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VARI-TONE CLOTH DYEING METHOD

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2 Sheets-Sheet 1

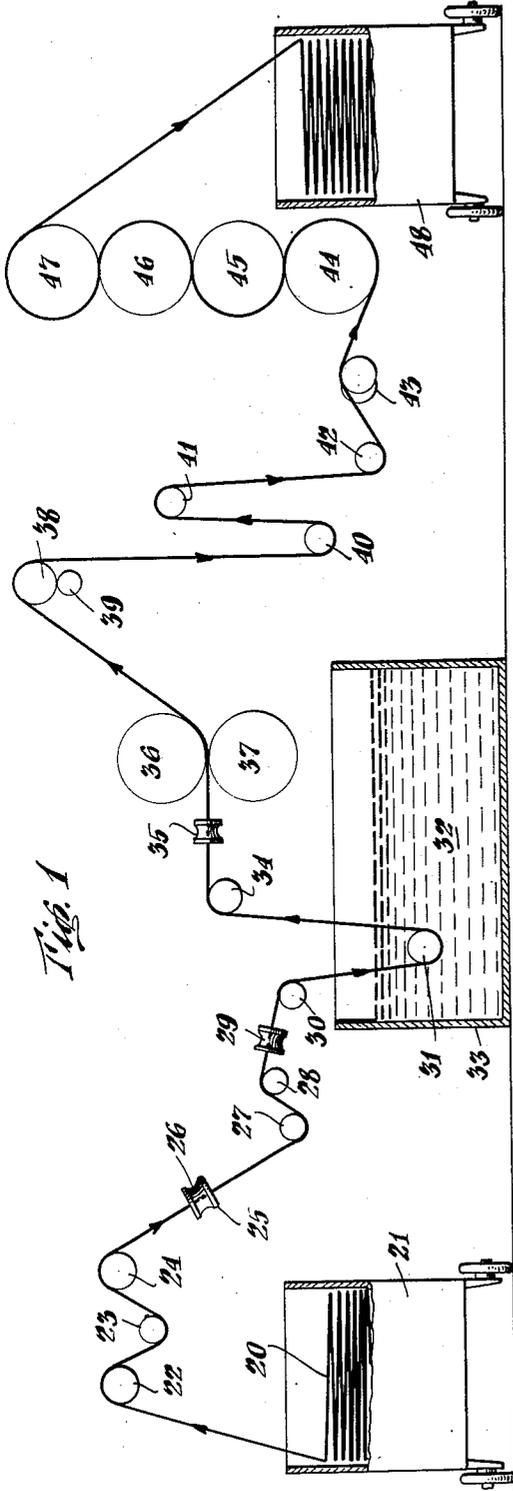


Fig. 1

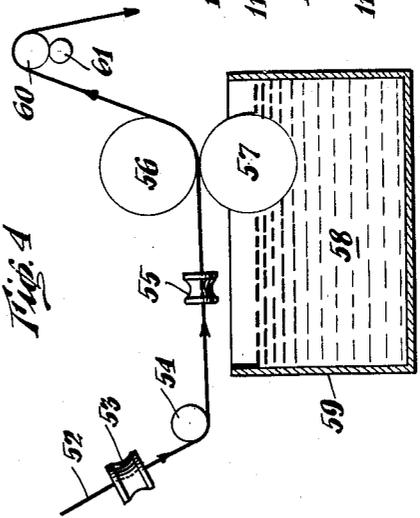
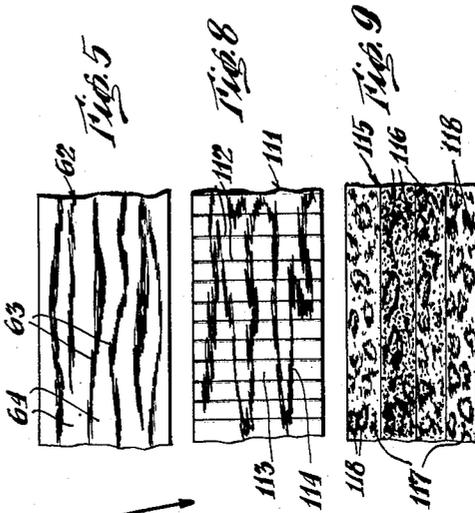


