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PROCESS OF ORNAMENTAL DYEING

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5 Claims. (Cl. 8—2.5)

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This application is a continuation in part of my United States patent application Serial No. 33,660, filed June 17, 1948.

My invention relates to dyed products and methods of forming same and has for its object the provision of an improved method for dyeing textile and paper products, an improved dyed textile and paper product, and an improved dye transfer medium and means.

The practical commercial dyeing of textile and paper product has been in the past almost entirely limited to certain forms of dyeing, namely, transferring dye solutions to and on a material by immersion or basically surface application, such as printing by block, screen or roller, with raised or cutout surfaces and by spray dyeing.

I have discovered that when a compressible porous fluid-absorbent material is impregnated with an aqueous dye solution, such as is commonly employed in the dyeing of fabrics, to the extent that the amount therein is substantially less than the absorption capacity of the material at normal temperatures and pressures, the impregnated material may be employed as a dye transfer medium with textile and paper products by placing the medium and textile or paper products in juxtaposition and compressing the two together, the amount of pressure employed controlling the extent of transfer of the dye solution contained in the medium.

I have further discovered that when the textile or paper product also is provided with a water content the dispersion of the dye solution from the medium into the textile or paper product is greatly facilitated.

I have also discovered that by impregnating two or more of the dye transfer mediums with differently colored dye solutions and sandwiching the textile or paper product therebetween before compressing multiple dyeing of the textile or paper product may be obtained, which by varying the type and kind of pressure employed may be widely variegated and made substantially non-reproducible.

The present invention, accordingly, contemplates and includes the new type of dye transfer medium, the new method of transferring the dye from the medium to the textile or paper product, variations in the type and kind of pressure employed in said new method by transferring the dye to the textile or paper product, and the new type of dyed textile and paper product produced thereby.

In accordance with these discoveries, the new dye transfer medium of the present invention comprises, in its broadest aspect, a compressible, porous, fluid absorbent body, preferably in sheet or strip form or a form which is substantially relatively thin as compared to its length and breadth, which is comprised of a substance or material which is substantially inert or non-reactive with the usual type of dye solutions employed in the dyeing of textiles and paper products and resistant to deterioration at the usual temperatures employed in the usual dyeing process.

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As one specific embodiment of such a dye transfer medium, but not as a limitation thereof, the material found most suitable for the purposes of the present invention is a woven cotton fabric, preferably such fabric known in the art as unbleached muslin.

Unbleached muslin is produced in a wide range of weights and weaves and for the purposes of the present invention the particular weight and weave employed may be widely varied without essential departure from the present invention, as all weights and weaves of unbleached muslin material are characterized by being highly absorbent towards aqueous dye solutions and by being compressible within the scope of the present invention sufficiently for the purpose of dye transfer.

The particular weight and weave of such unbleached muslin material selected for any given dye transfer operation, however, is subject to limitation with respect to the weight and weave and kind of fabric or paper to be dyed, it being apparent that as the weight of any given textile material increases, the weight of the unbleached muslin dye transfer material necessarily increases in some order or scale thereby to provide sufficient absorbed dye liquid to produce the desired dye effect at the pressure and type and kind of pressure employed.

In the practice of the present invention all types and kinds of textile materials to be dyed may be employed, such as cotton, wool, silk, and various textiles comprised of synthetic cellulosic, proteinic and polyamide fibers or filaments. A large number of paper products also may be dyed or colored by the practice of the present invention.

The aqueous dye solutions adapted for use in the present invention consist of any of those water soluble dyes well known in the art, and heretofore employed in the dyeing of textiles and paper by heretofore known processes. The so-called fast-color dyes, however, are preferred. The dye solution, per se, forms no part of the present invention, except as an element in the combination hereinafter defined.

As one specific example of the practice of the

present invention but not as a limitation of the same, I will describe the invention as practiced in the production of single-toned, two-toned, multiple-toned and variegated toned textile comprised of silk of the weight characteristically employed in the manufacture of women's silk scarves.

In the manufacture of single-toned scarves in accordance with the present invention, the scarf material is placed in a position between two dye-impregnated compressible dye-transfer mediums of the present invention and the "sandwich" thus formed is compressed between opposite plates, the pressure employed being variable but normally a constant with any given medium, heating at the temperature at which the dye normally will take a set in the fabric employed for a time interval effective to produce the desired setting of the said dye in the fabric.

To facilitate the rapid dispersion of the dye content of the medium into the scarf material, the scarf material is moistened uniformly sufficiently to accomplish this desired result. Normally, the fabric to be dyed is subjected, prior to the dyeing operation to a washing, de-sizing and bleaching operation to condition the same for dyeing. In accordance with the present invention, this preferred practice is followed, the bleached fabric then being rough dried to a lightly moistened condition.

As an example of this specific embodiment, the usual weight of silk scarf material for women's wear is a medium weight and the amount of dye required to color this light weight material accordingly is relatively small and I have the option of employing a heavy weight unbleached muslin dye transfer medium carrying a relatively small amount of absorbed dye solution, a medium weight unbleached muslin dye transfer medium carrying a large amount of absorbed dye solution, or a light weight unbleached muslin material for the dye transfer medium in which the absorbed dye solution closely approximates its saturation capacity.

