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W. WHITEHEAD

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METHOD OF PREPARING TEXTILE FABRIC

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Fig. 1.

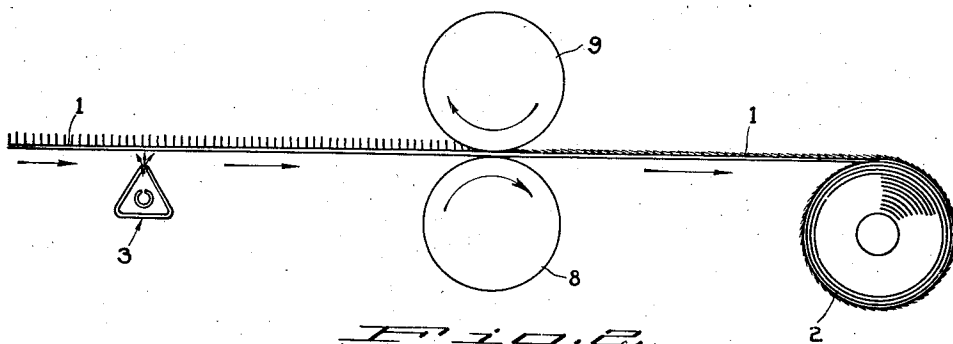
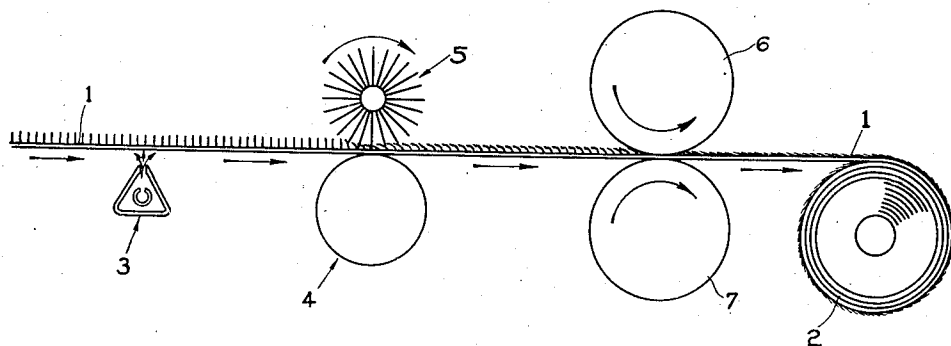


Fig. 2.

INVENTOR.

WILLIAM WHITEHEAD.

BY

J. Kelly & C. W. Swinson
ATTORNEYS

UNITED STATES PATENT OFFICE

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METHOD OF PREPARING TEXTILE FABRIC

William Whitehead, Rye, N. Y., assignor to Celanese Corporation of America, a corporation of Delaware

Original application March 24, 1939, Serial No. 263,873. Divided and this application April 16, 1940, Serial No. 329,861

4 Claims. (Cl. 26—1)

This invention relates to the preparation of knit fabric having a wool-like appearance in which at least some of the yarn comprises a thermoplastic material.

This application is a division of my application S. No. 263,873, filed March 24, 1939.

An object of my invention is to prepare a fabric having a nap at least part of which is in predetermined relatively permanent position. Other objects of my invention will appear from the following detailed description.

Referring to the drawing,

Fig. 1 shows diagrammatically one form of apparatus for carrying out the invention, and

Fig. 2 shows diagrammatically another form of apparatus.

I have found that beautiful and relatively permanent effects can be obtained by subjecting to heat and pressure a knit fabric having a nap of yarns or filaments of thermoplastic material.

The knit fabric, which may be circular knit or warp knit, treated by my invention is preferably so constructed that it comprises a looped pile face or float of yarn containing filaments or fibers of thermoplastic material, so situated on the face of the fabric that upon napping, the filaments or fibers of the loops or floats are substantially cut or broken, producing a nap or other villous face without significantly weakening the fabric as a whole.

