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FABRIC WITH A DESIGN AND PROCESS FOR MAKING THE SAME.

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My invention particularly relates to a fabric upon which designs are impressed and developed by cross-dyeing and to the process involved in its production.

Cross-dyed fabrics have hitherto been obtained by interweaving two different kinds of thread, each having an affinity for a different type of dye; for example, threads composed of cotton have been interwoven with threads of artificial silk and the fabric so made has been subjected to cross-dyeing, that is, the fabric has been placed in a bath containing two dyes, one of which dyes the artificial silk and not the cotton, and one of which dyes the cotton and not the artificial silk. If the cross-dyes are of different colors, a fabric is produced, for example, having its warp one color throughout and its filling another color throughout. The fabric which I have invented by cross- or selective-dyeing may consist of a background of one color with localized designs of a different color thereon.

My invention accordingly comprises a fabric having a figure or design thereon of a cellulose ester, and preferably cross-dyed to produce a design on a background of contrasting color. It also includes a process for producing a fabric with a design thereon which comprises impressing on the fabric, a cellulose ester which reacts selectively with respect to the fabric itself toward dyes, and preferably dyeing the fabric so prepared.

10 pounds of cellulose acetate are saturated with 3 gallons of phenol solution technically pure, and to this mixture are added 7 gallons of denatured ethyl alcohol. To this mixture is then added 5 pints of bisulphite of soda liquor of 32° Bé. and 4 pints of formaldehyde of 40 per cent strength. This solution has the form of a viscous liquid or jelly and in this form is printed upon the cotton in any desired design or figure. After drying the fabric, with its design printed thereon, for example, by steaming, to set the cellulose acetate—by driving off the volatile solvent,—the fabric is immersed in a bath or baths to effect selective or cross-dyeing. The process of steaming not only drives off the alcohol but it causes a reaction to occur between the phenol and formaldehyde probably effecting a condensation; whatever the result of reaction is, however, the smell of the phenol which would otherwise persist in the goods after drying, is eliminated, due to the use of the formaldehyde as noted. The dyeing is preferably effected in one bath containing two kinds of dyes, one kind for example which will dye cotton substantially without dyeing the cellulose acetate, and another kind of dye which will dye the cellulose acetate without dyeing the cotton. For instance, a bath may be made up with 2 per cent based on the weight of the fabric taken of dianil direct yellow S which is adapted to dye cotton directly yellow substantially without dyeing cellulose acetate and ½ per cent based on the weight of the fabric taken of methylene blue which is a basic dye adapted to dye cellulose acetate blue substantially without coloring the cotton. Dyeing is conducted for approximately 10 minutes at 100° C., at the end of which time the fabric is removed from the bath and dried. The fabric so prepared will present a dyed yellow background upon which a localized blue design appears.

It will be understood that various modifications may be made in the above procedure without departing from the invention. The preferred example given above is illustrative and is to be so regarded. As indicative of some of the changes which may be made, for example, I may substitute another cellulose ester such as nitrocellulose for cellulose acetate, and in so doing I may employ as a solvent for the nitrocellulose, any of the various well-known solvents employed therefor, such as amyl acetate, butyl alcolhol, etc. Instead of the alcoholic-phenol-formaldehyde solvent employed for the cellulose acetate I may use other well-known solvents, such as acetone and acetic acid. A wide range of dyes may be substituted for those indicated in the preferred example. For example, my experiments have shown that the following colors will dye cellulose acetate printed on cotton with

substantially no effect upon the cotton when used in correct quantities:

Basic colors	Chemical class
Auramine O	Diphenyl methane.
Rhodamine B	Pyrone.
Rhodamine 6G	Pyrone.
Safranine Y	Azine.
Safranine BL	Azine.
Malachite green	Tryphenyl methane.
Methylene blue	Thiazine.
New blue DA	Oxazine.
Methyl violet 2B	Tryphenyl methane.
Methyl violet 6B	Tryphenyl methane.
Chrysoidine Y	Azo.

Acid colors	Chemical class
Azo yellow A5W	Azo.
Brillifant wool blue N	
Wool violet 4BN	

My experiments have also shown that the following colors will dye cotton directly substantially without affecting the cellulose acetate.

