

May 24, 1938.

V. SALLADA

2,118,781

PROCESS FOR THE DECORATION OF FABRICS

Filed June 26, 1936

2 Sheets-Sheet 1

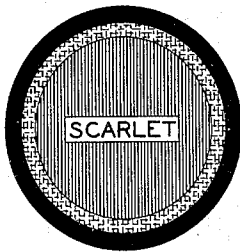


Fig. 1.

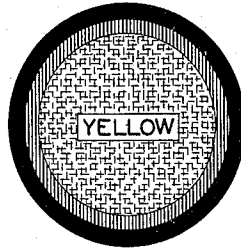


Fig. 2.

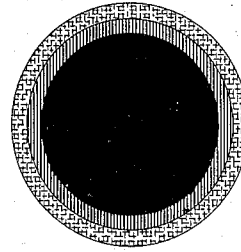


Fig. 3.

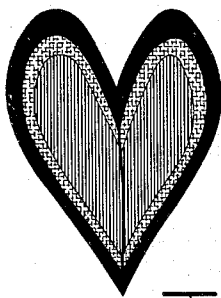


Fig. 4.

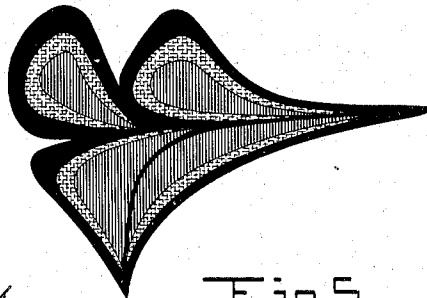


Fig. 5.

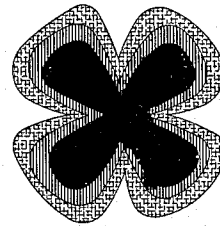


Fig. 6.

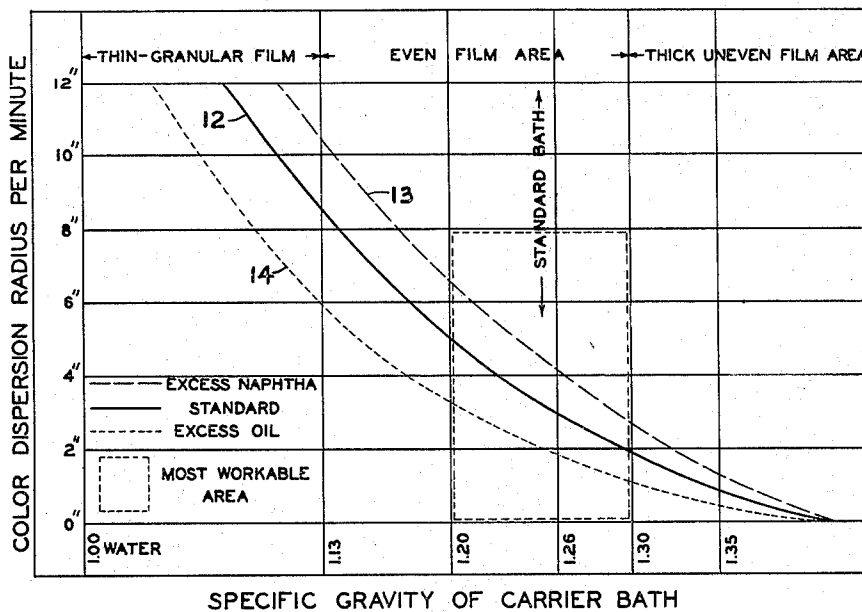


Fig. 10.

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2 Sheets-Sheet 2

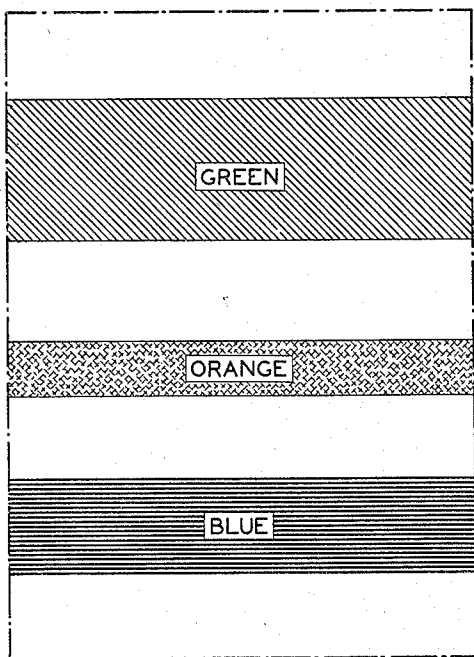


Fig. 2.