The thermoplastic material employed for making the filaments or staple fibers of which the yarn from which the nap is derived may be any suitable one such as polyvinyl resins or other synthetic resins, linear condensation polymers such as polyamides derived from amino acids or derived by the condensation of diamines with dicarboxylic acids, e. g., polyhexamethylene adipamide, but this invention is particularly applicable to articles containing thermoplastic organic derivatives of cellulose such as organic esters of cellulose and cellulose ethers. Examples of such organic esters of cellulose are cellulose acetate, cellulose formate, cellulose propionate and cellulose butyrate, or mixed esters such as cellulose aceto-propionate or cellulose aceto-butylate, while examples of cellulose ethers are ethyl cellulose, methyl cellulose and benzyl cellulose. The filaments or yarns containing the organic derivative of cellulose may be prepared by dissolving the organic derivative of cellulose in a volatile solvent such as acetone and extruding such solution through an evaporative atmosphere, as in dry spinning, or into a precipitating bath as in wet spinning.

The fabric to be treated need not necessarily be composed wholly of thermoplastic yarns and, therefore, may also contain cotton, regenerated cellulose, natural silk, etc.; it is, however, essential that the nap contain a substantial proportion of such thermoplastic yarns.

The napping, brushing or otherwise breaking and raising the filaments on one or both sides of the fabric may be done by any suitable means such as a revolving cylinder covered with conventional card-wire cloth.

The so-napped fabric may then be subjected to a brushing or other operation to cause the nap to assume over part or the whole of its surface a position not at right angles to the plane of the surface.

The napped fabric is then subjected to heat and pressure, preferably in the presence of water or steam, in order to cause the nap to assume a position, which is relatively permanent, because of the thermoplastic character of the material comprising the nap. The position the nap is caused to occupy by this pressing is one that is not at right angles to the plane of the surface of the fabric, so that it is at an acute angle to the plane of the face of the surface or even substantially horizontal thereto.

The heat and pressure applied and duration of treatment to obtain a given effect are interdependent and are also dependent upon the amount of water, steam or other softening agent, if any, present, the greater any one of these factors is, the less of one or more of the other factors is required. Generally temperatures of 140 to 240° C. produce satisfactory results.

Pattern effects may be obtained by employing heated pressure or calender rolls or blocks which have engraved or embossed designs thereon so that only that part of the fabric which comes in contact with the relief portions of the rolls or blocks have the nap pressed. These designs may be any desired configurations such as stripes, diamond, floral, etc. The nap may be caused to lie in any direction with respect to the length of the fabric, e. g., diagonally, by positioning the calender rolls in the desired direction to the length of the fabric.

Instead of or together with steam, other softening agents may be used such as vapors of liquids like acetone or ethyl alcohol that have a solvent or restricted solvent or swelling action on the cellulose acetate, or small amounts of plasticizers or other substances that are insufficient in themselves to soften the cellulose acetate appreciably but which become active soften-

ers under the action of steam, heat or both, such as from 0.5 to 2% of dibutyl phthalate or of diethylene glycol, its esters, ethers or ester-ethers.

After the treatment the fabric may be subjected to any desired finishing treatment such as steaming, tentering to desired width and drying.

In order further to illustrate my invention, but without being limited thereto, the following specific examples are given; reference being had to the drawing.

Example I

In circular knit fabric counting 50 wales and 46 courses per inch with a looped face, the loops extending approximately 1 mm. above the plane of the fabric, and knit from an acetone-soluble cellulose acetate yarn of 150 denier, 26 filaments and 2.5 turns per inch twist, is dyed and then napped on a conventional card-wire clothed napping machine.

The napped fabric 1 is drawn by roll 2 at a convenient speed which may be, for example, 15 yards per minute, in the direction of the arrows. Moist steam is blown at the fabric by the steaming device 3, after which the fabric passes between the rotating smooth roller 4 and the rotating brush 5, where the nap is given a brushing which serves to impart a preliminary directioning to the filaments and to prevent the filaments from crossing each other. Preferably the brushing is in a direction opposite to the direction of travel of the fabric 1.

