

# UNITED STATES PATENT OFFICE.

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## PROCESS OF PRINTING ON MIXED GOODS.

SPECIFICATION forming part of Letters Patent No. 614,237, dated November 15, 1898.

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*To all whom it may concern:*

Be it known that I, HENRI N. F. SCHAEFFER, a citizen of France, residing in Manchester, in the county of Hillsborough and State of New Hampshire, have invented an Improvement in Processes of Producing Printed Effects on Mixed Woven Goods, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to a novel process for producing printed effects on mixed woven and dyed goods composed of animal and vegetable fibers.

My improved process is especially applicable for producing printed warp effects on mixed woven goods composed of wool and cotton or silk and cotton, and also for producing discharged printed effects on mixed woven goods, as will be more specifically described.

Prior to this invention I am aware that mixed woven goods have been dyed with different basic colors by the use of a tannin mordant in the cotton dyeing; but this mordant, when combined with the basic coloring-matter in the cotton, produces a color or lake which cannot be discharged, which fact has prohibited the printing of mixed woven goods dyed with basic colors. I am also aware that mixed goods have been cross-dyed with substantive or direct colors; but I am not aware that such dyed goods have ever been printed, owing to the fact that no mordant has been found, prior to this invention, which would fix the substantive color on the cotton so that it could be subsequently discharged and leave the wool unaffected by the mordant. The tannin mordant employed with the basic colors cannot be used as a mordant for the substantive or direct colors.

In accordance with this invention I have discovered a novel mordant for substantive or direct colors and a fixing agent therefor, which combines with the substantive coloring-matter and forms a color or lake capable of being discharged with discharge reagents, such as now commonly employed in print works, and which mordant and fixing agent do not injuriously affect the wool fiber or the color with which it is dyed. This new mor-

dant for substantive colors enables me to produce printed warp effects on woven and dyed mixed goods composed of animal and vegetable fibers having the animal fiber dyed with a coloring-matter not affected or acted on by the discharge agent or mixture, as will be described, and the said mordant also enables me to produce discharged printed effects on mixed woven goods having both the animal and vegetable fibers dyed with a substantive color or colors. The mordant referred to should be colorless or substantially colorless, so that it will not change, tarnish, or otherwise affect the color of the wool, and must also be capable of rendering the substantive color fast on the cotton and yet leave the said color capable of being discharged to obtain the printing effects desired.

A mordant with which I have obtained superior results, and one which I prefer, is a triple compound metallic mordant, composed of salts of zinc, magnesia, and alumina, dissolved in water and rendered insoluble in the cotton fiber by a fixing agent which is not strongly alkaline and which therefore does not injuriously affect the wool. I prefer also to use the sulfate of zinc and magnesia and the acetate of alumina; but I do not desire to limit my invention in this respect, for while I have obtained superior results with these salts other colorless salts of the same bases may be employed, and a compound mordant, composed of two of the said salts, may be used to advantage with good results. The metallic mordant referred to is soluble and is rendered insoluble in the cotton by means of the fixing agent of common salt, which is not sufficiently alkaline to affect the wool.

In order that my invention may be clearly comprehended, I will first describe in detail the process of producing printed warp effects with which I have obtained excellent results.

The mixed goods of cotton and wool are prepared in the usual manner for dyeing wool with acid, basic, or like coloring-matter used in wool-dyeing and which wool color is not affected by discharge agents, the particular kind of color used for dyeing the wool being left to the judgment of the experienced dyer, who will select the color best suited, in his judgment, for that purpose. In the wool-dye bath I prefer to use lactic acid and bi-



