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CREPE FABRIC AND METHOD OF PREPARING SAME

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This invention relates to the treatment and production of textile fabrics made from yarn having a high degree of twist such as crepe fabric and it especially relates to the production of such fabrics from yarns and filaments containing organic derivatives of cellulose.

An object of the invention is the economic and expeditious production of such fabrics as crepes or other fabrics requiring a yarn containing a high degree of twist. Other objects of the invention will appear from the following detailed description.

By employing this invention processing steps heretofore necessary to produce a yarn sufficiently twisted to form a heavy crepe fabric are eliminated. Also yarn that has been exposed to the atmosphere for long periods of time may be commercially twisted to crepe yarn.

According to my invention I twist yarn while the same is soft i. e. the yarn contains solvents and/or plasticizers, with or without the additional plastifying action of steam. Thus the twist may be imparted to the yarn at the spinning cabinet prior to total evaporation of the solvent or the yarn may be plasticized or it may be softened by subjecting it to the mild action of solvents such as a dilute vapor or solution of a solvent or to the action of a mild solvent or a swelling agent.

This invention is applicable to yarns or filaments of any thermoplastic derivative of cellulose and especially the organic derivatives of cellulose such as the organic esters or ethers of cellulose. Also there may be employed the nitro organic esters of cellulose. Examples of organic esters of cellulose are cellulose acetate, cellulose formate, cellulose propionate and cellulose butyrate, while examples of organic cellulose ethers are methyl cellulose, ethyl cellulose and benzyl cellulose. The invention is also applicable to yarns containing cotton, wool, silk or other fibres that are mixed with thermoplastic derivatives of cellulose.

Under the term yarns or filaments 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 fibres, or yarn spun from such stable fibres. Although the invention is applicable to all types of yarns or filaments it is especially applicable to yarns consisting of several substantially continuous filaments.

The yarns or filaments preferably of organic esters of cellulose may be formed in a normal manner by either the wet or dry method of spinning and treated according to this invention as they leave or while still in the spinning cabinet to a twisting action and with steam to partially set the twist. At this stage in the formation of the yarn the same contains sufficient solvent to be maintained in a softened and pliable condition. The amount of solvent, which may be a simple substance or a complex mixture such as acetone, a mixture of dichlorethylene and alcohol, a mixture of benzene and acetone or a mixture of alcohol and acetone, will vary somewhat according to the conditions of spinning such as the temperature, the speed of spinning, the rate of exhausting the solvent vapors from the spinning cabinet and so on. Usually in current spinning practice the amount of solvent residual in the thread will be from 8 to 20% on the dry weight of the thread. It is of advantage in some cases to increase the amount of residual solvent in the thread particularly where very high twists are required to obtain very heavy creping actions in the fabrics. This may be accomplished by lowering the spinning temperature or reducing the spinning cabinet length. Further, high boiling solvents, for example, ethyl lactate, ethyl oxybutyrate, the ethers of the glycols and similar high boiling solvents. Another method of increasing the solvent of the yarn as spun is to add substantial quantities of material, which retard the evaporation of the solvent, to the solution from which the materials are to be spun. The fatty alcohols are particularly advantageous in this respect. Under average dry or evaporative methods of spinning, 10 to 20% of cetyl alcohol added to the spinning solution, will approximately double the amount of residual solvent in the yarn.

Thus this soft yarn may be twisted as it is formed by reducing the spinning feed rate to a few meters a minute and maintaining the spindle speed of a cap spinning takeup bobbin at between 10,000 and 11,000 revolutions per minute.

If desired the yarn may also be passed through steam just prior to its reaching the cap spinning device. The yarn may be treated with steam by passing it through a container or jacket containing steam or the steam may be applied to the yarn by means of a jet of steam blowing across the yarn and the excess removed by a suction cap on the opposite side. A device for applying steam to yarn, such as disclosed in U. S. application S. No. 703,426 may be used.

