

May 16, 1933.

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COATED CELLULOSIC PLASTIC

1,909,795

Filed Jan. 25, 1930

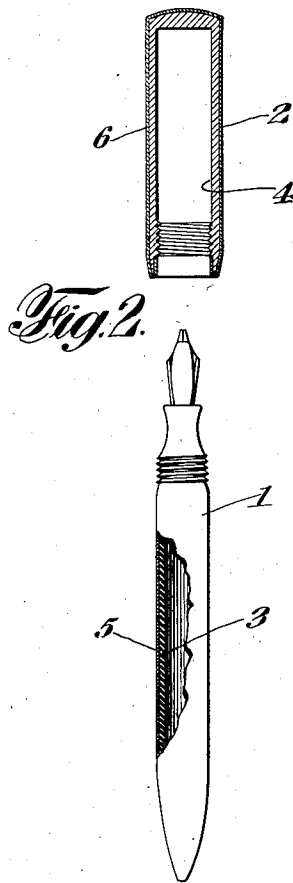
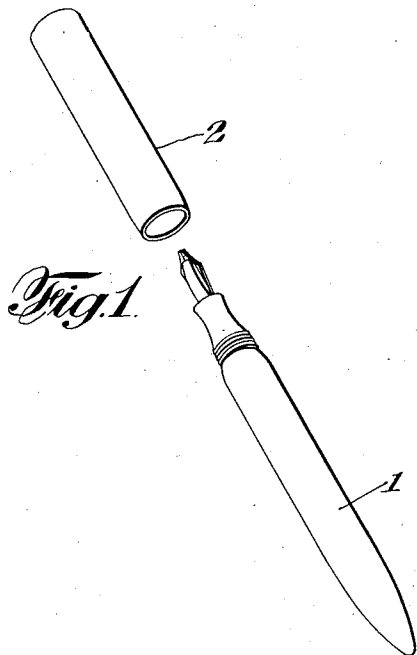


Fig. 3.

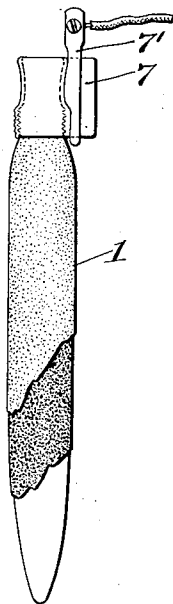


Fig. 4.

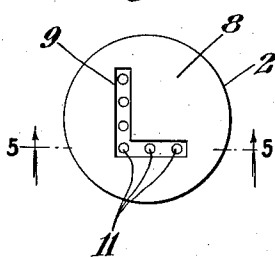
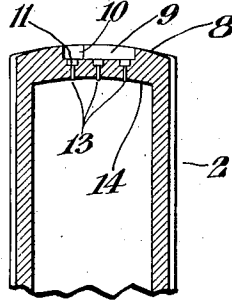


Fig. 5.



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## COATED CELLULOSIC PLASTIC

Application filed January 25, 1930. Serial No. 423,430.

This invention pertains to the general class of cellulosic plastics and particularly to cellulosic plastics coated with metallic substances.

5 This invention pertains more particularly to the coating of thermoplastics by means of electrolytically deposited metallic substances, an object of the invention being the employment of a thermoplastic as a base to support a film of any desired thickness of  
10 any suitable metal or alloy.

A further object of the invention is the production of articles of low cost, of light weight, and having metallic surfaces for decorative as well as other purposes.

15 A further object of our invention is to provide means for coating cellulosic plastics that is simple in operation, highly efficient, economical in use, and otherwise highly satisfactory for its intended purpose.

Further objects and advantages will become apparent to persons skilled in the art as the specification proceeds.

25 Our invention comprises coating cellulosic plastic articles with metals by electrolytic means. In carrying out our invention a cathode is formed upon the article by means of a suitable substance capable of conducting an electric current such as plater's graphite, sprayed metal etc. Any portions to be  
30 left uncoated are, of course, not covered with the conducting substance which forms the cathode, and such portions are preferably coated with a substance which is inert in the particular electrolyte used, and which does  
35 not react to electroplating operations. Waxes are very suitable for this purpose.

