Aug. 15, 1939 C. SCHUSTER 2,169,930

METHOD OF MAKING INLAID CELLULOSE PLASTIC BODIES

Filed Nov. 24, 1936

Fig. 1.

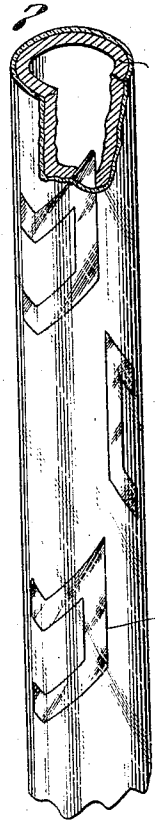


Fig. 2.

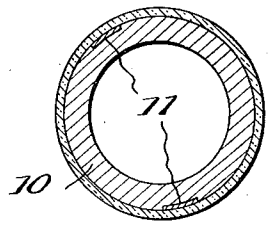


Fig. 3.

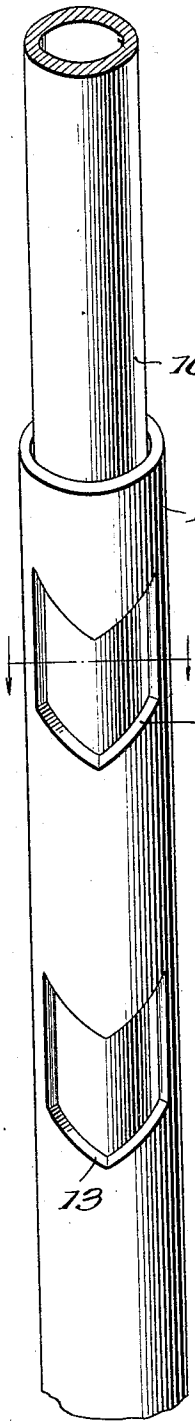


Fig. 4.

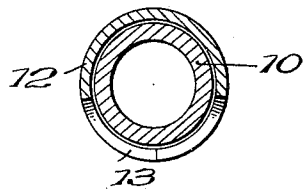


Fig. 5.

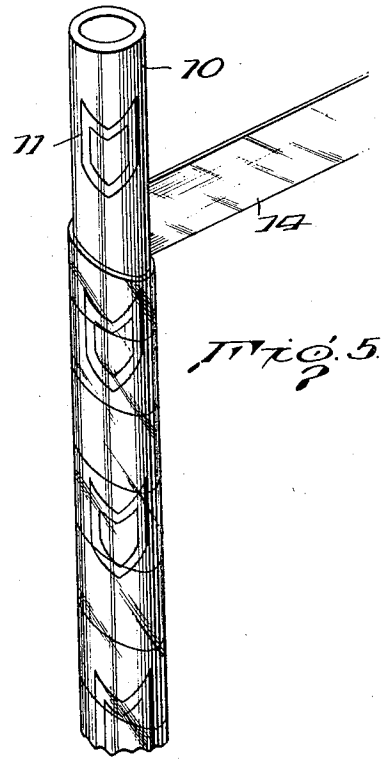
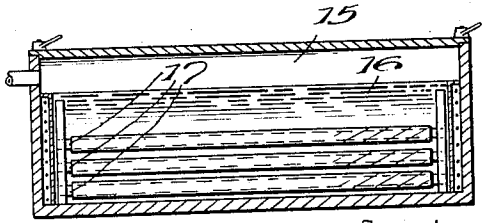


Fig. 6.



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UNITED STATES PATENT OFFICE

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METHOD OF MAKING INLAID CELLULOSE PLASTIC BODIES

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Application November 24, 1936, Serial No. 112,616

6 Claims. (Cl. 41—35)

This invention relates to improvements in cellulose plastic bodies, having on the surface thereof patterns formed of inlays of metal and the process of producing such bodies.

The principal object of the present invention is to provide a cellulose plastic body having inlays of metal or the like to provide on the surface thereof a pattern, and in which the individual elements constituting the pattern are not distorted or displaced so as to mar the uniformity of the pattern as a whole.

