UNITED STATES PATENT OFFICE.

UMIKICHI UNNO, OF TOKYO, JAPAN.

PROCESS OF ELECTROPLATING NON-CONDUCTING SUBSTANCES WITH COPPER.

1,352,331. Specification of Letters Patent. Patented Sept. 7, 1920.

No Drawing. Application filed November 21, 1917. Serial No. 203,179.

To all whom it may concern:

Be it known that I, UMIKICHI UNNO, a subject of the Emperor of Japan, residing at No. 20, Nichome, Shin-ogawa-machi, Ushigome-ku, city of Tokyo, and Empire of Japan, have invented certain new and useful Improvements in Processes of Electroplating Non-Conducting Substances with Copper, of which the following is a specification.

My invention relates to an improved process of electrically depositing a metal such as copper on non-conducting substances, such as wood, porcelain, paper, cloth, plaster, and the like, and has for its objects to provide an economical method whereby such substances can be coated, in a relatively short space of time, with a metallic skin adapted to stand considerable wear.

My said invention has particular reference to that class of method wherein the article to be treated is first impregnated with a substance adapted to expel air and moisture, and is then coated with a conducting material.

It has been proposed in a process of this nature to immerse the article in boiling white-wax, and it has also been proposed in another class of process to coat the article with a mixture containing gold graphite.

In carrying my invention into effect, the article to be coated is first treated so as to expel the air and moisture therefrom, and to form a body which is practically unaffected by water or moisture. For this purpose it is immersed in a bath of melted beeswax, paraffin wax, and white wax (Japan tallow) in the proportions of about 10, 7, and 3 respectively, in which it is retained while the bath is kept hot until the article is thoroughly impregnated with the mixture, and provided with a wax coating.

It is then treated with a conducting mixture, made from the following ingredients:—

Graphite	100 parts
Mercury	2 parts
Auric chlorid	1 part
Sulfuric ether	50 parts,

(said materials being mixed in the presence of a small amount of mineral acid, such as nitric and sulfuric).

The said mixture is dried and powdered, during which operation it is made homogeneous, and the ether, of course, evaporates. The dried mixture is then applied to the surface of the impregnated article, by means of a brush, or in any other convenient manner, to the wax-coated surface of the article in such manner that the whole of such surface is covered therewith. The auric chlorid being soluble in the sulfuric ether, is uniformly distributed in the mixture, and as both mercury and auric chlorid are better conductors than graphite, the article is thus easily provided with an equally distributed conductive coating in a finely divided condition, whereby the time and cost of plating are considerably reduced.

An electrolytic bath of copper sulfate solution of ordinary strength is provided, in which the article to be coated is now immersed and attached to the negative pole, while the positive pole is a plate or the like of copper. An electric current, such as is usually employed for electroplating, although preferably of slightly less voltage, is passed through the bath, and according to the length of time during which the passage of the current is maintained, a copper coating of greater or less thickness will be deposited on the article under treatment.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The method of electrolytically depositing metal upon an article made of a non-conducting substance which consists in impregnating the article with a mixture of beeswax, paraffin wax and white wax, preparing a coating mixture by mixing together relatively large proportions of graphite and sulfuric ether, and relatively small proportions of mercury and gold chlorid, drying and powdering the mixture, and coating the impregnated article therewith, then immersing the article so coated in a bath of electrolyte and electrolytically depositing a metal on said article while so immersed.

2. The method of electrolytically depositing metal upon an article made of a non-conducting substance which consists in impregnating the article with a mixture of beeswax, paraffin wax, and white wax, coating the impregnated article with a powder

formed from a homogeneous mixture containing a relatively large amount of graphite, and relatively small amounts of mercury and auric chlorid, immersing the articles so coated in a bath of electrolyte and electrolytically depositing a metal on said article while so immersed.

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

UMIKICHI UNNO.

Witnesses:
DAIJIRO ISHI,
KOICHI URIN.