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DEVICE FOR PRINTING FABRICS

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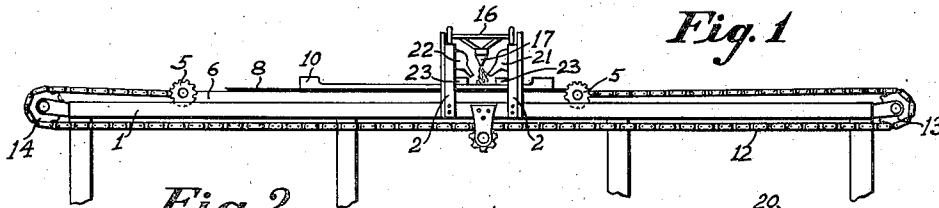
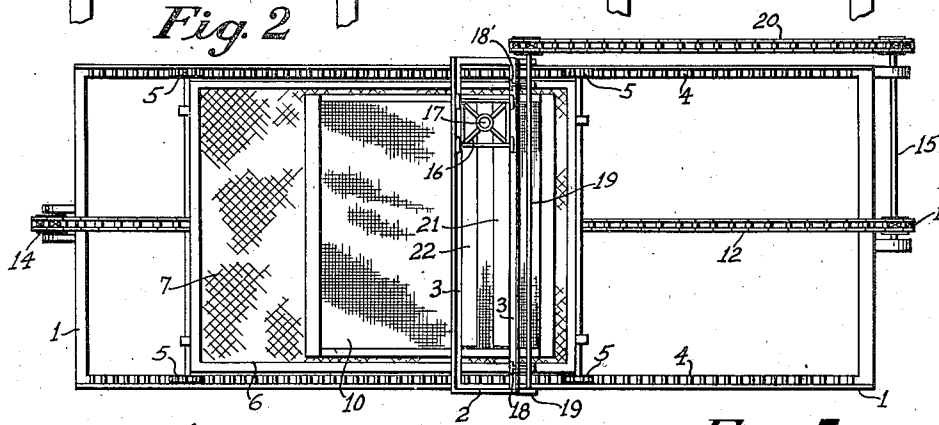


Fig. 4

Fig. 5

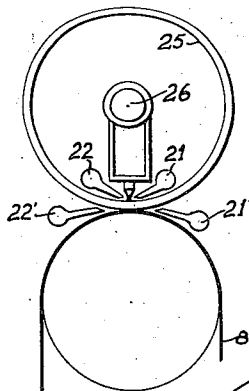
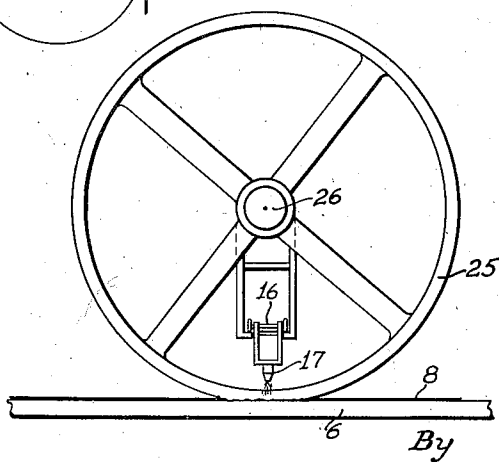
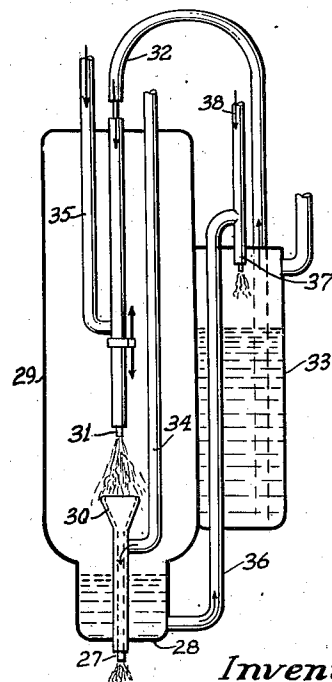


Fig. 3



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DEVICE FOR PRINTING FABRICS

Bruno Sonnino, Milan, Italy; vested in the Alien
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1 Claim. (Cl. 101-123)

This invention relates to a means for and a method of printing fabrics, by the use of liquid colors, applied to the fabrics through a textile template or mask, as silk, or similar finely reticulated material.

