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PROCESS FOR THE ORNAMENTATION OF
TEXTILE FABRICS

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It is known to render permanent on textile fabrics mechanically produced effects, such as calendering, glazing, schreiner and embossing, by impregnating the fabric with an aqueous solution containing a first condensation product of an aldehyde with another aldehyde, a ketone, an aldehyde-alcohol or a ketone-alcohol, together with an alkaline catalyst, drying the impregnated fabric, subjecting it to the appropriate mechanical ornamenting treatment, and finally heating it to complete the formation of an insoluble resin and thereby render the mechanically produced effect fast to washing.

In carrying out this process, it is essential to prevent any premature resin formation during the drying which precedes the mechanical ornamenting step. This can be achieved without difficulty by careful control of the drying temperature, in the case where the whole of the fabric is treated with the resin precondensate solution, using for instance a padding mangle followed by the usual drying plant.

In such cases however, where it is desired to produce pattern effects by limiting the formation of the insoluble resin to selected areas, it has not been found practicable to apply the resin precondensate locally, for instance by printing, followed by the steps of drying, mechanical ornamenting, heating and finally washing to remove the mechanically produced effects from the unprinted parts, because it is hardly possible to control the drying which follows the printing step sufficiently accurately to avoid occasional overheating.

It has also been attempted to produce such pattern effects by impregnating the whole of the fabric with the resin precondensate solution, and after drying to print it in selected areas with a resist capable of neutralizing the alkaline catalyst. In such case the mechanically produced effect fixes only in the unprinted parts. This method however involves two successive drying operations and also suffers from the difficulty of avoiding over-drying prior to the mechanical ornamenting step.

It is the object of the present invention to provide a process which avoids the abovementioned difficulties.

This invention comprises applying to the fabric, by printing or the like, in those areas which it is desired to leave plain, an aqueous solution of a salt which readily loses most or all its solubility on heating, but remains capable of neutralizing the alkaline substances which act as resin-forming catalysts. The printed fabric is then well

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dried by heat, in order to insolubilize the resist, and is then impregnated all over with an aqueous solution of a precondensate of formaldehyde with acetone, together with an alkaline catalyst. The fabric is then dried carefully at moderate temperature, conditioned if desired, subjected to the mechanical ornamenting treatment, heated in order to form the insoluble resin in the unprinted parts, and washed to remove soluble residues and also the mechanically produced effect from the printed parts. The fabric is finally dried, and the result is a pattern effect, due to the printed parts of the fabric having lost, and the unprinted parts having retained the mechanically produced ornamentation.

Suitable salts which act as a resist and prevent the formation of the resin which fixes the mechanically produced effects, are those formed from weakly basic metals such as aluminum, cadmium, chromium, lead, manganese, tin, zinc and zirconium, with weak organic acids such as acetic and formic acids, and those formed from organic carboxylic acids of moderate or low solubility with volatile bases, such as the ammonium salts of salicylic acid, sebacic acid, 2-hydroxy-3-naphthoic acid, benzoic acid, p-chlorobenzoic acid and the like.

On drying the fabric after printing these compounds become insoluble or less soluble in water, and thus do not readily either wash away or spread to the unprinted areas while the fabric is being impregnated with the resin precondensate solution. They however react readily with the alkaline catalyst, forming compounds incapable of promoting resin formation.

This invention also lends itself to the production of a variety of color effects. If the resisting agent is a salt of aluminum or chromium, the residual hydroxide in the printed parts may be dyed with a mordant dyestuff. Alternatively, the printing paste may contain a suitable dyestuff or dyestuff component. In the above cases, the fabric is plain and coloured in the printed parts, and mechanically ornamented but uncoloured in the unprinted parts.

The reverse effect may be obtained by adding to the impregnating solution a dyestuff which has no affinity for the fabric itself, but is fixed by the fully polymerized resin. In this case, the mechanically ornamented parts are coloured, and the parts printed with the resist are plain and uncoloured.

