

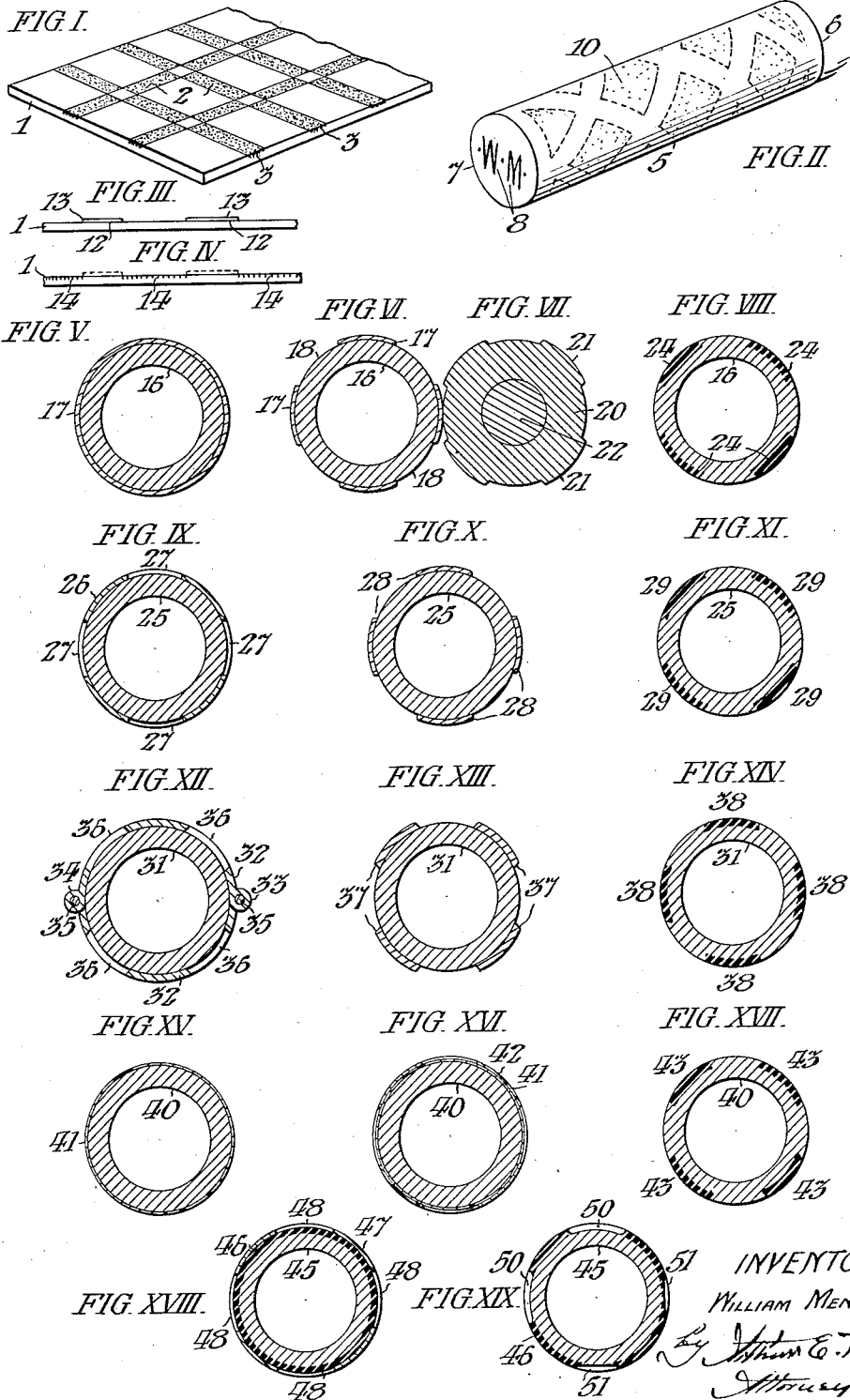
Oct. 25, 1932.

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1,884,068

PRODUCTS OF CELLULOID AND THE LIKE

Filed Jan. 2, 1929



UNITED STATES PATENT OFFICE

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PRODUCTS OF CELLULOID AND THE LIKE

Application filed January 2, 1929. Serial No. 329,686.

