

UNITED STATES PATENT OFFICE

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METHOD FOR MAKING TWO-SIDED FABRIC
USING SULFUR ACID ESTERS OF LEUCO
VAT DYES AND ACTINIC RAYSGlenn F. Womble, Danville, Va., assignor to Dan
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giniaNo Drawing. Application December 16, 1949,
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3 Claims. (Cl. 8—2)

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This invention relates to a process for dyeing textile materials such as fibers, yarns and cords, and more particularly to a process for dyeing a single thickness textile material to produce different colors on the two sides of the material.

To carry out this process and produce the unique product I take advantage of the fact that certain types of dyes can be developed into an insoluble or permanent form by exposure to strong light. Thus, I may apply an undeveloped dye to the fabric in the conventional manner but expose only one side to the light and thereby develop the dye to a fixed form on that side only and then remove the dye from the other side, by washing. This gives a fabric dyed on one side only and the process may then be repeated using a different color undeveloped dye, developing the reverse side only and then washing to remove the second dye from the side already permanently dyed. The resulting cloth is thereby dyed different colors on the two sides.

This process can be used to overdyed an already-dyed fabric by applying an undeveloped leuco ester dye to that fabric, exposing one side only to developing light and removing the excess undeveloped dye. This leaves the original dye unchanged on the unexposed side of the fabric and produces a new color on the exposed side.

Sulfuric acid esters of leuco vat dyestuffs split and oxidize when exposed to strong sunlight or artificial light of the proper wave length and intensity, and are thus made insoluble. In the undeveloped state, they have little affinity for most textile materials and in general are easily removed therefrom by washing. Accordingly, these types of dyes are well adapted for use in my new process.

More specifically, I impregnate the fabric with a sulfuric acid ester of a leuco vat dyestuff in an aqueous medium, and while the fabric is still wet I expose one side of it to direct sunlight or an artificial source of actinic rays for a short time, ordinarily, only a few seconds. I then immerse the fabric in scouring soap solution to remove the undeveloped dye from the side that has not been exposed to light, and then dry the fabric. This produces a fabric which is colored a distinct shade on one side but is uncolored on the opposite side. To apply a color to the then uncolored side, the process is repeated using a different color leuco dyestuff ester except that the originally unexposed side of the fabric is exposed to the light in this step, and the previously exposed side is now unexposed. The fabric is then scoured or washed as before which re-

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moves the dye from the side not exposed in this second step. After drying, the fabric has distinctly different colors on opposite sides with no apparent discoloration of one by the other.

By the term "light-sensitive ester of a leuco vat dyestuff," I intend to include those leuco esters of the vat dyes or their salts which are oxidized or developed by exposure to light. The "Algosols," "Solvats," "Indigosols" and certain of the "Ponsol Soluble" dyes, are suitable examples of the dyes that may be used.

This process may be used to treat fabrics, fibers, yarns or cards which are ordinarily dyed with the esters of leuco vat dyestuffs. Cotton and regenerated cellulose materials are probably the most likely examples, but the process may also be applied with the proper handling to various other types of materials such as cellulose acetate and nylon materials.

For developing the dye on the textile material I prefer to use artificial light of controlled intensity and expose the impregnated material for a regulated period of time. This makes it possible to achieve uniform results from my process. I have found a carbon arc light to be an excellent uniform source of strong light. However, other equivalent sources of light may be employed in my invention, and their use is fully contemplated as being within the scope of my invention.

Ordinarily, only a few seconds exposure to the developing light is required in practicing my process. The period of exposure depends on the intensity of the light and the particular dye being used.

Conventional dyeing apparatus with the proper installation of light sources for developing the dye may be employed in my process. An important feature is that exposure of the impregnated fabric to strong light be prevented except for the controlled exposure on one side of the fabric.

My invention will be more clearly understood from the following illustrative but non-limiting examples.

Example No. 1

Mercerized cotton poplin bleached and prepared for dyeing was impregnated through an immersion padder (with a pick up of approximately 75%) with the pad solution containing 20 grams per liter of Algosol Pink IR Extra (Pr. 109) in an aqueous solution. The wet fabric was placed flat down on a smooth surface and the top side of the fabric exposed to direct sunlight for a few seconds until the shade developed. Then the fabric was scoured in a hot soap solu-

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tion to remove undeveloped dye from the opposite side, and dried. This operation produced a red shade on one side of the fabric. Next, the fabric was impregnated under the same conditions as in the first operation, except this time with a pad solution containing 20 grams per liter of Algosol Blue 04B (color index No. 1184). The fabric while still wet was placed with the red side down on a smooth surface, and the other side exposed to the direct sunlight for a few seconds until the shade developed. The fabric without further exposure to strong light was again scoured in a hot soap solution, rinsed and dried. Thus was obtained a cotton fabric dyed with a fast bright red shade on one side and a fast bright blue shade on the opposite side.

