

# UNITED STATES PATENT OFFICE.

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ORNAMENTING AND PROTECTING METAL SURFACES.

1,370,967.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, OSCAR HOMMEL, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, a citizen of the United States, have invented or discovered certain new and useful Improvements in Ornamenting and Protecting Metal Surfaces, of which improvements the following is a specification.

The invention described herein relates to an improvement in the method of the ornamenting of metal surfaces described and claimed in an application Serial Number 141,582 filed January 10th, 1917, and consists in forming thereon a thin film of another metal, such film having a bright lustrous surface of a coloring differing from that of the metal surface to which the film is applied. The invention is hereinafter more fully described and claimed.

In the practice of the invention, a salt of the metal of which the film is to be formed, in a finely divided condition, is applied in a thin or attenuated layer on the surface of the article to be ornamented, such surface being in a highly heated condition, *e. g.*, from about 450 to 750 degrees C. at the time of applying the salt, or brought to the high temperature mentioned after the salt has been applied. The salt employed should be of such a character as to be capable of being reduced to a metallic condition by the heat to which it is subjected. It has been found that the metallic film formed by the reduction of the salt, will adhere so tightly that the surface thus ornamented may be bent without injury to the film.

In ornamenting surfaces formed of aluminum or containing aluminum, a large variety of metallic salts may be employed, as for example, iron chlorid, gold sulfid, uranium nitrate, copper acetate, etc., or a mixture of two or more of such salts.

Generally the film should be quite thin, and to attain this result, the salt should be in as fine a state of division as possible, and the layers should be uniformly distributed on the surface of the article. These conditions can be attained conveniently by dissolving the metal or salt of the metal in liquid, and the solution thus formed sprayed onto the metal or spread thereon with a brush. If it is desired to form a design, a

pattern is formed of rubber, the solution applied thereto and then transferred to the metal surface.

The solvent employed should not chemically combine with the surface to which it is applied, but simply serve as a carrier. A convenient manner of preparing the salt for application to the metal surface consists in mixing the salt with resin and dissolving the mixture in a solvent, as turpentine. Generally what is known and sold as liquid metallic lusters may be employed for forming the layer on the surface of the metal article.

The desired lustrous effect is believed to be largely due to the attenuation of the metal film, and as the desired attenuation can be attained only by employing material in such a finely divided condition, to which it is impossible to reduce almost all metals, hence, a salt of the desired metal is dissolved in an inert carrier, which is applied to the surface of the article and the salt reduced to a metallic condition when the article, having the solution thereon, is subjected to a high temperature, as stated.

It has been found that if a foundation film consisting of a metal having an affinity for the metal of the article and that of the finishing film, the latter will withstand severe rubbing. In forming this foundation film, the salt of a metal having the characteristic above stated, is dissolved in a liquid which will not chemically combine with the surface of the article. For example, if it be desired to apply a gold film to the surface of an article, it is preferred to form the foundation film of bismuth and in such case nitrate of bismuth is employed to form the solution.

In order that the solution may have sufficient consistency to form a continuous layer over the surface to which it is applied, flour, ocher, or other neutral material is added to the solution which is then so applied to the surface of the article by spraying or otherwise as to form an attenuated continuous layer. The article with this layer thereon is subjected to sufficient heat to reduce the salt to a metallic state and the metal to form a thin continuous film on the surface. The material used to thicken the solution and any undissolved salt is brushed off and a

thin layer of the solution of the salt of the metal to which the final film is to be formed, is applied to the first or foundation film, as hereinbefore described and the article with such final layer thereon is subjected to sufficient heat to reduce all the salt held in solution on the article.

The attenuation of the film or films will be proportional to the quantity or thickness of the salt covering deposited on the evaporation of the solvent. The thickness of such salt covering will be dependent upon the degree of saturation of the solution so that by adjusting the degree of saturation of the solution, the thickness of the coating may be changed. If a relatively thick film or films are desired, successive applications of the respective solutions may be made, the second or third layer being applied after the preceding coat has dried or hardened.

In the practice of the method, a smooth polished lustrous surface is formed on the aluminum or metal containing aluminum, without any further treatment, and such surface or film becomes so much an integral part of the metal ornamented, that the latter can be brought to any desired shape by mechanical manipulation without cracking or injuring the film.

The method herein described is not the mere duplication of steps for the purpose of obtaining a thickness of film, for the latter can be obtained by applying a layer of the solution to the article, allowing such layer to dry or harden and then applying a second or third layer. The method herein described has the effect of producing a more durable and more firmly adherent film, which can not be effected by forming a plurality of layers of the solution and the reduction of the salt contained in such layers by a single heating.

I claim herein as my invention:

1. The method herein described of forming on the surface of an article containing aluminum, a smooth, polished surface of another metal, which consists in applying a solution of a metallic salt to the surface of an article containing aluminum in such manner as to produce a thin layer of the salt, and subjecting the article so coated to sufficient heat to effect a reduction of such salt and the

adherence of the metal so freed to the underlying metal.

2. The method herein described of forming on the surface of a metal article, a smooth polished surface of another metal, which consists in applying a solution of a metallic salt to the surface of the article in such manner as to form a thin continuous layer of the solution, subjecting the article so coated to sufficient heat to effect a reduction of the salt, and the adherence of the metal so freed to the surface of the article, applying another layer of a solution of a metallic salt to the surface of previously formed metallic film, and again subjecting the article to sufficient heat to effect a reduction of the salt in the second layer.

3. The method herein described of forming on the surface of a metal article, a smooth, polished surface of another metal, which consists in applying to the surface of the article a thin layer of a solution of the salt of a metal differing from that of which the article is formed, subjecting the article so coated to sufficient heat to effect a reduction of the salt and the adherence of the freed metal to the article, applying a layer of a solution of a salt of metal differing from that first employed to the previously formed film and again subjecting the article to a temperature sufficient to effect a reduction of the salt and the adherence of the freed metal to the article.

4. The method herein described of forming on the surface of a metal article, a smooth polished surface of another metal, which consists in applying to the surface of the article a thin layer of a solution of a salt of said coating material, subjecting the article so coated to sufficient heat to effect a reduction of the salt and the adherence of the freed metal to the article, applying a layer of a solution of a salt metal differing from that first employed to the previously formed film, and again subjecting the article to a temperature sufficient to effect a reduction of the salt and the adherence of the freed metal to the article.

In testimony whereof I have hereunto set my hand.

OSCAR HOMMEL.