Sept. 24, 1929. E. KIRSCHENBAUM 1,729,347

TRANSFER DYEING PROCESS

Filed Oct. 18, 1926

Fig. 1

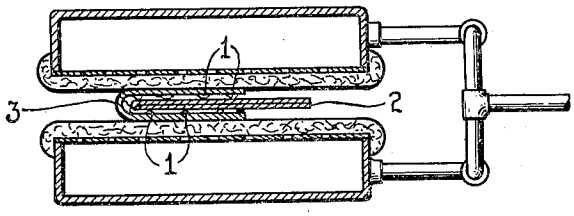

Fig. 4

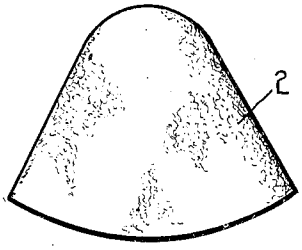

Fig. 7

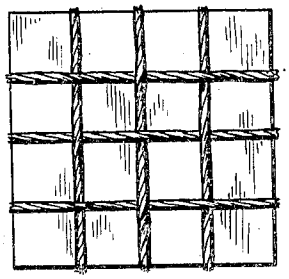

Fig. 8

Fig. 6

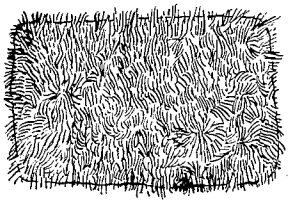

Fig. 9

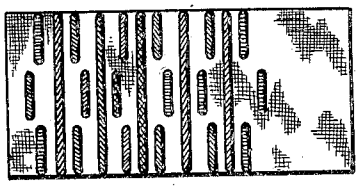

Fig. 10

Fig. 5

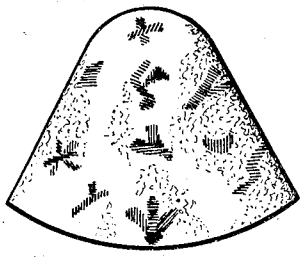

Fig. 2

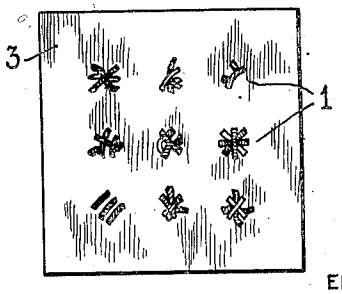

Fig. 3

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UNITED STATES PATENT OFFICE

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TRANSFER DYEING PROCESS

Application filed October 18, 1926. Serial No. 142,214.

My invention relates to the dyeing of fabric and similar materials, for the production of ornamental patterns and designs thereon.

An object of my invention is to provide a simple means for producing ornamental colored designs on fabric.

Another object of my invention is to provide a simple means for the printing of ornamental patterns upon fabrics.

Another object of my invention is to provide a simple means for the ornamentation of fabrics by the imprinting of colored ornamentation thereon by means of dye "bled" from dye absorbent materials which have been charged with an excess of dye.

In the art of the ornamentation of fabric it has been customary in the past to use one or the other of two major methods, that is by the insertion of colored threads in patterns, directly in the weaving of the fabric, or by embroidery thereon; or to apply colors in ornamental patterns by a printing process involving the use of printing plates or rolls. Both processes are subject to objections and difficulties in the way of cost or lack of flexibility.

My invention provides means for the production of color ornamentation upon a fabric by a process somewhat analogous to that of print dyeing but without the necessity of the large, complicated, and expensive machinery now required for print dyeing.

My invention makes use of the "bleeding" property of dye absorbent materials, when such material is charged with an excess of dye and then moistened in contact with another fabric. I have disclosed a preliminary embodiment of this principle in my Patent No. 1,518,585. In my present invention I provide a dye absorbent material which I supercharge with dye. This material I then arrange in the desired pattern by any one of a number of ways, after which I apply it to the fabric to be ornamented and cause the transfer of some of the excess dye to the second fabric by the addition of moisture. After a limited time for the "bleeding" or transfer of color to occur, I may remove the supercharged material, leaving a portion of the dye in place upon the fabric to be ornamented.

By means of my invention, I am enabled to produce a variety of new and unusual ornamental effects by a process of extreme simplicity and cheapness.

Other objects and the details of my invention will be apparent from the following description when read in connection with the accompanying drawings, wherein:

Fig. 1 shows a representative embodiment of the process and apparatus of my invention, and

Figs. 2, 3, 4, 5, 6, 7, 8, 9 and 10 show various details and steps in the operation of my invention.

