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METHOD OF MAKING ARTIFICIAL
BRISTLES, STRAW, AND THE LIKE

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This invention relates to the preparation of artificial bristles, straw and the like of reduced lustre from filaments containing thermoplastic derivatives of cellulose.

5 An object of our invention is to prepare artificial bristles, straw and the like of subdued lustre. A further object of our invention is to prepare artificial bristles or straw of reduced lustre by a process involving the use of a pigment or effect material and the coalescing or merging of finer filaments or yarns. Further objects of our invention will appear from the following detailed description.

10 Artificial bristles or straw made of organic derivatives of cellulose as ordinarily prepared are more or less transparent and lustrous. For many uses, it is desirable that they be more opaque and have less lustre. We have found that if a pigment or effect material is incorporated in such bristles or straw, desired opacity and lack of lustre is imparted thereto.

15 In accordance with our invention we prepare artificial bristles or straw by coalescing yarn or finer filaments of organic derivatives of cellulose or other thermoplastic derivatives of cellulose by means of a solvent or a restricted solvent, whilst incorporating a finely divided pigment or filling material therein. The pigment or filling material may be incorporated in the yarns or filaments being coalesced by the addition of the pigment or filling material to the spinning solution from which they are formed; or such pigment or filling material may be applied to the yarns or filaments after they are formed, either prior to the application of the coalescing liquid, or together with such coalescing liquid.

20 The material containing the thermoplastic derivative of cellulose to be coalesced may be in the form of fine filaments of say 2 to 25 denier, which filaments may be untwisted or may be twisted in the form of yarn. If desired a plurality of heavier filaments or artificial bristles or straw of say 50 to 1000 denier or more may be coalesced to form still larger bristles or straw by our invention. The material to be coalesced may also be in the form of braids, tapes or strips of fabrics made of or containing thermoplastic derivatives of cellulose.

25 The thermoplastic derivative of cellulose employed in the material to be treated in accordance with our invention is preferably an organic derivative of cellulose, examples of which are organic esters of cellulose such as cellulose acetate, cellulose formate, cellulose propionate or cellulose butyrate, or organic ethers of cellulose such as

ethyl cellulose, methyl cellulose or benzyl cellulose.

If particular ornamental effects are desired, yarns of non-thermoplastic material may be associated with the thermoplastic material prior to coalescing to form the artificial straw or bristle. Examples of such yarns are those made of natural silk, cotton, reconstituted cellulose, wool, etc. Often the presence of these non-thermoplastic materials improve the physical strength and knotting properties of the final bristle or straw produced. If metallized effects are desired, fine flat metal bands, such as are used in making tinsel, or metallized threads or yarns may be associated with the filaments of the thermoplastic material prior to coalescing.

30 In order to impart the desired opacity and subdued lustre, a pigment or filling material is incorporated in the bristles or straw. Examples of such pigments or effect materials are titanium dioxide, barium sulfate, strontium sulfate, barium carbonate, calcium carbonate, strontium carbonate, barium phosphate, strontium phosphate, calcium phosphate, zinc oxide or zinc sulphide.

35 In one form of our invention, the pigment or effect material is added to the spinning solution from which the filaments or yarns to be coalesced are formed. The filaments or yarns so formed are of subdued lustre, and when they are coalesced produce bristles or straw of such subdued lustre.

40 In another and preferred form, the pigment or effect material is applied to the filaments or yarns after they are produced. This may be done by applying a liquid containing such pigments or effect materials to the filaments or yarns immediately prior to the application of the coalescing liquid.

45 In another form, the coalescing liquid itself contains the effect material dissolved or dispersed therein. It is to be understood however that the use of two or three of these expedients of incorporating the pigment or filling material is not excluded from the scope of this invention.

50 The filaments or yarns or other materials to be coalesced may be drawn from bobbins or other suitable packages to be treated by our process, or they may be drawn directly from the spinning machine where they are produced and treated simultaneously with their production.