40 In the event that the surface to be coated is not of such a configuration as to securely anchor the coating of metal in place, other means for anchoring the deposited metal may be resorted to such as securing anchoring  
45 plugs or surfaces of metal in or on the surface of the cellulosic plastic, or forming a depression of the desired configuration in the surface of the cellulosic plastic and providing metallic anchoring means in such depression, or forming the borders of such depression with a bezel of under-cut groove, or

any other means may be resorted to for anchoring the deposited coating in place.

Referring to the drawing wherein like reference characters are appended to like parts in the various figures,

55 Figure 1 is a perspective view of a fountain pen having the cap removed therefrom.

Figure 2 is an elevation partly in section of a fountain pen body and cap.

60 Figure 3 is an elevation illustrating means for making electric contact with the cathode.

Figure 4 is a plan view of a fountain pen cap in enlarged scale.

Figure 5 is a sections on line 5—5 of Figure 4.

65 Referring to Figures 1 and 2, at 1 is shown a fountain pen body adapted to receive a cap 2. The body 1 and cap 2 are made up of base 3 and base 4 respectively, and coating 5 and coating 6 respectively. Base 3 and  
70 base 4 are formed of cellulosic plastic and may be made by any means known in the art of fountain pen manufacture. After having been given the desired surface contour and configuration, base 3 and base 4  
75 are coated with a cathode forming substance such as plater's graphite or sprayed metal. The cathode may be applied directly to the surface of the cellulosic plastic. However,  
80 in most instances, we prefer to first coat the cellulosic plastic with a substance inert in the electrolyte used, and which does not react to electroplating operations, such as wax, and then apply the cathode forming material thereto. We find paraffin very suitable  
85 for this purpose. This procedure is particularly preferred in those instances where the electrolyte and/or the electroplating operations tend to attack the surface of the cellulosic plastic.

90 At 7 in Figure 3 is shown one way of making contact with the cathode formed on the outer surface of the fountain pen barrel 1 and comprises a strip of foil wrapped about the upper end of the barrel and over the  
95 cathode. Electrical contact with the foil 7, can be readily made by means of the terminal 7'. This particular means of contacting the cathode is particularly useful in those cases in which the threads have already been  
100

formed, inasmuch as no metal is deposited on the part of the pen covered by the foil.

We prefer to form the cathode by first roughening the surface of the cellulosic plastic by any means such as with an abrasive. Emery cloth is very useful for this purpose. Solid paraffin wax is then applied and worked thoroughly into the roughened parts. For this purpose the wax is preferably semi-soft. We find that the temperature of the hand is sufficient for this purpose and that the wax may be applied with the fingers. It is of course, understood, that any suitable tool which may be warmed if desired may be used for this purpose. Any excess wax may be removed by any means, such as rubbing with a felt cloth.

The plater's graphite is now applied preferably while the wax is in a softened condition, such that the graphite particles will readily be bound to it. We find that for paraffin wax, a temperature of approximately 30° C. is very useful for this purpose. The graphite may be applied to the wax by any means such as with a dry brush, etc. After the cathode is formed, electric contact may be made with same by any desired means. Many devices for this purpose will readily suggest themselves to persons skilled in the art and familiar with our invention.

Portions which are not to be plated may be coated with the electrolytically inert material only.

Contact is made with the electric circuit by means of a clamp or other attachable means such as metal foil, etc. and each article is preferably separately submerged in the electrolyte. It is, of course, obvious that a plurality of articles may be submerged at one time. However, we prefer to separately connect each individual cathode to the electric circuit. For this purpose a block of electrolytically inert material, having a plurality of suitable clamps may be provided.

After the desired coating of metal or desired order of different metals have been deposited, the article or articles are withdrawn from the electrolyte, are preferably washed in water or other liquid to remove the film of electrolyte, and may then be polished or otherwise processed as desired.

Because of its low cost and its ready adaptability to electroplating operations, we in many instances, prefer to start plating with copper and then end up with some metal such as nickel, silver, gold, platinum or other precious metal, alloys of the precious metals, etc.