My invention relates to products of cellulose, such as celluloid, cellulose nitrate, cellulose acetate, and the like. In accordance with the ordinary methods of manufacture, such products, for commerce, are primarily formed in substantially plane rectangular molded slabs 5" x 21" x 51"; commercial sheets of celluloid being shaved from such slabs, of any desired thickness, and trimmed to 20" x 50". For most commercial uses, such slabs are formed from celluloid of a uniform color thruout their mass. However, there is a limited demand for celluloid presenting a mosaic appearance, and slabs for that use are formed of an aggregate of initially separate pieces of different colors or textures of cellulose or the like which are joined by compressing the aggregate while the material is softened with any suitable solvent. (For instance, acetone for celluloid and cellulose nitrate, and ethyl acetate, or a mixture of alcohol and ether for cellulose acetate.

Perhaps the principal use of such mosaic materials is for the tubular bodies and caps for fountain pens, pencils, and the like. Such tubes may be formed by rolling comparatively thin sheets shaved from a slab of the aggregate of the different pieces above contemplated, but, as such material is more or less translucent, the mosaic appearance of the outer convolutions of such tubes is blurred by the different arrangement of the pieces in the contiguous convolutions. Therefore, it is the usual practice to form such tubes, of mosaic appearance, by cutting such slabs into bars and turning the outer surface thereof to cylindrical form and boring such bars in coaxial relation with their outer surfaces. It is obvious that such a complicated method of manufacture is extremely costly. For instance, such mosaic material, in its primary form, costs approximately five times as much as the ordinary material of uniform color or texture, and fountain pens including holders and caps of the turned and bored type cost from \$7.50 to \$10.00 each, retail.

Therefore, it is the purpose and effect of my invention to produce celluloid and the

like, having such mosaic or other pattern appearance in the completed article, but at minimum cost, in comparison with the cost of such articles made in the manner aforesaid characteristic of the prior art.

As hereinafter described, it is characteristic of my invention that celluloid or the like, of uniform color or texture, or both, made by the least costly method and means known to the prior art, are caused to present the desired mosaic appearance by dyeing the material either in the form of the commercial plane sheets shaved from the primarily molded slabs above contemplated, or after the material is reduced to cylindrical, tubular, or other form, by any suitable method or means. As hereinafter described, such dyeing differs from a mere coating of the material contemplated such as may be effected by painting or spraying operations, in that the coloring may be caused to penetrate the mass of the material to any desired depth and effects the desired changes therein to such depth that it is impossible to eliminate the mosaic effect by any ordinary erosion of the outer surface where it is presented.

My invention not only enables the production of such mosaic effects as have been hitherto known in the trade at much less cost than by the ordinary means aforesaid; but permits the production of many other and more beautiful effects than is possible by mere aggregation of pieces of the material, as above contemplated. For instance, the demarcation between adjoining regions of different colors, or textures, or both, may be made extremely clear and sharp, or be gradated in shades and tints from one to the other.

My invention includes the various novel features of construction, arrangement, and method of procedure hereinafter more definitely specified.

In said drawing; Fig. I is a perspective view of a fragment of a sheet, shaved from a slab of material of the cheap uniform character aforesaid to which dye has been applied upon the top surface to produce a pattern effect.

Fig. II is a cylinder dyed to present a mo-

saic and other pattern appearance upon its outer surface.

Fig. III is an edge view of a piece of plane cheap celluloid or the like, having regions in spaced relation upon one face thereof, covered and protected by dye resisting material.

Fig. IV is a view indicating the piece of material shown in Fig. III, but after it has been subjected to the dyeing operation and the dye resisting material removed therefrom.

Fig. V shows a cross sectional view of a cylindrical tube of celluloid or the like, having a continuous coating of dye resisting material, such as wax, upon the outer face thereof.

Fig. VI is a cross sectional view similar to Fig. V, but showing portions of the dye resisting material removed to form a pattern.

Fig. VII is a cross sectional view of a rotary pattern device adapted for forming the pattern indicated in Fig. VI, by rolling contact with the tube shown in Fig. V.

Fig. VIII is a cross sectional view of the tube shown in Figs. V and VI, after it has been dyed with the desired pattern and the dye resisting material removed therefrom.

Fig. IX is a cross sectional view of a tube of celluloid or the like, provided with a cover of paper or the like, perforated to form the desired pattern.

Fig. X is a cross sectional view of the tube shown in Fig. IX, after dye resisting material, such as wax, has been applied thereto thru the perforations of the pattern cover shown in Fig. IX and such pattern cover removed.

Fig. XI is a cross sectional view of the tube shown in Figs. IX and X, after it has been dyed and the dye resisting material has been removed.

Fig. XII is a cross sectional view of a tube of celluloid or the like, in a pattern casing formed of perforated hingedly connected metal parts.

Fig. XIII is a cross sectional view of the tube shown in Fig. XII, after dye resisting material, such as wax, has been applied thereto thru the perforations of the pattern casing shown in Fig. XII, and such casing removed.