Color.	Chemical class.
Dianil direct yellow S	Azo.
Chloramin yellow M	Primuline oxidation product.
Essex direct rose FFB	Probably azo.
Essex scarlet B	Probably azo.
Dixie purpurine 4B	Anthraquinone.
Erie fast orange A	Azo.
Pontamine green BX	Probably azo.
Newport sky blue FF	Probably azo.
Newport brill. blue G	Azo.
Erie violet BW	Azo.
Pontamine catechu G	Probably azo.
Pontamine catechu B	Probably azo.
Diphenyl catechine BB	Azo.
Dianil fast grey 2BL	Probably azo.

It will be observed that in employing these dyes no salt is used in the bath where heavy shades are not desired. Absence of salt permits the dyes to act substantially entirely selectively upon the cotton and cellulose acetate, that is, giving substantial color on one of the materials without coloring the other. If heavy shades are desired and salt is employed in the bath there will be some tinting of the cotton or cellulose acetate by the dyes intended respectively for the cellulose acetate and cotton; that is a dye for dyeing the cotton will ordinarily not dye the cellulose acetate equally and vice versa. As previously noted in effecting the selective dyeing the fabric may be immersed in more than one bath, that is, it may be immersed in a bath containing one of the dyes to effect the dyeing of either the cellulose acetate or cotton, and may then be placed in a second bath containing another dye to color the undyed cotton or cellulose acetate.

What I claim is:

1. A fabric of vegetable fibre having a design thereon of a cellulose ester, the fabric as so prepared being dyed with a color which dyes either the fibre or the ester but does not dye both equally.

2. A fabric of vegetable fibre having a design thereon of a cellulose ester, the fabric as so prepared being dyed with a color which dyes the fibre substantially without dyeing the cellulose ester and with a color which dyes the cellulose ester substantially without dyeing the fibre.

3. A cotton fabric having a design printed thereon with a solution of cellulose acetate.

4. A cotton fabric having a design comprising cellulose acetate on a background of a different color, the fabric as prepared being treated with a color to dye either the cellulose acetate or the background but substantially without dyeing both.

5. A cotton cross-dyed fabric having a dyed cellulose acetate design on a dyed background of a different color.

6. A process for treating fabric which comprises printing a design thereon with a viscous solution of a cellulose ester in a volatile solvent and cross-dyeing the fabric so treated.

7. A process for treating cotton fabric which comprises printing a design thereon with a solution of cellulose acetate.

8. A process for treating cotton fabric which comprises printing thereon with a solution of cellulose acetate containing a solvent comprised of alcohol, phenol and formaldehyde, and heating the resulting fabric to drive off the alcohol and to render the phenol substantially odorless.

9. A process of cross-dyeing which comprises applying a design on cotton fabric of a cellulose ester, then dyeing the fabric so treated with a dye adapted to dye the cotton substantially without dyeing the cellulose ester, and another dye adapted to dye the cellulose ester substantially without dyeing the cotton.

10. A process of cross-dyeing which comprises applying a design on cotton fabric of a cellulose acetate, then dyeing the fabric so treated with a dye adapted to dye the cotton substantially without dyeing the cellulose acetate, and another dye adapted to dye the cellulose acetate substantially without dyeing the cotton.

11. A process of cross-dyeing which comprises printing on cotton fabric, a viscous solution of cellulose acetate in alcoholic-phenol-formaldehyde solution, containing sodium bisulphite, drying the fabric so treated, thereby removing the volatile solvent and dyeing the fabric so prepared by immersing it in a bath containing a direct cotton color adapted to dye the cotton substantially without dyeing the cellulose acetate design and a basic dye adapted to dye cellulose acetate substantially without dyeing the cotton.

12. A process for treating a fabric of vegetable fibre comprising printing a design thereon with a solution of a cellulose ester, and then dyeing the fabric so treated with a color which dyes either the fibre or the ester but does not dye both equally.

13. A process for treating a fabric of vegetable fibre comprising printing a design thereon with a solution of cellulose acetate, and then dyeing the fabric so treated with a color which dyes either the fibre or the acetate but does not dye both equally.

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