By combination of these methods, with or without the addition of other printing colors not containing any resisting agent, a great va-

riety of color effects combined with mechanically produced effects can be obtained. The printed resists may also contain matting or optical whitening agents in order to improve the contrast of the plain resisted parts of the fabric with the mechanically ornamented unprinted parts. Water-repellent substances may be added to the printing pastes in order to reduce the uptake of the impregnating solution and improve the resist effect.

It should be noted that fabrics treated according to my invention tend to shrink to a smaller extent in the mechanically ornamented parts than in the plain parts which had been printed with the resist. In order to prevent unpleasant effects due to differential shrinkage in the finished article, it is therefore desirable to pre-shrink the fabric before printing, and/or to adjust it to, and hold it at the appropriate dimensions during at least the final stage of the drying which precedes the mechanical ornamenting treatment.

It is however also possible to produce pleasing crimp effects on suitable fabrics by taking full advantage of the different potential shrinkage between the resisted and the resin-carrying parts of the fabric.

The following are examples of the manner in which the process according to the invention is carried out.

Example 1

A cotton cambric is printed with a paste containing 8.5% of aluminum formate and thickened with gum tragacanth. After drying, the fabric is impregnated with a solution containing per 100 ml., 4 grams of anhydrous sodium carbonate and 25 ml. of a precondensate obtained in known manner by reacting 200 ml. of commercial formalin with 50 ml. of acetone in presence of baryta. The fabric is then carefully dried at a temperature below 100° C., so as to retain 8-10% of moisture in the unprinted parts, passed through a friction calender, heat treated at 120° C. for 3-4 min., washed to remove soluble matter, and finally dried. The result is a plain pattern on a glazed ground.

Example 2

A white cotton cambric is printed with a paste containing 10% of zinc acetate and 1% of the sodium salt of the di-sulphuric ester of leuco-12.12'-dimethoxy-di-benzanthrone. After thorough drying, the cloth is impregnated, carefully dried, friction calendered, heat treated, washed, and dried, as described in Example 1. It is then passed through steam and formic acid vapour for 1 to 2 mins., after which the colour is developed in an acid solution of an alkali bichromate, and the fabric is rinsed, soaped, again rinsed and dried. The result is a green unglazed pattern on a white glazed ground.

Example 3

A cotton sateen is printed with a paste containing 20% of the ammonium salt of 2-hydroxy-3-naphthoic acid, and thoroughly dried. The fabric is then impregnated with the precondensate solution described in Example 1, and dried at a temperature below 100° C. so as to retain 8-10% moisture, care being taken that at least during the final stages of drying, the fabric is held at the appropriate dimensions to prevent differential shrinkage between the

printed and the unprinted parts. The fabric is then passed through an embossing calender, and after-treated as described in Example 1. The result is a plain pattern on an embossed ground.

Example 4

A cotton fabric is printed with a paste containing 8.5% aluminium triformate and 10% of the waterproofing emulsion marketed by Catomance Ltd. of Welwyn Garden City, Herts., under the registered trade name of "Mylstolene KP." After thorough drying, the fabric is then impregnated with a solution containing per 100 ml. 25 ml. of the acetone formaldehyde precondensate described in Example 1, 4 gms. of anhydrous sodium carbonate, 0.75 gm. of locust bean flour and 1 gm. Acid Yellow G (Col. Index No. 16). It is then dried as in Example 1, passed through an embossing calender, heat treated for 1½ mins. at 150° C., passed through the vapours of steam and acetic acid during 2 mins., rinsed, soaped and then dyed in Alizarin Orange A (Col. Index No. 1033). After final drying the effect is found to consist of a plain orange pattern on a yellow embossed ground.

Example 5

A bleached cotton cambric is printed with a paste containing 7.5% of chromium acetate and thoroughly dried. The cloth is then impregnated, carefully dried, friction calendered, heat treated and washed as in Example 1. Before drying the cloth is dyed with Chromazurine E (Col. Index No. 879), the final result being a plain blue pattern on a white glazed ground.

