Jan. 24, 1933. R. G. DORT 1,895,243

METHOD OF COLORING TEXTILE MATERIALS AND PRODUCT THEREOF

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Fig. 1.

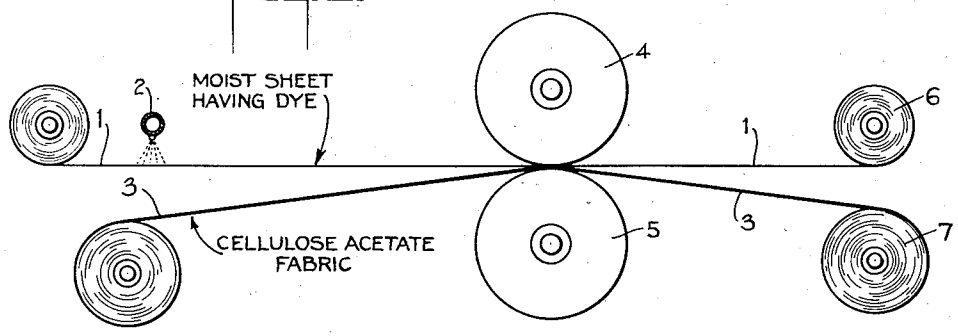


Fig. 2.

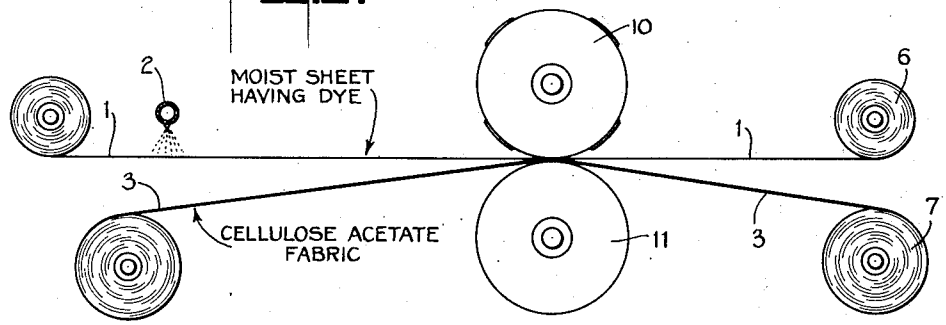
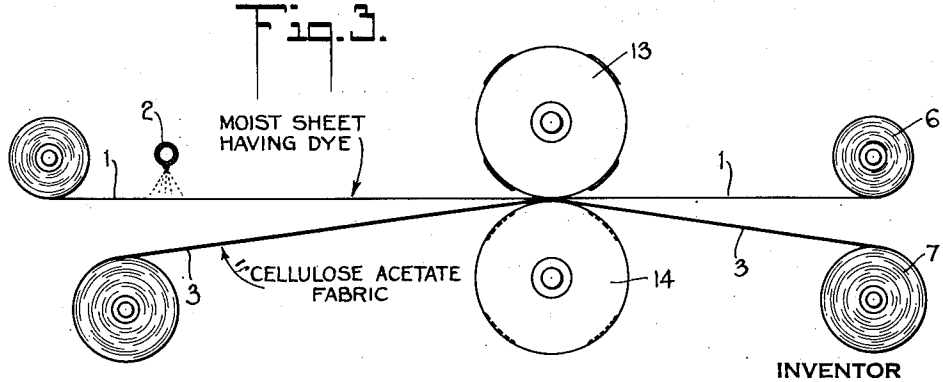


Fig. 3.



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Fig. 4.

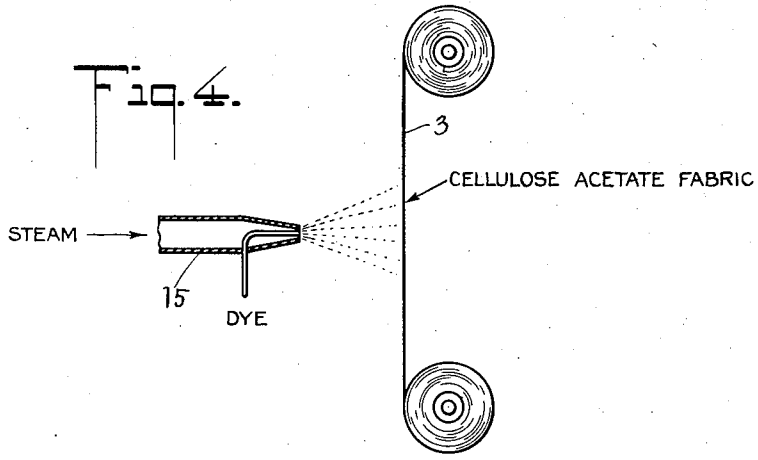


Fig. 5.

