Patented Jan. 18, 1938 2,105,519

UNITED STATES PATENT OFFICE

2,105,519

COLORED ARTIFICIAL YARN AND LIKE MATERIALS AND METHOD OF MAKING SAME

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No Drawing. Application June 23, 1936, Serial No. 86,822

6 Claims. (Cl. 18—54)

This invention relates to the manufacture of colored artificial filaments, films, yarns, and like materials wherein the color is imparted thereto by incorporating a dyestuff in a solution of the artificial material that is formed into the filaments, films, yarns and like materials. This invention also relates to colored artificial materials which may be easily and inexpensively topped to a black or a dark color.

An object of the invention is the economic and expeditious production of colored filaments, films, yarns and like materials by including in the said materials a dyestuff. Other objects of the invention will appear from the following detailed description.

An advantage of this invention is the production of colored filaments, yarns and like materials which are fast to light, perspiration, acid and scouring. A further advantage of the invention is the production of colored artificial materials which may be mixed with cotton, wool, silk and the like without the color bleeding on to the latter materials. A still further advantage of this invention is the economy with which colored textile materials containing organic derivatives of cellulose may be made.

In employing this invention, dark colored textile materials containing organic derivatives of cellulose may be produced without subjecting the material to long periods of time in heated dye baths, which baths are dangerous when employed by inexperienced operators due to the thermoplastic nature of organic derivatives of cellulose. The base color is imparted to the yarn or other material at its formation, and all that is required to impart the desired shade is the comparatively mild treatment with a topping color.

In accordance with my invention, I form filaments, yarns and like material from organic derivatives of cellulose, which materials contain dispersed therein one or a mixture of anthraquinone vat coloring matters, especially those of the indanthrene type. This may be accomplished by adding the anthraquinone vat coloring matter to a solution containing an organic derivative of cellulose which is to be formed into filaments, yarns and like materials.

This invention is applicable to the formation of yarns or filaments under which terms are included threads, assemblies or bundles of a number of continuous filaments which may be in parallel relationship or which may be twisted together, artificial bristles, straws, short lengths of staple fibers, or yarns spun from such staple fibers. This invention is also applicable to the formation of films, foils and ribbons. The yarns or filaments and like materials may be formed by extruding a solution of the organic derivative of cellulose through suitable orifices in spinning jets into a solidifying medium such as an evaporative atmosphere in accordance with the dry method of spinning, or into a precipitating bath in accordance with the wet method of spinning. Any suitable organic derivative of cellulose such as the organic acid esters of cellulose and the cellulose ethers may be employed. Examples of the organic acid esters of cellulose are cellulose acetate, cellulose propionate, cellulose butyrate and cellulose formate; while examples of cellulose ethers are ethyl cellulose, methyl cellulose and benzyl cellulose. The mixed esters and mixed ether-esters of cellulose may also be employed. The solvent employed will depend largely upon the particular organic derivative of cellulose selected and the method of forming the articles from the same. Examples of suitable solvents are acetone, chloroform, mixtures of acetone and ethyl or methyl alcohol, ethylene dichloride and mixtures of ethylene dichloride and ethyl or methyl alcohol.

The yarns, filaments and like materials may contain besides the organic derivatives of cellulose and the anthraquinone vat coloring matter, other suitable effect materials such as fire retardants, plasticizers, lubricants, and filling materials. Any suitable method may be employed for incorporating the anthraquinone vat coloring matter in the solution of the organic derivative of cellulose, for instance, the dry powdered coloring matter may be added directly to the solution. A preferred method of adding the vat coloring matter to the solution of organic derivative of cellulose is to grind the vat coloring matter in a 10% solution of the organic derivative of cellulose in the solvent to be employed in the formation of the materials. After grinding the vat coloring matter in the solution of organic derivative of cellulose, this highly pigmented solution is then added to a second solution of organic derivative of cellulose in a sufficient quantity such that the resulting solution will contain the desired amount of vat coloring matter. The vat coloring matter may also be added by first forming a lacquer chip of the same with cellulose acetate or cellulose nitrate and dissolving the lacquer chip or powder made from the same in the solution of the organic derivative of cellulose.

The amount of vat coloring matter to be incorporated in the solution will depend somewhat upon the depth of color desired. This amount will generally be from 0.1% to 3% based on the weight of the organic derivative of cellulose present of the dry vat coloring matter. For instance, from 0.1% to 0.4% of the dry black or dark blue vat coloring matter is sufficient to produce yarns, filaments and like materials of a medium shade such as gray which can be topped to the desired color after the yarns and filaments are formed.