In place of treating the yarn at the spinning cabinet the yarn may be formed into packages with little or no twist and stored for considerable periods of time. This yarn, prior to imparting

a twist thereto, is subjected to solvents in a mild form to soften it. The yarn may be softened by placing it in a humidor containing a substantial amount of a solvent vapor or the yarn may be passed, during a winding operation and preferably the winding operation during which the twist is imparted to the yarn, through an enclosed space containing a mild solvent or a solvent in dilute concentration. The solvent may be applied to the yarn from solution or as a vapor. As an alternative method, the yarn wound on a bobbin or into a package may be dipped in a dilute solution of a high boiling solvent for example benzol solution of a solvent. The benzol may be removed by evaporation leaving the solvent.

The mild solvents that may be employed for softening the yarn prior to imparting the twist thereto may be dilute phenol, dilute acetone, pyridine, alcohol, glycol, ethers and esters of glycol and ethyl ether of ethylene glycol.

The yarns and filaments may contain besides the organic derivatives of cellulose base a plasticizer and especially those plasticizers that have an increased softening action upon the cellulose derivatives at elevated temperature. Examples of such plasticizers are diethyl phthalate, dibutyl phthalate, triacetin, etc.

When the presence of the solvent in the filament might interfere with dyeing processes and produce effects not desired, such as a heavy deluster by precipitation of the materials in the dye bath, the solvent may be removed by washing at a temperature which will not produce such effect or in a bath which does not produce such effects. Thus tetrachlorethane in the yarn may produce a deluster if the yarn is treated in a normal aqueous dye bath at normal dyeing temperatures. However, the fabric may be washed with benzol first and dried to remove the solvent and the benzol and then dyed in a normal manner. Or again, a substantial quantity of ethyl oxybutyrate will produce a deluster when the yarn is treated in a normal scour bath at 85° C. or over, but if the fabric is aged, preferably at elevated temperatures to reduce the ethyl oxybutyrate content to 4% or less, subsequent normal scouring does not produce deluster.

Besides the plasticizers the yarns or filaments may contain effect materials such as dyes or lakes, fire retardants, pigments, filling materials and lubricants. Examples of fire retardants are beta chlornaphthalene, triphenyl phosphate and tricresyl phosphate. Examples of lubricants are glycols and glycerols, olive oil, teaseed oil and petroleum jelly. Examples of filling materials are powdered metal, powdered metal oxides and carbonates, powdered organic substances that when added to the material change its light absorption properties and like material.

The amount of crepe twist imparted to the yarn is preferably over 60 turns per inch or it may be 75 or more, say 80, 100 or 150 turns per inch.

As description and not as a limitation the following example is given.

Yarns and filaments are formed by extruding a solution of cellulose acetate in acetone through suitable orifices into an evaporative atmosphere that removes the acetone such that only between 8 and 20% is left in the yarn or filaments. These yarns or filaments are twisted as they leave the spinning cabinet by maintaining the feed rate at a few meters per minute and winding and twisting them onto a cap spinning device whose spindle speed is between 10,000 to 11,000 revolutions per minute. Other methods of winding and twisting the yarn at the spinning cabinet may be employed for example ring and flyer methods.

Alternatively yarns which have been exposed to evaporative atmospheric conditions such that their residual solvent has been reduced to below 8% may be twisted by treating them with sufficient solvent to again make them soft and then twisting them in the presence or absence of steam during a winding operation. The yarns by either method may be given a high degree of twist say 75 or above turns per inch.

The twisted yarns may or may not be sized and may then be woven in a normal manner into a fabric which when treated according to common methods will produce a crepe fabric.

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

1. The method of preparing crepe yarns containing individual filaments of organic derivatives of cellulose which comprises twisting yarn containing a solvent and, during the actual insertion of the twist in the yarn, subjecting the yarn to steam.

2. The method of preparing crepe yarns containing individual filaments of cellulose acetate which comprises twisting yarn containing a solvent and, during the actual insertion of the twist in the yarn, subjecting the yarn to steam.

3. The method of preparing crepe yarns containing individual filaments of organic derivatives of cellulose which comprises adding a solvent to the yarn, twisting the yarn and, during the actual insertion of the twist in the yarn, subjecting the yarn to steam.

4. The method of preparing crepe yarns containing individual filaments of cellulose acetate which comprises adding a solvent to the yarn, twisting the yarn and, during the actual insertion of the twist in the yarn, subjecting the yarn to steam.

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