Example 6

A cotton fabric is printed with a paste containing 22.5% of ammonium salicylate and thoroughly dried. The fabric is then impregnated with a solution containing per 100 ml. 25 ml. of the acetone formaldehyde precondensate described in Example 1, 4 gms. of anhydrous sodium carbonate, 0.75 gm. of locust bean flour and 1 gm. of Wool Fast Blue BL (Col. Index No. 833) dried, friction calendered, heat treated and washed as in Example 1, and finally dried. The result is a plain white pattern on a blue glazed ground.

Example 7

A cotton cambric is printed with a two-colour pattern as follows: on the 1st roller a paste containing 15% manganese acetate and 1.2% of the sodium salt of the disulphuric ester of leuco 5,7,5',7'-tetrabromindigo, on the 2nd roller which prints a blotch in register with the first roller a paste containing 3% Soledon Scarlet BS (the water soluble salt of the sulphuric ester of a leuco vat dyestuff marketed by Imperial Chemical Industries Ltd.). The cloth is then thoroughly dried and processed as in Example 2. The result is a scarlet glazed pattern on a plain blue ground.

Example 8

A crimp effect is obtained by printing on a suitable cotton cloth a thickened paste containing 20% of lead acetate, drying thoroughly, then impregnating with a liquor containing per 100 ml. 25 ml. of the acetone-formaldehyde precondensate described in Example 1, 4 gms. of anhydrous sodium carbonate, and 0.75 gm. of locust bean flour, drying while the warp is maintained in a stretched condition (preferably not less than

loom state dimensions) and then heat treating and washing as in Example 1, lead salts being finally removed by washing for 5 mins. at 50° C. in a 0.35% solution of hydrochloric acid followed by thorough rinsing. A combined crimp and glazed effect may be obtained if desired by friction calendering prior to the heat treatment step.

What I claim is:

1. In the fixing of mechanically produced effects, such as calendering, glazing, schreiner and embossing, on selected areas of textile fabrics, the process which comprises printing a fabric in the areas intended to be left plain with an aqueous solution of the salt of an organic carboxylic acid with a weakly basic component selected from the class consisting of ammonium and the metals aluminum, cadmium, chromium, lead, manganese, tin, zinc and zirconium; the said metal salts being the salts of an organic acid selected from the class consisting of acetic and formic acids and the said ammonium salts being the salts of an organic acid selected from the class consisting of salicylic acid, sebacic acid, 2-hydroxy-3-naphthoic acid, benzoic acid and p-chloro-benzoic acid; said salt being capable of neutralizing the alkaline condensation catalyst used in the subsequent impregnating step of the process; then heating and drying the printed fabric substantially to insolubilize the said salt, impregnating the whole of the fabric with an aqueous solution of an alkaline condensation catalyst and a precondensate of formaldehyde and acetone; whereby the pre-dried salt residues in the printed parts neutralize and render ineffective the said alkaline catalyst in the printed parts of the fabric; drying the fabric at a temperature below that required to insolubilize the resin, subjecting the fabric to a mechanical ornamenting treatment, heating it to form an insoluble resin in the unprinted parts, washing to remove soluble residues and to remove the mechanically produced effect from the printed

parts, and drying the fabric, whereby a patterned effect is obtained with the mechanically produced effect fixed in the unprinted areas.

2. The process of claim 1 wherein the said salt is a salt of aluminum and the resulting salt residues in the printed parts of the fabric are dyed with a mordant dyestuff.

3. The process of claim 1 wherein the said salt is a salt of chromium and the resulting salt residues in the printed parts of the fabric are dyed with a mordant dyestuff.

4. A process as claimed in claim 1, in which the salt solution also contains a coloring agent selected from a class consisting of dyestuffs and dyestuff components for coloring the parts to which the solution is applied.

5. A process as claimed in claim 1, in which there is added to the precondensate solution a dyestuff which has no affinity for the fabric itself but is fixed by the fully polymerized resin.

6. A process as claimed in claim 1, in which the fabric is adjusted to and held to fixed dimensions at least during the final stage of the drying which precedes the mechanical ornamenting treatment.

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