One of the problems in connection with inlaying such material is to prevent distortion of the pattern during the process of manufacture and another object of the present invention is to provide a novel process with which inlaying without such distortion can be accomplished at a low cost of manufacture.

More specifically, this invention contemplates tubes or rods of cellulose plastic provided with inlays of metal or the like to provide a pattern which will give an attractive appearance to the surface thereof.

A still further object of the invention is to produce an article of the nature described which is substantially free of what might be termed air pockets or bubbles. In the preferred embodiment of the invention, a sheath or covering of transparent material is applied to the body of cellulose plastic and metal inlays, and it is desirable that the formation of air pockets between these structural parts of the article be prevented or eliminated, if they should occur.

The pieces of metal or other material forming the inlays of the pattern, although visible, are not exposed at the surface of the finished article but are covered by a sheet or sheets of transparent Celluloid and a further object of the invention is to provide a method of applying the transparent Celluloid sheath whereby distortion or disturbance of the inlay elements forming the pattern is prevented.

With these and other objects in view, the invention consists in certain details of construction, and combinations and arrangements of parts, all as will hereinafter be more fully described and the novel features thereof particularly pointed out in the appended claims.

In the accompanying drawing, wherein the invention is illustrated in connection with the manufacture of fountain pens—

Figure 1 is a perspective view of a length of cellulose plastic material adapted to be formed into the barrel of the fountain pen, portions being broken away to more clearly illustrate the inlay and exterior wrapping;

Fig. 2 is a cross-sectional view of the barrel illustrated in Fig. 1;

Fig. 3 is a perspective view of a tubular member used for placement of the pattern elements or inlays on the barrel, the barrel being shown as partially inserted within said tube;

Fig. 4 is a cross-sectional view on the line 4—4 of Fig. 3;

Fig. 5 is a diagrammatical illustration of that step of the process during which the sheath or covering is wrapped on the barrel; and

Fig. 6 is a similar view illustrating one mode of consolidating the barrel, the inlay and sheath, and eliminating air pockets or bubbles.

In carrying out the present invention, a rod or tube, depending upon the nature of the article to be produced, is formed up from the cellulose plastic according to the usual methods employed in the working of a cellulose plastic material. The tube or rod may be either opaque or transparent. If a tube is to be employed in the production of the finished article, the tube thus formed will be sized internally by stretching on a mandrel while heated in a bath of hot water. For external sizing, whether a tube or rod be used, the same can be accomplished by grinding. As stated above, a tubular body 10, adapted for use in the manufacture of fountain pen barrels is illustrated in the present instance. The pattern for decorating or giving an attractive surface to the finished article is composed of a plurality of individual elements 11 of sheet metal, such as gold, brass, silver, or any other material, according to the decorative effect desired. The individual elements are prepared by punching, or otherwise, into the desired design to produce the composite pattern when applied to the surface of the tube or barrel. These metal inlay elements are preferably between .003 to .010 of an inch in thickness, but it is desirable that the metal should be kept flat in cutting or punching, so that kinking or curling will be prevented. In some cases, it may be desirable to flatten the pieces or pattern elements after they have been cut or punched out, so as to take out any kinks caused by the punching operation. The pieces or inlay elements, after being cut to the desired configuration, are then preformed around a mandrel to impart to them a curvature corresponding to that of the surface of a cellulose plastic body to which they are to be applied.

In order to assist in the placement of the individual inlay elements on the surface of the cellu-

lose plastic body and to insure regularity in the relative positioning of the several elements constituting the pattern, there is employed a gauge, in the form of a metal tube, having an internal diameter somewhat greater than the external diameter of the cellulose plastic body. Such a tube is illustrated at 12 in Fig. 3 and, as shown, said tube is provided with openings 13 corresponding in number and shape to the pattern formed collectively by the several inlay elements 11, the several openings being located at the proper points at which the individual inlay elements are to be applied to the body or barrel 10. This tube gauge 12 is adapted to be slipped over the barrel 10 and a suitable solvent for the cellulose plastic material is then applied to the barrel through the openings in the gauge tube, after which the metal inserts or inlays are applied to the barrel through the openings and adhere to the barrel by reason of the effect of the solvent on the barrel surface. The inlay elements having been thus applied in their proper locations, the gauge is then removed. This can be easily accomplished without distorting or disturbing the inlay elements by reason of the clearance between the interior of the gauge tube and the barrel, this clearance being in excess of the thickness of the metal inlay elements.