In all of these possible variations, the essential object by compression is to apply a pressure onto the sandwich which is effective to cause the dye solution which is in excess of the absorption capacity at the pressure employed to flow into the unsaturated material to be dyed, the moisture content of the undyed material facilitating the absorption and dispersion of the dye throughout the material and effectively shortening the time interval of application of the pressure as well as materially reducing the amount of pressure required to attain this result.

In the practice of this invention, in the forming of mono- or single-toned dyed fabric, the material to be dyed which, preferably has a light moisture content of about 20% is laid flat between two sheets or pads impregnated with the same color dye solution and the sandwich thus formed is compacted. The sandwich, however, may consist of a plurality of alternate layers of transfer medium and fabric to be dyed with the top and bottom layer consisting of the transfer medium. In such an assembly it is usually desirable to employ medium weight unbleached muslin for the dye-transfer medium, the absorbed quantity of dye solution therein being calculated or experimentally determined to approximate that needed and available at the pressure employed to dye the sandwiched fabric properly.

As an illustration, a piece of the scarf silk of the weight described, which is approximately 36

inches wide and 72 inches long, will be prepared for dyeing and then placed between two similar sized dye-transfer mediums comprised of unbleached muslin of medium weight impregnated with a dye solution of the usual strength or concentration employed in the dyeing of such silk by the prior art dipping process, to about 70% of its maximum absorption capacity at atmospheric temperatures and pressures, when the sandwich is compressed between opposing flat plates at a pressure approximating 10 pounds per square inch for a time interval approximating 2 seconds, particularly when the said scarf material is provided with a moisture content of about 20% of its absorption capacity at atmospheric temperatures and pressure.

Various modifications and departures may be made in the type and kind of pressure employed without essential departure from the invention. As an illustration, the transfer of the dye solution from the medium to the fabric may be accomplished in a continuous manner, if desired, as by feeding the two impregnated dye-transfer mediums and the textile, each in strip form, and with the textile sandwiched between the strip mediums through one or more compressing rollers, the pressures of the rollers being adjusted to effect the compressive transfer of the dye solution by the medium into the textile.

Alternately, the sandwich may be subjected to compressive forces such as by twisting, stamping, roping, folding, balling, rolling or other such forms of compression.

Where two-toned dyeing of the fabric is desired, one face of the fabric, one color and the other face another color, the two dye-transfer mediums of the sandwich are saturated to the extent desired with different colored dye solutions. Upon compression the different colored dye solutions enter the opposite faces of the fabric and blend together at the center. Care must be taken in this modification to limit the amount of the dye solution absorbed in each dye transfer medium to that which at the pressure employed approximates one-half of the dye absorption capacity of the fabric, and the time interval employed for compression transfer of the dye solution into the fabric must be closely controlled and regulated to obtain the desired two-toned effect.

A most unusual and important feature of my invention is that extraordinary results can be accomplished entirely by either hand work, by machine or a combination of both, the same process governing the operations of any or all ways.

Another important feature of my invention is that any kind of absorbent material, for example, textiles and paper can be dyed by my method.

One of the objects of my invention is to obtain a non-repeating effect, yet always sufficiently close to be practical for commercial use.

Another object of my invention is to control the type of color effects in a broad way by a combination of gathering in rope form, rolling, twisting and folding.

Another object of my invention is to control the type of color effects by the amount of pressure applied to the materials and how that pressure is applied when in rope or other forms.

Another object of my invention is by proper control of moisture content and distribution of same when the materials are put in sandwich or other form, to secure a great variety of color effects.

Another object of my invention is by proper control of the amount of and distribution of

sizing ingredients in the transfer medium materials when the materials are put in sandwich or other form to secure a variety of color effects.

Another object of my invention is by use of different weights, weaves, thickness, rigidity, smoothness, roughness in the transfer medium materials when the materials are put in sandwich or other form to secure another type of variation in effects.

Another object of my invention is by variation in the total amount of dyestuff solution (dye or dyes in solution) content or distribution in the transfer medium material when the materials are put in sandwich form to secure another variation in effects.

Another object of my invention is by not having a completely smoothed out condition of the materials when they are put in sandwich form to secure certain ripple, wavy, undulating and other effects, otherwise not possible by any other method.

Another object of my invention is obtaining, not solely a different color, cast or hue on each side of the materials dyed, but obtaining different variegated color effects on each side of the dyed materials.

Another object of my invention is to secure an irregular beautiful shading or color spectrum effect between two or more colors, which cannot be accomplished commercially by any other method.

Another object of my invention is to secure by controlling the amount and distribution of air in the materials, when wrapped in rope or other form, spectacular effects, accomplished by no other means.

Another object of my invention is to secure an irregular non-definitely repeating effect of a hand painted material, which no other process can do.

Another object of my invention is to dye three or more pieces of materials simultaneously with proper control of the eventual effect, two being the limit in ordinary dyeing operations.

