Patented July 13, 1937 2,086,591

UNITED STATES PATENT OFFICE

2,086,591

ARTIFICIAL MATERIAL AND METHOD OF MAKING SAME

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No Drawing. Application January 19, 1934, Serial No. 707,429. Renewed March 20, 1937

9 Claims. (Cl. 18—54)

This invention relates to the production of yarns, films, foils and other artificial materials containing organic derivatives of cellulose and a deliquescent inorganic salt and to the textile materials made from such yarn. This application is a continuation-in-part of application Ser. No. 611,943 filed May 17, 1932.

An object of the invention is the economic and expeditious manufacture of yarns and fabrics that have incorporated therein a substance that aids in wetting-out the yarn and otherwise enhances its textile properties. Other objects of the invention will be apparent from the following detailed description.

I have found that by incorporating in filaments of organic derivatives of cellulose an inorganic salt that is deliquescent, there is produced a yarn that is more easily dampened or wetted. Thus, yarns treated according to this invention require but very short periods of exposure to a humidifying atmosphere to impart thereto sufficient moisture to improve the knitting properties of the yarn and its amenability to be formed into sharp bends. Sheets, films, foils and the like made of organic derivatives of cellulose having such deliquescent inorganic salts incorporated therein, are more flexible, more easily handled and do not tend to develop static electricity when manipulated.

Yarns treated according to this invention wet out more rapidly and also dye more rapidly than yarns that do not contain a deliquescent material. Thus, by employing this invention, time and space may be saved in dyeing and scouring operations.

By employing inorganic hygroscopic salts in a spinning solution comprising a water containing solvent, such as acetone-water, there is a tendency for the water to be held in the filament during the evaporation of the water-acetone solvent in the dry spinning process. Further, the presence of the salts in the spinning solution, renders it capable of producing filaments of lower denier.

The formation of spun yarn from comparatively short lengths or staples of filaments, or threads composed of organic derivatives of cellulose, presents serious difficulty. This is due to the fact that such organic derivatives of cellulose are poor conductors of electricity, and when the filaments are rubbed together, during the various operations involved in spinning, a large static charge of electricity is developed. Because of the static charge, the staple fibres do not adhere to each other readily and cause difficulty in the spinning operation. Yarns treated according to this invention contain an electrolyte that conducts electric charges, allowing same to leak off from the filaments and fibres. Moreover, yarns or filaments, especially those made by the dry or evaporative method, when treated according to this invention, are amenable to cutting into uniform staple lengths without causing difficulties by fluffing or adhering to the metal parts of the cutting device.

According to my invention I form artificial filaments, foils, films and other material containing a hygroscopic inorganic salt that is but sparingly soluble in the solution from which the filaments are formed. An example of such salt is calcium nitrite. These salts may be dissolved to a syrupy consistence in water and added to the spinning solution from which the filaments are formed by extruding same through suitable orifices into a precipitating liquid or an evaporative atmosphere. Small amounts of ethyl or methyl alcohol in the spinning solution aid in dispersing the hygroscopic salt therein. The amount of nitrite employed may vary from 1% to 10% of the weight of the organic derivative of cellulose present.

While this invention is of general application and is applicable to the treatment of all artificial filaments or fibres, such as reconstituted cellulose (such as may be made by the viscose, cuprammonium or nitrate method), it is of particular importance in connection with filaments and with staple fibres made of organic derivatives of cellulose, such as organic esters and ethers of cellulose. Examples of organic esters of cellulose are cellulose acetate, cellulose formate, cellulose propionate and cellulose butyrate, while examples of organic ethers of cellulose are ethyl cellulose, methyl cellulose and benzyl cellulose.