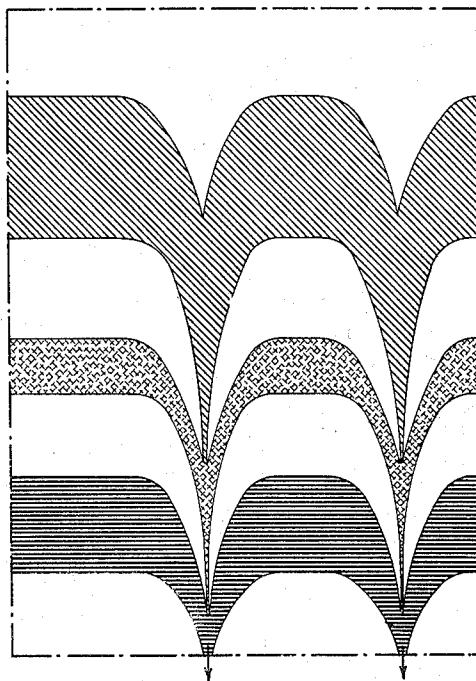
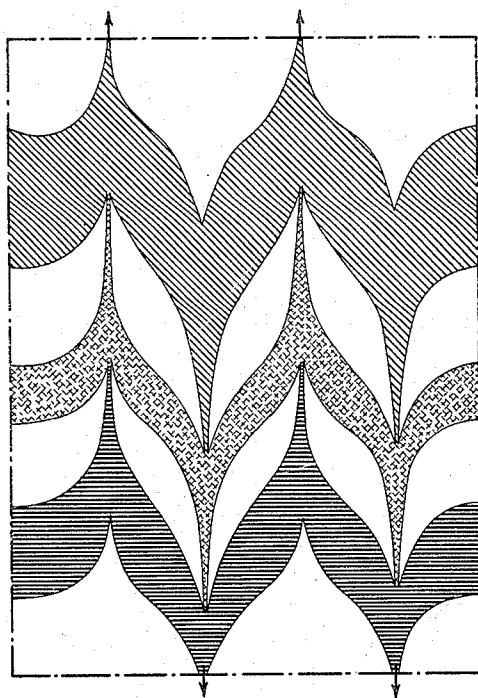


Fig. 3.

Fig. 4.



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UNITED STATES PATENT OFFICE

2,118,781

PROCESS FOR THE DECORATION OF
FABRICS

Velmont Sallada, Annandale, N. J.

Application June 26, 1936, Serial No. 87,581

10 Claims. (Cl. 91—68)

This invention relates to an improvement in the method of applying color to fabric, paper, wall board, tile, etc., such as is commonly referred to as marbleizing, and has for its main object to obtain new and desirable patterns, designs or effects by the flotation of color on a liquid carrier bath which color is readily transferable to the material, such as a textile fabric, and which color fulfills the requirements of fastness and design or pattern control demanded by the textile trade.

The general process of marbleizing heretofore used for decorating books, wall paper, imitation marble, etc. has not been suitable in connection with the production of designs or patterns on textile fabrics, and hence further objects of my invention are to reduce the limitations of processes of this character in control of the individual transfer designs or patterns obtainable with respect to repetition, the limitations in size and type of design or pattern obtainable, and the difficulties in obtaining the soft, flexible, drapery finish essential to general acceptance in the textile trade.

Other objects and features of novelty will be apparent from the following description in conjunction with the accompanying drawings, in which—

Figures 1, 2 and 3 are diagrams illustrating the controlled color dispersion;

Figures 4 and 5 are diagrams illustrating the controlled distortion of Figure 1;

Figure 6 illustrates controlled distortion of Figure 3;

Figures 7, 8 and 9 illustrate steps in the production of a particular design or pattern; and

Figure 10 is a curve or graph of color dispersion rate in inches per minute as ordinates, plotted against specific gravity abscissas.

