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PROCESS OF APPLYING DYES AND PRODUCT THEREOF

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12 Claims. (Cl. 8—5)

This invention relates to the printing of colored patterns or designs on fabrics and relates more particularly to the printing of fabrics, films or film coated material containing organic derivatives of cellulose by locally spraying a solution or paste containing the dyestuffs dissolved in a solvent for the same, which solution or paste contains a swelling or edging agent for the fabric.

An object of my invention is to provide a process wherein fabrics of any nature may be printed by having a solution or paste containing a swelling or edging agent sprayed in selected places thereon.

Another object of my invention is to provide a process wherein a fabric films or film coated material comprising organic derivatives of cellulose may be printed with a paste containing a dye that is insoluble in water, by spraying a solution of such dye in an organic solvent or a paste containing such solution onto such fabric. Other objects of my invention will appear from the following detailed description.

I have found that if a solution or dyestuff containing an organic solvent for the same, which solution is also a swelling agent for the fabric to be printed, and more particularly if a paste containing such solution is sprayed onto the fabric, film or the like many advantages are obtained over the previous processes of this art. Under the former practice it was necessary to wait long periods of time between applications of different colors in order to avoid smearing. Great skill was necessary in carrying out the manipulative steps and prolonged periods of ageing were necessary in order to fix the dyestuff in the fabric. By the use of my process these disadvantages are avoided.

In accordance with my invention, a dyestuff is dissolved in an organic solvent for the same, and is then sprayed onto a stencil-covered fabric, film or the like. When this fabric or film contains organic derivatives of cellulose, the organic solvent acts more or less as a swelling agent for the organic derivatives of cellulose, and thus imparts to it such physical characteristics as to cause a more ready absorption of the dyestuff therein, and thus where stencils are used, these can be changed immediately without fear of smearing. If the solvent for the dye does not act as a swelling agent for the fibres of the fabric, a swelling agent should be added. Thus when cotton is being printed, an alkali such as caustic soda which is a swelling agent for cotton may be added.

This invention will be more particularly described with respect to the printing of a fabric containing organic derivatives of cellulose yarn. Examples of organic derivatives of cellulose are cellulose esters such as cellulose acetate, cellulose formate, cellulose propionate and cellulose butyrate and organic ethers such as ethyl cellulose, methyl cellulose and benzyl cellulose. The fabric may consist wholly of yarns of one or more of the above named organic derivatives, or it may be a mixed fabric, containing such organic derivatives of cellulose and yarns of other fibres such as cotton, wool or silk. An example of such mixed fabric is mixed cellulose acetate and silk.

In the printing of fabrics containing organic derivatives of cellulose, it is found that the use of certain dyestuffs normally insoluble in water give the most desirable results. These dyestuffs are dissolved in organic solvents for the same and the resulting solutions are sprayed onto the fabric. When such solutions are applied to the cellulose derivative fabric in the undiluted state, the fabric may become stiffened where it has been applied especially in those cases where powerful swelling agents for the fabric, such as ethylene dichloride or dichlor ethylene are used as solvents for the dye. Thus a novel effect is produced, since the fabric is both stiffened and colored locally in the same places. As this solution is diluted with a thickening material to form a paste, the amount of stiffening of the fabric is diminished until a point is reached when no stiffening of the fabric occurs. Therefore, any degree of stiffening may be obtained by selection of the concentration of the solvent used.

For ease of application and subsequent handling of the printed fabric, I prefer the use of an aqueous thickening material with the solution of the dyestuff in the organic solvent. Examples of such thickening materials are emulsions of gum tragacanth or gum arabic in water. By the use of the paste, creeping or spreading of the dye and solvent under the stencil is

prevented and evaporation of the solvent from the spray or mist is restricted.

The organic solvents for the dyestuffs to be used in the printing mass are various. The following solvents are given as indicative of the types of solvents that may be used but it is to be understood that these solvents are named merely by way of example and that my invention is not limited to them.

Aromatic hydrocarbons such as benzene, xylene, toluene, etc.

Derivatives of saturated and unsaturated hydrocarbons such as dichlor ethylene, trichlor ethylene, ethylene dichloride, etc.

Alcohols such as ethyl alcohol, methyl alcohol, propyl alcohol, amyl alcohol, butyle alcohol, etc.

Obviously mixtures of two or more of any of the above solvents may be used, for example ethylene dichloride and benzene. The dyestuff used may be any dye having an affinity for the organic derivative of cellulose that is soluble in the organic solvents employed. A large number of such dyes are known as SRA dyes of which the following may be mentioned; 2.4-dinitro-diphenyl-amine—(yellow), dimethyl amino anthraquinone—(blue). These dyes are insoluble in water. However, dyes that are soluble in water but which are also soluble in organic solvents such as rosaniline hydrochloride (red) Cresyl blue (Color Index No. 877) and Auramine (yellow) may also be used.