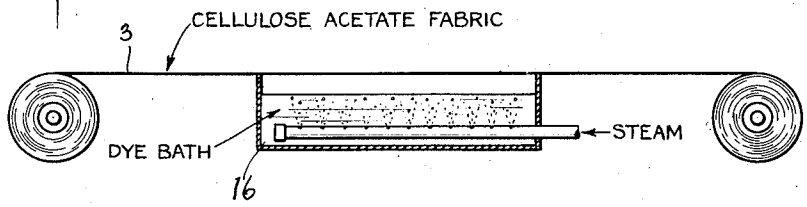


Fig. 6.

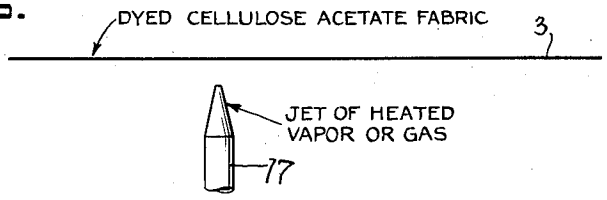
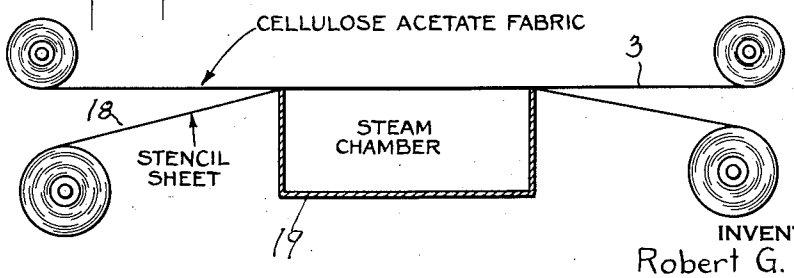


Fig. 7.



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UNITED STATES PATENT OFFICE

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METHOD OF COLORING TEXTILE MATERIALS AND PRODUCT THEREOF

Application filed March 15, 1929. Serial No. 347,452.

This invention relates to the production of ornamental effects on textile materials, and relates more particularly to the production of local coloring effects on such textile materials by the use of coloring matter that is at least partially volatile in steam or other hot gaseous or vaporous material.

An object of my invention is to color textile materials, either locally or on the whole surface thereof, by the application thereto of coloring material in the form of a vapor or which is carried in finely divided form in another vapor or gas at elevated temperatures.

A further object of my invention is to produce upon textile materials local color effects or designs whose outlines are not sharp, by the application of a dyestuff that is at least partially volatile. Other objects of my invention will appear from the following detailed description.

In accordance with my invention, I apply locally in predetermined places or to the whole surface of a textile material a dyestuff or coloring matter that is readily volatile in steam or other hot gases or vapors. The dyestuff may be applied to the fabric in any suitable form such as by means of a transfer medium, or by applying in the form of a spray or jet as will be described below.

Any suitable textile material may be treated by my invention. It may be yarns wound in any suitable package such as hanks, cops, bobbins, etc. Preferably, however, the textile material to be treated is in the form of fabric and this invention is of general application to fabrics or yarns of all kinds. Thus the fabric may be made of cotton, silk, wool, reconstituted cellulose, flax, etc. My invention is of particular advantage in its application to textile materials such as fabrics or yarns containing organic derivatives of cellulose, such as organic esters of cellulose or cellulose ethers. Examples of organic esters of cellulose are cellulose acetate, cellulose formate, cellulose propionate and cellulose butyrate, while examples of cellulose ethers are ethyl cellulose, methyl cellulose and benzyl cellulose. The fabric need not consist wholly of yarns of organic derivatives of cellulose but may also contain yarns of other fibres.

This invention is not restricted to any particular dyestuffs but is applicable to all dyestuffs that are at least partially volatile in steam or other hot gaseous or vaporous material. By way of example, it is pointed out that the following water insoluble coloring matters which have an affinity for textile materials containing organic derivatives of cellulose such as cellulose acetate, are volatile in steam and are applicable in my invention: 4-nitrobenzene-1'-azo-4' amino-3'. 6'dimethylbenzene (orange); 2-nitro-4-chlo'-4'-methyldiphenylamine (golden yellow); 4-nitro-2-methoxy-benzene-azo-4'-dimethylaminobenzene (red); and 4-nitro-2-methoxybenzene-azo-4'-diethylaminobenzene (red).