My process employs a liquid carrier bath on which patterns are created by the flotation of color media, but deviates from former practice in certain essentials which I have found to be creative of new and controllable design or pattern effects previously not obtained and which I have found to overcome the lack of adaptability of the process of marbleizing in its application to textile fabrics.

One of these essentials is the character of the liquid carrier bath. For my purpose I use a carrier bath of a certain predetermined viscosity or specific gravity such that it will not be readily disturbed on the surface thereof by vibration or other outside disturbances. The viscosity of the bath is, further, a controlling factor in the determination of my designs or patterns with respect to the dispersion rate, and distance to which

the color media may spread on the surface thereof. It is further preferable, particularly if the process is being applied to textile fabrics, that the carrier bath be heavier than the color media to be deposited on the surface thereof and of controllable viscosity and of a material or composition soluble in water to facilitate washing off such part of carrier bath as may adhere to the fabric decorated without disturbing the color or the design or pattern transferred thereto. For example, I prefer for this purpose chemically pure, water-white glycerine of approximately 28.4 degrees Baumé. This material is readily soluble in water. It presents a surface on which my color media may be floated and which is not easily disturbed from vibrations or other external agitation. Other materials, such as a solution of glucose in water, water soluble gums, etc., might be used if reduced to the desirable Baume. In any case, variation in the viscosity or specific gravity of the carrier bath used has a direct effect on the rate or distance of dispersion of the color media applied to the surface thereof and accordingly affects the size and appearance of the design or pattern to be created thereon. A carrier bath of greater viscosity causes the colors to disperse more slowly with the resultant smaller designs or patterns of greater color intensity and more clearly defined outlines. A bath of lesser viscosity makes the colors disperse more rapidly with resultant larger designs or patterns of lesser color intensity and less clearly defined outline. Hence, the character of the liquid carrier bath is an important factor in the production of individual transfer designs in accordance with the process of my present invention.

Another essential of my process is the character of the coloring material which is floated on the surface of the liquid carrier bath. This coloring material consists of a base and a vehicle. As the base for my coloring material, I prefer to use pigment colors ground in oil such as those used by artists. These colors are obtainable in a complete range of tone, shade and color, and give results that are acceptable as to color permanency, fastness to light as well as careful washing or dry cleaning. These pigment colors as obtained commercially are in paste form. The higher grade pigments, that is, the pigments that are ground with the greatest care, are preferable for my purpose as they assure the greatest uniformity in dispersion. For my purpose these pigments ground in oil must be reduced to a consistency at which they will flow readily.

For reducing these colors to the desired flowing

consistency, and likewise to impart to this coloring medium certain essential qualities with respect to the dispersion thereof on the surface of the carrier bath, I have provided a vehicle of definite characteristics. This vehicle contains a dispersion increasing agent and a dispersion retarding agent the proportions of which may be varied to produce any dispersion rate desired. It also contains an adhesive or binder to cause the color to adhere to the surface treated. I have found the following formula will produce a most satisfactory vehicle:

	Parts
Pure white varnish-----	12.5
Pure linseed oil-----	12.5
Naphtha-----	75.0

The varnish serves as a binder which on drying holds the color pigment to the surface of the material decorated. Other varnishes, synthetic resins, natural or synthetic gums may be used to serve this purpose.

The linseed oil serves to retain the proper oil ratio which otherwise would be affected by the addition of the solvent (in this case naphtha) and to hold the color pigment in uniform dispersion and further, to retard and hold the dispersing action. Poppy oil, turpentine or similar oils might be used to replace the preferred linseed oil.

Naphtha is used as a solvent to reduce the pigment paste to a workable, flowing consistency and to act as a spreader to increase the dispersion of the color on the surface of the carrier bath. Other solvents of approximately the same boiling point might serve to replace the naphtha—turpentine, methyl "Cellosolve", xylol, toluol, etc.

