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W. MENDEL

1,923,322

METHOD OF FORMING COMPOSITE CORDS AND BRAIDS

Filed Dec. 20, 1930

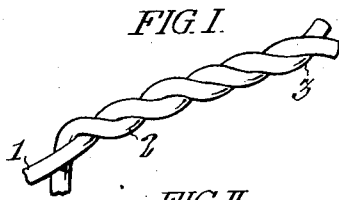


FIG. II.



FIG. V.



FIG. III.



FIG. IV.



FIG. VI.

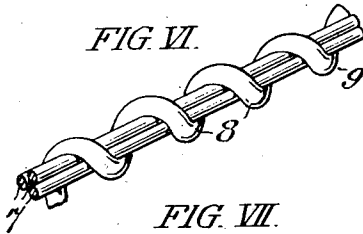


FIG. VII.



FIG. VIII.

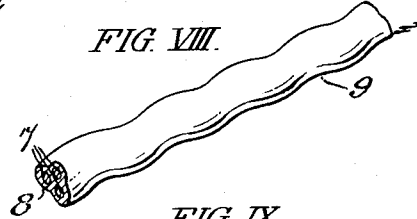


FIG. IX.

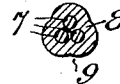


FIG. X.



FIG. XI.

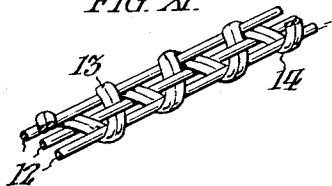


FIG. XIII.

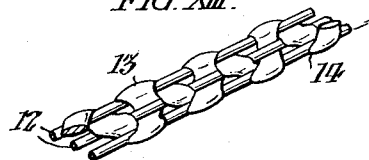


FIG. XII.



FIG. XV.

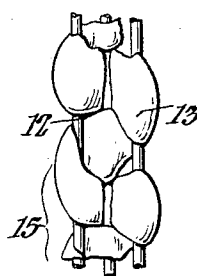


FIG. XIV.

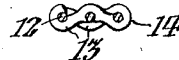


FIG. XVI.



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UNITED STATES PATENT OFFICE

1,923,322

METHOD FOR FORMING COMPOSITE
CORDS AND BRAIDS

William Mendel, Beverly, N. J.

Application December 20, 1930
Serial No. 503,756

7 Claims. (Cl. 18—59)

My invention may be advantageously employed to make filamentous materials which may be utilized in the production of ornamental textile fabrics, for instance, for the manufacture of hat crowns and trimmings.

The object and effect of my invention is to produce strings, threads, stranded cords, braids, etc., having the capacity for being brilliantly dyed which is characteristic of artificial textile filaments formed of cellulose acetate or cellulose nitrate, or similar cellulosic compounds, but with greater strength than is ordinarily characteristic of those filaments in a loose state; such greater strength being attained by associating with such artificial filaments, which are soluble, other artificial filaments which are not soluble in a solvent of such acetate or nitrate, and then subjecting the aggregate of soluble and insoluble filaments to the action of a solvent which causes the soluble filaments to coalesce upon and adhere to the insoluble filaments. The soluble and insoluble elements of the composite structure may be twisted together or one wrapped upon or braided on the other, before being subjected to the action of the solvent, and the effect of the latter may be enhanced by compressing the composite product, either before or after it is dried.

For instance, insoluble filaments may be formed by projecting a compound of cellulose (variously known as cellulose sulphocarbonate or cellulose thiocarbonate) through minute spinneret orifices into any medium which will coagulate the cellulose as a semi-solid impure cellulose hydrate. Such filaments may be flat like a ribbon, round like a horse hair, or otherwise shaped in cross-section. However, insoluble filaments may be formed from a solution of cellulose in ammoniacal copper oxide by what is known as the cuprammonium process or from a solution of cellulose in zinc chloride, or otherwise.

If the soluble elements of such composite structures are formed of cellulose acetate, the structures may be subjected to the action of ethyl acetate, or a mixture of alcohol and ether, both of which are suitable solvents for cellulose acetate. If the soluble material of the composite structure is a product of cellulose nitrate, acetone may be employed as the solvent. In any case, the effect of the solvent is to partly dissolve the soluble filaments and cause them to coalesce upon and adhere to the insoluble filaments.