Referring to the accompanying drawings, Figs. 1 to 7, inclusive, show diagrammatically some of the many modes of carrying out this invention.

There are many variations or modifications of the use of my invention and a few of these will be given below.

As an example of the application of my invention by the use of a transfer medium the following is given, reference being had to Fig. 1. A fabric or sheet 1 of other material that is dyed with, or has the volatile coloring matter thereon, is moistened with water from the spray 2 and is superposed over the fabric 3, such as one containing yarns of cellulose acetate, to be colored. This assembly is passed between hot smooth calender rolls 4 and 5 maintained at such a temperature as to cause the water to evaporate and steam to be generated. The steam so generated causes at least part of the coloring matter or dyestuff to be volatilized from the fabric or sheet used as a transfer medium and to be carried over to the fabric to be colored, whereby a color is imparted to the whole surface of the fabric to be colored. The fabric 1 is rolled up on roll 6, and the cellulose acetate fabric is rolled upon roll 7.

As another example of the use of a transfer medium, referring to Fig. 2, the assembly of a moist or wet transfer medium 1 and fabric 3 to be dyed is passed between heated

engraved or embossed roller 10 and smooth roller 11, such as are used in printing. At those portions where the greater pressure is applied to the assembly of transfer medium and fabric, because of the more intimate contact of the heated surfaces, the water is caused to vaporize and carry the dyestuff over to the fabric to be locally colored. In this manner, color designs are produced and these designs may or may not have sharp outlines, according to the type of pattern on the embossed or engraved rolls.

In another form of my invention involving the use of a transfer medium, as shown in Fig. 3, the assembly of moist or wet transfer medium 1 and fabric 3 to be locally colored is passed between heated embossing rolls 13 and 14 having male and female designs respectively. In this case it is preferable to employ a fabric having yarn made of thermoplastic material such as cellulose acetate, whereupon the fabric is simultaneously embossed and printed, the local color imparted to the fabric corresponding in outline to the embossed design.

In another form of my invention, the volatile dyestuff is applied to the fabric in the form of a spray or jet while it is being carried by steam or other hot gaseous or vaporous material. For this purpose, referring to Fig. 4, an ordinary spraying gun 15 such as is used in the spraying of lacquers, may be used, wherein steam is employed instead of air as the spraying medium. I have found that wet steam has a greater volatilizing action than dry steam, and therefore such wet steam is preferably employed. If temperatures higher than 100° C. are required, the wet steam may be under such elevated pressure as to attain such higher temperatures. Another mode of obtaining a spray, jet or stream of the dyestuff in volatile form (as shown in Fig. 5) is to bubble or inject moderately hot steam at moderate pressure through a solution 16 or a colloidal suspension of such dyestuff in an aqueous or other medium. The solution of dyestuff is preferably concentrated, and the steam or other vapor is preferably of sufficiently high pressure and temperature to raise the solution to the boiling point, whereby the steam and the volatilized dyestuff leaving such solution is at sufficiently high temperature so that the same do not condense prior to the time they are applied to the fabric to be colored.

The spray of volatile coloring matter and steam or other gaseous fluid may be applied to the whole surface of the fabric, but it is preferably applied only locally to the fabric. By directing the spray of the coloring material to predetermined places, any desired designs may be attained. In another form, the spray may be directed through stencils having a suitable design onto the fabric to be colored. An important application of my invention is to obtain the effects known as ombre dyeing. In this ombre effect, the fabric is colored in various colors, one color blending into the other. Thus a fabric may be dyed red at the side corresponding to one selvedge and this red progressively blend into an orange color and the orange color then progressively blend to a yellow until a pure yellow is obtained at the edge near the other selvedge. This effect may be attained by my process by first spraying a red dyestuff along one selvedge and applying less and less dyestuff as the other selvedge is approached until finally no red dyestuff is applied, and then applying a yellow dyestuff in the form of a spray to the other selvedge and gradually applying less and less yellow dyestuff as the first selvedge is approached, whereby the color will vary from bright red through orange to bright yellow, with no line of demarcation between the colors.

As another example of producing ombre dyeing effects, the fabric to be colored is stretched on an apparatus such as a tenter frame and while in a moist condition, has jets or sprays of dyestuffs applied thereto. In order to obtain the color effects above described, the part of the fabric near one selvedge will have a red dyestuff applied thereto by means of a first jet, the second jet will apply a mixture of red dyestuff with a little yellow dyestuff, the third jet will apply an orange dyestuff at a point substantially midway between the two selvedges, a fourth jet will apply a mixture of yellow dyestuff with a little red, while the fifth jet will apply a pure yellow dyestuff along the other selvedge of the fabric. In this manner of treatment, in some cases it is not necessary to finish the goods after treatment, although such finishing is not excluded.