It will be seen that two of the component parts of this formula serve a definite function and that a change in percentage of one or more of the materials used will serve to create a change in the action of the color when applied to the surface of the carrier bath. For example, if it is desired to increase the rate of dispersion of the color it is necessary only to either reduce the percentage of linseed oil and/or increase the percentage of naphtha, or conversely, if it is desired to retard the dispersing action of the color, it is necessary to increase the percentage of linseed oil and/or reduce the percentage of naphtha within certain limits. In this way, it is possible to control the dispersion of the individual colors whereas, if it is desired to increase or retard the dispersion of the entire range of colors this may be accomplished by altering the viscosity or specific gravity of the carrier bath. Thus the pigment paste is reduced to a flowing consistency suitable to my purposes, the amount of color paste so reduced being dependent on the effect it is desired to obtain.

The next step in my process is to apply this coloring material and vehicle to selected portions only of the surface of the liquid carrier bath, which I accomplish by dropping, spraying or otherwise distributing the color and vehicle, dependent on the type of design required. It should be noted that because the carrier bath is of a viscous nature the color and vehicle may be dropped from a considerable height without disturbing the smoothness of the surface. The dispersive action of the coloring material in the operation of the process is illustrated in Figures 1 to 3 inclusive, with for example, three colors that have been reduced in a vehicle as above described: 1. Black; 2. Yellow; 3. Scarlet. Referring to Figure 1, a

drop of black is deposited on the surface of the carrier bath. This drop of black disperses uniformly at a speed and to a distance predetermined by control of the ingredients described. Next, a drop of yellow is placed at the same point as was placed the black drop. The yellow then disperses in the same manner and pushes the black outwards. It will now be seen that as the yellow disperses it pushes the black in front of it and forms a black ring outside of a yellow mass, the black increasing in intensity as it is pushed outwards, the yellow remaining as a solid mass in the center of a black ring. I now place a drop of scarlet in the center of the yellow mass and again dispersion takes place, this time the scarlet pushing the yellow outwards. As before the color being pushed outwards becomes intensified and I now have a ring of black, a ring of yellow, and inside, a solid mass of scarlet. This procedure can be carried on with as many colors as desired.

Figure 2 shows the results obtained when the order of color drops is changed. In this case the black is dropped first; then a drop of scarlet, which creates a black ring around a mass of scarlet; then a drop of yellow in the center of the scarlet mass spreading outwards creates a scarlet ring within the black ring, and a mass of yellow in the center. Figure 3 shows even another order in which the yellow was dropped first; scarlet second; and the black last.

These views suffice to demonstrate the principle of controlled dispersion by which designs are obtainable by my process. The controllable variables are first, the viscosity of the carrier bath; second, the rate of speed of dispersion of the color medium on the carrier bath; third, the distance to which they will disperse. Each of these controllable factors may be adjusted individually as desired and further designing possibilities become apparent. For example, referring again to Figure 3, without changing the formula in the make-up of the color medium, if I had changed the viscosity of the carrier bath by increasing its specific gravity the spreading or the dispersion of the colors would have been retarded accordingly, the size of the pattern would have been reduced, and the intensity of the color increased. Conversely, if the specific gravity were decreased the pattern would be larger, the rings of color less intense and the outline of the pattern less clearly defined. On the other hand, with a carrier bath of higher viscosity, it would be possible to apply more color at one point and accordingly hold a larger pattern than would be possible with a carrier bath of lesser viscosity. Again, using a carrier bath of standard Baumé; i. e., 28.4 degrees, it will be clear that if the dispersion rate of one color were changed and the other two remained standard; i. e., as per formula described, the change would serve to either increase or retard the size or coverage of that color in ratio to the other colors dependent on whether its rate of dispersion were increased or retarded.

When the dispersing power of the color formula has spent itself (the controllable factor referred to as distance of dispersion) the transfer design or pattern remains on the surface of the carrier bath as created. It is however susceptible to directed distortion as may be desired. Figure 4, for example, is a distortion of Figure 1. In this case by drawing thru the design or pattern of Figure 1 with any suitable object such as a glass stirring rod, a heart-shaped design or pattern is created. As before, this design or pattern will

remain as made on the surface of the carrier bath until it is desired to transfer it to the article to be decorated (transfer should take place within certain time limits depending on atmospheric conditions before evaporation of the vehicle takes place). Experience shows that one-half hour should be the limit which the design or pattern may be left on the surface of the carrier bath.