Fig. 4



Fig. 2

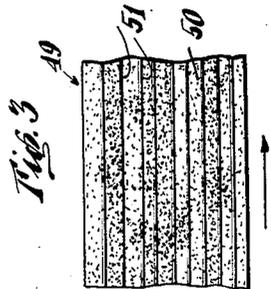


Fig. 3

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Fig. 6

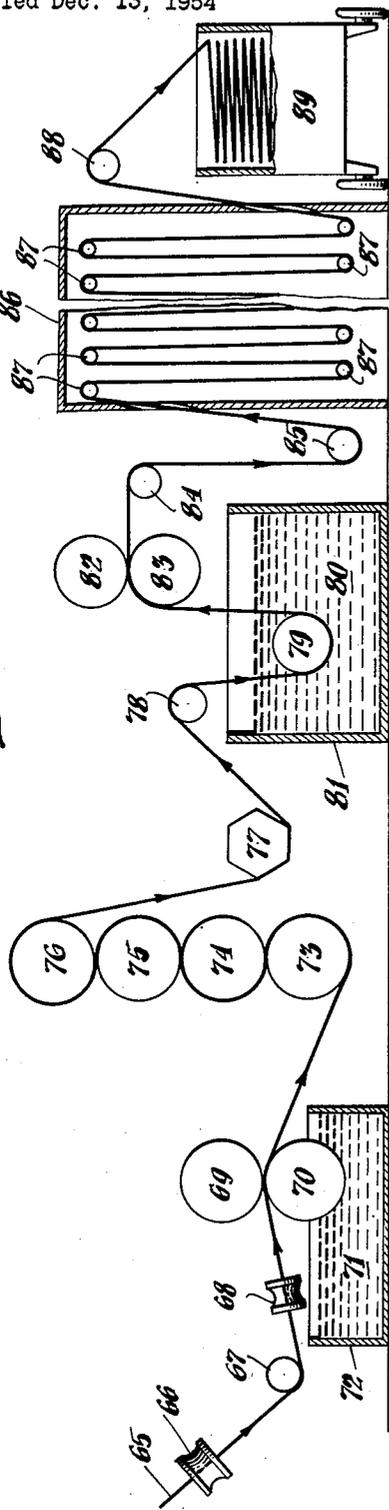
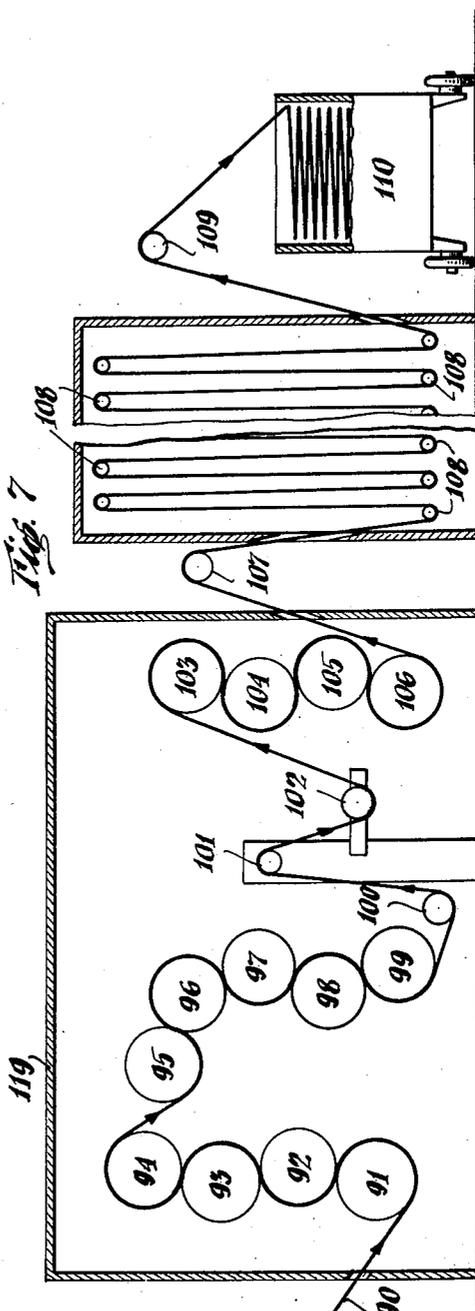


Fig. 7



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**VARI-TONE CLOTH DYEING METHOD**

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**1 Claim. (Cl. 8—14)**

This invention relates to the art of dyeing textile piece goods, and more particularly to the production of special dyeing effects wherein the goods receive and retain a deposit of color or coloring composition while in rope form as distinguished from being in open width.

