

UNITED STATES PATENT OFFICE

1,995,225

METHOD OF PREVENTING TARNISHING OF METAL ARTICLES

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No Drawing. Application May 20, 1932, Serial No. 612,646. In Germany May 23, 1931

5 Claims. (Cl. 148—6)

My invention relates to means for preventing bright metal articles containing silver or silver alloys from tarnishing under the influence of the atmosphere and solids, liquids or gases contained therein.

It is an object of my invention to protect such metal articles from decoloration without interfering with the brightness and color of the original metal surface.

As is well known to those skilled in the art, silver, silver alloys and articles plated or covered with silver or its alloys become yellowish, brown and ultimately black under the influence of the traces of hydrogen sulfide always present in the atmosphere, and these traces also tarnish or discolor other metals including copper, nickel, zinc and tin.

In order to avoid this decoloration, it has been proposed to superficially coat such articles with a transparent and colorless varnish, but the results thereby obtained are little satisfactory as such coating, even if not worn off after a short while, is not capable of altogether preventing the tarnishing of the metal surfaces, and frequently also takes on a color of its own, thereby changing the apparent color of the metal.

Attempts have also been made to cover silver articles with metals such as rhodium, palladium, or chromium by electroplating, the thickness of the deposit being extremely low so that it remains translucent. Experience has however shown that the color of silver is changed by such metal coats in an unfavorable sense.

Still another method heretofore suggested consists in immersing silver or silver-plated articles in solutions which contain chlorine, bromine, or iodine, but the cover of silver halide formed thereby, if thick enough to prevent reaction between the metal and hydrogen sulfide, imparts to the article a yellowish or greyish color.

My invention is based on the discovery that the surfaces of silver alloys can be successfully protected against tarnishing by immersing them in a solution, which causes the formation of a layer which is altogether invisible but nevertheless fully protects the metal surface. Such solutions may contain inorganic oxygen compounds of chromium having a distinct oxidizing power such as chromic acid or chromates (bichromates).

In carrying out my invention I immerse the articles to be protected in a solution containing one or more of the compounds mentioned above in a suitable concentration and for a suitable period of time, the exact figures yielding the

best results depending on various circumstances. As a rule higher concentrated solutions require only a short immersion, and the conditions yielding the best results can be ascertained by simple tests.

In order to obtain a uniform covering of the metal articles with the protective layer it is necessary to provide for a wetting of the articles by the solution. I usually first remove any traces of fat adhering to the metal surface to be treated by means of a solvent such as ether, or by a solution of a caustic alkali or preferably by an electrolytic treatment of a well known kind according to which the metal article is inserted as cathode in an electrolytic circuit formed in a watery solution of an alkali compound.

In practising my invention I may for instance proceed as follows:—

Example 1

Silver articles or silver-plated articles are freed with ethyl ether from all traces of fat and are then immersed for one minute in a watery solution of chromic acid containing 0.5 grams CrO_3 per litre. The articles are then washed, preferably with water, and dried. They are now altogether proof against tarnishing, their original color and brightness remaining altogether unaltered.

Example 2

The metal articles to be protected are freed from fat by inserting them as cathodes in the electrolysis of caustic potash. They are then washed with water to remove adherent traces of the electrolyte and are then immersed during 3 to 6 minutes in a watery solution of potassium or sodium bichromate containing about 100 grams of one or both of these salts per litre. The articles are then further treated and ultimately display the same properties as those described with reference to Example 1.

In all cases the protective coating produced must be very thin, but still thick enough to allow careful polishing. Articles thus treated will stand the rubbing required for obtaining a fair polish without deterioration of the protective coating.

While the most important field of application of this invention appears to be the protection of silver and silver-plated surfaces, I have found it also highly useful in the protection of German silver, nickel and platinum surfaces.

I am unable to state with any certainty the character of the protective coating formed by

this treatment. When using a solution of chromic acid or a bichromate, which I have found to yield by far the best results, I believe that there is formed a fine layer of silver chromate, which
5 may or may not be covered with a layer of chromium chromate. However, this is a merely hypothetical assumption.

Various changes may be made in the details disclosed in the foregoing specification without
10 departing from the invention or sacrificing the advantages thereof.

I claim:—

1. The method of preventing surfaces containing silver from tarnishing under the influence
15 of gases containing hydrogen sulfide comprising treating such surfaces with a watery solution of an inorganic chromium oxygen compound.

2. The method of preventing surfaces containing silver from tarnishing under the influence of
20 gases containing hydrogen sulfide comprising

treating such surfaces with a watery solution of chromic acid.

3. The method of preventing surfaces containing silver from tarnishing under the influence
5 of gases containing hydrogen sulfide comprising treating such surfaces with a watery solution of a chromate.

4. The method of preventing surfaces containing silver from tarnishing under the influence
10 of gases containing hydrogen sulfide comprising treating such surfaces with a watery solution of a bichromate.

5. A process of treating an article possessing an exposed surface of silver to render it tarnish
15 resistant which consists in immersing it in a solution of a metallic chromate until a thin transparent layer of silver chromate has been deposited on said silver surface.

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