My invention includes the various novel features of procedure and product hereinafter more definitely specified.

In said drawing; Fig. I is a fragmentary en-

larged respective view of a cord wherein a single filament of covering material is twisted with a single filament of core material.

Fig. II is a cross sectional view of the structure shown in Fig. I.

Fig. III shows a fragment of the structure of Fig. I after the covering material has been subjected to the action of a solvent thereof.

Fig. IV is a cross sectional view, similar to Fig. II, but showing the structure of Fig. III with the core material integrated with the covering material by the softening and deforming effect of the solvent of the latter.

Fig. V is a cross sectional view of the structure shown in Fig. IV but compressed and dried to form a substantially flat band or ribbon, wherein the core and covering materials alternate from edge to edge throughout its length.

Fig. VI is a fragmentary enlarged perspective view of a cord wherein a plurality of substantially straight core filaments are wrapped with a single filament of covering material.

Fig. VII is a cross sectional view of the structure shown in Fig. VI.

Fig. VIII shows a fragment of the structure of Fig. VI after the covering material has been subjected to the action of a solvent.

Fig. IX is a cross sectional view similar to Fig. VII but showing the structure of Fig. VI with the core material integrated with the covering material by the softening and deforming effect of the solvent of the latter.

Fig. X is a cross sectional view of the structure shown in Fig. IX but compressed and dried to form a substantially flat band or ribbon, wherein the core material is entirely sheathed by the covering material.

Fig. XI is a fragmentary enlarged perspective view of a braid wherein a plurality of core filaments are interlaced with a plurality of covering filaments.

Fig. XII is a cross sectional view of the structure shown in Fig. XI.

Fig. XIII shows a fragment of the structure of Fig. XI after the covering material has been subjected to the action of a solvent.

Fig. XIV is a cross sectional view similar to Fig. XII but showing the structure of Fig. XI with the core material integrated with the covering material by the softening and deforming effect of the solvent of the latter.

Fig. XV is a plan view of the structure of Fig. XIV compressed and dried to form a substantially flat band or ribbon wherein the core ma-

terial is visible at intervals throughout the length of the fabric.

Fig. XVI is a cross sectional view of the braid shown in Fig. XV.

Referring to the form of my invention shown in Figs. I to V inclusive; the core 1 consists of a filament or filaments, of the insoluble character above contemplated, having the desired tensile strength. The covering material 2 is an artificial filament or filaments formed of a coagulated cellulosic compound such as cellulose acetate or cellulose nitrate. Said materials 1 and 2 twisted together as indicated in Fig. I form a composite cord 3, but the two materials are primarily separate and distinct, as indicated in Fig. II. Said composite product 3 is then immersed in or drawn through a liquid solvent of the artificial cellulosic material 2 but which has no solvent effect upon the insoluble material 1. In any case; the effect of the solvent is to cause the cellulosic material 2 to coalesce upon and adhere to the insoluble core material 1, as indicated in Figs. III and IV, so that the cord 3 is then of substantially circular cross section as indicated in Fig. IV; and it may be dried in that form. However, either before or after it is dried, and preferably before it is completely dried, the cord 3 may be compressed to form a substantially flat band or ribbon, as indicated at 5 in Fig. V, conveniently by running said cord 3 between parallel rollers. In such flattened form the core 1 and covering material 2 alternate from edge to edge thereof through the length of the product 5.

In the form of my invention shown in Figs. VI to X inclusive, the core 7 is formed of a plurality of insoluble filaments such as above contemplated which, while in substantially straight parallel relation, are wrapped with a covering filament or filaments 8 of the cellulosic material aforesaid, to form the cord product 9. As indicated in Fig. VII, said core 7 and covering 8 are primarily separate and distinct. However, by subjecting them to the action of a solvent of the covering material 8, the latter is caused to coalesce upon the core material 7 and adhere thereto so as to form a substantially continuous sheath for the core material, as indicated in Figs. VIII and IX. As indicated in Figs. VII and VIII; the composite cord 9 is substantially round. However, either before or after it is dried, it may be compressed to form a substantially flat band or ribbon as indicated at 10 in Fig. X.