A representative method of practicing my invention may be described by reference to the figures, as follows:

I may take a series of hanks of inexpensive cotton yarn which may suitably be lightly twisted in order to be a soft porous yarn. I may then dye the various hanks of yarn a variety of different colors, using a very strong dye solution and giving the threads an excess of dye so that they are supercharged with the dye substance. I may next comminute the hanks of yarn into relatively small fragments. I may also take a piece of coarse paper and put a series of spots of glue in some desired order or pattern upon the paper. The chopped fragments of superdyed yarn may then be thrown at random upon the paper. Some will stick to each spot of glue. The excess may then be removed in any convenient manner, such as by turning the sheet over and allowing them to drop off or by blowing them over with a blast of air. The glue may then be allowed to dry. This results in a paper having upon it pieces of the yarn material supercharged with dye arranged in a pattern according to the placing of the spots of glue as shown in Figs. 2 and 3. This I may call a transfer sheet. This pattern is suitable to be transferred to the fabric which it is desired to ornament.

If, for instance, I desire to apply the ornamental design to a felt hat form, of the type indicated in Fig. 4 I may cut a fragment of the paper with the attached superdyed threads, that is, the transfer sheet, of a size suitable to cover the felt hat form. The paper may then be folded around both sides of the

flattened hat form with the dyed yarn in contact therewith, and the whole placed in a press, such as a Hoffman press, as indicated in the Fig. 1. Pressure, moisture and heat, are then applied by the press for a short time, depending upon the amount of excess dye in the yarn, and the depth to which it is desired to dye the ornamented fabric. This is usually a matter of but a few minutes. As shown by Fig. 1, the pressure holds the superdyed threads 1 of Figs. 1, 2 and 3 in close contact with the felt hat form 2 of Fig. 4, between the hat and the paper 3, and the moisture dissolves the dye and allows it to "bleed" from the superdyed threads into the felt fabric. When the dyeing has proceeded to the desired extent, the press is opened, the contents removed, the paper unfolded from the felt hat form and laid aside, and the felt passed on to further processing operations. It may then have the appearance indicated in Fig. 5.

After the pressing treatment, the fabric is substantially unchanged in character, except that the dye has been added to it in the desired pattern. The dye reaches the surface fibres first in the bleeding process and they are more strongly dyed. In the event that the pressing operation has occupied but a relatively short time, relatively little chance is offered for the dye to penetrate into the body of the fabric and it may therefore lie entirely on and in the surface fibres. If it is desired, however, I may by extending the time of pressing, cause the dye to bleed to a greater depth into the fabric, and if the fabric is thin and the pressing time relatively long, the dye may travel entirely through the fabric.

If the fabric to be ornamented is wool or similar material, it is preferable that the dye used be one of the acid or basic dyes since the use of such dye avoids the necessity for a mordanting bath. Other dyes are, however, usable, since the fabric to be ornamented may be treated with a mordant, either before, or, preferably, after the application of the dye design.

I am not limited in the nature of the pattern which I may use in the operation of my process. In the preceding description I have suggested a pattern made by the random attachment of superdyed fibres to spots of glue upon a sheet of coarse paper. If, however, I desire to produce a plaid effect, I may coat a sheet of paper with glue over its entire surface, sprinkle fragments of the dyed yarn over the entire surface as shown in Fig. 6, and then cut the dried product into strips which may be laid in crosswise position upon the material to be ornamented and the dye caused to "bleed" and transfer as before. Strips of paper with attached yarn, all of a single color, may be used as shown in Figs. 7 and 8, or, if desired, different sheets of paper may be coated with glue and attached yarn, superdyed in different colors. Strips of different colors may then be intermingled in any desired fashion for the production of elaborate patterns of plaid in different colors.

It is not necessary that the fabric to be ornamented be an undyed fabric. The fabric to be ornamented may first be given a uniform tint of any desired color by dip dyeing in the usual fashion. Patterns in other colors or tints may then be applied by my process as previously described.

It is, likewise, not necessary that the material to be ornamented be a felt hat form. I may apply the process to other flat or shaped fabrics of any desired type. It works equally well on felt sheet, or woven woolen cloth, and on woven silk, either natural or artificial. It may be applied to rugs, carpets, hangings, and other heavy fabrics. Likewise it may be applied to fur. It works equally well upon light fabrics such as ribbons, and braids, on straw fabrics such as straw hats, on cotton cloth, or in general any dyeable fabric.

Likewise the invention is not limited to the use of superdyed cotton threads chopped into fragments and attached to paper. I may, for instance, embroider the superdyed threads upon paper or upon thin fabric, to form an elaborate design, and transfer the design by the similar process as described, to the fabric which it is desired to ornament. In this modification I may find it convenient to apply the embroidery upon a dyeproof material, such as paper which has been filled with waterproof material, such as waxed paper, or upon a thin woven fabric similarly treated for waterproofing. The embroidery threads may then be recharged with dye after use by redipping the completed embroidery into a dye bath. Under these conditions the foundation material, the waxed paper or cloth, remains free from dye while the embroidery fibres absorb a fresh charge and may be reused for the application of ornamentation to further quantities of fabric.

Alternately, I may use a fabric such as cloth and stencil the desired designs upon the cloth with an excess quantity of dye, thereby supercharging certain portions of the fabric only with dye. This partially supercharged fabric may then be used (as previously described in connection with the fibres attached to paper) for the application of the stencil design to other goods or fabrics to be ornamented. Or I may use an absorbent paper supercharged with dye as before described, either by stenciling or by any convenient printing process.