After brushing, the fabric is caused to pass between the calender rolls comprising upper roll 6 and lower roll 7, both of which are internally heated by steam under pressure.

The temperature and pressure of the calender rolls are suitably adjusted to support a desired hand without glazing or stiffening the fabric. As an example of the relationship of temperature, pressure, moisture content and time of treatment, with the speed of travel of the fabric of 15 yards per minute, with a moisture content (regain) of the fabric of 12 to 15%, at a pressure of 10 lbs. per square inch, a temperature of 190° C. is suitable. If a substantially higher temperature is used, it is necessary to reduce the mechanical pressure; a smaller moisture content requires higher temperatures and/or pressures; while with higher speeds, higher pressures, temperatures and/or moisture content are required.

Example II

Referring to Fig. 2, the napped fabric 1, as described in Example I, is conducted over the open steamer 3 and is then passed between the lower calender roll 8 and upper calender roll 9, both of which are heated. The upper calender roll 9 rotates at a greater peripheral speed than the lower roll 8, the difference in speed being, for example, 5%. The rolls 8 and 9 are preferably set with a positive gap which may be equal to the thickness of the fabric excluding the thickness of the nap. The temperatures of the calender rolls 8 and 9 and the moisture content of the fabric is the same as in Example I. The greater peripheral speed of the upper roll 9 strokes the nap in one direction.

It is to be understood that the foregoing detailed description is merely given 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. Method of treating a knit fabric having a napped surface containing yarns or filaments of a thermoplastic material, which comprises applying a softening agent to the fabric so as to soften the thermoplastic yarns or filaments and then, while said thermoplastic yarns or filaments are still in a softened condition, laying the nap of the fabric in a relatively permanent position by passing said fabric between heated rotating surfaces spaced apart a distance equal to the thickness of the fabric excluding the thickness of the nap, the rotating surface in contact with the napped surface of the fabric moving at a greater peripheral speed and in a reverse direction than the other.

2. Method of treating a knit fabric having a napped surface containing yarns or filaments of cellulose acetate, which comprises applying a softening agent to the fabric so as to soften the cellulose acetate yarns or filaments and then, while said cellulose acetate yarns or filaments are still in a softened condition, laying the nap of the fabric in a relatively permanent position by passing said fabric between heated rotating surfaces spaced apart a distance equal to the thickness of the fabric excluding the thickness of the nap, the rotating surface in contact with the napped surface of the fabric moving at a greater peripheral speed and in a reverse direction than the other.

3. Method of treating a knit fabric having a napped surface containing yarns or filaments of a thermoplastic material, which comprises applying a softening agent to the fabric so as to soften the thermoplastic yarns or filaments and then, while said thermoplastic yarns or filaments are still in a softened condition, simultaneously stroking and setting the nap of the fabric in a relatively permanent position by passing said fabric between heated rotating surfaces, spaced apart a distance equal to the thickness of the fabric excluding the thickness of the nap, the rotating surface in contact with the napped surface of the fabric moving at a greater peripheral speed and in a reverse direction than the other, said stroking being in a direction opposite to the direction of travel of the material between said rotating surfaces.

4. Method of treating a knit fabric having a napped surface containing yarns or filaments of cellulose acetate, which comprises applying a softening agent to the fabric so as to soften the cellulose acetate yarns or filaments and then, while said cellulose acetate yarns or filaments are still in a softened condition, simultaneously stroking and setting the nap of the fabric in a relatively permanent position by passing said fabric between heated rotating surfaces, spaced apart a distance equal to the thickness of the fabric excluding the thickness of the nap, the rotating surface in contact with the napped surface of the fabric moving at a greater peripheral speed and in a reverse direction than the other, said stroking being in a direction opposite to the direction of travel of the material between said rotating surfaces.

WILLIAM WHITEHEAD.