The colored yarns, filaments and like materials containing organic derivatives of cellulose and the anthraquinone vat coloring matter dispersed therein may be topped to any suitable shade by treating the materials with a dyestuff having an affinity for the organic derivative of cellulose. For this purpose, any of the insoluble or difficultly soluble coloring matters or organic compounds having an affinity for the cellulose ester or ether under treatment or capable of coloring the same may be utilized. As instances of suitable bodies may be mentioned the coloring matters or organic compound or classes of coloring matters or compound referred to in United States Patents Nos. 1,618,413, 1,545,819, 1,600,277, 1,641,965, 1,618,415, 1,694,414, 1,679,935, 1,989,133; British Patents Nos. 239,470 and 283,081; the coloring matters of U. S. Patent No. 1,986,883 containing one or more keto-acidyl groups and particularly aceto-acetyl groups; the nitro-diarylamines specified in U. S. Patent No. 1,947,038; the unsulphonated thiazole derivatives of U. S. Patent No. 1,871,673; the azole dyes containing the xanthene of thio-xanthene nucleus of U. S. Patent No. 1,935,205 and the azole dyes of U. S. Patent No. 1,935,623 containing the anthraquinone nucleus. These dyestuffs having affinity for the organic derivatives of cellulose may be applied to yarn, filaments and like materials, or fabrics made from same, by treatment of the materials in baths containing the dyestuff dispersed therein. The dyestuff may be dispersed in the bath by means of sulphonated oils, soaps and like materials.

As stated above, the coloring matter to be added to the solution of an organic derivative of cellulose which is to be formed into an article is an anthraquinone vat coloring matter or a mixture of anthraquinone vat coloring matters, especially those of the indanthrene type. These coloring matters have little or no dyeing affinity for organic derivatives of cellulose. Examples of suitable anthraquinone vat coloring matters capable of producing a neutral gray shade in yarns, filaments and like materials are Indanthrene Black B B, Alizanthrene Black B (Color Index No. 1102), Indanthrene Gray K (Color Index No. 1145), Alizanthrene Gray B, Indanthrene Gray B, Amanthrene Gray B G (Color Index No. 1123). For producing yarns, filaments and like materials of other than a gray color, other coloring matters of the indanthrene type may be employed, for instance, Indanthrene Blue G G S L, Calco Vat Blue R S.

As an aid in describing this invention but without being limited thereto, the following example is given:

Example

Indanthrene Gray K (Color Index No. 1145) is milled for 24 hours in a 10% solution of cellulose acetate in acetone. A 25% solution of cellulose acetate in acetone is prepared and a sufficient amount of the pigmented solution is added such that the resulting solution contains 0.5% milled vat coloring matter on the weight of the cellulose acetate present. This solution is spun, by the dry method of spinning, into a yarn containing about 45 filaments, each filament being about 2 denier. The yarns are knitted into a circular knit fabric. The yarn is found to be of a neutral gray shade, fast to light, acid and scouring.

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

Having described my invention, what I desire to secure by Letters Patent is:

1. A method of manufacturing colored filaments, yarn and like materials containing organic derivatives of cellulose, which comprises the steps of adding an anthraquinone vat coloring matter to a solution of an organic derivative of cellulose, shaping the materials, removing the solvent and topping the materials to the desired color with a dyestuff having an affinity for the organic derivative of cellulose.

2. A method of manufacturing colored filaments, yarn and like materials containing cellulose acetate, which comprises the steps of adding an anthraquinone vat coloring matter to a solution of cellulose acetate, shaping the materials, removing the solvent and topping the materials to the desired color with a dyestuff having an affinity for the cellulose acetate.

3. A method of manufacturing colored filaments, yarns and like materials containing an organic derivative of cellulose, which comprises the steps of grinding together an indanthrene type of anthraquinone vat coloring matter and a solution of an organic derivative of cellulose to form a highly pigmented material, adding the highly pigmented material to a second solution of an organic derivative of cellulose, shaping the material, removing the solvent and topping the materials to the desired color with a dyestuff having an affinity for the organic derivative of cellulose.

4. A method of manufacturing colored filaments, yarns and like materials containing cellulose acetate, which comprises the steps of grinding together an indanthrene type of anthraquinone vat coloring matter and a solution of cellulose acetate to form a highly pigmented material, adding the highly pigmented material to a second solution of cellulose acetate, shaping the material, removing the solvent and topping the materials to the desired color with a dyestuff having an affinity for the cellulose acetate.

5. A method of manufacturing colored filaments, yarns and like materials containing organic derivatives of cellulose which comprises the steps of adding from 0.1% to 3% on the weight of the organic derivative of cellulose of an anthraquinone vat coloring matter to a solution of an organic derivative of cellulose, shaping the materials, removing the solvent and topping the materials to the desired color with a dyestuff having an affinity for the organic derivative of cellulose.

6. A method of manufacturing colored filaments, yarns and like materials containing cellulose acetate, which comprises the steps of adding from 0.1% to 3% on the weight of the cellulose acetate of an anthraquinone vat coloring matter to a solution of cellulose acetate, shaping the materials, removing the solvent and topping the materials to the desired color with a dyestuff having an affinity for the cellulose acetate.

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