The yarns, filaments and fibres may contain, besides the hygroscopic salt and organic derivatives of cellulose, effect materials of an inert nature, i. e., that do not have either a strong oxidizing or hydrolizing quality which would react with the nitrites or like salts. They may contain such effect materials as pigments, filling materials, dyes or lakes, fire retardants, plasticizers, sizes and lubricants. The effect materials used will depend upon the particular nitrite salt used. Examples of fire retardants are beta chlornaphthalene, triphenyl phosphate and tricresyl phosphate. Examples of plasticizers are triacetin, diethyl phthalate, dibutyl tartrate, ethyl toluene, sulfonamid, etc. Examples of lubricants are olive oil, teaseed oil, petroleum jelly and similar substances.

This invention is particularly 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 or staple fibres, or yarns spun from such staple fibres. This invention is also applicable to the formation of foils, films and sheets, especially those that are to be colored, or that contain a coloring material.

Instead of treating the filaments by incorporating the hygroscopic inorganic nitrite salt in the yarns and filaments by addition of same to the spinning solution, from which the yarns or filaments are formed, a solution of the salt may be applied to the formed yarns or filaments by applying the salt thereto by means of suitable furnishing devices. Such furnishing devices as rollers and discs that dip into a solution of the salt and over which the yarn is drawn are preferable, however, such devices as wicks and padded rollers may be used.

Alternatively, staple fibres may be treated with the salt by being sprayed therewith or being dipped into an aqueous solution of the salt while held together in suitable containers.

In order further to illustrate my invention, but without being limited thereto, the following specific example is given.

Example

A spinning charge of cellulose acetate in about three times its weight of 95/5 acetone/water is formed. To this charge is added 2% calcium nitrite (on the weight of the cellulose acetate). The calcium nitrite is added in the form of a heavy water solution of syrupy consistency; it is only slightly soluble in the charge but forms a fine dispersion therein that is stable and passes through filters, etc. The charge is then filtered and spun through suitable orifices into a heated atmosphere.

The charge is found to have good spinning stability, normal filtration properties, a slightly lower than normal viscosity and the ability of being efficiently spun into filaments of low denier (say 1.8).

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

1. Process for the production of artificial filaments, threads, films and the like, which comprises forming a spinning solution containing a deliquescent inorganic salt and extruding the said solution into a setting medium.

2. Process for the production of artificial filaments, threads, films and the like of organic derivatives of cellulose, which comprises forming a solution containing an organic derivative of cellulose and a deliquescent inorganic salt, and extruding the said solution into a setting medium.

3. Process for the production of artificial filaments, threads, films and the like of cellulose acetate, which comprises forming a solution containing cellulose acetate and a deliquescent metallic nitrite, and extruding the said solution into a setting medium.

4. Process for the production of artificial filaments, threads, films and the like of organic derivatives of cellulose, which comprises forming a solution containing an organic derivative of cellulose and calcium nitrite, and extruding the said solution into a setting medium.

5. Process for the production of artificial filaments, threads, films and the like of cellulose acetate, which comprises forming a solution containing cellulose acetate and calcium nitrite, and extruding the said solution into a setting medium.

6. Process for the production of staple fibres of cellulose acetate, which comprises forming a solution containing cellulose acetate and a deliquescent inorganic salt, extruding the said solution into a setting medium to form filaments, and cutting the filaments thereby produced into suitable lengths.

7. Process for the production of staple fibres of organic derivatives of cellulose, which comprises forming a solution containing an organic derivative of cellulose and a deliquescent metallic nitrite, extruding the said solution into a setting medium to form filaments, and cutting the filaments thereby produced into suitable lengths.

8. Process for the production of staple fibres of organic derivatives of cellulose, which comprises forming a solution containing an organic derivative of cellulose and calcium nitrite, extruding the said solution into a setting medium to form filaments, and cutting the filaments thereby produced into suitable lengths.

9. Process for the production of staple fibres of cellulose acetate, which comprises forming a solution containing cellulose acetate and calcium nitrite, extruding the said solutions into a setting medium to form filaments, and cutting the filaments thereby produced into suitable lengths.

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