

UNITED STATES PATENT OFFICE.

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ALUMINIUM PLATING.

SPECIFICATION forming part of Letters Patent No. 675,584, dated June 4, 1901.

Application filed October 24, 1900. Serial No. 34 195. (No specimens.)

To all whom it may concern:

Be it known that I, ANSON G. BETTS, a citizen of the United States, residing at Lansingburg, county of Rensselaer, and State of New York, have invented certain new and useful Improvements in Aluminium Plating, of which the following is a specification.

The principal object of my invention is to provide the surface of a body of aluminium or aluminium alloy with a permanently-adherent coating of some other metal, which metal is adapted to be electroplated, soldered, or tinned by some well-known method.

My invention consists in coating a body of aluminium or aluminium alloy by bringing the surface to be coated into contact with a fused salt of the coating metal, as hereinafter more fully described, and particularly pointed out in the claims.

It is well known that aluminium surfaces cannot be successfully electroplated, and I believe that the firm and permanent attachment of a coating of another metal to aluminium by molecular contact has hitherto been unattained. The chief obstacle is probably the presence of aluminium oxid, which so readily and quickly forms on aluminium surfaces, a very slight amount of which would prevent a metallic union.

I make use of a combined fluxing and depositing action removing the oxid from the aluminium surface to be coated and preparing a clean free metallic surface to receive the deposit of the coating metal. I also make use of a high temperature, which insures the absence of water and prevents the formation from water of hydrogen simultaneously with the reduction of the salt to metal by the chemical action of the aluminium.

In carrying out my process I provide a comparatively dry salt of the metal with which it is desired to coat the body of aluminium and heat the same to a condition of fusion. The fused salt being brought into contact with the aluminium surface to be coated the metal contained in the fused salt exchanges with the aluminium and is evenly deposited by chemical action upon the contact-surface of the aluminium.

For example, if a thin layer of dry cuprous chlorid is placed, as by a sifter, upon a sheet of aluminium and heat applied sufficient to

fuse the salt without fusing the aluminium the fused salt spreads out evenly and the copper is deposited by chemical action. The appearance of white fumes of aluminium chlorid or oxychlorid shows that chemical reaction is taking place. The semifused resulting salts are easily removed by scraping while still hot. The aluminium sheet may be coated on the opposite side or not, as desired. The coating applied as above described may be reinforced or made thicker by electrodeposition or by dipping in any of the well-known methods.

It is obvious that the aluminium body to be coated can be dipped in a receptacle containing the fused salt of the coating metal or the fused salt applied in any known manner.

The failure to successfully electroplate aluminium by the usual means of electroplating metals results from the fact that anhydrous aluminium oxid, which always forms on the surface of aluminium, even though in a slight degree, is insoluble in any aqueous plating solution, whether acid or basic. The interposition of a layer of aluminium oxid, however thin, prevents metallic union. The success of this process depends on the solvent effect on the oxid of fused metallic salts, particularly salts of the more basic metals, like copper.

The higher temperature used is an advantage, because it tends to promote alloying at the junction of the two metals.

The surface of the aluminium body to be coated or plated may be immersed in a bath of a fused salt of the coating metal and when desired the plating action made continuous by inserting in the same bath a piece of the coating metal and connecting the aluminium as cathode and the piece of coating metal as anode with a source of electric energy in the well-known manner of electroplating.

By the word "aluminium" I desire to include all alloys of aluminium which cannot be successfully coated or plated by previously-known methods.

After the aluminium surface has been provided with a thin coating of some metal, as copper, that coating may afterward be reinforced in any manner, as by electrodepositing or fusing some metal thereon.

I prefer the use of a non-oxygen salt of the

coating metal, such as haloid copper salts, and more particularly cuprous salts as distinguished from cupric salts, by the use of which I find it unnecessary to employ a boracic or other flux to facilitate fusion, and avoid the formation of oxids and insure the solution of any oxids which may be present.

The haloid salts, which are preferably employed in my process, are those in the lowest form of oxidation or combination.

What I claim as new, and desire to secure by Letters Patent, is—

1. That improvement in the art of coating aluminium with other metals which consists in treating an aluminium surface with a fused non-oxygen salt of a coating metal capable itself of dissolving aluminium oxid and capable of being reduced to a metallic state by the action of aluminium.

2. That improvement in the art of coating aluminium with other metals which consists in treating an aluminium surface with a fused non-oxygen haloid salt of a coating metal in the lowest form of oxidation, capable of dissolving aluminium oxid and of being reduced to a metallic state by aluminium.

3. That improvement in the art of coating aluminium with copper which consists in treating an aluminium surface with a fused non-oxygen copper salt.

4. That improvement in the art of coating aluminium with copper which consists in treating an aluminium surface with a fused non-oxygen cuprous salt.

5. That improvement in the art of coating

aluminium with copper which consists in treating an aluminium surface with fused cuprous chlorid.

6. That improvement in the art of coating aluminium with another metal which consists in placing on the surface to be coated a layer of dry, fusible, non-oxygen salt of a coating metal capable itself of dissolving aluminium oxid, and capable of being reduced to a metallic state by the action of aluminium, and heating the whole until such salt is fused and the coating effected by the action of the aluminium on the fused metallic salt, substantially as described.

7. That improvement in the art of coating aluminium with copper which consists in placing on the surface to be coated a layer of cuprous chlorid and heating the whole until said cuprous chlorid is fused and the surface has been evenly coated with copper by the action of the aluminium on the fused copper salt, substantially as described.

8. That improvement in the art of coating aluminium with another metal which consists in treating the surface to be coated with fused cuprous chlorid and afterward reinforcing the metallic coating so formed with the other metal, substantially as described.

In testimony whereof I have hereunto set my hand this 22d day of October, 1900.

ANSON G. BETTS.

Witnesses:

GEO. A. MOSHER,

FRANK C. CURTIS.