Example No. 2

The same fabric as used in Example No. 1 was dyed with same procedure except first pad solution contained 20 grams per liter of Indigosol Brown IVD (identity unknown) and second pad solution contained 20 grams per liter of Indigosol Blue 04B (color index 1184). Thus was obtained a fast rich brown shade on one side of fabric and a fast bright blue shade on the opposite side.

Example No. 3

An all spun viscose broadcloth fabric prepared for dyeing was dyed by the same procedure given in Example No. 1 except that first pad solution contained 10 grams per liter of Indigosol Grey IBL (Pr. 295) and the second pad solution contained 10 grams per liter of Algosol Brown IRRD (Pr. 121). Thus was obtained an all rayon fabric dyed with fast colors with one side dyed grey and the opposite side dyed brown.

Example No. 4

An all spun viscose broadcloth prepared for dyeing was dyed by the same procedure given in Example No. 1 except that first pad solution contained 10 grams per liter of Algosol Brown IRRD (Pr. 121) and the second pad solution contained 5 grams per liter of Algosol Pink IR Extra (Pr. 109). In this case was obtained a fabric dyed tan on one side and pink on the opposite side.

Example No. 5

An all spun viscose poplin prepared for dyeing was passed through an immersion padder as in Example No. 1 and thereby impregnated with a pad solution containing 40 grams per liter of Sherdye Yellow T-3W (an oil in water emulsion of a resin binder and insoluble pigment) and 10 grams per liter of Algosol Blue 04B (color index 1184). This fabric while still wet was exposed on one side to direct sunlight thus developing the blue dye on one side only. Then fabric without further exposing to strong light was dried on a frame inside an oven. After drying, the sample was cured by heating to 170° C. for one minute, which operation bound the resin pigment to the fibers. Then fabric was scoured by washing in a detergent to remove undeveloped blue dye on side not exposed to direct sunlight. Thus was obtained a rayon fabric dyed with a yellow shade on one side and a green shade on the opposite side.

Example No. 6

An all spun viscose twill fabric prepared for dyeing was passed through an immersion padder containing 15 grams per liter Algosol Yellow IKG

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(Pr. 291) and while still wet developed in conventional manner with nitrous acid. Then fabric was neutralized, soaped, rinsed and dried. This operation gave a fabric dyed yellow on both sides. Then fabric was passed through padder containing 15 grams per liter Algosol Scarlet IB (identity unknown) and while still wet one surface only was exposed to strong light. Then without further exposure sample was scoured to remove undeveloped dye from unexposed side, and dried. Thus was obtained a fabric dyed a golden yellow on one side and a beautiful salmon shade on the opposite side.

The foregoing examples illustrate some of the modifications of which my process is susceptible. The scope of my invention is defined by the appended claims.

I claim:

1. A method for dyeing a textile material to produce two different solid colors on opposite sides thereof which comprises the steps of impregnating said textile material with an ester of a leuco vat dyestuff, exposing one side only of the impregnated material to light for a time sufficient to develop the solid color dye on that side without developing the dye on the unexposed side, removing the undeveloped dye from the unexposed side of said material, impregnating said material with a different color ester of a leuco vat dyestuff, exposing the originally unexposed side only of said material to light for a time sufficient to develop the solid color dye on the side then exposed, and removing the undeveloped dye from said material.

2. A method of dyeing the two sides of a textile fabric two distinct solid colors which comprises the steps of impregnating said fabric with a light-sensitive sulfuric acid ester of a leuco vat dyestuff, exposing one side only of the impregnated fabric to actinic rays to develop the desired solid color intensity on the side so exposed without exposing the opposite side of said fabric to said rays, removing the undeveloped dye from said fabric, and repeating the impregnating, developing, and dye-removal steps with a different light-sensitive dye to develop a solid color on the previously undyed side of said fabric.

3. A method of dyeing the two sides of a textile fabric two distinct solid colors, which comprises dyeing the fabric the same solid color on both sides thereof, then impregnating the fabric with a light-sensitive sulfuric acid ester of a leuco vat dyestuff, exposing one side only of the impregnated fabric to actinic rays to develop the desired solid color intensity on the side so exposed without exposing the opposite side of said fabric to said light, removing the undeveloped dye from the unexposed side of said fabric, and drying the fabric.

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