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## ELECTROLYTIC EXTRACTION OF PURE ALUMINUM

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3 Claims. (Cl. 204—20)

This invention relates to the electrolytic extraction of pure aluminum in dense form from crude aluminum, aluminum alloys and the like.

In the prior United States Patent No. 1,709,759 to J. Weber et al., relating to aluminum production a process is described for the electrolytic extraction of pure aluminum by the refining of crude aluminum, aluminum alloys or the like, in which both the anodes made of the material to be refined containing aluminum, and the cathodes, are used in solid form, with the utilization of a bath of electrolyte, the fusion point of which is lower than that of the electrodes, and which consists of halogen salts of aluminum and of alkaline and/or alkaline earth metals. In working according to such a process, it is important to obtain the aluminum deposit on the cathode in the densest possible form and of sufficient thickness. This cannot always be ensured merely by increasing the proportion of aluminum halide (relatively to the alkaline or alkaline earth halide) in the electrolyte, but it can be done according to the present invention which is an improvement over said process.

It has been found that a certain proportion of foreign substances of different kind in the electrolyte prevents the "growing out" of the cathode deposit, and a dense deposit is obtained. As additions which produce such a result, may be mentioned metals (such as iron, manganese, lead, cadmium, nickel) or their compounds or salts. Thus, for instance, additions of iron oxide, or of chloride of iron, lead, produce the above mentioned effect.

These additions may be introduced into the electrolyte in various manners: either they may be added to it directly or the metal from which the chloride in question is formed, may be also used in the form of a separate auxiliary anode. In such a case, the proportion of the chloride of the auxiliary metal is easily to be regulated by the potential or by the strength of the current the auxiliary anode is fed with.

For the purpose of obtaining completely dense deposits, it is sufficient to have a proportion of about (or less than) 0.1 to maximum 0.5 percent of the additional metal.

What we claim is:—

1. In an electrolytic process of producing refined aluminum from impure material, wherein the material to be refined is used as solid anode, and cathodes also in solid form, together with an electrolyte bath composed of halides of aluminum and of other metals, and having a lower point of fusion than that of the electrodes, the step comprising supplying to the electrolyte, besides the aluminum compounds, small quantities of heavy metals more electropositive than aluminum.

2. In the electrolytic refining process as in claim 1, the step comprising supplying to the electrolyte during the electrolysis small quantities of compounds of heavy metals more electropositive than aluminum.

3. In the electrolytic refining process as in claim 1, the step comprising supplying by means of separate auxiliary anodes, to the electrolyte during the electrolysis small quantities of compounds of heavy metals more electropositive than aluminum.

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