As is generally known, goods in the piece, as for example, textile piece goods, of almost any kind or description such as cottons, rayons, nylons, or material made from fibers of other characteristics, can be dyed either in open width form or in the so-called rope form, and the present invention has for an object the production of special dyeing effects obtained by processing the goods, namely, textile goods in the piece, while the same are in rope form, that is, not subject to lateral tension.

Another object of the invention is a method of obtaining novel effects resembling the so-called "finger paintings," which for convenience herein may be defined as a design or pattern characterized by an all-over random application of color which comprises a plurality of tones or shades or degrees of color penetration.

A still further object is the production of what may be termed "marbleized dyeings," which are also characterized by a more or less random or irregular application of coloring composition and variation in color shade depth, but which differ from the so-called "finger" paintings or dyeings in that they also include a plurality of free spacings or areas which do not receive any application of color while the goods are being processed according to the present invention.

A still further object is the application of a plurality of differing dye tones to textile piece goods in rope form, which goods are subsequently after-finished in such wise as to cumulatively enhance the vari-tone dyeings. That is to say, for example, goods according to this invention may first be marbleized or finger dyed and subsequently pleated or plissed, and it has been found that the addition of these after-finishing treatments for goods which previously have been finger dyed or marbleized results in an improved product: specifically the pleating texture of the goods appears to have been heightened or visually emphasized by reason of the vari-tone dyeings. Similarly, if the goods are first marbleized or finger dyed and subsequently plissed, it has been found that the plisse texture has been enhanced or improved in appearance by reason of the multi-tone rope dyeings. Conversely, it has further been found that the subsequent pleating or plisseing, or other subsequent finishing treatment which imparts a texturized surface to goods previously rope finger dyed or marbleized, tends to bring out more attractively the multi-tone dyeing effects, over and above that which would be apparent, at least to the casual observer, where there has not been any subsequent texturizing.

With the above and other objects in view, as will be apparent, the present invention consists in the construction, combination, and arrangement of parts and/or steps, all as hereinafter more fully described, claimed and illustrated in the accompanying drawings wherein:

Fig. 1 illustrates schematically a convenient arrange-

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ment of apparatus for obtaining finger dyeings according to one embodiment of the present invention, including means for immersing the material, while it is in rope form, in a bath containing a pigment or non-pigmented coloring composition, and means for subsequently expanding the dyed material to open width form before it is dried and cured, or dried or cured;

Fig. 2 is a plan view of an oblong poteye comprising means for effectively narrowing the width of material as it comes from a source of supply so that by the time the goods reach the dyeing bath the original open width has been reduced to the dimensions of rope form;

Fig. 3 is intended to represent a fragmentary portion of goods finger dyed as per the method and apparatus schematically shown in Fig. 1, the goods so processed being characterized by exhibiting what amounts to virtually an over-all random or irregular application of dye-stuff with, however, a plurality of different tones or varying shades of color strength;

Fig. 4 illustrates, again schematically, a variation in the procedure shown in Fig. 1, whereby the goods, in rope form, instead of being dunked in the dye bath are merely carried through the nip of a pair of rotating and coating rollers, one of which, namely—the lower roller, carries an application of coloring composition which is picked up by the rope of cloth as it passes through these two rollers;

Fig. 5 is a fragmentary plan view similar to that of Fig. 3, of the product of the process indicated in Fig. 4 which, for convenience, is termed herein a marbleized dyeing; the product being characterized by a random or haphazard application of color of varying tones to the cloth, and being further characterized by a plurality of spaces or areas of the cloth which remain free of any deposit or application of the coloring composition; except that already possessed (if any) by the cloth prior to the present treatment;

