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MANUFACTURE OF CELLULOSE ESTER HOSIERY

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4 Claims. (Cl. 28—76)

This invention relates to the manufacture of hosiery from cellulose ester yarns, and more particularly to improvements in the manufacture of dyed hosiery knitted from cellulose acetate yarn.

In the manufacture of hosiery from cellulose ester yarns, for example cellulose acetate, great difficulty has been experienced in obtaining hosiery having a clear, even stitch. Even plasticized cellulose acetate yarn or cellulose acetate yarn treated with various knitting oil compositions have been difficult to knit, and the percentage of rejects has generally been so high that commercial exploitation was considered not feasible.

Furthermore, when a large number of stockings made from cellulose acetate yarn are thrown together in a netted bag and dyed as is the standard procedure for dyeing hosiery, they become badly tangled and wrinkled, and "crease marks" or "crow's feet" thus formed cannot be removed by subsequent boarding procedures as is possible in the case of silk or viscose process rayon goods. To solve this latter problem it has been proposed to scour and dye cellulose acetate hosiery on suitable forms. The knit hose is extended to its proper shape by means of a form and wet processed and dyed while maintained in this shape whereby wrinkling and tangling and the resulting "crease marks" or "crow's feet" are avoided. Although improved goods can be obtained by this method, it is not at all practical and so far as is known, no commercial use has developed based on this process. Therefore, the conclusion heretofore has been that cellulose ester yarn is unsuited for the manufacture of hosiery.

An object of this invention is to provide an improved commercial process for making hosiery from cellulose ester yarn.

Another object is to provide an improved and commercially practicable process for making dyed hosiery from cellulose acetate yarn.

A still further object is to improve the process of manufacture of dyed hosiery from cellulose acetate yarn to the end that hosiery of a clear, even stitch and free of "crease marks" or "crow's feet" is made.

Other objects will become apparent as the description proceeds.

These objects are accomplished by the process of this invention which, briefly stated, comprises passing the cellulose acetate or other cellulose ester yarn through an aqueous solution just prior to knitting and then before dyeing the knit stocking, placing it on a smooth, rigid form of such shape that the stocking will become slightly tensioned while it is subjected to the action of saturated steam under a pressure of at least ten pounds per square inch above atmospheric, following which the stocking is removed from the form, scoured, dyed in the usual manner, and finally boarded in the usual manner. For convenience the steam treatment of the stocking under tension on the form and prior to dyeing, scouring, etc., will hereinafter be referred to as "preboarding."

The knitting is preferably carried out on a single unit machine, whereon the entire stocking is knit rather than transferring a partially knit stocking from the "legger" to the "footer." It is also preferred to pass the yarn through an aqueous solution or emulsion of softening oils just prior to feeding it to the knitting machine.

To further illustrate this invention, the following specific example is given:

Example

75 denier, 24 filament cellulose acetate yarn having 7 turns per inch Z-twist is knit into ladies' full-fashioned hose on a conventional single unit machine. The yarn is brought from the supply cone through an aqueous emulsion containing about 2% olive oil, 1% sulfonated olive oil, and 1% diethylene glycol, the composition being maintained at room temperature. Following the knitting, the stocking is looped and seamed in the customary manner, after which the stocking is moistened with water at room temperature and carefully fitted over a metal hosiery boarding form. The stocking on the form, after air drying, is then placed in a closed chamber and saturated steam admitted until the chamber is under a pressure of 15 pounds per square inch above atmospheric pressure. The stocking is allowed to remain in this chamber under 15 pounds steam pressure for four minutes, whereupon it is removed, allowed to cool, withdrawn from the form and subjected to the normal operations of scouring, dyeing, rinsing, finishing, wringing, and reboarding. The stocking so produced was commercially acceptable, being formed with clear, even stitches and free from undesirable wrinkles.

It has been found that no substantial benefit is to be gained by preboarding cellulose acetate stockings at temperatures in the neighborhood of boiling water, but that substantially higher temperatures corresponding to at least 10 pounds per square inch of steam pressure above atmospheric pressure are required to set the stitch and

prevent wrinkles from forming in subsequent treatment.

The time of treatment may be varied somewhat, but even prolonged treatment with steam, such as an hour at temperatures much below 115° C. (about 10 pounds per square inch gage pressure), are ineffective whereas but a few minutes' treatment with saturated steam at a temperature of from 115° C. to 126° C. is very effective.

The yarn just prior to knitting should be wetted with water. The addition of certain textile softening agents such as sulfonated oil, sulfonated alcohol, soap, glycol, diethylene glycol, glycerin, increase the wetting out action of the yarn and greatly improve the form and uniformity of the stitch.

The cellulose ester yarn may be of any suitable denier and filament count, although best results are obtained with relatively fine denier yarn such as 100 denier or less.

It is to be understood, of course, that this invention is not restricted to the exact details of conditions and procedure hereinabove recited for purposes of illustration, but is susceptible rather to all modifications and the the substitution of all equivalents falling within the scope and spirit of this invention as defined in the following claims.

I claim:

1. In the process of manufacturing hosiery knit from cellulose acetate yarn, the improvements which comprise wetting the cellulose yarn with an aqueous composition prior to knitting and preboarding the hosiery prior to dyeing by placing the hosiery under tension on a rigid form and subjecting it to the action of saturated steam under a pressure of at least 10 pounds above atmospheric pressure.

2. In the process of manufacturing hosiery knit from cellulose acetate, the improvement which comprises wetting the cellulose acetate with an aqueous composition comprising softening agents for the yarn prior to knitting, and preboarding the hosiery prior to dyeing by placing the hosiery under tension on a rigid form and subjecting it to the action of saturated steam at a temperature of from 115° to 126° C.

3. The process of manufacturing hosiery from cellulose acetate yarn which comprises wetting cellulose acetate yarn with an aqueous composition comprising softening agents for the cellulose acetate yarn, knitting the yarn to form hosiery therefrom, immediately thereafter placing the hosiery on a rigid form dimensioned to place the hosiery under slight tension, subjecting the hosiery under tension to the action of saturated steam under a pressure of at least 10 pounds above atmospheric pressure, and finally dyeing and finishing the hosiery.

4. The process of manufacturing hosiery from cellulose acetate yarn which comprises wetting cellulose acetate yarn of 100 denier or less with an aqueous composition comprising softening agents for the cellulose acetate yarn, knitting the yarn to form hosiery therefrom, immediately thereafter placing the hosiery on a rigid form dimensioned to place the hosiery under slight tension, subjecting the hosiery under tension to the action of saturated steam under a pressure of at least 10 pounds above atmospheric pressure, and finally dyeing and finishing the hosiery.

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