sulfate of soda instead of the other acids now commonly employed. The goods are placed in the wool-dye bath and the latter is brought to the boiling-point and maintained at the boiling-point for a given time, as now commonly practiced in wool-dyeing, whereby the wool fiber is dyed with the desired shade of its color, after which the goods are well washed and dried. It will be understood that in this wool-dyeing the cotton fiber remains unaffected by the wool color. The mixed goods after being dried are passed through a solution of a compound (substantially colorless metallic mordant for the best results) composed of magnesium sulfate, zinc sulfate, and acetate of alumina, in about equal portions—say fifty grams of each dissolved in two thousand cubic centimeters of water, cold or lukewarm. The mixed goods are allowed to become well impregnated with the mordant solution and are then squeezed or hydroextracted to remove excess of liquor and then run through a fixing solution for the mordant, which may and preferably will be composed of the following ingredients and for the best results in about the proportions given—namely, one thousand cubic centimeters water, one hundred grams sodium chlorid, and five to ten cubic centimeters ammonia. After passing the mordanted goods through the fixing solution they are freed from excess of the fixing solution by squeezing, hydroextracting, or in any other suitable manner and allowed to stand a short or substantially short time, after which they are washed and dyed with the substantive coloring-matter desired or required for any particular color or shade of color.

It is my belief that the mordant solution absorbed by the cotton is precipitated in the cotton by the fixing agent in the form of insoluble oxids, which reaction does not appear to take place in the wool.

The dye-bath of the substantive color is prepared in any usual or suitable manner and of a concentration or strength sufficient to obtain the shade desired, and for the best results a small quantity of sodium chlorid may and preferably will be added to the substantive dye-bath. The goods are then placed in the substantive dye-bath, which is maintained at a substantially low temperature—that is, below the boiling-point—and preferably for the best results at or below 70° centigrade, and the length of time the goods remain in the substantive dye-bath depends on the depth of shade it is desired the color on the cotton fiber should possess. After the color on the cotton fiber has been developed to the desired shade the goods are removed from the substantive dye-bath and washed well, and if deemed necessary they may be given a cold soaping, after which they are dried, when it will be found that the color of the wool remains practically the same as it was at the completion of the wool-dyeing and that it is not stained, tarnished, or otherwise changed

or contaminated by the substantive color of the cotton, and consequently each fiber is dyed of the desired color and each color is of the desired shade and brilliancy. The mixed woven goods, now cross-dyed and with the substantive color in the cotton warp rendered fast by a metallic mordant which does not contaminate nor change the color of the wool and which mordant permits the substantive color fixed on the cotton to be discharged with suitable reagents or discharge mixture such as now commonly employed in discharge printing, have next applied to them, in design, the discharge reagent—such as tin, bisulfite of soda, zinc, &c.—alone, for a white discharge or with a suitable coloring-matter when a colored discharge is desired, and are then steamed and washed. The discharge reagent reacts on the cotton color and produces printed colored designs on the cotton warp, but does not react on the wool color, which remains undisturbed, and the result is mixed woven and dyed goods with the wool or animal fiber dyed throughout the fabric, but not printed with the design, while the vegetable fiber dyed with the substantive color is printed with the design.

In obtaining printed warp effects the color with which the wool fiber of the mixed woven goods is dyed may be basic, acid, or any other color, such as now commonly employed in wool-dyeing and such as is not acted upon by a discharge agent or mixture; but by reason of the capability of the substantially colorless mordant combining with the substantive color, so as to produce a fast substantive color capable of being discharged, I am enabled to produce in addition to the printed warp effects discharged printed effects on woven goods with both the animal and vegetable fibers dyed with the same or different substantive colors, so that the printed design will appear both on the wool and on the cotton. When the printed effect or design is to appear on both the animal and vegetable fiber dyed with the same substantive color, the cotton is first dyed and fixed at a low temperature, after which the wool or animal fiber is dyed by bringing the dye-bath to the boiling-point and maintaining it at such temperature until the wool is dyed the desired shade.

In the process of producing discharge printed effects referred to the goods are mordanted and treated the same as the cotton or vegetable fiber is treated in the process of producing printed warp effects, and if the wool is to be dyed with the same substantive color the goods are allowed to remain in the same dye-bath and the latter brought to the boiling-point, and after the wool color has been brought to the desired shade the goods are removed from the substantive dye-bath, washed, and printed in design with the discharge mixture or agent and then steamed and washed, as above described, with relation to printing the vegetable fiber to produce printed warp effects. The discharge mixture



or agent applied in design to both the animal and vegetable fibers reacts on the substantive color in both and produces the colored designs on both the animal and vegetable fiber.