Fig. 6 purports to indicate suitable means for processing goods according to another variation or modification of the present invention, the modification involving application of the so-called "indirect method" of applying dyestuffs, whereby as seen in this figure the goods, again in rope form, may receive first or preliminarily a deposit of a resist or reserve composition, the function of which is to block out or prevent the areas covered thereby from subsequently receiving and retaining any coloring matter. Further according to this modification, after the initial deposition of the resist on random local areas of the cloth, the material is dunked in a bath containing dyestuff of any type: pigment or otherwise, and during this step of the modified process the goods may be dyed in open width form whereby the portions not containing the resist are dyed. Subsequently the resist may be washed out or, if desired, may be left intact on the goods, but in either case only selected portions of the cloth will have received the applications of color. Therefore, this modified process may be characterized as a method for obtaining marbleized dyeings indirectly, the method preferably involving both rope dyeings and open width dyeings;

Fig. 7 illustrates a means, more detailed than the alternate means shown in Fig. 1, for altering the widthwise dimension of the dyed cloth from rope form to open width, and here this transition is seen to take place at a point after the material has passed through one bank of drying cans and just prior to its entrance on a second bank of drying cans: whereby the dyed cloth is consecutively dried, first in rope form, and then in open width. This figure also illustrates means for curing the dyed and dried cloth, the curing box being rather conventional and substantially the same as that shown in Fig. 6 at the end of the dyeing range;

Fig. 8 is a plan view of a portion of goods marbled according to the present invention and subsequently pleated; and

Fig. 9 is a plan view similar to that of Fig. 8 but illustrating a piece of cloth that has been finger dyed and subsequently plissed, it being understood, of course, that the marbled material of Fig. 8 might just as well have been plissed, and conversely, that the finger dyed cloth of Fig. 9 might be after-pleated instead of plissed.

As previously set forth, according to the present invention special dyeing effects are produced on cloth while it is in rope form, which effects survive the subsequent finishing treatments and transition of the cloth from rope form into open width form. More particularly, these special effects are of at least two types, viz.: the so-called finger dyeings characterized by a random but substantially all-over application of dyestuff to the cloth being processed with resultant visible variations in tone or color shadings; and the so-called marbled effects which, similar to the finger dyeings in respect of a random or haphazard application of coloring composition, include or comprise irregular or non-symmetrical portions of cloth to which no dyestuff is applied during the dyeing process of the present invention. There is further contemplated the subsequent treatment of cloth or goods previously finger dyed or marbled by means which will impart a texturized character thereto; that is to say, after being first finger dyed or marbled, the goods may later be pleated or plissed or otherwise finished so as to receive a special surface character, the appearance of which is enhanced by the special dyeing effects, and which in turn contributes to the visual attractiveness of such pre-dyeings.

With more special reference to the drawings hereof, the invention contemplates a source of supply such as the movable handcart or truck 21 for the goods 20 which may be lifted out of the truck 21 by any suitable means and in open width form trained over the guide rolls 22 and 24 and under the intermediate guide 23 for subsequent passage through a constricting member 25 which may comprise an apertured poteye oblong in shape as seen in Fig. 2, having a restricted central portion 26 of limited circumference whereby the width of the cloth is altered as it comes from the roller 24 in open width form so that by the time the material passes through the oblong shaped poteye 25 it is substantially in rope form.

The cloth 20 to be dyed may then be brought to the dyeing bath and immersed therein according to the embodiment schematically illustrated in Fig. 1. That is to say, after emerging from the restricting poteye 25, the undyed base cloth 20 is carried under and over the tensioning rolls 27 and 28, respectively, and from thence is pulled through a further restricting poteye 29, over the guide roll 30, and from thence directly to the guide roll 31 and into the bath 32 containing a suitable coloring composition, preferably pigment dye of any desired color, which is to say that the bath 32 may comprise any suitable coloring pigment dispersed in an organic solvent solution of, for example, synthetic resins.

After picking up the pigment dyestuff in the dye bath 32, the direction of the motion of the cloth is reversed as by means of the freely rotatable roller 31, and as the cloth comes up out of the bath container 33, it passes over a guide 34, through another restricting or governor poteye 35 and thence through the nip of a pair of rotating squeeze rollers 36, 37 vertically aligned, whereby excess dyestuff is removed from the cloth by the application thereto of pressure in the form of the coating working surfaces of the rollers 36, 37.

As will be apparent, according to the modification or embodiment of Fig. 1 just recited, in this instance the cloth is actually dunked or immersed in the bath 32 with the result that the material 20 is finger dyed as

above referred to, and this effect will be described with more particularity hereinafter.