Fig. XIV is a cross sectional view of the tube shown in Figs. XII and XIII, after it has been dyed and the dye resisting material removed therefrom.

Fig. XV is a cross sectional view of a tube of celluloid or the like, coated with a film of photographic character in that it is capable of being affected by exposure to light, to render the exposed portions thereof dye resistant.

Fig. XVI is a cross sectional view of the tube shown in Fig. XV, with a pattern covering having regions penetrable by light to photographically print the desired pattern upon the film shown in Fig. XV.

Fig. XVII is a cross sectional view of the tube shown in Figs. XV and XVI, after it has been dyed and the film of dye resisting material removed from the outer surface thereof.

Fig. XVIII is a cross sectional view of a tube of celluloid or the like, dyed to a slight depth at its outer circumference.

Fig. XIX is a cross sectional view of the tube shown in Fig. XVIII, but with parts of its dyed surface removed by erosion.

Referring to Fig. I; the sheet 1, of celluloid or the like, has the pattern 2 formed thereon by dyeing the material of said sheet to a substantial depth, as indicated at 3, so that said sheet presents the same appearance as if it had been formed of primarily separate pieces of different colors aggregated as above contemplated.

Referring to Fig. II, the tube 5 of celluloid or the like, which may be a tubular cap for a fountain pen, which is open at the end 6 but closed at the end 7, has, upon its surface at the closed end, a pattern of letters 8, which may be the initials of the purchaser of the fountain pen, such pattern being formed by dyeing the same in accordance with my invention. The cylindrical surface of said article 5 has a mosaic pattern 10 formed thereon, by dyeing the same in accordance with my invention.

Referring to Figs. III and IV; the sheet 1 of celluloid or the like, has regions 12 in spaced relation upon one face thereof, covered and protected by dye resisting material 13 of any suitable character. For instance, it may be a film of paraffin or other wax; preferably a composition of half paraffin and half bees wax. The sheet thus protected, so that portions of its surface will not be dyed, has liquid dye applied thereto, with the effect that the dye penetrates the mass of the material 1 in regions 14 so as to present the desired pattern appearance, for instance, as indicated at 2 in Fig. I. The dye resisting material 13 may then be removed, either with a suitable solvent or by warming the sheet 1 and wiping such material 13 from it.

Referring to Figs. V to VIII inclusive; the tube 16 of celluloid or the like is coated with a film 17 of suitable dye resisting material. for instance, by dipping it in the melted wax composition and withdrawing it; or by brushing or spraying said material 17 thereon, or otherwise. As indicated in Fig. VI, portions of the material 17 have been removed at the regions 18 so that the latter may be dyed. Such removal may be effected by any convenient method or means, but, I have shown in Fig. VII, a rotary die 20 having cameo regions 21 of the configuration of the regions 18. Said die 20 is mounted to rotate upon the shaft 22 so that it may be turned in contact with the tube 16 when pressed against the latter, to produce the pattern shown in Fig. VI

by squeezing the dye resisting material 17 off the tube 16 at the regions 18. Liquid dye is then applied to the exposed regions of the outer surface of the tube 16 with the effect of penetrating the latter, as indicated at 24 in Fig. VIII. The remaining portions of the dye resisting material 17, shown in Fig. VI, are then removed; leaving the outer surface of the tube 16 cylindrical as in Fig. VIII.

Referring to Figs. IX to XI inclusive; the tube 25 of celluloid or the like is provided with a covering 26 of paper or the like, having pattern perforations 27 therethru. Said pattern cover may be pasted or otherwise secured upon the circumference of the tube 25 while dye resisting material 28, such as above contemplated, is applied to said tube 25 thru the perforations 27 in said covering. The covering may then be removed by any suitable means, for instance, by wetting it. Liquid dye is then applied to the exposed regions of the outer surface of said tube 25 with the effect of penetrating the latter, as indicated at 29 in Fig. XI. The remaining portions of the dye resisting material 28, shown in Fig. X, are then removed; leaving the outer surface of the tube 25 cylindrical as in Fig. XI.

Said pattern device 26 is, in effect, a stencil and altho such devices may be cheaply made from paper which is disintegrated by its removal; it is more economical in quantity production of the same pattern to have a stencil device which may be repeatedly used. Such a device is shown in Figs. XII to XIV inclusive, wherein the tube 31 of celluloid or the like is temporarily covered by the pattern casing formed of semi-cylindrical sections 32 which may be hingedly connected at 33 and 34 by pintles 35, which may be withdrawn, axially, to permit said casing to be applied and removed. Said casing has perforations 36 forming the desired pattern, and dye resisting material 37 may be applied thru said openings 36, and said casing be removed, as above described, leaving the tube 31 with the regions thereof exposed, as in Fig. XIII. Liquid dye is then applied to the exposed regions of the outer surface of said tube 31, with the effect of penetrating the latter, as indicated at 38 in Fig. XIV. The remaining portions of the dye resisting material 37, shown in Fig. XIII, are then removed; leaving the outer surface of the tube 31 cylindrical, as in Fig. XIV.

