

# UNITED STATES PATENT OFFICE.

THOMAS CHARLES COLE, OF SOUTHBRIDGE, MASSACHUSETTS.

## PROCESS FOR COATING ALUMINUM.

No Drawing.

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*To all whom it may concern:*

Be it known that I, THOMAS CHARLES COLE, a citizen of the United States, residing at Southbridge, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Processes for Coating Aluminum, of which the following is a specification.

This invention relates to an improved finish for metallic articles and to improved methods and processes of obtaining the same.

The principal object of my invention is to coat or plate a metallic object quickly and inexpensively without the use of the usual electrical current in such a way that the coating will be permanent and wear-resisting, and so that it may be either polished for a clear luster finish or oxidized for the darker finishes as desired.

Another object is to obtain desirable metallic finishes in a minimum of time and at a minimum of expense.

One of the principal objects of the invention is to provide a suitable metallic coating for aluminum which may be either polished or oxidized as desired.

Another object of the invention is to provide such permanent metallic finishes by the bath or dip method as contrasted with the longer and more expensive method of the electric current.

The difficulties in plating aluminum have long been known and many endeavors have been made to accomplish it, but so far, none of these methods has proven commercially successful, especially when applied to the so-called commercial aluminum. The trouble seems to have been that the aluminum quickly oxidizes and becomes coated with a film which causes the plating to flake off. It has also been thought that this was in part due to iron particles present on the face of the aluminum. Efforts have been made to break up and prevent this film forming but so far as I am aware without success. In those processes where the usual electroplating processes are employed it takes considerable time, from twenty to thirty minutes and longer, to form a coating; and this coating has not been permanent due to the oxidizing film underlying it. In my process the coating is practically instantaneous, thus obviating the oxidizing film referred to above.

One of the most popular and satisfactory

finishes is that known as the "gun metal" finish, which has usually been obtained by a heat process which is long and expensive. It is possible with this process, to obtain substantially instantaneously and very inexpensively, the desired plating. When applied over aluminum it makes a most desirable article. It is, therefore, one of the objects of the invention to overcome these difficulties in the treatment of aluminum and other metals and to produce a finished article that shall possess the desired characteristics.

Briefly stated my process is as follows, although these steps may be alternated and changed without affecting the final results, the preferred form only being described here by way of illustration. It will be understood that the steps and their order may be departed from without departing from the spirit of the invention as expressed in the claims.

The aluminum article to be plated is first subjected to a cleansing operation in order to thoroughly prepare the same, in order that the article may take on a substantial plating. In cleansing the aluminum article, it is first immersed in a solution of substantially one part of sal soda to substantially thirty-two parts of water, by weight, the solution being charged with a substantial steady current of electricity, and the article is maintained immersed until it is thoroughly cleansed. The fact is the electro-chemical action of the solution rapidly cleanses the aluminum article in a very short time and renders the surface thereof more susceptible to a substantial permanent plating. After the article is cleansed, it is removed from the electrified cleansing solution and is immersed in a bath of copper cyanide saturated solution which is subjected to heat substantially one hundred and ninety degrees Fahrenheit, thus generating a galvanic action which, due to the surface receiving its preparation from the electro-chemical action, the aluminum article will take on a substantial permanent plating. At the time of immersing the article in the copper cyanide saturated solution, the time consumed is substantially one-half a minute, it depending entirely on the size of the article, and during this step, there is no outside current introduced.

If desired silver nitrate can be used instead of the copper cyanide. The article can

be coated with gold, silver, copper, nickel or other metals.

When the article has been coated with copper or other metal it can be polished or oxidized as desired. If a luster polish is desired the article is placed on a buffing wheel until the desired polish is reached.

If an oxidized finish is desired the procedure is as follows: After removing the article from the cyanide bath the article is immersed in another bath, a cold solution of liver of sulphur and leave it there about one-half minute. It takes longer in winter than in summer. No electric current is introduced. This sulphur solution oxidizes the copper coating or other metal, as the case may be, turns it dark until it has the appearance of gun metal. It produces a very beautiful finish of high luster of the desired color, and which needs not be further polished or buffed. The article is ready for use as it comes from the sulphur solution.

In the case of copper, the dark finish is a sulphide of copper, the sulphur solution simply oxidizes the copper coating; there is nothing but the base metal underneath.

Articles treated with this process receive highly satisfactory results, particularly with aluminum.

From the foregoing description it will be seen that there has been produced, metallic articles with the desired finishes in a rapid, expeditious and inexpensive way.

After applying a layer of copper on the article, it is also possible to plate the copper layer with other metals, such as gold, silver, nickel, etc.

In employing the term sal soda in the foregoing specification it is to be understood that I have in mind the substance listed in U. S. Official Pharmacopœia as crude sodii carbonas monohydratus, and that in referring to liver of sulphur I mean the substance so referred to in the book aforesaid and also referred to in said book, page 30, as crude potassa sulphurata, the common nomenclature of the art having been used throughout the specification and claims for more ready understanding by the ordinary person in the art of the particular substances under consideration.

I claim:

1 A process for plating aluminum articles, first consisting in preparing the article by immersing the same in a solution of substantially one part sal soda and substantially thirty-two parts water, by weight, charging the solution with a substantial steady current of electricity, the electro-chemical action of the solution rapidly cleansing the aluminum article, rendering the surface thereof more susceptible to a subsequent substantial permanent plating, then removing the article from the electrified cleansing solution, and immersing it in a bath of copper cyanide saturated solution which is subjected to heat substantially one hundred and ninety degrees Fahrenheit, thereby generating a galvanic action which, due to the surface having previously received its preparation from the electro-chemical action, the aluminum article will take on a substantial permanent plating.

2. A process for plating aluminum articles, first consisting in preparing the article by immersing the same in a solution of substantially one part sal soda and substantially thirty-two parts water, by weight, charging the solution with a substantial steady current of electricity, the electro-chemical action of the solution rapidly cleansing the aluminum article, rendering the surface thereof more susceptible to a subsequent substantial permanent plating, and immersing it in a bath of copper cyanide saturated solution which is subjected to heat substantially one hundred and ninety degrees Fahrenheit, thereby generating a galvanic action which, due to the surface having previously received its preparation from the electro-chemical action, the aluminum article will take on a substantial permanent plating, removing the article from the cyanide solution and subjecting it to a polishing process to give the article a luster finish, and finally oxidizing the polished surface thereof.

In testimony whereof I have affixed my signature, in presence of two witnesses.

THOMAS CHARLES COLE.

Witnesses:

HARRY H. STYLL,  
ALICE G. HASKELL.