Referring to the form of my invention shown in Figs. XI to XV inclusive, the core 12 is a plurality of insoluble filaments such as above contemplated, which may be arranged in parallel relation in a substantially common plane, as indicated in Fig. XII with covering filaments 13 of soluble material; as aforesaid, interlaced therewith by the operation of a suitable braiding mechanism to form the substantially flat braid 14, in which the core material 12 and covering material 13 are separate and distinct, as indicated in Figs. XI and XII. However, by subjecting said braid 14 to the action of a suitable solvent of the material 13, as above contemplated, said material 13 is caused to coalesce upon and adhere to the core material 12, as indicated in Figs. XIII and XIV.

The composite braid product shown in Figs. XIII and XIV may be compressed either before or after it is dried, to a flatter band or ribbon 15, as indicated in Figs. XV and XVI, wherein

the core material 12 is visible at intervals throughout its length.

As above noted; all of the composite products above described are capable of being more brilliantly colored, by ordinary dyes, than natural textile fibers, and may be made like ordinary thread or yarn suitable for being woven, knit, or otherwise utilized in textile fabrics. However, the products above described may be used singly in the formation of any suitable fabric. For instance, the braid shown in Figs. XV and XVI has a sheen exceeding that of the most lustrous natural straw and may be formed of such width that successive convolutions thereof may be sewed together to form a hat crown.

It is to be understood that the forms of my invention above described are merely typical, and 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 a stringlike structure, entirely of artificial filaments, which consists in assembling filaments of material respectively soluble and insoluble in the same solvent, in a dry state, and thereafter subjecting the structure to the action of a solvent of the soluble filament material until it coalesces and adheres to the insoluble filament material, and compressing said structure.

2. The method of forming a stringlike structure, entirely of artificial filaments, which consists in assembling filaments of material respectively soluble and insoluble in the same solvent, in a dry state, and thereafter subjecting the structure to the action of a solvent of the soluble filament material until it coalesces and adheres to the insoluble filament material, and compressing said structure until the materials thereof are integrated, while the soluble material is softened with the solvent.

3. The method of forming a stringlike structure, entirely of artificial filaments, which consists in assembling filaments of material respectively soluble and insoluble in the same solvent, in a dry state, and thereafter subjecting the structure to the action of a solvent of the soluble filament material until it coalesces and adheres to the insoluble filament material, and compressing said structure until it is substantially flat.

4. The method of forming a stringlike structure, entirely of artificial filaments, which consists in assembling filaments of material respectively soluble and insoluble in the same solvent, in a dry state, and thereafter subjecting the structure to the action of a solvent of the soluble filament material until it coalesces and adheres to the insoluble filament material upon the exterior thereof, covering and concealing said insoluble material, and compressing said soluble material upon said insoluble material.

5. The method of forming a stringlike structure, entirely of artificial filaments, which consists in assembling filaments of material respectively soluble and insoluble in the same solvent, in a dry state, and thereafter subjecting the structure to the action of a solvent of the soluble filament material until it coalesces and adheres to the insoluble filament material upon the exterior thereof, covering and concealing said insoluble material, and compressing said soluble material upon said insoluble material until the structure is substantially flat.

6. The method of forming a stringlike structure, entirely of artificial filaments, which con-

sists in assembling filaments of material respectively soluble and insoluble in the same solvent, in interlaced relation, in a dry state, and thereafter subjecting the structure to the action of a solvent of the soluble filament material until it coalesces and adheres to the insoluble filament material, and compressing said structure.

7. The method of forming a stringlike structure, entirely of artificial filaments, which con-

sists in assembling filaments of material respectively soluble and insoluble in the same solvent, in interlaced relation, in a dry state, and thereafter subjecting the structure to the action of a solvent of the soluble filament material until it coalesces and adheres to the insoluble filament material, and compressing said structure until it is substantially flat.

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5	80
10	85
15	90
20	95
25	100
30	105
35	110
40	115
45	120
50	125
55	130
60	135
65	140
70	145
75	150