Fountain pens having an average diameter of 1.2 cm. and an approximate length of 9 cm. with surfaces of approximately 32 square centimeters have been plated as follows:

After applying the wax and the formation of the cathode, the pens were placed in the

electrolyte and plating was started with the low current of about 0.1 amperes. After the copper had started to spread over an area of about 1/2 to 1 square centimeter, the current was raised to about 0.2 to 0.25 amperes. When a complete pen film had formed, the current was raised to 0.5 to 0.7 amperes. Care must be taken to avoid much higher currents, inasmuch as the probability of forming spongy deposits greatly increases above this point.

Any thickness of copper may be formed as desired. Upon the formation of the desired thickness, we prefer to finish coating with a flash of some precious metal such as silver, gold, platinum, etc. The coating of precious metal, of course, may be of any desired thickness. The finished article may be processed by any means such as buffing, polishing, etc. Care must be taken, however, to avoid undue expansion of the base, due to change in temperature, particularly in those cases in which the coating is relatively thin in order to avoid cracking of same. Before the second metal is applied, the surface of the first metal is preferably cleaned and buffed.

In Figures 4 and 5 is shown a means whereby electrolytically deposited coatings may be anchored to cellulosic plastics. Such anchoring is desired in those cases in which the configuration of a coating is not such as to bind itself firmly to the article. At 8 is shown the top of a fountain pen considerably enlarged. 9 is a depression of any desired depth which it is desired to fill, under-fill or over-fill with a metal or metals. The depression, merely for the purposes of illustration, is in the form of the letter L and may be provided with a bezel or under-cut groove, not shown, around its borders. To deposit metal in the depression 9 it is merely necessary to coat the same with a cathode forming substance which may be applied either directly to the cellulosic plastic or to the surface of an electrolytically inert substance such as wax on the surface of the cellulosic plastic. All surfaces not to be coated are preferably coated with an electrolytically inert substance. Contact with the electric circuit may be made with any suitable means such as a metallic rod not shown, inserted in the cap and contacting the anchoring means. The article is then dipped in the electrolyte, and any desired thickness of coating or coatings may be applied. The surface of the deposited metal may, of course, be below, above or flush with the surface of the article as desired.

In Figure 4 is shown suitable anchored means. The depression 9 has side walls 10 which may or may not be under-cut. Anchoring lugs 11 of a suitable metal are securely set in the floor of the depression 9. Stems 13 on lugs 11 may project slightly beyond

the inner wall 14 of the cap 2. Sufficient space, however, should be allowed for free movement of the pen point. The upper surfaces of the lugs 11 are, of course, exposed and are not coated with either the cathode forming substance or the electrolytically inert material. The lugs 11, however, are made a part of the cathode. This is accomplished by bringing the cathode forming substance up to and in contact with the edges thereof. The first coating is thus firmly united to the lugs 11, which in turn are anchored to the article and the metal is thus firmly held in place.

While this invention has been described as being applied to a fountain pen, it is of course, obvious that the configuration or nature of the article itself is immaterial, and that the invention may be applied to cellulosic plastic articles without limit.

By the term "cellulosic plastics" is meant plastics made with cellulose nitrate, cellulose acetate, cellulose formate, cellulose propionate, cellulose butyrate, methyl cellulose, ethyl cellulose, benzyl cellulose, cellulose phthalate, etc. Of these, the plastics made with cellulose nitrate are preferred. The formation of plastics with these materials is well known in the art and is generally accomplished by means of the addition of a substance or substances commonly referred to as plasticizers. Camphor, dimethyl phthalate, diethyl phthalate, dibutyl phthalate, dibutyl tartrate, paraethyltoluol-sulphonamid, methyl salicylate, triphenyl phosphate, tricresyl phosphate, trinaphthyl phosphate, mono methyl exylene sulphonamid are examples.

These substances are generally combined by the aid of a volatile solvent as is well known, as well as the further processing necessary to bring these plastics into a condition suitable for the manufacture of articles.

Having described our invention it is obvious that many modifications may be made in the same within the scope of the claims without departing from the spirit of the invention.

We claim:

1. As a new article of manufacture, a fountain pen comprising a base of cellulosic plastic having a coating of electrolytically deposited metal anchored to the surface thereof.

2. As a new article of manufacture, a fountain pen comprising a base of cellulose nitrate plastic having a coating of electrolytically deposited metal anchored to the surface thereof.

In testimony whereof, we have hereunto subscribed our names.

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