Interesting and valuable effects may also be obtained by the application of an excess of dye to tufts in the pattern of a chenille fabric. This may be done by hand or by any suitable mechanical method and some of the excess of dye may then be bled to another fabric for

a production of a pattern thereon by the application of moisture and pressure as previously described. Figs. 9 and 10 show materials for this modification.

It is not essential that I use absorbent threads or yarn as previously described. I may instead use an absorbent paper which I may charge with an excess of dye in a manner similar to that in which I charge the fabric threads, such as by dipping the paper in strong dye solution and drying. I may then chop or shred the paper into small fragments and mix fragments of various colors. These may then be applied as described in connection with the dyed yarns, to an adhesive coated paper. This material as so prepared may then be used instead of the previously described paper with the attached yarns, being applied to the fabric to be ornamented, and both then subjected to heat, moisture and pressure. The dye-charged papers may be subdivided all into fragments of substantially the same size, or they may be of different sizes. They may be dropped upon the adhesive coated foundation paper in any convenient means for producing a random distribution, such as by blowing on and off by a light draught of air or by any other suitable means.

It is not necessary to the operation of my process that I use a fibre of the sort typified by the yarn or absorbent paper. I may instead use a dye absorbent material such as gelatine, which may be dyed by the application of cold dye solution to the sheet gelatine as it is found in the trade. Or I may mix an excess of dye into a warm gelatine solution and shred or sheet the material by any convenient means. The dyed gelatine, whether dyed in solution or in the sheet, is desirably broken up into fragments of proper size and shape, and, as before, fragments of different colors may be mixed. These fragments may be caused to adhere to paper or other fabric, and the combination may then be used, as before described, to cause the dye to "bleed" and transfer to the fabric which it is desired to ornament. The gelatine may be coarsely powdered, or may be shredded, or may be cut into a desired ornamental pattern shape.

Similarly, the dyed paper, cloth or gelatine may be cut out by a suitable punch into any desired shape, as for instance, to represent flowers or animals, or geometrical designs, or other shapes, which may then be applied by hand in selected locations to such fabrics as hat forms, or may be applied with mathematical regularity to a flat fabric which it is desired to ornament, the previously described operation may then be carried through to "bleed" the dye into the desired fabric.

Unusual and attractive effects may be obtained by moistening the fabric to be ornamented in spots only, and sprinkling powdered or shedded gelatine over the fabric and then pressing without the application of additional moisture and without the addition of heat sufficient to melt the gelatine. The dye then "bleeds" from the gelatine fragments into the fabric to produce a very striking effect.

It is not necessary that a given fragment of foundation fabric with its attached dye-charged material be used but a single time. The supercharged materials will readily take up sufficient dye for several impressions, and it is, therefore, possible to use a single transfer piece for several successive impressions upon fabric to be ornamented. In doing so the first transfer is made by the application of only a little moisture and only a little heat for only a short time. A second impression may then be made from the same transfer material by the use of more moisture and heat for a longer time, and successive additional transfers may be made by increasing the moisture and time of transfer until all of the free dye has been discharged.

If it is desired to make a number of transfers of light color from a single transfer sheet, the time of treatment of the first transfer may be undesirably short. This may be compensated by treating the material to be ornamented with a gum solution such as a water solution of gum tragacanth, which reduces the rate of transfer of the dye from the supercharged material to the fibres of the fabric to be ornamented.

In the previously described embodiments of my invention I have disclosed various methods of incorporating an excess of dye into a material, which may be a foundation member or may be fastened by adhesives to a foundation member. It is, however, not essential that the superdyed material be cemented to the foundation material. Instead it may be attached by some convenient method such as stapling with wire staples, stitching down with thread, or by cutting slots or notches into the foundation member and forcing the superdyed elements through the opening to hold them in place. These and many other methods are equally suitable, and will occur to the workman skilled in the handling of fabrics and dyes.

By these means of my invention I am enabled to produce upon a variety of desired fabrics ornamentation in colors for the production of very unusual and striking effects, by a process of extreme simplicity, extreme flexibility, and very low cost, and I shall use the term "fabric" hereafter to include any fibrous or any other material capable of being dyed.

While I have described several embodiments of my invention, it is capable of additional modifications therefrom without departing from the spirit thereof and it is desired, therefore, that only such limitations shall be imposed thereon as are required by

the prior art or indicated by the appended claim.

I claim as my invention:

The method of producing a plurality of similar ornamentations on a plurality of fabrics which comprises securing a pattern of absorbent material upon a non-absorbent base, superdyeing said absorbent material, bleeding a portion of the excess dye from said absorbent material to a fabric by pressing engagement therewith, bleeding additional successive portions of dye from the absorbent material to other fabrics to be ornamented and replenishing the dye on said absorbent material by dipping it into a supersaturated solution of dye.

In witness whereof, I hereunto subscribe my signature.

ELIAS KIRSCHENBAUM.