

UNITED STATES PATENT OFFICE.

HARRY B. SMITH, OF ALBANY, NEW YORK.

METHOD OF DYEING TEXTILE MATERIALS.

No Drawing.

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My invention relates to a method of dyeing textile materials such as cotton.

It is sometimes desirable to produce fabric or cloth in which the dye is applied unevenly, there being places or spots in the cloth in which none of the dye appears, the remainder of the cloth being dyed more or less deeply so that a variegated effect or appearance is obtained. In the most desirable variegated effect the spots of different color effect appear unevenly distributed or at random. It is one of the objects of my invention to produce a simple, cheap and efficient process to produce such variegated or random effects. Other objects, features and advantages will appear more fully in the following detailed description and appended claims.

I have found it preferable in the practice of my invention for the dyeing of cotton material to pursue a detailed procedure substantially as follows, but I do not limit myself thereto as the invention may be varied within the scope of the appended claims.

A suitable dyeing bath is prepared by adding to water a cotton dye and a suitable assistant to accelerate the deposition of the color on the portion of the cotton which readily absorbs the dye, that is, upon the relatively soft or loosely twisted parts of the material. The deposition of color upon the tightly twisted or hard parts of the material, which do not readily absorb the dye, is, as will be hereinafter more fully described, avoided.

The dye employed may be any cotton dye, preferably a direct or substantive dye. It may be, for example, a mixture composed of suitable proportions of three well-known dyes having the trade names "Naphtamin Orange T. B.", "Naphtamin Brown R. B." and "Direct Black G". Most of the general class of dyes to which I have referred can, however, be satisfactorily used in my process. Other dyes, such as basic dyes, may be used but not with as good results as obtained with the direct or substantive dyes.

The amount of dye employed in the bath should be such that the dye bath while producing a sufficiently deep color in the relatively soft or loosely twisted portions of the material will be substantially exhausted before any substantial deposition of the color upon the tightly twisted or hard parts of

the material can take place. Good practical results are obtained by employing between two to five ounces of a direct or substantive dyestuff for each one hundred pounds of the cotton material treated according to the depth or shade desired. It is to be understood, however, that for obtaining certain very light or very deep effects a greater or less amount respectively of the dyestuff may be employed.

Any suitable accelerating assistant, for example common salt or Glauber's salt alone or in conjunction with the common salt, may be employed. I prefer to use common salt (sodium chloride) however because of its high effectiveness as an assistant for a given amount employed. As to the amount of assistant to be employed, this varies within wide limits depending upon the particular assistant employed. When common salt or sodium chloride is employed as the assistant I prefer to use about twenty pounds of sodium chloride for each one hundred pounds of cotton material treated. A lower amount will give results which are practical but not as satisfactory as this amount. To a certain extent a larger amount of sodium chloride will give better results but is unnecessary for the effective practical carrying on of the process. Suitable amounts of other assistants can be readily ascertained from the amount of sodium chloride specified above.

The temperature of the bath should preferably be sufficiently low not to prematurely fix any of the color and thereby to interfere with the proper application of the color to the material. It may be atmospheric temperature.

The above ingredients having been added to the bath, the cotton material in a dry state, either in the form of cloth or skeins, is run into the bath. The material is kept in this bath, preferably in motion, for a suitable period, say thirty minutes. The soft or loosely twisted parts of the material, which appear in all such material, during this time take up the color, the assistant acting on the dye to cause a very rapid deposition of the color on these parts of the material. At the end of this time the bath has practically become exhausted of coloring matter and the hard portions of the material have not absorbed or taken up any substantial or appreciable amount of the color. Of course the cotton material has portions of varying

hardness; so that there is a considerable variation in the amount or depth of color at different portions of the material. By the foregoing we have developed the desired variegated or random effect in the material. In other words, some of the spots or places in the material are white (or the original color of the fabric) and other spots or places in the material are colored by the dye to varying depths, the spots or places of different color being positioned at random throughout the material.

The bath, substantially free from coloring matter, is now heated slowly, say in one-half an hour, to a sufficient temperature, say 150° F. to effect the fastening of the color on the material. This heating should take place after the addition of the assistant; inasmuch as, if the bath is heated before the introduction of the assistant, the color when fixed by the heated bath will be comparatively uniformly distributed on the material and a distinct variegated effect will not be obtained.