While the use of an organic solvent for the dyes that is a restricted solvent or swelling agent for the fabric or film being treated gives the best result, the use of organic solvents that have only a very mild swelling action of the fabric is not excluded. Thus benzene, which swells cellulose acetate fabric but little, is an excellent solvent for many dyestuffs and is a good reagent for use in printing, since benzene has an extraordinary power of most thoroughly penetrating cellulose acetate fibre. It will be thus seen, that it is only necessary for the dyeing liquid to have only a slight swelling effect on the fabric to effect dyeing, but much better dyeing is effected by using a solvent for the dye which is a swelling agent for the fabric.

The dye may be applied by any suitable spraying machine or gun, and preferably by one that delivers a uniform and fine spray mist. The design may be obtained by stencils or screens or merely by directing the spray where desired without the aid of a screen or stencil. The spraying device may be traversed across the stencil in spraying by hand or mechanical devices either in uniformly fast motions or in motions of varying speed to thus effect difference in depth of shade of the print either in the fabric generally or in the actual details of the design.

The proportions of the ingredients used in the printing mass may be varied within wide limits, depending on the effect desired. Usually it is found best to use a saturated solution of the dyestuff in the organic solvent.

After the application of the dyestuff to the fabric, it may be scoured at once without any resort to the lengthy process of ageing. However, the use of the ageing step with steam is not excluded from this process. The scouring may be done in any desired manner, although I have found that scouring with a soap solution containing some sodium hydrosulphite produces somewhat clearer prints. The fabric may be of any desired knit or weave such as circular knit, warp knit, satin, crepe, velvet, etc.

To further explain my invention the following specific example is given.

A cellulose acetate satin is covered by a stencil having any suitable design therein. By means of a spraying machine the following printing mass is applied.

	Parts by weight
Gum tragacanth	40
Water	2000
Ethylene dichloride	40
Dimethyl amino anthraquinone	4

The stencil is then removed from the fabric. If only a light application of the printing paste has been made, the design does not penetrate to the back of the rather closely woven fabric. A light ageing with steam may then be given. The fabric is then scoured for 15 to 30 minutes in an aqueous bath containing from 0.5 to 0.75 grams of soap per litre and about 0.25 grams of sodium hydrosulphite per litre at a temperature of 45° to 50° C.

It is to be understood that the foregoing detailed description has been given merely by way of illustration and that many variations may be made therein without departing from the spirit thereof.

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

1. Method of applying dyes to a fabric or film containing organic derivatives of cellulose comprising spraying onto the same a material containing a water-insoluble dyestuff dissolved in an organic liquid which is a swelling agent for said fabric.

2. Method of applying dyes to a fabric containing organic derivatives of cellulose comprising spraying onto the same, a material containing a water-insoluble dyestuff and an organic liquid which is a swelling agent for the organic derivative of cellulose.

3. Method of applying dyes to a fabric containing cellulose acetate comprising spraying onto the same, a material containing a water insoluble dyestuff and an organic liquid which is a swelling agent for the cellulose acetate.

4. Method of applying dyes to a fabric containing organic derivatives of cellulose comprising spraying onto the same, a material containing a water insoluble dye and ethylene dichloride.

5. Method of applying dyes to a fabric containing cellulose acetate comprising spraying onto the same, a material containing a water insoluble dye and ethylene dichloride.

6. Method of applying dyes to a fabric containing cellulose acetate comprising spraying onto the same, a material containing a water insoluble dye and ethylene dichloride and a thickening agent.

7. Method of printing fabrics containing organic derivatives of cellulose comprising locally spraying in predetermined places onto the same, a material containing a water-insoluble dyestuff and an organic liquid which is a swelling agent for the organic derivative of cellulose.

8. Method of printing fabrics containing cellulose acetate comprising locally spraying in predetermined places onto the same, a material containing a water-insoluble dyestuff and an organic liquid which is a swelling agent for the cellulose acetate.

9. Method of printing fabrics containing cel-

lulose acetate comprising applying a stencil having a desired design on the fabric, and then spraying onto said fabric a mass containing a water-insoluble dyestuff and an organic liquid which is a swelling agent for the cellulose acetate.

10. Method of printing fabrics containing organic derivatives of cellulose comprising applying a stencil having a desired design on the fabric, and then spraying onto said fabric a mass containing a water-insoluble dyestuff and an organic liquid which is a swelling agent for the organic derivative of cellulose and a thickening agent.

11. Method of applying dyes to a fabric containing an organic derivative of cellulose comprising spraying on to the same a liquid of spraying consistency containing a water-insoluble dyestuff dissolved in an organic liquid solvent.

12. Method of applying dyes to a fabric containing cellulose acetate comprising spraying on to the same a liquid of spraying consistency containing a water-insoluble dyestuff dissolved in an organic liquid solvent.

WILLIAM WHITEHEAD.

CERTIFICATE OF CORRECTION.

Patent No. 1,929,573. October 10, 1933.

WILLIAM WHITEHEAD.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 25, for "dimethyl amino" read 1.4-di-(methyl-amino); and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 28th day of November, A. D. 1933.

F. M. Hopkins

(Seal) Acting Commissioner of Patents.