The present invention is applicable to the printing of fabrics of all kinds, and is particularly efficient when used in connection with fluffy or hairy fabrics and those having a nap.

One method of printing fabrics by the use of liquid colors applied thereto through silk templates or masks on which any desired designs are represented by photographic process, is well known.

In carrying out this method, such template is superposed upon the fabric or other material to be printed, and the coloring substance in paste form, is vigorously rubbed on the template or mask by hand, to cause it to penetrate the meshes or reticulations of the silk template, and deposit on the fabric underneath.

This manual working results in the irregular and unequal deposit of coloring matter on the fabric or material being colored, because the coloring matter is not evenly distributed. Hence, the imprint on the fabric is non-uniform in intensity as well as thickness of coating.

Furthermore, fabrics printed according to this method require an additional washing process to eliminate the thickening substances mixed with the liquid color, in forming the paste.

The use of liquid coloring substances applied by hand-manipulated air-brush or similar atomizing device is unsatisfactory, because silk templates conceal the fabric from the view of the workman, preventing him from determining whether or not the coloring is applied in sufficient quantities to the several areas. Also, because the quantity of coloring matter applied is manually controlled by the operator, it is difficult to obtain a uniform deposit on the fabric, which is not remedied by the use of metallic templates, as screening, which permit the operator to view the fabric therethrough.

According to the present invention, textile templates, as silk, to which any desired design has been applied by photographic or other process, are used, and the printing on the fabric overlaid by the template is effected by sprinkling or depositing the liquid coloring on the template under mechanically controlled pneumatic pressure, to insure an even, uniform distribution thereof, which has proven satisfactory in all respects by practical demonstration.

In carrying out the invention, liquid coloring

matter is sprinkled or discharged from spray nozzles mechanically controlled to traverse the area of the template in regular reciprocating movements at a uniform velocity, in addition to which, the fabric and template is given a uniform feed relatively to the nozzles in timed relation with the reciprocations thereof.

More in detail, the discharging nozzles are reciprocated back and forth at uniform speed along a fixed path extending, for example, transversely of the length of the fabric, and as the discharging nozzles reach either end of their path of travel, the fabric and template are advanced one step to present an uncoated surface to the nozzles during their travel in the opposite direction.

The mutually intersecting travel of the spray nozzle or nozzles, and the fabric and silk template, of course, may be otherwise effected. For instance, the fabric and template may be given a continuous travel, instead of step by step, and a more rapid reciprocatory movement imparted to the nozzle; or a stationary row of nozzles may be arranged to extend across the entire width of the fabric and template which is given a continuous travel in the direction of its length; or a single slotted nozzle may be substituted in the last instance, for the plurality of stationary nozzles in a row. Also, it is possible to provide a nozzle or nozzles which will travel in the direction of the length of the fabric under treatment while the fabric remains stationary.

In every such instance, however, by providing mechanically controlled relative movement between the fabric being treated and the spray nozzle, an absolutely uniform deposit of the liquid coloring substance is effected, both as to the quantity of coloring substance discharged and its even application to the material, which is of the highest importance where liquid coloring substances are used.

A further important feature of the invention resides in the method of and means for instantaneously drying the coloring substance sprayed or deposited on the template after sufficient time has elapsed for the liquid to seep through or penetrate the template and color the fabric underneath, to permit the liquid color remaining on the template from flowing into adjacent areas of the template and leaking through onto the fabric, which would result in altering the design or pattern and particularly the outlines of the decoration.

This drying may be effected by applying a current of hot air to the areas of the template onto which the color has been sprayed, such hot air

current being applied by blowing nozzles or induced by suction.

A still further object of the invention is the provision of a spray or discharge nozzle capable of effecting a uniform sprinkling or deposit of the color.