Figure 5 shows a further distortion of Figure 4. Again a glass rod is drawn at right angles to the heart-shaped design or pattern and a new and different design created. Figure 6 shows a distortion of the design or pattern 3 where the rod was drawn from four points of the circumference of the circle to the center. These simple examples demonstrate the possibilities of obtaining individual transfer designs placed on selected portions only of the surface of the carrier bath. When it is further considered that either the precise dropping of color drops at measured intervals or at random, and that the rate and distance of dispersion of each color may be controlled independently, and that following that the designs or patterns may be distorted in any direction or in any manner desired, and that the individual designs or patterns so created will remain as created on the surface of the carrier bath until such time as it may be desired to transfer them to the article to be decorated, it will become apparent that the multiplicity of obtainable and repeatable designs is almost infinite.

The curve shown in Figure 10 illustrates graphically the effect upon dispersion of the color media on the surface of the carrier bath when one or more changes are made in the percentages of dispersion increasing and dispersion retarding agents present in the vehicle or when the specific gravity of the carrier bath is altered. Reading from left to right, the horizontal divisions represent the carrier bath of different specified specific gravities. Reading upwards, the vertical divisions represent the dispersion radius per minute when a drop of the color media is placed on the surface thereof. 1 gram of Venetian red, artists' color, was mixed as per standard formula with 10 c. c. of the vehicle, the vehicle consisting of 12.5 parts pure white varnish, 12.5 parts pure linseed oil and 75 parts naphtha. One drop of this color media was then placed on the surface of the carrier bath progressively as the specific gravity of the carrier bath was reduced.

The dispersion rate is indicated by curve 12. It will be seen with a specific gravity of 1.35 the color dispersed approximately 1" in radius or formed a circle of 2" in diameter; with a specific gravity of 1.30 a drop of the same media dispersed 2" in radius or formed a circle of 4" in diameter. As the specific gravity of the bath is further reduced the dispersion is found to increase. With a specific gravity of 1.13 a spot 8" in radius or 16" in diameter is created. Experience has taught me that with this specific gravity greater than 1.30 the film formed on the surface is apt to be thick and uneven and not suitable for my purpose, and on the other hand if the specific gravity is reduced substantially below 1.20 the film formed is apt to be thin and granular and lacks sufficient strength to permit of directed distortion without being entirely broken up so that the definition of the individual design or pattern is lost. I have found that the most satisfactory film for my purpose, one which is uniformly dispersed and will maintain a well defined shape and which lends itself to direct dis-

tortion, is created on a carrier bath of specific gravity ranging from 1.20 to 1.30.

Referring again to Figure 10, the broken curve 13 represents the dispersion of a drop of the coloring media. In this case, however, the 12.5 parts of linseed oil were omitted from the vehicle. Here it will be seen that with a carrier bath with a specific gravity of 1.30 the dispersion is more rapid; that one drop of this coloring media in one minute of time disperses to make a spot 3" in radius or 6" in diameter; with a carrier bath of a specific gravity of 1.26 it will disperse slightly over 4" in radius or 8" in diameter, etc.

The dotted curve 14 represents a drop of the same color media, only in this case the naphtha of the vehicle was replaced by the same quantity of linseed oil. In this case I find that the rate of dispersion is very definitely retarded so that with a carrier bath of a specific gravity of 1.30 the dispersion is reduced to approximately 1½" in radius or a spot 3" in diameter in one minute; that with a specific gravity of 1.26 the dispersion carried only to 2" in radius; with a specific gravity of 1.20 the dispersion was only carried to approximately 3" in radius.