When the cloth 20 has emerged from the press or nip of the rotating squeeze rollers 36, 37, it is carried up over an elevating roll 38 which is in contact with a smaller yardage measuring or counter device 39. The cloth 20 is now ready for the step of drying and/or curing but prior thereto means may be provided as shown in Fig. 1 for increasing or decreasing the lengthwise tension of the cloth as may be found necessary, and for again altering the widthwise dimension thereof from rope form to open width. To these ends the processing apparatus may include also a dancer roll 40 moving within a vertical slot (not shown) and adapted to be controlled by any suitable means (not shown) and move vertically up or down to decrease or increase the lengthwise tension of the cloth 20 as it passes under the dancer roll 40 and intermediate the elevated rollers 38 and 41. After passing through the lengthwise tensioning zone 39—41 the dyed cloth 20 may be fed under a positioning roll 42 and then over an expanding Mycox roll 43 which opens out the cloth 20 from rope form to the open width, after which it is trained over the successive steam heated drying and/or curing cans 44, 45, 46 and 47. In the final step of Fig. 1 the material is taken off the last drying can 47 and folded up in laps in the cart 48. The material thus processed is intended to be designated and shown in Fig. 3, and comprises the dried and/or cured cloth 49 having an over-all haphazard or random application of dyestuff 50 characterized by a plurality of tone shades of varying strength or depth 51. It may be added that the several tone variations appear to run generally lengthwise of the fabric rather than laterally over the face thereof. In general the appearance of the rope dyed cloth 20 thus processed is referred to for convenience as a finger dyed effect in which the prime or chief manifestations are (1) a random substantially over-all application of color, and (2) the color having variable tones or shades.

A preferred form of the invention is indicated schematically in Fig. 4 whereby instead of running the cloth 52 through a bath of dyestuff 58, it by-passes the trough 59 and goes immediately from the poteye 55 through the nip of the pad rollers 56, 57. To characterize the difference between this form of the invention and that illustrated in Fig. 1, it may be in order to refer to this modified process as a "nip without a dip" and to refer to the first process as a "dip followed by a nip."

More particularly, the operation apprehended by Fig. 4 may entail leading the material 52 from any accessible source of supply and by any suitable means (not shown) through the constricting oblong collar 53 under the positioning guide 54 and then through the further constricting poteye 55 and from thence within the nip formed by the coating vertically arranged rotating rollers 56, 57; the roller 57 as seen in Fig. 4 being partially covered by the dyestuff 58 contained in the steel container 59. As the roller 57 is rotated in the dye bath 58 the working surface of the roller 57 picks up a deposit of the dyestuff 58 which later is transferred to the cloth 52 as by pressure at the nip of the padder rollers 56, 57. This is the step of marbledizing which will be referred to at further length hereinafter. When the cloth 52 has passed through the pressure station 56, 57, it may be further processed according to the scheme outlined from that point on in Fig. 1 starting with the passage of the marbled material 52 over the elevated roll 60 in contact with the counter 61.

The rope dyed marbled cloth 62 resulting from treatment thereof according to the steps indicated in Fig. 4 comprises (as seen in Fig. 5) a plurality of more or less horizontally aligned portions 63, each containing a deposit of color, the several portions 63 having multi-tones of varying shade values and being generally spaced from each other by portions 64 which do not contain any

coloring composition. While a visual comparison and inspection of the marbled product 62 with the so-called finger painted product 49 readily discloses differences therebetween, it is rather difficult clearly to define these differences by the spoken word alone. It may be said in that regard, however, that the spaced uncolored portions 64 of marbled cloth are contrasted or differ from the finger dyed product 49 which does not appear to have any uncolored portions at all. Secondly, the transition from one color 63 to no color 64 in the marbled product 62 contrasts with the more gradual change in color tone which characterizes the finger dyed cloth 49. As previously mentioned, the marbled product 62 may comprise portions 64 which, instead of being free of color, have been dyed before the cloth 52 has been subjected to the treatment of the present invention. In this case where the cloth comes to be treated already colored then the contrast brought about by the transition from one color 63 to a different color 64 is even more marked than that involved in marbleizing where the transition is simply from one color 63 to no color 64. Thirdly, the arrangement of colors appears to be more random or haphazard in the marbled material 62, whereas on the other hand in the case of the finger dyed material 49 there seems to be a certain amount of symmetry or regularly recurring color change widthwise of the cloth which probably is heightened by reason of the horizontal darker lines 51 which stand out from the lighter shaded portions 50 of the product 49.

