UNITED STATES PATENT OFFICE.

STEPHAN JAHN, OF CHARLOTTENBURG, GERMANY, ASSIGNOR TO AKTIENGESELLSCHAFT MIX & GENEST, TELEPHON- UND TELEGRAPHEN WERKE, OF BERLIN, GERMANY, A FIRM.

PROCESS FOR PICKLING ALUMINIUM AND ITS ALLOYS PRIOR TO GALVANIZING OR COATING THE SAME WITH OTHER METALS.

1,011,203. Specification of Letters Patent. Patented Dec. 12, 1911.

No Drawing. Application filed June 16, 1910. Serial No. 567,189.

To all whom it may concern:

Be it known that I, STEPHAN JAHN, doctor of chemistry, citizen of Austria, residing at Charlottenburg, Germany, have invented new and useful Improvements in Processes for Pickling Aluminium and its Alloys Prior to Galvanizing or Coating the Same with other Metals, of which the following is a specification.

This invention relates to the coating of aluminium and its alloys with or without the use of electric current, and particularly to processes for pickling aluminium and its alloys to prepare them for the coating operation.

Various attempts have been made in the past to solve the problem of the coating of aluminium, but in all the processes previously proposed defects or difficulties have been encountered which have prevented these processes from being applied in practice to any considerable extent. In some of the known processes the aluminium has been etched or corroded by means of alkalis, sometimes in a boiling bath and sometimes with the aid of an electric current. In other cases baths containing sulfuric acid diluted with water and with a small addition of boracic acid or of phosphate of sodium and sulfate of magnesium have been suggested, the treatment in such a bath to be followed by a rinsing operation and immersion in another bath of sulfuric acid with nitrate of soda and small additions of other substances including hydrochloric acid.

As distinguished from such processes, the present invention relates to a process in which acids of the halogen group are used diluted with water, and with the addition of further reagents intended to serve for restraining or checking the reaction. In processes according to this invention the baths do not require to be raised to a boiling point, and a temperature of 70° C. is quite sufficient to enable the required reaction to take place. The weaker the baths and the lower their temperatures, the slower will the pickling be effected and the less risk will there be of the aluminium being too strongly attacked, but the weakness of the baths is limited by considerations of the length of time which the pickling process can be allowed to occupy. Examples hereinafter given will indicate approximately the best conditions of working.

In working according to the present invention the aluminium to be coated with other metals, is first cleaned and freed from grease in any known manner. After this it is inserted into a bath containing one or more of the acids of the halogen group diluted with water and containing also if required suitable reagents for restricting or checking the reaction, such for example as ordinary (ethyl) alcohol or other alcohols such as glycerin; organic acids containing hydroxyl (OH) groups; and gelatin or like substances which are soluble in the baths can also be used as restraining or checking agents. As an instance of such a bath may be mentioned a mixture of 500 grs. of hydrochloric acid with 1000 grs. of water and 150 grs. of ethyl alcohol, kept at about 70° C.; or if hydrofluoric acid is used the bath may contain 10 grs. of this acid in 1000 grs. of water, with at least 15 grs. of ethyl alcohol.

Other examples of baths with others of the restricting agents above mentioned, are as follows:—The bath may be at about 70° C., and besides 1000 grs. of water it may contain:—(*a*) 500 grs. of hydrochloric acid with 150 grs. of glycerin, or with 30 grs. of citric acid; or (*b*) 10 grs. of hydrofluoric acid with at least 15 grs. of glycerin, or with 20 grs. of citric acid.

If hydrochloric acid is used in the bath, the process can be materially simplified, the addition of a special checking or restricting agent not being necessary, but it is quite sufficient in this case to add a suitable quantity of water to make the acid weak; for example, for a bath to be kept at about 40° C., 200 grs. of hydrochloric acid may be used with 1000 grs. of water.

If the baths above mentioned as being used at about 70° C., are used at lower temperatures such as 40° C., they may be made rather stronger; and vice versa, the last bath above mentioned should be made still weaker if its temperature is to be raised much above 40° C.

I claim:

1. Process for pickling aluminium and its alloys prior to coating the same with other metals, in which the aluminium is first freed from grease and the like, and then immersed

in a heated pickling bath containing diluted acid of the halogen group, with the addition of restraining agents, substantially as described.

2. Process for pickling aluminium and its alloys prior to coating the same with other metals, in which the aluminium is first freed from grease and the like, and then immersed in a heated pickling bath containing diluted acid of the halogen group, with the addition of an alcohol, substantially as described.

3. Process for pickling aluminium and its alloys prior to coating the same with other metals, in which the aluminium is first freed from grease and the like, and then immersed in a heated pickling bath containing diluted acid of the halogen group, with the addition of a higher alcohol, substantially as described.

4. Process for pickling aluminium and its alloys prior to coating the same with other metals, in which the aluminium is first freed from grease and the like, and then immersed in a heated pickling bath containing diluted acid of the halogen group, with the addition of glycerin, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

STEPHAN JAHN.

Witnesses:

WOLDEMAR HAUPT,

ARTHUR SCHROEDER.