The annexed drawing illustrates some examples of the means by which my improved method of coloring or printing fabrics is accomplished, and in which;

Fig. 1 is a view in side elevation of one embodiment of the invention;

Fig. 2 is a top plan view of the form shown in Fig. 1;

Fig. 3 is a detail view in end elevation, illustrating somewhat diagrammatically, a modification of the form shown in Figs. 1 and 2;

Fig. 4 is a detail view in end elevation, of another modification, utilizing the liquid distributing and template-holding means shown in Fig. 3, and ;

Fig. 5 is a vertical sectional view of my improved discharge nozzle.

Referring to that form of the invention shown in Figs. 1 and 2, the bed or table 1 of suitable length supported on legs 1a is provided intermediate its ends with a transversely extending, skeleton bridge member 2, the longitudinal guide rails 3—3 of which span the table and are spaced above the table area on posts secured to the outer faces of the respective opposite side bars of the table.

An oblong skeleton fabric-supporting frame 6 is supported in horizontal position on the table and is capable of traveling from end to end thereof on pairs of toothed wheels 5, at its opposite ends, meshing with racks 4 mounted on and extending along the upper faces of the side bars of the table 1.

A metallic netting 6a stretched across the traveling frame 6 supports the fabric 8 to be printed, and a second skeleton frame 10 in which is stretched the silken or other suitable textile template 10a having a design formed superficially on the upper face of the template, is laid upon the fabric.

The traveling fabric-supporting frame 6 constitutes a carriage which is mechanically traversed back and forth longitudinally of the table 1, in any convenient manner, as by chains 12 to which the traveling carriage 6 is attached. The chain passes over the respective sprockets 13 and 14 at opposite ends of the table.

The sprocket 13 is fast on a shaft 15 journaled in bearings at one end of the table and provided with a second sprocket 15a at its outer end, connected by a second chain 20 to a sprocket 20a fast on the outer end of a step-by-step feed shaft 19 extending across, and suitably journaled above the opposite sides of the table.

The shaft 19 imparts a step-by-step feed to the traveling carriage 6, the shaft 19 having upwardly extending radial tappets 18, 18' at its opposite ends extending into the path of a nozzle-supporting truck 16 mounted to travel back and forth on the guide rails 3 of the skeleton bridge extending transversely of the table.

As the truck approaches either end of its back and forth travel, it strikes one of the tappets 18, 18' which projects into its path to impart partial rotation to the feed shaft 19, which is transmitted by sprocket 20a, chain 20, sprocket 15a, shaft 15 and sprocket 13 to draw the chain 12

and the fabric supporting frame 6 with the template frame 10 one step to the right.

This step feed of the fabric and template frames removes the last-printed area of the fabric or template from beneath the path of the nozzle-carrying truck, and positions a new unprinted surface beneath the path of the truck.

The truck 16 comprises a skeleton framework depending from the axles 16a of wheels 16b running on the guide rails 3.

A spray nozzle 17 is mounted in the truck, with its discharge end downward, and is supplied with liquid coloring substance from a suitable source, not shown.

A uniform reciprocatory or back and forth travel is imparted to the truck by a motor (not shown) in any convenient manner, as by means of a lead screw suitably journaled in the stationary bridge member, the lead screw passing through a threaded follower attached to the truck 16.

At each end of its travel the nozzle-supporting truck 16 contacts a reversing lever connected with a reversible coupling between the motor and the lead screw, to reverse the direction of rotation of the lead screw, and hence, reverse the direction of travel of the truck.

Substantially simultaneously with the operation of the reversing mechanism, the truck, as heretofore explained, contacts the tappet 18 or 18' to advance the fabric and template one step in a direction transverse to the path of the truck.

Liquid color is continually sprayed from the nozzle 17 as the truck 16 runs back and forth on its guide rails 3.

In this manner, the fabric is uniformly printed area by area, by the mechanical deposit of liquid color evenly and regularly distributed over the template.

The color 10 is deposited upon the textile template not only over the design photographically applied to the template, but also over that area of the template not covered by the design.

The coloring material filters through the textile area covered by the design more readily than through the areas not embraced within the design, and because of the even, uniform application of the liquid color to the surface of the template and the uniform texture of the template it will seep evenly through that portion of the template bearing the design to form a print of uniform intensity of color.

