

UNITED STATES PATENT OFFICE

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PROCESS OF EMBOSSING CIRCULAR KNIT FABRICS

No Drawing.

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This invention relates to the process of embossing circular knit fabrics made from or containing thermoplastic derivatives of cellulose. More especially it deals with embossing such fabrics and stockings containing cellulose acetate yarn and includes within its scope the products obtained by such process.

The object of this invention is to devise a process for imparting to circular knit fabrics and stockings made of or containing thermoplastic derivatives of cellulose embossed effects which shall be permanent. Another object of this invention is to devise a process for embossing circular knit fabrics and stockings made from or containing cellulose acetate so that the designs imprinted upon such fabrics or stockings will not disappear even after long wear, washing or dry cleaning. Still another object of this invention is to obtain improved fabrics and stockings made from or containing organic derivatives of cellulose having permanent embossed surfaces or designs thereon.

It is well known that fabrics can be embossed by passing the same between heated rolls under pressure over a pattern or by having a desired pattern engraved on the rolls. This well known process does not give permanent results and an improvement of the same, applicable to fabrics containing organic derivatives of cellulose, was discovered by the applicant and is described in his U. S. patent application No. 167,876 filed February 12, 1927. The process disclosed in said application gives embossings which are permanent even when the fabric is subjected to washing, dry cleaning, etc.

The applicant has now discovered that circular knit fabrics made from or containing thermoplastic derivatives of cellulose can be embossed by the improved methods described in said application. This is unexpected in view of the fact that such fabrics or stockings must be embossed in a double thickness.

The present process is particularly useful in embossing circular knit hosiery. Such stockings can be embossed either in the greige or after they have been dyed. They can be embossed either on the outside or the inside of

the stocking. Excellent results were obtained by embossing the stockings on the outside after they had been dyed.

In the embossing of such circular knit fabrics or stockings they were first sprayed or otherwise wetted with dilute aqueous solutions of acetone and then subjected to the usual embossing operations. The design was impressed very clearly and distinctly on both layers of the fabric.

The design or impression on the half of the fabric which came in contact with the upper or steel engraved roll is somewhat deeper than that on the other half of the fabric (or stocking). This difference is so slight that it is noticeable only as the fabric comes off the embossing machine. When the stocking or other fabric is worn no difference or only a slight difference in the appearance of either half of the stocking or fabric is noticeable. Where it is desired to eliminate even this slight difference in the appearance of the two halves of the stocking this can be accomplished by having a deeper impression on the lower non-steel roll. Usually, however, this is unnecessary.

In the embossing of circular knit fabrics or stockings excellent results were obtained by utilizing a 25% aqueous solution of acetone. Very good results were also obtained by utilizing aqueous solutions of acetone of as high as 50% concentration.

The acetone can be applied to the fabrics or stocking in any suitable manner, but preferably by spraying the acetone solution upon the fabric or stocking to be embossed. Where desired the fabric or stockings can be passed through a bath containing the acetone solution, the excess liquid being removed by passing the material between smooth rolls. The fabric or stocking with the excess liquid removed is then subjected to the usual embossing operations, or as set out in detail in application No. 167,876 previously referred to.

The strength of the acetone solution employed can be greater or less than the figures above given. Of course the strength of the acetone solution should not be so high that it will dissolve the cellulose acetate or other thermoplastic derivative of cellulose present.

Nor should it be so low that it will not have any softening or swelling effect upon the thermoplastic derivative of cellulose present.

The temperature and pressure necessary to give the desired embossing will vary in accordance with the strength of the acetone solution employed. The higher the concentration of the acetone the lower the temperature and pressure necessary to give the embossing effect. Conversely, the more dilute the acetone solution the greater will be the pressure and the higher the temperature necessary to be employed to emboss the fabric or stocking.

The dilute acetone mentioned above as an aid in the embossing can be replaced by other solvents or softening agents for cellulose acetate or other thermoplastic derivatives of cellulose present in the fabric, for example, methyl acetate or other solvents. Instead of utilizing volatile solvents or softeners, high boiling solvents or plasticising agents such as triacetin, para-toluene sulphonamide, diethyl phthalate, alkylated xylene sulphonamide etc., can also be used with beneficial results in the present process. Where a solvent for the thermoplastic derivative of cellulose is used it should be diluted to such a degree with water or any other diluent, which latter is not a solvent for the derivative of cellulose, that it will act as a slight softener only. Where solid softening agents or water insoluble solvents or softening agents are employed they should first be dissolved either in water or in an appropriate liquid, which latter liquid should not be a softener or solvent for the thermoplastic derivative of cellulose.

A decided advantage resulting from the applicant's invention is the marked improvement in the appearance of the embossed circular knit fabrics or stockings. Due to the peculiar properties of the cellulose acetate or other thermoplastic derivatives of cellulose, when the acetone moistened fabric is subjected to the embossing operations, those portions of the fabric which are subjected to the heat and pressure, that is the depressed portions of the fabric, assume a high degree of lustre. In view of the fact that the remaining portions of the fabric or stocking retain their usual lustre, this serves to accentuate the design on the stocking or fabric and serves to give them the appearance of a jacquard woven fabric.

This result was entirely unexpected. Because of the fact that the fabric or stocking is necessarily treated while in a double layer it was expected that only one-half of the stocking or fabric would be properly embossed, that is, the portion of the fabric or stocking in contact with the engraved roll or embossing device. The applicant has, however, discovered that the embossing is virtually uniform throughout the fabric or stocking, despite the double layer of mate-

rial, if the embossing operation is conducted under certain conditions as above set out.

This invention is not to be considered as limited to the treatment of fabrics made wholly of cellulose acetate or other thermoplastic derivatives of cellulose, such as cellulose formate, cellulose propionate, methyl cellulose, ethyl cellulose, etc. It applies equally as well to mixed fabrics containing any of the above in varying proportions in admixture with each other or with cotton, wool, silk, artificial silks of the cellulose type and to fabrics containing mixtures of several organic derivatives of cellulose.

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

1. Process of permanently embossing circular knit fabric containing yarns of thermoplastic derivatives of cellulose with an all-over design in a single embossing step which consists in treating said fabric with a softening agent for the thermoplastic derivative of cellulose and then subjecting the fabric while it is still in double thickness to a suitable embossing operation.

2. Process of permanently embossing circular knit fabric containing yarns of thermoplastic derivatives of cellulose with an all-over design in a single embossing step which consists in spraying said fabric with a softening agent for the derivative of cellulose and then subjecting the fabric while it is still in double thickness to a suitable embossing operation.

3. A process of permanently embossing circular knit fabric containing yarns of organic derivatives of cellulose which consists in spraying said fabric with a dilute aqueous solution of acetone, and then subjecting the fabric to a suitable embossing operation.

4. A process of permanently embossing circular knit fabric containing yarns of cellulose acetate which consists in spraying said fabric with a dilute aqueous solution of acetone, and then subjecting the fabric to a suitable embossing operation.

5. A process of permanently embossing circular knit stockings containing yarns of cellulose acetate which consists in spraying said stockings with a 25% aqueous solution of acetone and then subjecting the stockings to a suitable embossing operation.

6. A process of permanently embossing circular knit stockings containing yarns of cellulose acetate which comprises impregnating said stockings with a 25% aqueous solution of acetone, removing the excess acetone solution and then subjecting the stockings to a suitable embossing operation.

In testimony whereof, he has hereunto subscribed his name.

CAMILLE DREYFUS.