Although according to the process of Fig. 1 the cloth 20 is passed through only a single dye bath 33 so as to receive only one deposit of color 32, it will be understood that the cloth 20 may successively be passed through two or more dye baths, each containing a different color from those of the other dyestuff compositions. In similar fashion, although Fig. 4 would appear to indicate only a single passage of the cloth 52 through the nip of the pad rollers 56, 57 thereby receiving only one color deposit, it is nevertheless entirely practical successively to move the cloth 52 through the same apparatus changing the color 58 in the bath 59 with each passage. Alternatively a tandem arrangement or several sets of nipping rollers, each with its own coating dye bath, might be set up in a continuous range with provision for drying the cloth each time as it moves from one set of nipping rollers to the next.

Whatever the arrangement may be however, with regard to multiplying the number of "dips and nips" or the number of "nips without dips" which the cloth receives, it has been found that where the process includes one or more dippings the resulting product is substantially as shown in Fig. 3, which is to say the cloth which does not have any spacings widthwise thereof defining areas free of coloring composition, whereas the resultant obtained where there is no dipping but only nipping is substantially that as shown in Fig. 5: subject, however, to this qualification, that if the cloth 52 has been previously dyed all-over to begin with, before it comes to the dyeing apparatus involved in the present invention, then of course in the marbled product 62 there would not be any spacings entirely free of color, but there would be, at least visually, distinct gaps between the portions 63 of the material 62 which receive a deposit of color from the bath 58 and the remaining portions 64 which have received only the initial all-over dye deposition, prior to treatment according to the instant invention.

Fig. 6 illustrates a further modification of the invention, the modification consisting in the substitution of a so-called indirect method for the direct method characterized or exemplified by Figs. 1 and 4 of the drawings. According to Fig. 6 the material is first brought in contact with a reserve or resist composition made of gum or other material characterized in that it prevents the deposition of color on the cloth, which only thereafter is subjected to the action of a coloring composition. Furthermore,

according to this modification, means may be provided intermediate the steps of reserve application and dye application for opening out the material from rope form to full width so that while the cloth is receiving an application of a resist or reserve it is in the rope form, and later while still carrying this resist it may be run through a dye bath in open width form.

Another factor involved in the modification of Fig. 6 is that shades of deeper color may be obtained in the product because where the resist is first applied, dyes other than the so-called pigment dyes may be incorporated in a subsequent dye bath, as for example, vat dyes and naphthol shades, and the material may travel through a dye bath containing such deeper shades in open width form.

Therefore, according to the adaptation of the invention illustrated in Fig. 6 the cloth 65 to be processed may be narrowed down laterally as by means of an oblong poteye 66, movement of the cloth through the processing range being accomplished by any suitable motive power (not shown). After the cloth 65 has attained its rope form, it may be trained under a guide 67, through a second restricting poteye 68, and move from there into the nip of a coating pair of rotating pad rollers 69, 70, of which the roller 70 receives a deposit of any suitable resist non-coloring composition 71 from a reserve container 72. As will be apparent, as the cloth 65 goes through the pressure zone established by the coating rollers 69, 70 it receives in rope form the resist deposit from the working surface of the under roller 70, after which the resist painted material may be passed through a range of drying cans 73, 74, 75 and 76. After its passage through the drying range 73-76 the material 65 may be opened out into its full width as by means of a spreader device 77, then trained over the guide 78 and then immersed in a bath 80 of non-pigment dyestuff held in the container 81. Alternatively, instead of being actually immersed in the dyestuff 80, the cloth 65 being treated may be merely sent through the nip of the coating rollers 82, 83, and in this instance contrary to the position thereof shown in Fig. 6, the rollers 82 and 83 are lower, so that at least a portion of the roll 83 is in actual contact with the dyestuff 80.

