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PROCESS OF PRODUCING METAL EMBOS-
ING FOILS

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This invention relates to metal embossing foils and their manufacture and has for its object an improved foil and process for making it.

Embossing foils consist of a layer of metal on a support such as paper or the substance sold under the registered trade-mark "Cellophane," with an intermediate layer of a substance such as wax, permitting the layer of metal to be detached from the support when the foil is heated, and an adhesive layer such as a layer of size on the face surface of the metal layer, adapted to cause the metal layer to stick to the article to be embossed. The metal employed is gold and its alloys, but foils of aluminium and silver have been made.

Embossing foils have usually been made by applying gold leaf to a waxed support and sizing the gold leaf. Embossing foils have been made with a layer of gold which is thinner than is possible to obtain by beating, by cathode deposition of the gold on a waxed support.

According to the invention, an embossing foil is made by enclosing the support and a supply of metal in a vacuum chamber and heating the metal to a temperature above its vaporization point at the pressure in the chamber, so as to deposit a film of metal on the support.

By this process, foils can be produced commercially of metals which cannot be beaten as gold is beaten, such as nickel, cobalt, chromium, aluminium bronzes, and of metals which cannot commercially be deposited by cathode discharge, such as aluminium, copper and the above mentioned metals and alloys. And, by the same apparatus and process, embossing foils can be made with a layer of precious metal, such as gold, platinum, palladium or their alloys on a layer of a comparatively cheap base metal.

In an embossing foil, the layer of metal must have a certain minimum thickness, and by producing a composite layer the necessary thickness of metal may be obtained with a lesser thickness of precious metal than is permissible in a layer of precious metal only, and thereby the cost of the foil is materially reduced.

The base metals used for the composite layer are, for the metal in contact with the precious metal, metals which do not become alloyed with it by diffusion and, for the metal which is in contact with the leather or other material to which the foil is applied, metals which are not attacked by the said material.

Base metals suitable for the composite layer cannot, at any rate commercially, be deposited by cathode deposition, because the rate of deposi-

tion is too slow, but by thermal deposition in vacuo, they can be deposited as rapidly as, for instance, gold.

Examples of metals suitable for a single layer foil, because they do not readily tarnish, are, gold, platinum, palladium and their alloys and cobalt, chromium, aluminium and aluminium bronzes. Examples of metals suitable for the base metal portion of a composite layer are nickel, cobalt, chromium and copper.

In carrying out the invention, the support is coated with a layer of wax or the like, and is then placed in a vacuum chamber having, preferably, means for continuous evacuation. The metal to be deposited is then heated to a temperature above its vaporization point at the pressure in the chamber, and thereby the deposition of a layer on the support is effected. If the foil is to have a layer of a single metal only, the deposition is continued until a layer of sufficient thickness to form an embossing foil has been deposited. If the foil is to have a composite layer of a precious and a base metal, the deposition of the precious metal is continued, for the sake of economy, for a shorter time, and the layer produced may be thinner than would give a satisfactory embossing on a rough surface, or than would retain the colour of the precious metal. The operation is then repeated in the same or a similar apparatus by depositing a base metal on the layer of precious metal. The layer of metal is then coated with size or other suitable adhesive.

The precious or base metal deposited may be an alloy and a composite layer may consist of a layer of precious metal and two different base metals. Thus a layer of copper or nickel may be deposited on the precious metal, and a layer of aluminium deposited on the copper or nickel. Thereby the precious metal is protected from any diffusion into it of the aluminium.

When the metal to be deposited is an alloy, it is heated to a temperature above the vaporization point, at the pressure employed, of the constituent of the alloy having the highest vaporization point, and the phrase "vaporization point of the metal" is to be understood herein as meaning the vaporization point of the constituent having the highest vaporization point, when the metal is an alloy.

A metal, however, may be deposited from a mixture with the metal of a metal having a substantially higher vaporization point, and the mixture is then heated to a temperature above the vaporization point of the metal to be de-

posited, but below that of the metal with which it is mixed.

Preferably the support is in the form of a roll which is unrolled from one bobbin onto another bobbin in the vacuum chamber during the process of deposition, and thereby the size of the vacuum chamber necessary for producing a large sheet of foil may be greatly reduced.

The thermal deposition of metals in vacuo, for the production of mirrors on glass, has been carried out commercially, and the process need not therefore be described in greater detail.

It is to be understood that the support on which the metal is deposited comprises the layer of material, such as wax, permitting the metal layer to be detached.

By the above described process a foil can be produced having a composite layer of metal, of which the thickness of the precious metal is less than 40 milli-microns, and the foil may have such a total thickness as to be suitable for embossing on rough materials.

Having described my invention, I declare that what I claim and desire to secure by Letters Patent is:

1. Process of producing a metal embossing foil, by coating a non-metallic support with a material adapted to release the support when heated, enclosing the coated support together with a supply of one of the group of metals consisting of gold, platinum, palladium, gold alloy, platinum alloy, palladium alloy, in a vacuum chamber, heating the metal to a temperature above its vaporization point at the pressure in the chamber so as to deposit a film of the metal on the coated support, then enclosing the support with metal film together with a supply of a base metal adapted to form a consistent film in a vacuum

chamber, heating the base metal to a temperature above its vaporization point at the pressure in the chamber so as to deposit a film of base metal on the precious metal and coating the base metal, after removal from the chamber, with an adhesive material.

2. Process of producing a metal embossing foil, by coating a non-metallic support with a material adapted to release the support when heated, enclosing the coated support together with a supply of one of the group of precious metals, consisting of gold, platinum, palladium, gold alloy, platinum alloy, palladium alloy, in a vacuum chamber, heating the metal to a temperature above its vaporization point at the pressure in the chamber so as to deposit a film of metal on the coated support, then enclosing the support with metal film together with a supply of a base metal adapted to form a consistent film in a vacuum chamber, heating the base metal to a temperature above its vaporization point at the pressure in the chamber so as to deposit a film of base metal on the precious metal, and, by the same process, depositing a film of a different base metal adapted to form a consistent film on the first base metal and coating the base metal, after removal from the chamber, with an adhesive material.

3. Process as claimed in claim 1 in which the base metal is one of the group of metals consisting of nickel, cobalt, chromium, copper.

4. Process as claimed in claim 2 in which the first base metal is one of the group of metals consisting of nickel, chromium, cobalt, copper, and the second base metal is one of the group of metals consisting of aluminium and its alloys.

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