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PEN POINT

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1 Claim. (Cl. 120—109)

This invention relates to an improved pen point.

The invention is particularly concerned with the production of pen points of the type comprising a base composed of a chromium alloy steel having an electrolytically-deposited gold plate thereon, whereby to secure an article which is not only highly acid resistant but which is further inexpensive as compared with solid gold pens.

In considering some of the objects of the invention it is first pointed out that heretofore it has been proposed to apply a gold plate to a chromium alloy steel pen point by immersing the pen in a plating bath containing free hydrocyanic acid, a full disclosure of such a process appearing in my copending application Serial No. 21,190, filed May 13, 1935, issued May 5, 1936, as Patent No. 2,039,328.

In accordance with the present invention, the pen is produced by first depositing a layer of highly acid resistant metal such as platinum or rhodium, on top of which is deposited a layer of gold in order to secure the desired gold surface and appearance.

I have found that certain metals, such as platinum and rhodium, may be deposited on a chromium alloy steel (when following the procedure hereinafter more fully discussed) without the use of free hydrocyanic acid which, of course, is difficult and dangerous to handle.

Thus, in accordance with the present invention, an under-coating of a metal is first applied to the pen, the said under-coating being capable of being deposited without the use of free hydrocyanic acid and further having such characteristics as to make it highly acid resistant or corrosion proof, this being of importance because of the porosity of the gold plating applied as the outer coat or upon wear thereof to expose the metal of the base, and in order to resist attack by acid and other corroding ingredients frequently found in commercial inks.

In practicing the invention I prefer to employ as the base of the pen, a so-called "stainless" steel which may be composed, for example, of 18% chromium, 8% nickel and the balance iron. I prefer to use an alloy also containing about 2½% molybdenum, this being especially effective in resisting corrosion under the influence of certain conditions encountered in use.

As to the nature of the process it is pointed out that I have found that the plating solution should have a relatively low hydrogen ion concentration. In other words, this solution should preferably be slightly acid, although the condition of the solution, as to acidity, is not critical. In general the solution may range in acidity from a point approximating neutrality to a point at which the deposit noticeably loses adherence.

A suitable platinum plating solution may be made up of the following ingredients in the approximate proportions indicated:

To each gallon of water add—

Platinum chloride	12 pwt.
Ammonium phosphate	6 ounces
Sodium phosphate	32 ounces

A suitable rhodium solution may be made up of the following ingredients in the approximate proportions indicated:

To each gallon of water add—

Rhodium sulphate	8 grams

The solution should also contain a slight amount of free sulphuric acid.

Regardless of which solution is being employed, I prefer to proceed as follows:

The pens are first treated with hydrochloric acid in order to dissolve the oxide film which normally forms on the surface of chromium alloy steels. This may be done by dipping the pens in a relatively concentrated hydrochloric acid solution containing, for example, from about 25% to about 50% hydrochloric acid.

Following this the pens may, although not essentially, be rinsed either in pure water or in a dilute hydrochloric acid rinse containing from about 10% to about 15% hydrochloric acid. Whether or not the washing step is employed, the pens should very promptly be placed in the plating solution, the rapidity of transfer from one bath to another being of importance in order to avoid re-formation of the oxide film.

I have further found that the cathode connection should be applied to the pens prior to immersion in the plating bath. If this is not done, the deposit is not adherent, the reason for this possibly being that some constituent of the alloy being plated is electropositive with reference to the platinum or rhodium. Under these circumstances an immersion deposit which is not highly adherent may therefore be produced before the current is passed through the solution and the pens being plated. On the other hand it may be that if the pens are immersed any appreciable interval of time prior to the application of the current, the solution would have a tendency to reoxidize the surface of the articles before the deposit is made. This condition might be aggravated when employing plating solutions approximating neutrality.

In any event, the most adherent deposit is secured by completing the cathode connection prior to immersion of the pens in the plating solution.

Following this plating operation, the pens are then placed in a gold plating solution which may be of the usual cyanide type, prepared, for example, in accordance with the following:

To each gallon of water add—

Sodium gold cyanide	½ ounce
Sodium cyanide	2½ ounces

In accordance with the foregoing, it will be seen that the invention provides for the production of a relatively inexpensive pen having gold surface and appearance which pen is at the same time highly acid resistant because of the nature of the materials employed and which pen may further be produced without employing free hydrocyanic acid in any plating bath.

While I have referred to an under-coating of platinum in the appended claims, it is to be understood that I intend to include within the scope of my protection any metal which can be used equivalently. A metal suitable for the under-coating of my invention should have the following characteristics: (*a*) a high degree of corrosion resistance, (*b*) should be capable of being deposited on a chromium alloy steel without the use of free hydrocyanic acid, and (*c*) be one upon which an adherent gold deposit may be secured, also without the use of free hydrocyanic acid.

I claim:—

As an article of manufacture, a pen point comprising a base composed of a chromium alloy steel, the pen having an adherent electrolytically-deposited layer of platinum thereon and an adherent electrolytically-deposited layer of gold on the platinum deposit.

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