greatly reduced.

It is also an object of the present invention to provide a superior alloy anode, which necessitates less attention than those of known composition.

It is a further object of the invention to provide an anode which has a greater resistance to corrosion while in operation than former anodes.

Further objects and advantages of the invention will become apparent in the following specification.

According to the present invention these objects are achieved by carrying out the electro-deposition with an anode consisting of an alloy of lead, tin and cobalt and preferably also silver.

It has been known to add small quantities of silver or tin to lead anodes in order to improve the quality of the deposited zinc. The zinc produced using such anodes contains less lead than when pure lead anodes are used.

It has now been found, however, that the addition of small amounts of cobalt to the anode alloy has a very pronounced effect in producing purer zinc. Actual tests have shown that when such anodes are used there is less than half the amount of lead carried over to the cathode than when regular lead-tin or lead-silver alloys are used, and that less than a quarter of the lead is carried to the cathode than when pure lead anodes are used.

According to the invention there is used an anode which consists principally of lead alloyed with small amounts of tin and cobalt. Varying small amounts of silver may be added to this alloy with favourable results.

Suitable alloys according to the invention are those which consist mainly of lead, alloyed with from 0.1—0.3% tin, and 0.0005—0.003% cobalt. Alloys which contain in addition to the above from 0.25—1% silver are also suitable according to the invention.

The method of producing such anodes is generally as follows:

An alloy of tin and cobalt is first prepared, and added to molten lead in the proportions required to produce a resulting alloy of the desired composition. The molten alloy is then cast into a suitable anode shape.

In the case of the lead-tin-cobalt-silver alloy, it has been found desirable first to make an alloy of tin and cobalt, and then to add this alloy to an alloy of lead and silver in suitable proportions. The alloy is then molded to a suitable shape as mentioned above.

These anodes have been found to withstand to a far greater extent than prior anodes the corrosive action at the anode present during electrolysis, which is due to the transfer of some of the lead from the anode to the cathode and to the precipititation of lead products in the electrolytic cell and on the anode. They have also the further advantage that the deposition of scale, which forms on anodes during electrolysis, and which usually consists of a mixture of many metals and/or chemical compounds including lead peroxide, gypsum and manganese dioxide, is considerably lessened, thereby lengthening the active life of the anode, and decreasing the frequency of cleaning necessary to keep the anodes in good condition.

The invention is more fully illustrated by means of the following tables which show results of actual tests and which clearly illustrate the superiority of the alloys of the invention. It is understood, however, that these figures are given for purposes of illustration only, and that the relative quantities of materials given may be considerably altered without departing from the scope of the invention.
3

In full scale plant operation

<table>
<thead>
<tr>
<th>Days Operation</th>
<th>% Pb in the Zn Deposit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pure lead anodes</td>
<td>.0049</td>
</tr>
<tr>
<td>Lead anodes with .83% Ag added</td>
<td>.0033</td>
</tr>
<tr>
<td>Alloy lead anodes according to the invention with .84% Ag, .23% Sn, .002% Co</td>
<td>.0011</td>
</tr>
</tbody>
</table>

In laboratory operation

[Lead anode with additions as shown]

<table>
<thead>
<tr>
<th>% Ag</th>
<th>% Sn</th>
<th>% Co</th>
<th>Days Operation</th>
<th>% Pb in the Zn Deposit</th>
</tr>
</thead>
<tbody>
<tr>
<td>.95</td>
<td></td>
<td></td>
<td>49</td>
<td>.0037</td>
</tr>
<tr>
<td>.90</td>
<td></td>
<td></td>
<td>50</td>
<td>.0029</td>
</tr>
<tr>
<td>1.0</td>
<td>.007</td>
<td>.007</td>
<td>39</td>
<td>.0022</td>
</tr>
<tr>
<td>.81</td>
<td>.002</td>
<td>.002</td>
<td>109</td>
<td>.0018</td>
</tr>
</tbody>
</table>

We claim:

1. An alloy anode for use in the electrodeposition of zinc from a zinc sulphate solution, said anode consisting essentially of lead alloyed with small amounts of tin and cobalt and up to 1% of silver.

2. A process for the electrodeposition of zinc, which comprises causing deposition of zinc from a zinc sulphate solution with an anode consisting of an alloy composed essentially of lead, with small amounts of tin and cobalt and up to 1% of silver.

3. A process for the electrodeposition of zinc, which comprises causing the deposition of zinc from a zinc sulphate solution with an anode consisting of an alloy composed essentially of lead with small amounts of tin and cobalt.

4. An alloy anode for use in the electrodeposition of zinc from a zinc sulphate solution, said anode consisting essentially of lead, alloyed with about 0.1%–0.3% tin, and 0.0005%–0.03% cobalt.

5. An alloy anode according to claim 4, containing 0.25%–1% silver.

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G. H. KENT.
G. W. LONG.

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