Referring to Figs. XV to XVII inclusive; the tube 40 of celluloid or the like is coated with a film 41, sensitive to light. For instance, what is known to the photographic trade as chromated gelatin, i. e., gelatin including potassium bi-chromate, or any other substance which, upon exposure to light, becomes insoluble and, therefore, impenetrable by dye liquor. Said tube 40, thus sensitized, is then encased in the pattern covering 42, which may be a photographic film embody-

ing a negative of the dye pattern desired. The structure shown in Fig. XVI may then be exposed to light, with the effect of rendering the film 41 insoluble in certain regions forming the pattern desired. The pattern element 42 may then be removed and the film 41 developed photographically to remove the portions of the light sensitive material which have not been exposed to the light and to fix the portions of said material which have been exposed to the light. Thereupon, the tube 40 with its dye resisting pattern film 41 may have liquid dye applied to its outer surface, with the effect that the dye penetrates said tube 40 at the regions 43, thru the unsensitized gelatin regions of the film 41, but is excluded from the intermediate regions by the portions of said film which have been rendered insoluble in the dye liquor, as above contemplated. Thereupon, the film 41 may be removed from the tube 40 by dissolving said film or otherwise; leaving the tube 40 in the condition shown in Fig. XVII.

Referring to Figs. XVIII and XIX; the tube 45 of celluloid or the like is dyed to a slight depth upon its outer surface, as indicated at 46, by any suitable method or means; for instance, by dipping said tube in dye liquor or by brushing or spraying such liquor on said tube. Said tube 45 may then be covered with a perforated pattern shield 47 and be sand blasted or otherwise eroded thru openings 48 in said shield to form the desired pattern, if the latter is to be comparatively sharply defined, as indicated at 50 in Fig. XIX. However, portions of the dyed surface 46 may be removed from the tube 45, as indicated at 51 in Fig. XIX, by a buffing, grinding, or other eroding operation, without any pattern shield, as articles of oxidized metal are buffed to produce ornamental effects. It may be observed that if the body of the tube 45 and the dyed portion 46 thereof are respectively light and dark, or vice versa, the regions 51 will manifest gradations of shades and tints of both.

Altho ordinary dyes soluble in water may be employed in accordance with my invention; the depth of penetration of the dye may be varied by the inclusion of more or less of a solvent of the material to be dyed. For instance, any desired depth of penetration of the dye during a given length of time of exposure of celluloid to the action of the dye liquor may be attained by forming the dye liquor as an aqueous solution containing more or less acetone, acetic acid, or alcohol. Moreover, if the tubes above contemplated have been formed by rolling sheets of celluloid or the like, moistened with solvents thereof as described; the degree of penetration of the dye liquor may be varied in accordance with whether the dye is applied to such tubes immediately or after the solvent has been permitted to evaporate therefrom; the penetra-

tion of the dye being at the maximum when the solvent content of the article is at the maximum.

In any case, a product in accordance with my invention is distinguished from any product of celluloid and the like of the prior art which is merely printed or painted upon; in that the dyed regions of my improved product penetrate the undyed mass thereof to such extent that they cannot be eradicated except by destructive erosion thereof.

Therefore, I do not desire to limit myself to the precise details of construction and arrangement or method of procedure herein set forth, as it is obvious that various modifications may be made therein without departing from the essential features of my invention, as defined in the appended claims.

I claim:

1. The method of forming an ornamental design upon the circumference of a tube of cellulosic material, which includes protecting a region of its outer surface with a dye resisting substance; rotating said tube while removing a portion of said dye resisting substance in accordance with said design; and dyeing said outer surface in the regions from which said dye resisting substance has been removed.
2. The method of forming a pattern of contrasting regions upon the outer surface of a cylindrical tube of cellulosic material, by dye; which includes treating said material with a solvent thereof before applying the dye to thereby affect the depth to which the dye shall penetrate said material, and thereafter dyeing certain regions of the outer surface of said tube, and excluding the dye from certain of said regions.
3. A method as in claim 2, which includes rotating said tube during the operation of forming the pattern thereon.

In testimony whereof, I have hereunto signed my name at Burlington, New Jersey, this 17th day of December, 1928.

WILLIAM MENDEL.

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