After the removal of the gauge tube from the barrel with the latter carrying the metal inlay elements, the next step is to apply a cover or sheath of transparent cellulose plastic material thereto. In carrying out this step, it is quite important that the relative positions of the several inlay elements constituting the pattern be not disturbed or that the elements themselves be not distorted. It has been found that this can best be accomplished by preparing a strip of transparent celluloid according to usual methods, said strip being about one inch wide and from .010 to .025 of an inch in thickness, and wrapping this strip spirally around the barrel and inlay elements. In accordance with the usual practice in the art, this strip, denoted at 14, is moistened with cellulose plastic solvent as it is wrapped spirally around the barrel and, if desired, the starting end of the strip may be clamped to the barrel. Preferably, pressure is applied while wrapping the strip about the barrel, as by tensioning the strip to secure the desired pressure. This tensioning or pressure is sufficient to cause the strip to be cemented to the barrel and to cause the edge portions of the strip, which are wrapped to abut each other, to be cemented together. In addition to the pressure or tensioning of the strip assisting in the cementing of the same to the barrel, it has also been found that the application of pressure during this step tends to prevent or eliminate the formation of air pockets or bubbles at points between the barrel surface proper and the inlay elements and sheathing or between the surfaces of the inlay elements and the sheathing. In other words, the application of the solvent to the surfaces of the cellulose plastic materials and the pressure exerted during the wrapping step, causes said materials to merge or consolidate into a substantially integral mass free of air pockets or bubbles. However, if desired, the presence of air pockets or bubbles in the finished article can be absolutely precluded by further treatment of the article. In other words, if, after the spiral wrapping of the strip on the barrel has been completed, it is thought that there is a possibility of bubbles or air pockets occurring beneath the sheath of transparent material, the wrapped body can be subjected to pressure and heat in a suitable apparatus to further insure consolidation of the barrel and sheath into a substantially integral mass in which the metal inlay elements are embedded. The apparatus for carrying out this step, known as a "debubbleizer", is illustrated in Fig. 6, wherein there is diagrammatically illustrated a compartment 15 in which the wrapped barrel or other article is immersed in a body of water 16. The compartment 15 is adapted to be sealed and the water heated to a temperature of about 150° to 212° F., and hydraulic pressure applied to the heated water. The heat and the pressure will, of course, be transmitted through the water to the wrapped articles and will serve to consolidate the outer wrapping or sheath of transparent material with the wrapped body. This effectively removes all air pockets or bubbles. As indicated, this may be said to be a supplementary step for the elimination of air pockets and bubbles, as it is believed, in most cases, the formation of air pockets or bubbles can be effectively prevented by the use of pressure during the step of spirally wrapping the strip of transparent sheathing on the barrel or other body 10. If desired, mandrels 17 may be inserted in the barrels for the purpose of supporting them when immersed in the body of water 16, as well as for preventing distortion during this step of consolidation.

The wrapped tubes or rods are then seasoned, by drying, for a suitable period of time, and at the proper temperature until substantially all of the excess solvent has been evaporated. In the case of tubular bodies, such as the barrel 10, they are again subjected to an internal sizing operation by stretching on a mandrel after heating in a bath of hot water. Both tubes and rods are also subjected to another external sizing operation by grinding.

