UNITED STATES PATENT OFFICE.

JOHN A. McCLELLAND, OF LOUISVILLE, KENTUCKY, ASSIGNOR OF ONE-THIRD TO EUGENE W. JOHNSON, OF WASHINGTON, DISTRICT OF COLUMBIA.

METHOD OF TREATING AND ORNAMENTING PYROXYLINE COMPOUNDS.

SPECIFICATION forming part of Letters Patent No. 360,811, dated April 5, 1887.

Application filed May 26, 1886. Serial No. 203,307. (No specimens.)

To all whom it may concern:

Be it known that I, JOHN A. McCLELLAND, a citizen of the United States of America, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in the Method of Treating and Ornamenting Pyroxyline Compounds; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to certain new and useful improvements in the art of decorating articles made of pyroxyline dissolved in camphor or other gum, generically termed "celluloids," the purpose of such decoration being to produce an imitation of the grain of ivory or other natural products, as well as to produce figures or other designs upon the surface of the celluloid.

It has been a source of expensive and laborious experiment since the introduction of celluloid as an article of commerce to manufacture the same in such a way as more closely to resemble ivory. Up to the present time, so far as I am aware, it has not been found practicable to produce this imitation of ivory except by a marked increase in the expense of making the material. Various methods to accomplish the desired result have been suggested, differing very little from each other, so that the following description of a process now in use will serve to explain, generally, all the processes in vogue for the purpose: The pyroxyline, in the course of its manufacture into celluloid, has added to it a certain quantity of oxide of zinc or other suitable coloring-matter; but different quantities of celluloid are provided with different proportions of the coloring-matter, and thus the separate quantities will have different tints. After receiving the composition from the roll, small sheets are shaved off each composition and placed upon each other in alternate layers of lighter and darker celluloid. It is generally found necessary to apply a small quantity of camphor or alcohol, or both, to the surface of the sheets to insure their proper adhesion. The mass thus arranged is put into dies or presses and pressed into a compact cake. After the mass has hardened sufficiently sheets of greater or less thickness are cut transversely from the cake, which sheets will be found to present a grain resembling ivory very nearly as much as it resembles the grain of other natural products. The foregoing process is sometimes varied by tinting the surface of the various layers before pressing into a cake, in place of providing layers of various shades. This expensive, laborious, and, at the best, unsatisfactory method of procedure has been adopted principally because it seemed impossible to discover any means for applying an imitation of grain to the celluloid after its manufacture. It has been impossible to tint the surface in the necessary well-defined lines with the use of any known coloring-matter, for, although it might be successfully applied to the surface, it could not be prevented from spreading nor made permanent.

I have discovered a simple and effective way of decorating the surface of celluloid, so as to produce an imitation of the grain of ivory, as well as any other design of any required tint, which shall be permanent and yet shall not injure the article by softening or indenting the same.

My invention consists, broadly, in the treatment of the surface of celluloid when the same contains a coloring-matter—such as oxide of zinc—with an acid having the property of dissolving or otherwise changing the coloring-matter. This acid is preferably nitric acid or sulphuric acid, or a combination of both, sufficiently diluted. When applied to celluloid having oxide of zinc as a coloring-matter, the acid will dissolve and abstract the oxide of zinc at the point where it is applied, leaving a tint corresponding very nearly with the color of the pyroxyline composition, free from pigment. This tint closely resembles that of the grain-lines of ivory. I have found that by using proper care the acid may be applied in a minute line to the celluloid, dissolving or otherwise changing a minute quantity of pigment, and yet leave a distinct and well-defined line upon the surface. Of course the greater the quantity of pigment extracted the more pronounced will be the tint.

In order to assure the application of the acid in the proper design, and to prevent, by accident or otherwise, the discoloration of other parts of the surface, I have invented a method of treating the article, which consists in coating the surface with wax or other material having the property of resisting the action of the acid employed. I have found that paraffine-wax and in a less degree bees-wax and others are capable of use when nitric or sulphuric acid is employed. After coating the surface of the celluloid with the wax, preferably in a melted state, and after it has cooled, I cut into the same with an ordinary engraving-tool the design which I desire to produce upon the celluloid. In this proceeding the instrument should pass entirely through the wax coating; but it is preferable that it shall not cut into the celluloid. The acid is then applied to the entire surface, and will attack the exposed parts of the celluloid without discoloring the parts covered by the wax coating. The wax is provided merely for the purpose of protecting the surface of the celluloid, and may be applied in many ways besides the one above described, and may consist of other material than wax, the essential requirement being that it shall resist the action of the acid.

It may be found desirable, where another design besides graining is to be applied, to form the design upon paper, cutting it out in the necessary outline and besmearing one surface with paraffine-wax or other acid-resist and then applying it to the celluloid surface. Any medium of this nature having the characteristic of resisting the action of the acid, which I therefore prefer to designate by the generic term "resist," will come within the scope of my invention.

After the acid has remained for a sufficient length of time upon the celluloid, it is washed off with water, and then the resist is removed by rubbing it with a light oil or otherwise. The celluloid may then be polished in the usual manner. As the acid does not affect the pyroxyline proper, but only the coloring-matter, no indentation results from my process, but the surface is perfectly smooth.

It is sometimes desirable to apply a design as well as an imitation of grain to the celluloid surface, which may readily be done by first graining it according to my process, removing the resist, and then applying a new resist and design outline.

A third feature of my invention relates to the decoration of celluloid surfaces with designs which shall have positive colors. To accomplish this result I employ a resist which shall have the power of resisting the action of the acid, sulphuric ether, or other solvent used for the color, and cut out of the resist the design which it is desired shall appear. The coloring-matter is then applied to the entire surface, or so much thereof as may be thought advisable, and enters the unprotected surface of the celluloid, dissolving or otherwise changing the same and combining therewith without affecting the protected portion. After a sufficient time has elapsed the surplus of coloring-matter and the resist are washed off, leaving a permanent design upon the celluloid surface. It may be desirable to remove part of the pigment contained in the celluloid before coloring, which may readily be done by applying the acid as above described.

What I claim as new, and desire to secure by Letters Patent, is—

1. The process of decorating celluloid containing a pigment or coloring-matter, which consists in applying to the surface of the same in proper design an acid having the property of dissolving the pigment or coloring-matter, substantially as described.

2. The process of treating a celluloid article containing a pigment to decorate the same, which consists in coating the entire surface of the article with a resist not affected by the solvents of the pigment, removing part of the resist in the desired design, and then applying a solvent for the pigment, substantially in the manner and for the purpose specified.

3. The process herein described of applying a design in colors to celluloid containing a pigment, which consists in coating the surface with a resist, cutting out the resist so as to expose to the celluloid the proper design, applying a solvent of the pigment to the exposed celluloid, removing said solvent and then applying coloring-matter, with or without a new resist.

4. As a new article of manufacture, a celluloid composition having a superficial decoration in imitation of the grain of ivory, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN A. McCLELLAND.

Witnesses:
E. D. GRANT,
H. D. PULLEN.