

UNITED STATES PATENT OFFICE

2,355,933

PROCESS OF METAL PLATING

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No Drawing. Application April 12, 1941,
Serial No. 388,267

13 Claims. (Cl. 117—35)

This invention relates to process of metal plating, and it is particularly directed to the process of electroplating articles made of plastic, such as cellulose acetate, Celluloid, Bakelite, urea, polystyrene, and the like plastics, reference being particularly had to electroplating small items such as buttons made of such plastics.

An object of the invention is to provide a process of preparing such plastic items as mentioned above for electroplating in a silver cyanide bath or acid copper solution.

The improved process includes the steps of activating the surfaces of such articles in such a way as to prepare the surfaces to receive enough silver deposit upon treating the articles in silver nitrate baths, together with reducing agents, so that such silver deposit will serve as a cathode in the subsequent electroplating process.

A further object of this invention is to provide a highly economical process of the character described, which shall be easy to carry out and which shall be highly efficient.

Other objects of my invention will hereinafter appear in the following specification and the novel features thereof will be particularly pointed out in the appended claims.

In accordance with the present invention, small plastic items such as buttons and the like articles, made of cellulose acetate, Celluloid, Bakelite, urea, polystyrene, and the like plastics are rolled in sand. Said articles may be placed in a barrel together with sea sand, and the barrel rotated on its longitudinal axis at the rate of between sixty and seventy revolutions per minute. Thereafter, the articles are taken out of the barrel and rinsed to wash off the sand.

The articles are then immersed in a 1 to 10% solution of ferrous sulphate from ten minutes to an hour. The articles are then taken out of the ferrous sulphate solution and placed in a 1 to 5% copper sulphate solution at a temperature of 25° to 35° centigrade for a period of between two and four minutes. Said articles are then taken out of the copper sulphate solution and placed in a bath made up of the following substances:

Between 600 to 1000 cc. of water
Between 150 and 250 cc. of ethyl alcohol
Between 5 and 20 cc. of sulphuric acid
From 5 to 15 grams of quinol
Between 25 to 40 grams of stannous sulphate.

The articles are allowed to remain in this bath from one-half hour to an hour, and then removed and rinsed well in water. The articles are now ready for deposit of silver, which may be ac-

complished by treating the articles in a bath including the following:

About 10 grams of sodium hydroxide
About 20 grams of silver nitrate
About 50 cc. of ammonia.

This bath is treated with a reducing agent which may be one of the following: (1) Either 175 cc. of 37% formaldehyde, plus enough water to make up one gallon; or (2) A solution made up of:

About 90 grams of sugar
About 4 cc. of nitric acid
About 1 litre of water

This solution is boiled for five minutes and then mixed with 175 cc. of ethyl alcohol.

The reducing agent causes the silver nitrate to deposit a thin layer of silver on the plastic articles, thus making the surfaces of the articles conductive.

When using formaldehyde, as much reducing agent is used as silver nitrate; and when using the sugar and nitric acid solution, three times as much silver nitrate solution should be used as reducing agent. Other reducing agents such as tartrates can also be used.

The articles may then be placed in an electrolytic bath, either of silver cyanide or acid copper solution, to deposit metal on the surfaces of the articles.

The silver deposit on the articles which was deposited in the silver nitrate bath, serves as a cathode during the electrolytic process.

Best results have been found by using a 1% ferrous sulphate solution for fifteen minutes, and a 2% copper sulphate solution for three minutes at 30° centigrade. Furthermore, the best results have been found by using as activating bath 800 cc. water, 200 cc. ethyl alcohol, 5 cc. sulphuric acid, 10 grams quinol, 30 grams stannous sulphate, with the articles in such solution for 45 minutes.

It will thus be seen that I have provided a composition and method in which the several objects of this invention are achieved and which are adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiment above set forth, it is to be understood that all matter herein set forth, is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim

as new and desire to secure by Letters Patent:

1. A process of the character described consisting in rolling plastic articles in sand, then washing off the sand, then immersing the articles first in a ferrous sulphate solution and then in a copper sulphate solution, and then immersing the articles in a bath, consisting of water, ethyl alcohol, sulphuric acid, quinol and stannous sulphate, then rinsing the articles in water and immersing the articles in a bath of sodium hydroxide, silver nitrate with ammonia, together with a reducing agent.
2. A process of the character described consisting in immersing a sand-tumbled organic plastic article first in ferrous sulphate solution and then in copper sulphate solution, and then in a bath consisting principally of water and including stannous sulphate, alcohol and sulphuric acid and quinol, and then treating the articles in a silver nitrate solution carrying ammonia and caustic soda together with a reducing agent.
3. A process of the character described consisting in rolling plastic articles in sand, washing off the sand, immersing the articles in a 1 to 10% ferrous sulphate solution from 10 minutes to an hour, then immersing the articles in a 1 to 5% copper sulphate solution from two to four minutes at 25° to 35° centigrade, then immersing the articles in a bath consisting principally of water and including stannous sulphate, alcohol, quinol and sulphuric acid, then rinsing the articles well in water, and then immersing the articles in a bath including sodium hydroxide, silver nitrate and ammonia, together with a reducing agent.
4. A process of the character described consisting in rolling plastic articles in sand, washing off the sand, immersing the articles in a 1 to 10% ferrous sulphate solution from 10 minutes to an hour, then immersing the articles in a 1 to 5% copper sulphate solution from two to four minutes at 25° to 35° centigrade, then immersing the articles in a bath consisting principally of water and including stannous sulphate, alcohol, quinol and sulphuric acid, then rinsing the articles well in water, and immersing the articles in a bath including sodium hydroxide, silver nitrate and ammonia, together with formaldehyde.
5. A process of the character described consisting in rolling plastic articles in sand, then washing off the sand, then immersing the articles first in a ferrous sulphate solution and then in a copper sulphate solution, and then immersing the articles in a bath, consisting of water, ethyl alcohol, sulphuric acid, quinol and stannous sulphate, then rinsing the articles in water and immersing the articles in a bath of sodium hydroxide, silver nitrate with ammonia, together with a reducing agent.
6. A process of the character described consisting in tumbling plastic articles in sand, then washing off the sand, then treating the articles in a ferrous sulphate solution, then in a copper sulphate solution, then immersing the articles in a bath consisting principally of water and including stannous sulphate and alcohol and sulphuric acid and quinol, then rinsing the articles in water, and then immersing the articles in a bath including silver nitrate and carrying caustic soda and ammonia, together with a reducing agent.
7. A process of the character described consisting in tumbling an article in sand, then washing off the sand, then treating the article in a ferrous sulphate solution, then in a copper sulphate solution, then treating the article in a bath