In order to make the variegated or random effect more distinct it may be desirable to bleach the dyed material. With such bleaching the portion of the material which has retained its natural color will be brightened or whitened to a material extent while there will be very little brightening or whitening of the dyed portions of the material, the variegated effect being made thus more pronounced. In treating cotton material I prefer to employ during the bleaching operation an agent which in addition to bleaching will remove any motes, shives, and/or leaf which are commonly found in such material. To this end I preferably treat the material in an alkaline oxidizing bath. Various agents may be added to the bath to render it alkaline oxidizing, attention being directed to the materials set forth in U. S. Patent No. 1,199,745 to Irwin J. Smith and myself. Of these materials I prefer to employ a mixture of approximately equal amounts of peroxide of sodium and a salt of an alkaline metal, such as sodium chloride. This mixture is added to the dye bath and the material thereupon treated in this bath for a suitable length of time, say one-half an hour or longer. After this treatment the material is suitably bleached and the motes, shives and/or leaf softened and removed. The material is accordingly cleaner and has a more distinctly variegated appearance. It may now be taken from the bath and suitably washed and dried.

By the above described process the desired variegated or random effect is obtained in the material at a lower cost and with a consumption of less time and labor than has heretofore been required. Furthermore, the color of the dyed material is more permanent or fast than that produced with the

common mechanical methods now used for producing variegated effects.

Many variations from the specific embodiment of the invention described above may be made, not only as to the ingredients or agents employed but also as to the particular way in which the material to be dyed is subjected to the treatment by the various agents. For example the material may be first treated in a dye bath without the assistant, thereupon washed to take off any surplus color from the surface of the material and then treated in a subsequent alkaline oxidizing bath containing a suitable assistant such as common salt, the last-named bath being brought to a suitably high temperature. Also, for example, if desired a small amount of a suitable acid such as acetic acid may be added to develop and brighten the color. Other variations will appear to those skilled in the art.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. The process of producing a variegated effect in cotton having portions of varying hardness which comprises treating the cotton in a bath to which have been added a cotton dye and an assistant to accelerate the deposition of the color on the soft parts of the cotton and to substantially exhaust the bath before substantial deposition of the color on the hard parts of the cotton can take place.

2. The process of producing a variegated effect in twisted cotton having portions of varying hardness which comprises treating the cotton in a bath to which have been added a cotton dye and an assistant to accelerate the deposition of the color on the soft parts of the cotton and to substantially exhaust the bath before substantial deposition of the color on the hard parts of the cotton can take place, and thereafter heating the bath to fasten the color on the cotton.

3. The process of producing a variegated effect in cotton having portions of varying hardness which comprises treating the cotton in a cotton dye bath, and effecting the deposition of the color on the soft parts of the cotton while substantially avoiding the deposition of color on harder portions of the cotton and subjecting the cotton to an oxidizing bath to bleach the same and thereby render the variegated effect more distinct.

4. The process of producing a variegated effect in twisted cotton having portions of varying hardness which comprises treating the cotton in a cotton dye bath, and subjecting the dye to the action of an assistant to effect the deposition of the color on the soft parts of the cotton while substantially avoiding the deposition of color on harder portions of the cotton.

5. The process of producing a variegated

effect in cotton having portions of varying hardness which comprises treating the cotton in a cotton dye bath, subjecting the dye to the action of an assistant to effect the deposition of the color on the soft parts of the cotton while substantially avoiding the deposition of color on harder portions of the cotton, and subjecting the cotton to an oxidizing bath to bleach the same and thereby render the variegated effect more distinct.

6. The process of producing a variegated effect in cotton having portions of varying hardness which comprises treating the cotton in a cotton dye bath, subjecting the dye to the action of an assistant to effect the deposition of the color on the soft parts of the cotton while substantially avoiding the deposition of color on harder portions of the cotton, and subjecting the cotton to an alkaline oxidizing bath to bleach the same and thereby render the variegated effect more distinct and to remove moths, shive, and/or leaf from the cotton.

7. The process of producing a variegated or random effect in cotton cloth which comprises treating the cloth in a bath to which have been added a direct or substantive dye and an assistant to accelerate the deposition of the color on the soft parts of the cloth and to substantially exhaust the bath before substantial deposition of the color on the hard parts of the cloth can take place, and thereafter heating the bath to fasten the color on the cloth.

8. The process of producing a variegated or random effect in textile material which comprises treating the material in a bath to which have been added a dye and an assistant to accelerate the deposition of the color on the more absorbent parts of the material and to substantially exhaust the bath before substantial deposition of the color on the less absorbent parts of the material can take place, and thereafter heating the bath to fasten the color on the material.