My invention may also be applied to obtain effects analagous to discharge printing effects. This may be done by dyeing the fabric with the volatile dyestuff, and then locally applying steam or other heated gases or vapors to the dyed fabric 3 in predetermined places, either by jets 17, as is shown in Fig. 6 or onto the fabric that is protected by stencils 18 as is shown in Fig. 7, whereby at least part of the dyestuff is volatilized from those places where the steam or other heated gas has been applied from the steam chamber 19.

In the cases where local color effects are obtained, because of the mode of procedure and the volatile nature of the dyestuffs or coloring materials employed, the outlines of the design are not sharp, but are rather clouded and gradually blend into the background. The effects thus produced are highly ornamental, and are of the nature usually obtained either by hand processes such as in Batik printing, or by other expensive methods.

It is to be undertsood that the foregoing detailed description is given merely by way of illustration, and that many variations may be made therein without departing from the spirit of my invention.

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

1. The method of coloring textile materials comprising applying thereto on at least part of the surface thereof a readily volatilizable coloring material in substantially volatile form.

2. The method of coloring textile materials containing yarns of organic derivatives of cellulose, comprising applying thereto on at least part of the surface thereof a readily volatilizable coloring material in substantially volatile form.

3. The method of coloring textile materials containing yarns of cellulose acetate, comprising applying thereto on at least part of the surface thereof a readily volatilizable coloring material in substantially volatile form.

4. Method of producing local color effects on fabrics containing organic derivative of cellulose yarn comprising locally applying thereto volatilized dyestuff carried in a hot gas or vapor medium.

5. Method of producing local color effects on fabrics containing cellulose acetate yarn comprising locally applying thereto volatilized dyestuff carried in a hot gas or vapor medium.

6. Method of producing local color effects on fabrics containing organic derivatives of cellulose comprising applying to the fabric to be treated a transfer medium having thereon a readily volatilizable dyestuff, which transfer medium is moistened or dampened with water, and then applying a heated surface in predetermined places thereto.

7. Method of producing local color effects on fabrics containing cellulose acetate comprising applying to the fabric to be treated a transfer medium having thereon a readily volatilizable dyestuff, which transfer medium is moistened or dampened with water, and then applying a heated surface in predetermined places thereto.

8. Method of producing local color effects and embossed designs on fabrics containing organic derivatives of cellulose comprising applying to the fabric to be treated a transfer medium having thereon a readily volatilizable dyestuff, which transfer medium is moistened or dampened with water, and then passing the same between heated embossing devices.

9. Method of producing local color effects and embossed designs on fabrics containing cellulose acetate comprising applying to the fabric to be treated a transfer medium having thereon a readily volatilizable dyestuff, which transfer medium is moistened or dampened with water, and then passing the same between heated embossing devices.

10. Method of coloring fabric containing yarns of cellulose acetate comprising applying thereto a stream of a hot gas or vapor carrying a volatile dyestuff for the cellulose acetate material.

11. Method of locally coloring fabric containing yarns of cellulose acetate comprising locally applying thereto a stream of a hot gas or vapor carrying a volatile dyestuff for the cellulose acetate material.

12. Method of producing "ombre" dyeing effects on fabric containing cellulose acetate yarn comprising spraying a volatile dyestuff of one color in progressively diminishing amounts from one side thereof towards the other side, and then spraying a volatile dyestuff of another color of progressively increasing amounts towards the said other side.

13. Method of producing local color effects on fabrics containing organic derivative of cellulose yarn comprising applying thereto a readily volatilizable dyestuff and then locally applying a heated gas to the fabric.

14. Method of producing local color effects on fabrics containing cellulose acetate yarn comprising applying thereto a readily volatilizable dyestuff and then locally applying a heated gas to the fabric.

15. Method of producing local color effects on fabrics containing organic derivative of cellulose yarn comprising applying thereto a readily volatilizable dyestuff and then locally applying a heated gas to unprotected portions of the fabric.

16. Method of producing local color effects on fabrics containing cellulose acetate yarn comprising applying thereto a readily volatilizable dyestuff and then locally applying a heated gas to unprotected portions of the fabric.

In testimony whereof, I have hereunto subscribed my name.

ROBERT G. DORT.