

UNITED STATES PATENT OFFICE

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PROCESS OF PRODUCING TEXTILES WITH
CALENDER FINISH PERMANENT TO WASH-
ING AND PRODUCT THEREOFChristian Bener, Chur, Switzerland, assignor to
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3 Claims. (Cl. 91—67.9)

This invention relates to the production of improved textiles having calender finish permanently fast to washing and the product thereof.

Hitherto, it was impossible to obtain calender or stamping effects on fabrics in a satisfactory manner, so as to render the fabric fast to after-treatments, as for example the normal washing. The texture imparted to the textile by calendering the same by pressing, stamping or lapping the fibers automatically changes back to the original state by the fibers reassuming their previous form and relative disposition, when swelling up by being wetted, soaped, steamed or ironed, whereby the effect obtained on the fabric by means of the calender disappears entirely or for the most part.

I have now found that a permanent finish can be obtained by fixing the effects accruing from the calender treatment by means of resins adapted to be hardened. This method ends in the surprising result that the artificial effects and the corresponding form and relative disposition of the textile fibers produced by means of the calender are permanently retained also during washing such fabrics, provided that the resin had been hardened.

It was also known before the present time that by incorporating in the fibers, that is, introducing into the interior thereof, natural or artificial resins or starting components thereof, in some cases, by subsequently changing the structure of these substances chemically, effects can be obtained which, due to a hardening; that is an increase of the resistivity against flexion and of the elasticity of the fibers, promote the tendency of the fibers to reassume their original form upon deformation. The so-called methods of rendering fabrics resistive against wrinkling are based on this knowledge.

In view of this state of the art, the fact that by aid of exterior and interior deposits of this kind and by hardening the same, textile articles can be arbitrarily compelled to change their surface or form so as to be adapted to permanently withstand the influence of soaking in the wash, is a surprising and unexpected technical advance in the art.

Based on the prior knowledge of rendering textiles resistive against creasing and the relevant experience, one should have expected that all the fibers of the material impregnated in this fashion would tend to reassume their original natural shape and relative dispositions and thus also the surface texture of the material would be recovered, so that for example all textile materials of a smooth surface texture would regain

their original smoothness by the wrinkles in the surface disappearing. This is, however, not so, not even after washing or the like, as the material retains any surface texture or structure which it has been compelled to assume from the start. Thus, not only a mere increase of resistivity against influences tending to disturb the natural fibrous structure of the material is involved, but also an additional stabilizing capacity of the deformed fibrous material.

The products according to the invention are distinguished by a calender-finish which is rendered absolutely fast to washing by being fixed by impregnation with artificial resins that are fast to light and practically odorless and colorless. As resins qualifying for this purpose, carbamide-aldehyde resins may be mentioned or else a mixture of urea and thio-urea condensation products. Alternatively, the artificial resin used for the impregnation may be combined with sizing, softening, matting or filling materials or with dyestuffs.

By means of the method according to the invention a lasting finish can be applied to a textile, for example, by previously impregnating the fabric with a solution of a resin or a mixture of resins adapted to be hardened in combination with suitable catalyzers, softening or filling materials, dyestuffs or similar auxiliary materials commonly used in the textile industry as wetting materials, and thereupon subjecting the fabric in a moist or in dry condition to a calendering at a proper temperature. The thusly treated fabric is then hardened in a known manner, preferably by a proper treatment by heat. Advantageously, the fabric is subsequently soaped, washed and dried. The effects thus obtained withstand wet treatments and washing without losing the calender effect irrespective of whether, as the case may be, stamping, feel, gloss, moire, wave, plait, beetle or other effects are involved. Furthermore, this mode of procedure involves the surprising result that spots arising in the fabric due to drops of certain liquids getting thereon is no longer to be feared, whereas the finish obtained by means of the hitherto known methods was completely destroyed by dulling the finish, or eliminating the stamping effect on the same. The fabrics obtained in this manner can be dyed in normal manner without eliminating the finish.

It is obvious that the substance to be hardened can be applied to the fabric in any other proper manner instead of by impregnation, for example by spraying, printing or the like.

After a brief calendering has been applied

thereto, the fabric is submitted to a final heat treatment in order to harden the resin completely.

The previously mentioned modes of procedure, viz. moire, wave, stamping, crepe, lucid gloss, matted gloss, silk lustre, similar imitation mercerizing surface treatment effect and the like are also classified as calender finishing. A finish giving a softer or harder feel can be obtained depending on the substance chosen for the impregnation. It is obvious that the substance used for the impregnation can be modified by the addition of known sizing materials, as starch, dextrin, British gum etc. In this way the final finish can be varied within wide limits.

The hardening can be effected to advantage in a drying chamber the temperature of which can be controlled, or else on drying cylinders or in calenders or the like. The temperature at which the hardening is effected and the duration of the hardening process depend largely on the chemical nature of the resin, the presence of catalyzers and so on.

As resins adapted to be hardened, particularly artificial resins of the type of carbamide resins are extremely well qualified in this respect on account of being colorless, highly fast to light and adapted to be hardened in an easily variable manner. Furthermore, these resins do not cause fading during storage of the textiles, which is of great importance. Among these carbamide resins the urea and thio-urea condensation products and mixtures of the same of a lower condensation phase are particularly well suited, especially if soluble in water. All these resins can naturally be applied in combination with catalyzers, for influencing the hardening, with dyestuffs, softening, filling, matting, wetting or other materials commonly used in the textile industry.