consisting principally of water and including stannous sulphate and sulphuric acid and alcohol and quinol, then washing off the article and immersing the article in a silver nitrate solution carrying caustic soda and ammonia, together with a reducing agent.

8. A process of the character described consisting in sanding the surface of an article to be electroplated, then washing off the sand, then placing the article in a 1% to 10% solution of ferrous sulphate from 10 minutes to an hour, then placing the article in a 1% to 5% copper sulphate solution at a temperature of 25° to 35° centigrade for a period of between two and four minutes, then placing the article in a bath consisting of between 600 cc. to 1000 cc. of water, 150 cc. to 250 cc. of ethyl alcohol, 5 cc. to 20 cc. sulphuric acid, 5 grams to 15 grams of quinol, and 25 grams to 40 grams of stannous sulphate, allowing the article to remain in said bath from one-half hour to an hour, then removing the article and rinsing in water, and then placing the article in a bath consisting of about 10 grams of sodium hydroxide, about 20 grams of silver nitrate, and about 50 cc. of ammonia, the above bath being treated with a reducing agent.

9. A process of the character described consisting in sanding the surface of an article to be electroplated, then washing off the sand, then placing the article in a 1% to 10% solution of ferrous sulphate from 10 minutes to an hour, then placing the article in a 1% to 5% copper sulphate solution at a temperature of 25° to 35° centigrade for a period of between two and four minutes, then placing the article in a bath consisting of between 600 cc. to 1000 cc. of water, 150 cc. to 250 cc. of ethyl alcohol, 5 cc. to 20 cc. sulphuric acid, 5 grams to 15 grams of quinol, and 25 grams to 40 grams of stannous sulphate, allowing the article to remain in said bath from one-half hour to an hour, then removing the article and rinsing in water, and then placing the article in a bath consisting of about 10 grams of sodium hydroxide, about 20 grams of silver nitrate, and about 50 cc. of ammonia, the above bath being treated with formaldehyde.

10. A process of the character described consisting in sanding the surface of an article to be electroplated, then washing off the sand, then placing the article in a 1% to 10% solution of ferrous sulphate from 10 minutes to an hour, then placing the article in a 1% to 5% copper sulphate solution at a temperature of 25° to 35° centigrade for a period of between two and four minutes, then placing the article in a bath consisting of between 600 cc. to 1000 cc. of water, 150 cc. to 250 cc. of ethyl alcohol, 5 cc. to 20 cc. sulphuric acid, 5 grams to 15 grams of quinol, and 25 grams to 40 grams of stannous sulphate, allowing the article to remain in said bath from one-half hour to an hour, then removing the article and rinsing in water, and then placing the article in a bath consisting of about 10 grams of sodium hydroxide, about 20 grams of silver nitrate, and about 50 cc. of ammonia, the above bath being treated with a solution made up of sugar, nitric acid, and water, boiled and mixed with ethyl alcohol.

11. A process of the character described consisting in rolling plastic articles in sand, then washing off the sand from the articles and immersing the articles in a 1% ferrous sulphate solution for 15 minutes, then immersing the articles in a 2% copper sulphate solution for three minutes at 30° centigrade, then placing the ar-

ticles for 45 minutes in a bath consisting of 800 cc. of water, 200 cc. of ethyl alcohol, 5 cc. of sulphuric acid, 5 grams of quinol and 30 grams of stannous sulphate, then rinsing the articles in water, and placing the articles in a bath consisting of 10 grams sodium hydroxide, 20 grams silver nitrate, 50 cc. of ammonia, the last bath being mixed with a reducing agent.

12. A process of the character described consisting in rolling plastic articles in sand, then washing off the sand from the articles and immersing the articles in a 1% ferrous sulphate solution for 15 minutes, then immersing the articles in a 2% copper sulphate solution for three minutes at 30° centigrade, then placing the articles for 45 minutes in a bath consisting of 800 cc. of water, 200 cc. of ethyl alcohol, 5 cc. of sulphuric acid, 5 grams of quinol and 30 grams of stannous sulphate, then rinsing the articles in

water, and placing the articles in a bath consisting of 10 grams sodium hydroxide, 20 grams silver nitrate, 50 cc. of ammonia, the last bath being mixed with an equal amount of reducing agent, said reducing agent being made by mixing 175 cc. of 37% formaldehyde with enough water to make one gallon.

13. A process of the character described, consisting in treating a sand-tumbled article made of casein plastic in a solution of ferrous sulphate, then in a solution of copper sulphate and then immersing said article in a bath consisting principally of water and carrying quinol and stannous sulphate and alcohol and sulphuric acid, then rinsing the article and then immersing said article in a bath including silver nitrate caustic soda and ammonia together with a reducing agent.

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