It will be seen from the graphic description that the controllable elements; namely, the linseed oil, the naphtha in the vehicle of the color media, and the specific gravity of the carrier bath, have jointly a very definite relation to the size and type of design or pattern obtainable. It will likewise be apparent that with slighter modifications all these controllable elements will serve to modify the design or pattern created in direct relationship to the degree of alteration. It will also be seen that the relative proportions of dispersion increasing agent and dispersion retarding agent will confine the dispersion of the coloring material of each individual transfer design or pattern to a predetermined restricted portion of the surface of the liquid carrier bath.

For example, referring to Figure 7, using a carrier bath of standard specific gravity; i. e., 1.26, three thin streams of the coloring media were spread across the carrier bath, one green, one orange, and one blue, spaced at distances from each other slightly greater than the distance to which the color media would disperse, the vehicle carrying the blue color being standard, the orange having been altered by replacing a part of the naphtha with linseed oil, hence reducing the distance to which this color media would disperse. The vehicle, in making up the green, is altered by increasing the amount of naphtha and decreasing the amount of oil, with the result that the green disperses to a greater distance than either the blue or the orange. It will be seen that it is entirely at the option of the operator to control the dispersion of any one of the colors, choosing either to the extent of increasing the dispersion or decreasing it, depending on the effect desired.

These colors having dispersed to the limit now remain on the surface of the carrier bath in stripes of varying widths and are now ready and susceptible to distortion. Figure 8 represents the design or pattern of Figure 7 where a stirring rod or some other instrument has been passed in one direction at intervals across the stripes. Figure 9 represents a further distortion of Figure 7 where the same instrument has been drawn through the bath in the opposite direction at intervals. As in the other figures, the design or pattern so created on the surface of 75

the carrier bath remains until it is desired to transfer it to the article to be decorated.

The design or pattern, now having been created on the surface of the carrier bath, is ready for transfer to the surface of the article to be decorated. This is accomplished by merely placing the dry surface of the article in contact with the decorated surface of the carrier bath. The article being dry, the color promptly transfers from the liquid surface to the article. In the case of textile fabrics where the carrier bath is stationary, the fabric is stretched on a frame and brought down evenly and carefully in contact with the decorated bath. The fabric is then removed, still on the frame, and washed with cold water to remove the glycerine of the carrier bath that may have adhered to it and for the purpose of setting the binder, for example, varnish incorporated in the color formula. The goods may then be removed from the frame and finished in accordance with general practice. This batch, or stationary process, has been described first as being simplest, but for production purposes a continuous process is preferred. This lends itself to the use of continual process machinery utilizing a moving or flowing carrier bath and continuous feed and delivery of the material being treated and incorporating the use of many devices available for dropping, spreading or otherwise distributing on the surface thereof, the color media used.

In the operation of this continuous process my carrier bath is conveyed on an endless rubber apron or blanket of a width to conform with popular fabric widths dress goods, etc., 40", for draperies 50", etc. The rubber apron or belt is supplied with upstanding soft rubber flanges approximately 1" high, to retain the bath thereon. This apron passes over two horizontally spaced drums or rollers, for example 30 feet apart, the upper run of the apron being supported by a smooth horizontal table. The carrier bath is fed to the apron at one end from a supply tank for example, and is conveyed by the apron to the further end, where the bath flows into a trough or sump and is pumped back to the supply tank. I find that the bath can be carried at a speed of from 2-6 yards per minute most satisfactorily, the speed being dependent on the type of design or pattern to be created.

Preferably at the end of the machine opposite the bath liquid supply tank is mounted a suitable fabric feed or supply device, for example consisting of rollers and a support for the roll of fabric to be decorated, whereby the fabric is brought in lapping contact with the surface of the carrier bath in a manner to transfer the design or pattern created on the surface thereof to the dry surface of the fabric. I find that this transfer takes place almost instantaneously, so that it is necessary only to have the fabric touch the surface of the bath lightly, it being vitally important, however, for most purposes, that the fabric move at precisely the same speed as does the carrier bath.

The space between the supply tank and the transfer mechanism (about 12') is convenient for the creation of my designs or patterns. As explained, the individual designs or patterns may be applied to selected portions only of the surface of the liquid carrier bath, by dropping, spraying or distributing as desired, dependent on the effect desired. However, the points along the travel of the bath at which the respective colors are applied, and the distance between

said points must all be predetermined, and the order or timing of the color application and the controlled distortion thereof after application must all be synchronized, both with respect to the rate of movement of the bath, to produce the individual transfer designs or patterns desired.