As above indicated, one problem encountered in the decoration of the surfaces of cellulose plastic bodies with inlay elements has been the difficulty of maintaining the individual inlay elements in their proper relative positions after placement thereof on the surface of the body being decorated. The present process or method completely solves this problem, because the use of the so-called placement tube 12 insures the individual elements being properly positioned with respect to one another originally and the clearance provided between said tube and the body being decorated permits said tube to be removed without disturbing the inlay elements. Likewise, the next, or covering, step, wherein a strip of transparent cellulose material is wrapped spirally around the body, can also be carried out without danger of marring the design of the pattern by disturbing any of the individual inlay elements. As a result, the finished article has its surface decorated with a composite pattern, wherein the several individual elements thereof are uniformly distributed or located with respect to one another. It will also be appreciated that the use of the gauge tube 12 may be dispensed with under certain circumstances.

What I claim is:

1. The process of producing a body of cellulose plastic material having a pattern formed by a plurality of elements on the surface thereof which comprises forming perforations in a tubular member, said perforations corresponding to the design to be imposed on said body, inserting said body within said tubular member, applying a solvent for said material to the areas of said body

exposed through said perforations, applying said elements to said areas through said perforations, removing said tubular member from said body, and applying a transparent sheath to said body.

2. The process of producing a body of cellulose plastic material having a pattern formed by a plurality of elements on the surface thereof which comprises forming perforations in a tubular member, said perforations corresponding to the design to be imposed on said body, inserting said body within said tubular member, applying a solvent for said material to the areas of said body exposed through said perforations, applying said elements to said areas through said perforations, removing said tubular member from said body, wrapping a length of transparent material spirally around said body with the edges of said strip abutting, and consolidating said body, elements and strip to eliminate air pockets.

3. The process of producing a cylindrical body of cellulose plastic material having a pattern on the surface thereof formed by a plurality of metallic elements of desired design, which consists in forming perforations in a tube of greater interior diameter than the exterior diameter of said body, said perforations corresponding individually to the design of said elements and collectively to said pattern, inserting said body within said tube with a clearance between the tube and body, applying a solvent to the areas of said body exposed through said perforations, applying the metallic elements to said areas through said perforations, removing said tube while maintaining the clearance between the same to prevent disturbance of said pattern elements, and securing a transparent sheathing over said body and elements.

4. The process of producing a cylindrical body of cellulose plastic material having a pattern on the surface thereof formed by a plurality of metallic elements of desired design, which consists in forming perforations in a tube of greater interior diameter than the exterior diameter of said body, said perforations corresponding individually to the design of said elements and collectively to said pattern, inserting said body within said tube with a clearance between the tube and body, applying a solvent to the areas of said body exposed through said perforations, applying the metallic elements to said areas through said perforations, removing said tube while maintaining the clearance between the same to prevent disturbance of said pattern elements, securing a strip of transparent material over said body and pattern elements, said strip being disposed spirally of the body, and consolidating said body, elements and strip to eliminate air pockets.

5. The process of producing a cylindrical body of cellulose plastic material having a pattern on the surface thereof formed by a plurality of metallic elements of desired design, which consists in forming perforations in a tube of greater interior diameter than the exterior diameter of said body, said perforations corresponding individually to the design of said elements and collectively to said pattern, inserting said body within said tube with a clearance between the tube and body, applying a solvent to the areas of said body exposed through said perforations, applying the metallic elements to said areas through said perforations, removing said tube while maintaining the clearance between the same to prevent disturbance of said pattern elements, wrapping a strip of transparent material on said body to cover said body and pattern elements, immersing said covered body in a liquid, and applying heat and pressure to said liquid to eliminate air pockets in said article.

6. The process of producing a cylindrical body of cellulose plastic materal having a pattern on the surface thereof formed by a plurality of metallic elements of desired design, which consists in forming perforations in a tube of greater interior diameter than the exterior diameter of said body, said perforations corresponding individually to the design of said elements and collectively to said pattern, inserting said body within said tube with a clearance between the tube and body, applying a solvent to the areas of said body exposed through said perforations, applying the metallic elements to said areas through said perforations, removing said tube while maintaining the clearance between the same to prevent disturbance of said pattern elements, wrapping a strip of transparent material under tension spirally of said body to cover said body and pattern elements and to consolidate said body, elements and strip into a substantially integral mass free of air pockets.

CHARLES SCHUSTER.