As liquid color remains on the template particularly at the intersections of the meshing threads thereof, it is highly desirable, if not necessary, to immediately dry said color to prevent it from leaking through the meshes of the template onto the fabric, and spotting the fabric as well as impairing the appearance and regularity of the decorative design which is being printed on the fabric.

For this purpose, the bridge 2 is equipped with blast or suction nozzles 21, 22 fixed to the opposite sides thereof throughout its length, from which, in the case of blast nozzles, hot air from any suitable source is discharged against the template on both sides of the path traversed by the color-discharging nozzle 17 to effect rapid drying of the excess coloring matter collecting on the template.

Provision is also made to retain the template 10a in close contact with the fabric to be printed which leads to the imprint of the decorative figures and designs on the fabric with neat, clean and clear-cut borders.

To this end, the inner faces of the opposite longitudinal sides of the table 1 beneath the bridge 2, are equipped with suitable pairs of guides (not shown) spaced apart the width of the area on which the coloring matter is sprayed during travel of the truck in one direction.

Corresponding pairs of guides accommodate a pair of compression or squeeze bars 23 which contact the upper surface of the template 10a and extend along the opposite sides of the area to be sprayed, to press that portion of the template between the compression bars snugly and firmly against the fabric.

The compression bars may act by their own weight or be forced down by means of springs (not shown) and always maintain their position relatively to the stationary table.

In the modification illustrated in Fig. 3, the opposite longitudinal edges of the template 10a are fastened to two circular disks, hoops or wheel-like members 25 to form a cylindrical device. The circular disks or wheel-like members are journaled on a horizontal shaft 26 extending transversely across the table 1 and at a distance above the table equal to one-half the diameter of the disks or wheels, so that the template 10a maintains a rolling contact with the fabric 8 supported on the fabric-frame 6.

It is obvious that, fastened in the manner above described, the template, in effect, forms the cylindrical surface of a roll.

The reciprocating nozzle-carrying truck 16, equipped with its wheels 16b depends, as in the form of the invention shown in Figs. 1 and 2, from guide rails 16c hanging from the shaft 26.

In this form of the invention, the truck 16 may be reciprocated, and the fabric-carrying supporting frame 6 may be advanced by means equivalent to that shown in Figs. 1 and 2.

However, this modified form is particularly adapted for treating fabrics of great length, the template being given a step-by-step rotating movement as the fabric supporting frame is advanced step by step, between the excursions of the successive transverse truck, to displace the successively printed areas of the fabric from the printing zone, and locate new unprinted areas of fabric and clear portions of the template at the printing zone.

Referring to Fig. 4, the modification there disclosed, utilizes the cylindrically-arranged template 10a mounted on the circular heads 25 supported on the shaft 26, the difference residing in the elimination of the fabric-supporting frame 6, for which is substituted a cylinder or roller 44 over which the fabric is fed in any suitable manner (not shown).

As in the modification shown in Fig. 3, that shown in Fig. 4 is especially adapted for the printing of fabrics of great length.

And in the modification shown in Fig. 4, in addition to the rows of hot air blast or suction nozzles 21, 22 provided on opposite sides of the path of travel of the truck 16, (with which the modification Fig. 3 may also be provided) there are two opposed rows or lines of hot air blast nozzles 21', 22' arranged beneath the template and on opposite sides of the line of contact between the template and the fabric, for the purpose of drying the excess coloring matter on the periphery of the cylindrical template excluding said line of contact, as well as drying the printed area of the fabric itself.

As heretofore stated, the liquid color must be uniformly deposited or sprinkled on the template,

and so far as applicant is aware, none of the spraying nozzles now on the market are satisfactory, particularly as to the quantity of color deposited.

Therefore, this invention contemplates the provision of an improved spray nozzle especially designed to eject a uniformly even jet of liquid coloring substance.

Referring to Fig. 5, I provide a closed casing 29, preferably tubular in shape, supported as herein before explained, in a vertical position, and having a reduced lower end or well 28.

A tube 30 is vertically disposed within and preferably concentric with the casing, the tube protruding downwardly through the closed bottom of the well. The spray nozzle proper 27 is mounted in the lower exposed end of the tube 30. The tube extends upwardly part way of the length of the casing and terminates at its upper end in a funnel 30a.