9. The process of producing a variegated effect in textile material which comprises treating the material in a dye bath, subjecting the dye to the action of an assistant to effect the deposition of the color on the more absorbent parts of the material while substantially avoiding the deposition of color on less absorbent portions of the material.

10. The process of producing a variegated effect in cotton having portions of varying hardness which comprises treating the same in a bath to which have been added a cotton dye to an amount no less than 2 oz. for each 100 lbs. of cotton and an assistant to an amount sufficient to effect the deposition of the color on the soft parts of the cotton and to substantially exhaust the bath before substantial deposition of the color on the hard parts of the material can take place.

11. The process of producing a variegated effect in cotton cloth which comprises treating the same in a bath to which have been added a cotton dye to an amount between 2 and 5 oz. for each 100 lbs. of cotton and an assistant to an amount sufficient to effect the deposition of the color on the soft parts of the cotton and to substantially exhaust the bath before substantial deposition of the color on the hard parts of the material can take place.

12. The process of producing a variegated effect in cotton having portions of varying hardness which comprises treating the same in a bath to which have been added a cotton dye to an amount no more than 5 oz. for each 100 lbs. of cotton and an assistant to an amount sufficient to effect the deposition of the color on the soft parts of the cotton and to substantially exhaust the bath before substantial deposition of the color on the hard parts of the material can take place.

13. The process of producing a variegated effect in cotton having portions of varying hardness which comprises treating the same in a bath to which have been added a cotton dye and an assistant to an amount no less than 20 lbs. for each 100 lbs. of cotton and sufficient to effect the deposition of the color on the soft parts of the cotton before substantial deposition of the color on the hard parts of the cotton can take place.

14. The process of producing a variegated effect in cotton having portions of varying hardness which comprises treating the same in a bath to which have been added a cotton dye and sodium chloride to an amount no less than 20 lbs. for each 100 lbs. of the cotton.

15. The process of producing a variegated effect in cotton cloth which consists in treating the cloth in a bath to which have been added a cotton dye and an accelerating assistant to an amount no less than 20 lbs. for each 100 lbs. of cloth, the temperature of the bath being sufficiently low to avoid fastening of the color on the cloth, and thereupon heating the bath to fasten the color on the cloth.

16. The process of producing a variegated effect in cotton cloth which consists in treating the cloth in a bath to which have been added a cotton dye to an amount between 2 and 5 oz. for each 100 lbs. of cloth and an accelerating assistant to an amount no less than 20 lbs. for each 100 lbs. of cloth, the temperature of the bath being sufficiently low to avoid fastening of the color on the cloth, and thereupon heating the bath to fasten the color on the cloth.

17. The process of producing a variegated effect in cotton cloth which consists in treating the cloth in a bath to which have been added a cotton dye to an amount between 2 and 5 oz. for each 100 lbs. of cloth and

sodium chloride to an amount no less than 20 lbs. for each 100 lbs. of cloth, the temperature of the bath being sufficiently low to avoid fastening of the color on the cloth, and thereupon heating the bath to fasten the color on the cloth.

18. The process of producing a variegated effect in cotton cloth which consists in treating the cloth in a bath to which have been added a cotton dye to an amount between 2 and 5 oz. for each 100 lbs. of cloth and an accelerating assistant to an amount no less than 20 lbs. for each 100 lbs. of cloth, the temperature of the bath being sufficiently low to avoid fastening of the color on the cloth, thereupon heating the bath to fasten the color on the cloth and subjecting the cloth to an oxidizing bath to bleach the same and thereby render the variegated effect more distinct.

19. The process of producing a variegated effect in cotton cloth which consists in treating the cloth in a bath to which have been added a cotton dye to an amount between 2 and 5 oz. for each 100 lbs. of cloth and

an accelerating assistant to an amount no less than 20 lbs. for each 100 lbs. of cloth, the temperature of the bath being sufficiently low to avoid fastening of the color on the cloth, thereupon heating the bath to fasten the color on the cloth and subjecting the cloth to an alkaline oxidizing bath to bleach the same and thereby render the variegated effect more distinct and to remove moles, shives and/or leaf from the cloth.

20. The process of producing a variegated effect in textile material which consists in treating the material in a bath to which have been added a dye to an amount between 2 and 5 oz. for each 100 lbs. of material and sodium chloride to an amount no less than 20 lbs. for each 100 lbs. of material, the temperature of the bath being sufficiently low to avoid fastening of the color on the material, and thereupon heating the bath to fasten the color on the material.

In testimony whereof, I have signed my name to this specification.

HARRY B. SMITH.