As shown, however, in Fig. 6, the cloth 65 is sent through the nip of the squeeze rollers 82, 83, the roller 83 being out of contact with the dyestuff 80, so that after the material 65 goes through the nip of the rollers 82, 83 it may be passed over the elevated guide 84 through a dancer device 85, and from thence into a curing and/or drying chamber 86 to pursue a serpentine passage over and under the individually distinct rollers 87 within the oven enclosure 86.

Insofar as curing is concerned, it will be understood that ordinarily according to the steps outlined and described with relation to Fig. 6 of the drawings, curing is not required if ordinary dyestuffs (not pigment dyes) are incorporated in the dye bath 80. In such case the oven 86 may serve merely to dry the material 65. On the other hand, if desired, pigments may be used in the dye bath 80, and as is known, these ordinarily require curing, and this curing may be attended to while the material is simultaneously dried in the curing box 86. After the drying and/or curing, the treated cloth 65 may be collected in a handcart 89 after its passage over the last guide roll 88.

Alternate means or arrangements for drying and/or curing the material 65 or the material 52 or 20 are illustrated schematically in Fig. 7. In accordance with the plan thereof, the material 90, which, as will be understood, has been previously rope dyed only, as per Fig. 1 or Fig. 4, or which has successively received a resist while in rope form and has been dyed in open width form as per Fig. 6, may be fed into the primary bank of drying cans 91-99 inclusive. After passing the last drying can 99 if the material 90 is then in rope form as it would be after going

through the process outlined in Figs. 1 and 4, then it may be changed back to open width form as by being passed over positioning guides 100 and 101 and then through an expander roll 102 where it opens out into full width form. Then while still maintained in that open width form the cloth 90 may be sent through a secondary bank of drying cans 103 to 106 inclusive from which it passes over the outer roll 107 and into the oven passageways 108. Finally the cloth 90 thus treated comes out of the oven passages 108 and is passed over the last guide roll 109 from which it is collected on a hand truck 110.

Alternatively, if the material 90 has been processed according to the modification of Fig. 6 whereby a reserve or resist is first applied, and this step is followed by application of a dyestuff while the resist carrying cloth 90 is in the open width form, then the cloth 90 will still be in open width as it goes into the chamber 119 enclosing the drying cans 91-99. In such case the operation will be substantially the same as that previously described for the method of Figs. 1 and 4 except that the material 90 goes to the first drying can 91 and comes off the last can 106 in open width form; for in this instance instead of providing an expander roll 102 there may be substituted at that station any convenient means for dissolving and removing the resist from the treated cloth 90. The remainder of the operation, namely, the passage through the secondary bank of drying cans 103-106 inclusive through the heaters 108 to final "lapping" at 110, would be the same as that described for the process of Figs. 1 and 4.

As shown in Figs. 8 and 9, the processes as described above are applicable to goods having different kinds of surface textures. For example, in Fig. 8 the treated cloth 111 includes a series of widthwise pleats 112, the appearance of which is enhanced or improved by the marbled effect comprising the plurality of spaced portions 113 substantially free of color application and a plurality of interspaced portions 114 carrying different tone variations haphazardly applied.

A plisse effect is intended to be represented by Fig. 9 wherein the base cloth 115 having been previously finger dyed as heretofore described comprises a plurality of substantially horizontal and parallel multi-tone variations 116 on a background of an all-over color application also of different shades 117; with a superimposed plisse or crinkled effect 118 which is enhanced by the multi-tones 116 of the finger dyeing, and which in turn are enhanced by the plisse effect 118. It will be clear, of course, that although the plisse effect is shown in conjunction with the finger dyeing process in Fig. 9, while the pleating is shown in relation to the marbleizing effects of Fig. 8, actually this order could be reversed and the pleating could be performed on finger dyed material, and by a similar transposition a plisse effect could be imparted to cloth previously marbled. Furthermore, in the case of the pleated product 111, the pleats 112 could be laid in lengthwise instead of widthwise of the cloth, and the pleates could be of varying kinds, as for example, box pleats or knife pleats.

What is claimed is:

Method of continuously producing special dyeing effects on open width cloth in the piece, which includes the steps of compressing the cloth widthwise into rope form, passing the compressed cloth in rope form lengthwise through a padding zone whereby the surface of the cloth acquires a random localized application of multi-tone color only in spaced isolated portions thereof, and subsequently returning the cloth thus treated in rope form to open width form.

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