The lower end of a color-supplying second tube 31 arranged in axial alinement with the spray nozzle tube 30 is spaced apart from the funnel 30a and may be fitted with a nozzle 31a discharging into the funnel 30a.

The color supply tube 31 extends upwardly through the closed upper end of the casing 29 and connects with a pipe 32 leading from a color container 33, which in the present instance, is shown laterally adjacent the casing 29, but which could be otherwise disposed.

In the illustration, however, the color supply pipe 32 extends through the upper end of the color-container, and nearly to the bottom thereof, so that the inlet end 32a of the color supply pipe will lie beneath the level of the liquid color until the container is practically empty.

The discharge end of a hose 33 leading from any suitable source of compressed air passes through, and terminates just within the color-container 33 and above the liquid level therein. A hose 35 from a compressed air source (not shown) leads into the airtight casing 29 and is connected at its discharge end to the color supply tube 31 within the casing just above the outlet 31a of such tube to expel the liquid color into the flaring mouth of the funnel 30a of the tube 30.

A pipe 40 leading from the color-container 33 admits atmospheric pressure to the container above the level of the liquid coloring material.

From the foregoing, it will be clear that the suction effected by the discharge of compressed air from hose 35 downwardly into the color supply tube 31 within the casing 29 in conjunction with the atmospheric pressure to which the liquid level in the color-container is subjected through the pipe 40, causes a flow of the liquid color upwardly through the submerged lower end of the color supply pipe 32 to the nozzle 31a which delivers the liquid color into the flaring upper end 30a of the spray nozzle tube 30.

Another hose 34 leading from a compressed air source is connected to the tube 30 at a point above the spray nozzle 27 to discharge the liquid color through the sprayer 27.

The provision of the telescopic connection 32c between the color supply pipes 31 and 32, and the adjustable clamp 32b enables the adjustment of the nozzle 31 towards and from the funnel, as indicated by the arrows shown at the clamping member 32b in Fig. 5, to permit an exact regulation of the quantity of liquid color delivered to the funnel and also a control of the amount discharged by the spray nozzle 27. By this means, the volume of liquid color discharged onto the

template, mask or screen 16a may be maintained constant at any desired adjustment.

The compressed air discharged with the liquid color from the nozzle 31a of the supply pipe 31 accumulates in the casing 28. Also such liquid color as is discharged from the nozzle 31a, but is not caught in the funnel 30a, collects in the wall 28.

To relieve the pressure of air in the casing and also salvage the liquid color in the well, a return pipe 35 leads from a point near the bottom of the well and is connected at its upper end to the compressed air hose 38.

Pressure in the casing 28 on the liquid level in the wall, as well as the suction created by the flow of compressed air through the hose 38 into the container 33 causes the liquid color in the well to flow through the return pipe 35 into the compressed air hose or duct 38 and from the nozzle 37, back into the container.

The quantity of liquid color in the container 33 may be replenished as desired through the air vent pipe 40.

Returning to a consideration of the entire invention, other forms than those disclosed herein, may be devised for carrying out the invention.

For example, the fabric to be printed, and the template or mask covering the fabric may be supported for movement in a vertical plane, in which case, the liquid color would be sprayed onto the template from horizontally arranged spray nozzles.

This arrangement is particularly useful when it is desired to print both sides of a fabric, as the color depositing equipment can be duplicated, as well as the template, to enable printing to be simultaneously performed on both sides of the fabric.

Other changes and alterations may be made in the forms and arrangements of the several elements disclosed without departing from the spirit and scope of this invention.

What is claimed as new is:

In a fabric coloring machine, the combination of a stationary bed; a support mounted to travel longitudinally thereof; the travelling support bearing the fabric to be colored; a textile template superposed on the fabric; a track located above, and extending transversely of, the stationary bed and travelling support; a color truck mounted to traverse said track; means to drive the truck back and forth on the track; a color sprayer carried by the truck to deposit liquid color on that area of the template located therebeneath; and feed means connected with the travelling support and operable by the color truck as it reaches its opposite limits of movement, to advance the travelling support bearing the fabric to be colored and the template step by step, to successively present uncolored areas of the fabric and template to the color sprayer.

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