UNITED STATES PATENT OFFICE.

ALEXDR. HENRY DUFRESNE, OF PARIS, FRANCE

IMPROVEMENT IN GILDING AND ORNAMENTING STEEL AND OTHER METALS.

Specification forming part of Letters Patent No. **17,140**, dated April 28, 1857.

To all whom it may concern:

Be it known that I, ALEXANDRE HENRY DUFRESNE, of No. 6 Rue de Sëze, Paris, in the Empire of France, and a subject of His Majesty Napoleon III, have invented or discovered an Improved Process for Gilding, Silvering, and Ornamenting Steel and other Metals; and I do hereby declare that the following is a full and exact description thereof.

My invention consists in the gilding, silvering, or ornamenting of metals incapable of direct amalgamation by means of the following processes:

First. The employment of one or several intermediate metals deposited either by chemical or electro-chemical agency on the metal to be gilded, silvered, or ornamented.

Second. The manual or mechanical application of a protecting matter—such as varnish, bitumen of Judæa, printer's ink, &c.—upon the intermediate metals to form the reserves to be gilded, silvered, or ornamented. These reserves may be produced by photographic means or by a general coating susceptible to light, such as bitumen of Judæa.

Third. The destruction of the intermediate unreserved metals by baths of different kinds—such as ammoniacal or acid solutions—according as it may be wished to preserve the polish or to act on the surface of the metal to be gilded, silvered, or ornamented for the production of flat or relief work.

Fourth. The removal of the protecting matters which have served to preserve the surfaces operated on.

Fifth. The gilding, silvering, or ornamenting of the surfaces thus prepared by means of the ordinary processes of amalgamation; and, finally, the volatilization of the mercury by heat.

These several processes being taken as the base of operation, I will now proceed to describe some of the more general applications, premising that the working details may be modified according to circumstances and the metals on which the deposit is to be effected.

To operate on iron or steel, a coating of copper is deposited on the one of these metals selected, which is then gilded or silvered by the ordinary processes of amalgamation, if it is intended to cover the entire surface.

To decorate or damasken either of these metals with designs in gold or silver on the iron or steel ground, or vice versa, I cover entirely the metal to be operated upon by a coating of copper by the ordinary means. On the copper surface thus prepared I form the required design by means of varnish, bitumen of Judæa, or other suitable protecting substance, and then immerse the object in a fresh bath of chromic acid, which dissolves the portions of the copper unprotected by the varnish, leaving intact the surface of the iron or steel. The varnish is then removed by means of hot turpentine, exposing thus a design in copper on the iron or steel ground. The object is then finished off and the gilding or ornamenting of the design effected, the mercury being volatilized by heat after the amalgamation in the ordinary way.

To operate on platina, I cover entirely with copper the object to be ornamented, and then form the design, as before stated. The unprotected parts of the copper are then dissolved out by nitric, sulphuric, chromic, or other suitable acid, and the varnish being removed, I gild or ornament by amalgamation, as for iron.

To operate on silver: The processes are in this case modified as follows: I deposit on the silver surface a triple metallic coating, thus: first, copper; second, iron; third, a second surface of copper. I form the reserves on this last coating of copper, and then destroy in succession the unreserved parts of the superposed metals, so that the iron, which presents itself on removal of the upper coating, prevents the mercury from attaching itself to the first copper or silver surface during the amalgamation. The iron is lastly removed by any suitable reagent. The object of interposing the iron between the two copper surfaces is to facilitate and shorten the operation by restraining the employment of the reserves to the surfaces to be gilted or ornamented, while by the present mode of operation the entire ground is protected.) This object is effectually attained by the agency of the chromic acid, which readily dissolves the copper without affecting the iron surface to the slightest extent.

Instead of interposing an iron coating between two coatings of copper, I can employ, and in most cases more advantageously, a surface of nickel or antimony, which is readily acted on by the chromic acid. In this case I remove the last surface of copper by an ammoniacal solution, which has the advantage of leaving the silver untouched. These intermediate metals may, however, vary according to circumstances.

Instead of forming the reserves by the hand

by means of protective varnishes, I can employ the ordinary processes of photography, heliography, or impression, either directly or by transfer, on the surface to be gilded, silvered, or ornamented, and am thus able to reproduce in the metallic state the most complicated arabesques and designs.

Having now described the nature of my said invention and the most convenient manner of putting it into execution, I wish it to be understood that I do not confine myself to the precise working details herein laid down, as the same may be modified according to the requirements of each operation without departing from the principle of the invention; but

What I claim is—

1. The application of gold and silver to metals incapable of direct amalgamation by means of the processes hereinbefore described.

2. The employment of photographic, heliographic, and printing processes for the production of the reserves on the metallic surfaces, to be operated on by the means hereinbefore described.

3. The use of chromic acid for the destruction of the nickel, copper, antimony, or other metal employed in these processes, as hereinbefore described.

In witness whereof I, the said ALEXANDRE HENRY DUFRESNE, have hereunto set my hand this 29th day of July, 1856.

A. HENRY DUFRESNE.

Witnesses:

J. W. F. WENNOUS, Jr.,

GEO. HUTTON.