Another object of my invention is to secure at will desired effects which can be made to run lengthwise, crosswise, diagonally in one direction, diagonally in two directions (herringbone effect), double herringbone effect, varying degree angle diagonals, radially and spirally.

Another object of my invention is by variation in the degree of dissolving of one or more of the dyestuffs used in the dye-bath for any one or more transfer medium materials, to produce an unusual effect in the material to be dyed and hitherto not accomplished.

Another object of my invention is by the proper relationship and control of both moisture content and degree of flatness of the two sets of materials and the sandwich to produce a marbelized effect, not otherwise obtainable by any other method.

Another object of my invention is by the insertion of bands, ribbons, strips of cloth, cords, braids and yarns, at definite places in the materials sandwich, to produce unusual irregular effects otherwise not obtainable.

In securing variegated color effects in the materials to be dyed, assuming for example with average normal weight materials that three pieces of said material are to be dyed, four transfer medium materials then must be used.

The seven materials, described in the previous paragraphs and prepared as stated previously,

are then placed one on top of the other in sandwich form, as follows, each material is generally laid out flat, in respect to the adjoining ones, but not under great tension, either in length or breadth.

Transfer medium #1—color black, for instance.
First piece of material to be dyed.
Transfer medium #2—colored blue, for instance.
Second piece of material to be dyed.
Transfer medium #3—colored green, for instance.
Third piece of material to be dyed.
Transfer medium #4—colored black, for instance.

The colors and the depth of same can be varied at will.

This sandwich as thus formed is then gathered together either selvage to selvage or on itself lengthways, rolled in some way, twisted in some way, folded in some way, or in a combination of the above four steps, depending on the eventual effect desired in the materials to be dyed.

The sandwich is next fastened securely in the desired form, which may be compared basically to what is known as rope form in the finishing branch of the textile industry. The rope may be bound spirally or otherwise by yarn, twine, cord, banding or cloth or twisted or wrapped by another material.

The next step is while the materials are in rope form, to squeeze out any excess moisture by running through some type of wringer or press rolls. If certain types of effects are desired, the previous step may be preceded by removing part of the excess moisture by pressure flat on the sandwich or this last step may precede the former step.

Materials, still in bound or unbound rope form, are then subjected to sufficient temperature for the proper length of time, according to the type of dyestuffs used, as well as depth and blending of color desired to fit, or set, the dyestuff (dye) on or in the materials being dyed. This process may be accomplished in any known commercial way desired and available.

Next, the wrapping or covering, or both, is removed, the rope opened up and the materials again returned to flat form.

The individual materials are then separated; the transfer medium materials washed for future use and the dyed materials washed, dried, tentered or otherwise treated in any regular method available and desired.

Many variations may be made in carrying out my process without departing from the spirit and intent of the same and the said variations are set forth in the specification and defined by the claims.

I claim:

1. The method of dyeing a piece of fabric with water soluble dyes which comprises impregnating an elongated piece of compressible fluid absorbent fabric material with an aqueous dye solution to an extent substantially less than the absorption capacity at normal temperatures and pressures, placing the wet impregnated piece in juxtaposition with a piece of fabric to be dyed and twisting the two pieces together and compressing the two pieces together at a pressure which transfers a part of the absorbed dye solution in the one piece into the other piece.

2. The method of dyeing a plurality of pieces of fabric with water soluble dyes which comprises impregnating a plurality of elongated pieces of compressible fluid absorbent fabric material with an aqueous dye solution to an extent substantially less than its absorbent capacity at

normal temperatures and pressures, placing the wet impregnated pieces in juxtaposition with the pieces of fabric to be dyed and twisting and compressing them together at a pressure which transfers a part of the absorbed dye solution from the impregnated pieces to the pieces to be dyed.

3. The method of dyeing a plurality of pieces of fabric with water soluble dyes which comprises impregnating a plurality of elongated pieces of compressible fluid absorbent fabric material with an aqueous dye solution to an extent substantially less than its absorbent capacity at normal temperatures and pressures, placing the wet impregnated pieces in juxtaposition with the pieces of fabric to be dyed and winding spirally and compressing them together at a pressure which transfers a part of the absorbed dye solution from the impregnated pieces to the pieces to be dyed.

4. The method of dyeing a plurality of pieces of fabric with water soluble dyes which comprises impregnating a plurality of elongated pieces of compressible fluid absorbent fabric material with an aqueous dye solution to an extent substantially less than its absorbent capacity at normal temperatures and pressures, placing the wet impregnated pieces in juxtaposition with the pieces of fabric to be dyed and twisting and compressing them together diagonally at a pressure which transfers a part of the absorbed solution from the impregnated pieces to the pieces to be dyed.

5. The method of dyeing a plurality of pieces of fabric with water soluble dyes which comprises impregnating a plurality of elongated pieces of compressible fluid absorbent fabric material with an aqueous solution to an extent substantially less than its absorbent capacity at normal temperatures and pressures, placing the wet impregnated pieces in juxtaposition with the pieces of fabric to be dyed and twisting and compressing them together in advancing circles at a pressure which transfers a part of the absorbed dye solution from the impregnated pieces to the pieces to be dyed.

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