5 If it is desired to dye the wool or animal fiber with a different substantive color from that with which the cotton or vegetable fiber is dyed, the mixed goods are dyed after the manner pursued in the dyeing to produce  
10 printed warp effects—that is to say, the mixed goods are dyed in a bath of substantive color at a high temperature, which dyes the animal fiber the desired shade. The mixed goods are then removed from the dye-bath, washed,  
15 mordanted, and fixed, as above described, and then immersed in a bath of the substantive color with which it is desired the vegetable fiber should be dyed, the dyeing of the vegetable fiber being conducted at a low tempera-  
20 ture, so as not to affect the color of the animal fiber.

The animal and vegetable fibers may be dyed with the same color or shade of color or with different colors, as described, and various-colored designs may be produced by the  
25 reaction of the discharge reagent on the fixed substantive color.

I am aware that it has been proposed to use as mordants for substantive colors in  
30 cross-dyeing sulfate of copper, chromium fluorid, bichrome, and a mixture of bichrome and sulfate of copper; but such mordants are not suitable for use with substantive colors, as they have the effect of saddening or dead-  
35 ening the color of the cotton and also of the wool.

As a practical illustration of my invention let it be supposed that it is desired to obtain printed warp effects with the wool dyed blue  
40 and the cotton red. In this case the wool-dye bath may be made up in about the following proportions: To one pound of cloth take one ounce of the blue color known to the trade as "patent blue A" and having the fol-  
45 lowing composition: disulfo-acid calcium salt of metaoxy diethyl dibenzyl diamido-triphenyl carbinol, ten gallons of water and four ounces of bisulfate of soda. Place the cloth in the wool-dye bath and raise the tempera-  
50 ture gradually to boiling and maintain the bath at the boiling-point until the desired shade of blue is obtained. The partially-dyed goods are then washed well and dried, after which they are passed through a bath  
55 of mordant composed of fifty grams each of

sulfates of zinc and magnesia and acetate of alumina dissolved in two thousand cubic centimeters of water. Permit the goods to become saturated, remove, and hydroextract. Pass the mordanted goods through a fixing  
60 solution composed of one hundred grams common salt in one thousand cubic centimeters of water, to which is added five to ten per cent. of ammonia. Remove excess of fixing  
65 liquor and dye, either wet or dry, in a substantive bath composed of five per cent. to weight of goods of diamine scarlet, to which is preferably added about ten per cent. com-  
70 mon salt. Dye at a low temperature until the required depth of shade is obtained, which usually takes from three-quarters of an hour to one hour. Remove, wash well, soap, if  
75 desired, and dry. Then print the cross-dyed goods in design in the manner now commonly practiced in calico-printing.

I claim—

1. The process of producing printed effects on mixed woven goods composed of animal and vegetable fibers, which consists in dye-  
80 ing both fibers with a substantive color or colors, rendering the substantive color fast on the vegetable fiber by a substantially colorless compound metallic mordant, and a  
85 fixing agent not sufficiently alkaline to affect the animal fiber, and printing in design on both fibers a discharge reagent which reacts on both the animal and vegetable substan-  
90 tive color and produces a colored design on both of said fibers, substantially as described.

2. The improvement in the process of pro-  
95 ducing printed effects on mixed woven goods composed of animal and vegetable fibers, which consists in mordanting the vegetable fiber of the mixed goods with a substantially colorless mordant for a substantive color, fix-  
100 ing the mordant with a reagent not sufficiently alkaline to affect the animal fiber, dyeing the mordanted and fixed vegetable fiber with the substantive color, and printing in design on the mixed goods a discharge reagent which  
105 reacts on the mordanted substantive color, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRI N. F. SCHAEFFER.

Witnesses:

JAS. H. CHURCHILL,  
J. MURPHY.