The method described can be applied to textile articles such as fabrics or meshed goods of any kind made of any suitable materials, as for example cotton, linen, hemp, ramie, artificial silk composed of cellulose or cellulose derivatives, or mixed fabrics and so forth. Also fabrics that are mercerized or improved by treatment with acid or lye or other swelling agents enter into question. The applicability of the novel method to cotton and artificial silk and to fabrics containing both of these materials is of particular importance. Very beautiful effects can be obtained also on printed fabrics by means of known calender treatments.

Example 1

A mixed fabric composed of artificial silk and cotton is impregnated following the bleaching and dyeing with a 20% aqueous solution of carbamide resin containing 0.5% of tartaric acid and then the slightly dried fabric is passed through a stamping calender heated to about 150° C. By this passage the pattern is distinctly stamped into the fabric. Thereupon the fabric is hardened in a drying chamber which is kept heated to 110° C. for about 5 to 10 minutes. On the subsequent washing and drying the stamping pattern is left perfectly intact and remains permanently fast to washing.

Example 2

A cotton muslin fabric is impregnated in the manner described in Example 1 and subjected to a hot calender treatment in a moist condition to obtain a gloss effect. After the harden-

ing, which is effected as described in the preceding example, the fabric is soaped, rinsed and dried. The highly lucid finish thus obtained is fast to washing and perfectly immune to the effect of drops of certain liquids.

Example 3

A bleached and dyed satin fabric of cotton, which is prepared the same as described in Example 1, is waved in a Schreiner-calender, subjected to a final hardening, soaped and rinsed. After the drying a silk finish fast to washing obtains.

Example 4

A fabric of artificial silk is subjected in impregnated condition to a calender treatment for matting the same and further treated as specified in Example 1. The thus obtained matting and stiffening remains incorporated in the fabric after the wash.

Example 5

A cotton fabric which is impregnated with a 25% solution of dimethyl-urea is subjected, after being slightly dried, to a calender treatment for obtaining a gloss effect and repeatedly passed to the hot roller of the calender through the chasing apparatus until the hardening is completed. The finishing treatment is applied to the fabric as explained above.

Example 6

A satin fabric is printed with a printing paste which contains per kilogram of weight, in addition to the usual thickening materials, 225 grams of dimethylol-urea and 75 grams of thio-urea together with 2% of boric acid (as regards the total amount of dimethylol-urea plus thio-urea). The slightly dried fabric is then subjected to a hot calender treatment to obtain a high lucidity, finally hardened, washed and dried. The thus treated fabric displays a damask-effect, the printed portions of the fabric being highly lucid, whereas the non-printed portions are dulled. This result is due to the fact that, on washing, the calender finish effect is removed from the unprinted resin-free portion of the fabric but is unaltered on the printed portion. If desired, the fabric can be subsequently dyed.

Example 7

A cotton voile which is imprinted with vat dyestuffs in a manner fast to washing is impregnated with a solution which contains 20% of a urea-formaldehyde condensation product soluble in water together with 0.5% of salicylic acid acting as a catalyzer. The precautiously dried fabric is then subjected to a hot treatment in a stamping calender, and thereupon finally hardened at 130° C. for 5 minutes. After the soaping, washing and drying a fabric is obtained which displays a beautiful novel combination effect of color printing and relief stamping.

In my copending application Serial No. 746,933, filed October 4, 1934, for Methods of rendering textiles resistive against shrinking and product thereof, I have disclosed and claimed the production of non-shrink fabrics by impregnation with certain hardenable resins, tensioning the material, and hardening the resin while under tension.

In my application Serial No. 193,211, for the Production of textile fabrics in formed printed patterns, filed February 28, 1938, which is a division of the present application, I have claimed the embodiment of this invention in which the

heat hardenable resin is applied to the textile by printing so that the permanent wash-fast calender effect occurs only on the printed portions.

What I claim is:

- 5 1. Process of producing calender finishes on cellulose textile fabrics, comprising impregnating the fibers of the fabric with an aqueous carbamide resin-forming solution, capable of reaction to increase the resistivity of fibers impregnated therewith against flexion and containing an acid catalyst; drying the fibers slightly or to a moist condition; and then changing the form and relative disposition of the fibers to impart to the slightly moist fabric an ornamental texture by means of a calender heated to about 150° C.; and thereupon hardening the resin completely up to the final state in which the calender finish becomes permanently fast to washing by heating to 110° C. for about 5-10 minutes.
- 15 2. Process of producing calender finishes on cellulose textile fabrics, comprising impregnating the fibers of the fabric with an aqueous resin-
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forming solution, capable of reaction to increase the resistivity of fibers impregnated therewith against flexion; drying the fibers slightly or to a moist condition; and then changing the form and relative disposition of the fibers to impart to the slightly moist fabric an ornamental texture by means of a heated calender; and thereupon subjecting the fabric to a heat treatment at a temperature and for a period of time that will harden the resin completely up to the final state without deterioration of the fabric, and in which the calender finish becomes permanently fast to washing.

3. The product of the process of claim 2 being a cellulose textile fabric with a calender finish effect fixed by heat hardened resin and characterized by the quality that the calender finish is substantially permanent and will withstand washing with soap and water without substantially losing the calender effect.

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