It will be further apparent that utilizing a moving bath introduces another controllable factor with respect to distance of dispersion of the color media. If the speed of the carrier bath is such as to convey the color media from the point of application to the point of transfer before the dispersion has reached its limit, the design or pattern created would differ from one similarly created but permitted to spread to its limit before reaching the point of transfer. In general I find it more desirable to permit the color to spread to its limit before transfer but certain desirable and different effects can be obtained by utilizing this further controllable factor.

After the transfer has taken place, the fabric is preferably passed through a soft rubber wringer to remove any excess carrier bath material that may adhere to the fabric and then washed in cold water. From there on the fabric may be finished in the normal manner.

My carrier bath being of a viscous nature makes it particularly suited for machine operation as I find that its surface is not disturbed readily by vibration. When the color media is placed on its surface and distorted as desired, the design or pattern created will hold its shape and conformation to the point of transfer.

While the invention has been specifically described in connection with the treatment of fabric using a water-soluble bath, it is to be understood that it is also applicable for use in the treatment of paper, wall board, tile and other surfaces, and that a water-insoluble bath, such as one containing starch, may be employed where it is not necessary or advantageous to remove the constituents of the bath from the product. The coloring material floated on the bath will be selected, depending on the nature of the bath and the material to be decorated.

I claim:—

1. Method of producing individual transfer designs on the surface of a liquid carrier bath by the use of coloring material comprising a base and a vehicle including dispersion increasing and dispersion retarding agents, which comprises adjusting to a predetermined degree the relative proportions of said agents present in said vehicle to control the dispersion of said coloring material, said coloring material being immiscible with said bath and of lower specific gravity than said bath, and applying said coloring material to selected portions only of the surface of said bath, the relative proportions of said agents in said vehicle confining the dispersion of the coloring material of each individual transfer design to a predetermined restricted portion of the surface of said liquid carrier bath.

2. Method of producing individual transfer designs on the surface of a liquid carrier bath by the use of coloring material comprising a base and a vehicle including dispersion increasing and dispersion retarding agents, which comprises adjusting to a predetermined degree the viscosity of the liquid carrier bath and the relative proportions of said agents present in said vehicle to control the dispersion of said coloring material, said coloring material being immiscible with said bath and of lower specific gravity than said bath, and applying said coloring material to selected

portions only of the surface of said bath, the viscosity of said liquid carrier bath and the relative proportions of said agents in said vehicle confining the dispersion of the coloring material of each individual transfer design to a predetermined restricted portion of the surface of said liquid carrier bath.

3. Method of producing individual transfer designs on the surface of a liquid carrier bath by the use of coloring material comprising a base and a vehicle including dispersion increasing and dispersion retarding agents, which comprises adjusting to a predetermined degree the relative proportions of said agents present in said vehicle to control the dispersion of said coloring material, said coloring material being immiscible with said bath and of lower specific gravity than said bath, applying said coloring material to selected portions only of the surface of said bath and subjecting said applied coloring material and vehicle to directed distortion, the relative proportions of said agents in said vehicle confining the dispersion of the coloring material of each individual transfer design to a predetermined restricted portion of the surface of said liquid carrier bath.

4. Method of producing individual transfer designs on the surface of a continuously moving liquid carrier bath by the use of coloring material comprising a base and a vehicle including dispersion increasing and dispersion retarding agents, which comprises adjusting to a predetermined degree the speed of the continuously moving carrier bath and the relative proportions of said agents present in said vehicle to control the dispersion of said coloring material, said coloring material being immiscible with said bath and of lower specific gravity than said bath, and applying said coloring material to selected portions only of the surface of said continuously moving carrier bath, the speed of the continuously moving carrier bath and the relative proportions of said agents in said vehicle confining the dispersion of the coloring material of each individual transfer design to a predetermined restricted portion of the surface of said liquid carrier bath.