55 The coalescing liquid applied to the yarns, filaments and the like containing an organic derivative of cellulose contains a substance which is either a solvent or a restricted solvent for the organic derivative of cellulose. Examples of such solvents or solvent mixtures are acetone, ethylene

dichloride and ethyl or methyl alcohol, dichlorethylene and ethyl or methyl alcohol, etc. If desired this coalescing liquid may have dissolved therein a suitable desired proportion of an organic derivative of cellulose, and this organic derivative may be any of those above mentioned. In the case where the coalescing liquid is relied on solely to cause coalescence, this liquid should preferably be a strong solvent for the organic derivative of cellulose present in the filaments or yarns. However if heat and pressure are subsequently applied to the filaments or yarns to be coalesced, the coalescing liquid need not be such a strong solvent but may be merely a latent solvent which becomes a solvent at the heat and pressure employed.

The solvent liquid may be applied in any suitable manner, such as by means of wicks, rolls or rods, or by spraying the same on to the yarns or filaments.

Often, particularly in the case where straw or other flat bands are to be made, it is desirable to apply heat and pressure to the yarns or filaments of the thermoplastic derivative of cellulose after the solvent liquid has been applied. This pressure device may assume the form of a pair of rollers rotating at opposite directions at the same peripheral speed. At least one of the rollers is heated to a suitable temperature by any suitable means such as steam, hot water, electrical resistances, etc.

Bristles, straw and the like, when prepared in accordance with this invention, have a desirably subdued lustre and increased opacity. This subdued lustre is substantially permanent, not being affected even by pressing while wet at elevated temperatures. The pigment or effect material is well embedded in the artificial bristle or straw and therefore cannot be removed by rubbing or scouring. The bristles may be employed in the making of brushes, braids and for other purposes to which natural bristles or horsehair are put. The artificial straw may be used for making hats, braids, etc.

In order further to illustrate our invention, but without being limited thereto, the following specific examples are given.

Example I

In this example, we use yarns having the pigment incorporated therein by having been formed from a spinning solution containing such pigment. A yarn of 150 denier and having 40 filaments of an acetone-soluble cellulose acetate and containing titanium oxide in an amount equal to 1%, is wound while being caused to pass over a flannel wick which supplies acetone of 99%

strength. The rate of travel of the yarn is 200 meters per minute, and the amount of acetone supplied is equal to 20% of the weight of the yarn.

The individual filaments of the yarn coalesce together to form a white, matte, and very opaque single filament or bristle.

Example II

In this example, the pigment is applied to the yarns or filaments after their formation.

A yarn of 150 denier containing 40 filaments of an acetone-soluble cellulose acetate is wound from one package to another. During its transit, there is applied thereto by means of a furnishing roller a 25% dispersion of titanium oxide in diethylene glycol. After the application of the titanium oxide in dispersion, at about a distance of 12" therefrom, acetone of 99% concentration is applied by means of a flannel wick. The amount of dispersion of titanium oxide applied is about 5% of the weight of the yarn, and the amount of acetone applied is about 22% of the weight of the yarn.

The individual filaments of the yarn coalesce to a single filament or bristle, and during this coalescence the titanium oxide becomes embedded therein. The bristles so formed are white, matte and quite opaque.

It is to be understood that the foregoing examples are given merely by way of illustration and that many variations may be made therein without departing from the spirit of our invention.

Having described our invention, what we desire to secure by Letters Patent is:

1. Process of forming artificial bristles or straw of subdued lustre comprising first applying a suspension of a pigment in a liquid to a plurality of filaments of an organic derivative of cellulose and then applying a solvent for the organic derivative of cellulose which is free from solid binding material and effecting coalescence.

2. Process of forming artificial bristles or straw of subdued lustre comprising first applying a suspension of a pigment in a liquid to a plurality of filaments of cellulose acetate and then applying a solvent for the cellulose acetate which is free from solid binding material and effecting coalescence.

3. Process of forming artificial bristles or straw of subdued lustre comprising first applying a suspension of titanium oxide in diethylene glycol to a plurality of filaments of cellulose acetate and then applying acetone which is free from solid binding material and effecting coalescence.

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