5. Method of producing individual transfer designs on the surface of a continuously moving liquid carrier bath of variable viscosity by the use of coloring material comprising a base and a vehicle including dispersion increasing and dispersion retarding agents, which comprises adjusting to a predetermined degree the speed of the continuously moving carrier bath, the viscosity of said liquid carrier bath and the relative proportions of said agents present in said vehicle to control the dispersion of said coloring material, said coloring material being immiscible with said bath and of lower specific gravity than said bath, and applying said coloring material to selected portions only of the surface of said bath, the speed of the continuously moving carrier bath, the viscosity of said liquid carrier bath and the relative proportions of said agents in said vehicle confining the dispersion of the coloring material of each individual transfer design to a predetermined restricted portion of the surface of said liquid carrier bath.

6. Method of producing individual transfer designs on the surface of a liquid carrier bath containing a viscous liquid and a viscosity-changing material miscible therewith, by the use of coloring material comprising a base and a vehicle including dispersion increasing and dispersion retard-

ing agents, which comprises adjusting the proportions of said viscous liquid to said viscosity-changing material and adjusting to a predetermined degree the relative proportions of said agents present in said vehicle to control the dispersion of said coloring material, said coloring material being immiscible with said bath and of lower specific gravity than said bath, and applying said coloring material to selected portions only of the surface of said bath, the proportions of said viscous liquid to said viscosity-changing material and the relative proportions of said agents in said vehicle confining the dispersion of the coloring material of each individual transfer design to a predetermined restricted portion of the surface of said liquid carrier bath.

7. Method of producing individual transfer designs as defined in claim 1, wherein the liquid carrier bath is composed of at least one material selected from the group consisting of glycerine, aqueous solution of glucose, and aqueous solution of water soluble gum.

8. Method of producing individual transfer designs on the surface of a liquid carrier bath by the use of coloring material consisting of pigment ground in oil and reduced to flowable consistency by varnish, linseed oil and naphtha, which comprises adjusting to a predetermined degree the relative proportions of linseed oil to naphtha to control the dispersion of said coloring material, said coloring material being immiscible with said bath and of lower specific gravity than said bath, and applying said coloring material to selected portions only of the surface of said bath, the relative proportions of linseed oil to naphtha confining the dispersion of the coloring material of each individual transfer design to a predetermined restricted portion of the surface of said liquid carrier bath.

9. Method of producing individual transfer designs on the surface of a liquid carrier bath by the use of coloring material consisting of pigment ground in oil and reduced to flowable consistency by varnish, linseed oil and naphtha, which comprises adjusting the viscosity of said liquid carrier bath to a predetermined value, adjusting to a predetermined degree the relative proportions of linseed oil to naphtha to control the dispersion of said coloring material, said coloring material being immiscible with said bath and of lower specific gravity than said bath, and applying said coloring material to selected portions only of the surface of said bath, the viscosity of said bath and the relative proportions of linseed oil to naphtha confining the dispersion of the coloring material of each individual transfer design to a predetermined restricted portion of the surface of said liquid carrier bath.

10. Method of producing multi-colored individual transfer designs on the surface of a liquid carrier bath by the use of distinctive coloring materials each comprising a base and a vehicle having a dispersion increasing agent and a dispersion retarding agent, which comprises adjusting to a predetermined degree the relative proportions of said agents present in each vehicle to control the dispersion of each distinctive coloring material, each coloring material being immiscible with said bath and of lower specific gravity than said bath, applying a first distinctive coloring material to a selected portion only of the surface of said bath, the relative proportions of said agents in the vehicle of said first distinctive coloring material confining the dispersion of said first coloring material to a predetermined re-

stricted portion of the surface of said liquid carrier bath, and applying a second of said distinctive coloring materials to the selected portion of the surface of said bath to displace the distinctive coloring material first applied, the relative proportions of said agents in the vehicle of the second distinctive coloring material confining the dispersion of said second coloring material to a predetermined restricted portion of the surface

of the liquid carrier bath less than the restricted portion of said bath covered by said first coloring material, whereby said second coloring material will differentially displace any of the first coloring material lying within the predetermined area covered by the first coloring material in proportion to the ratio of the respective dispersive powers of said first and second coloring materials.

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