Feb. 23, 1932. F. W. CLARK 1,846,845

PROCESS AND APPARATUS FOR COLORING TEXTILE WEBS

Filed April 11, 1930

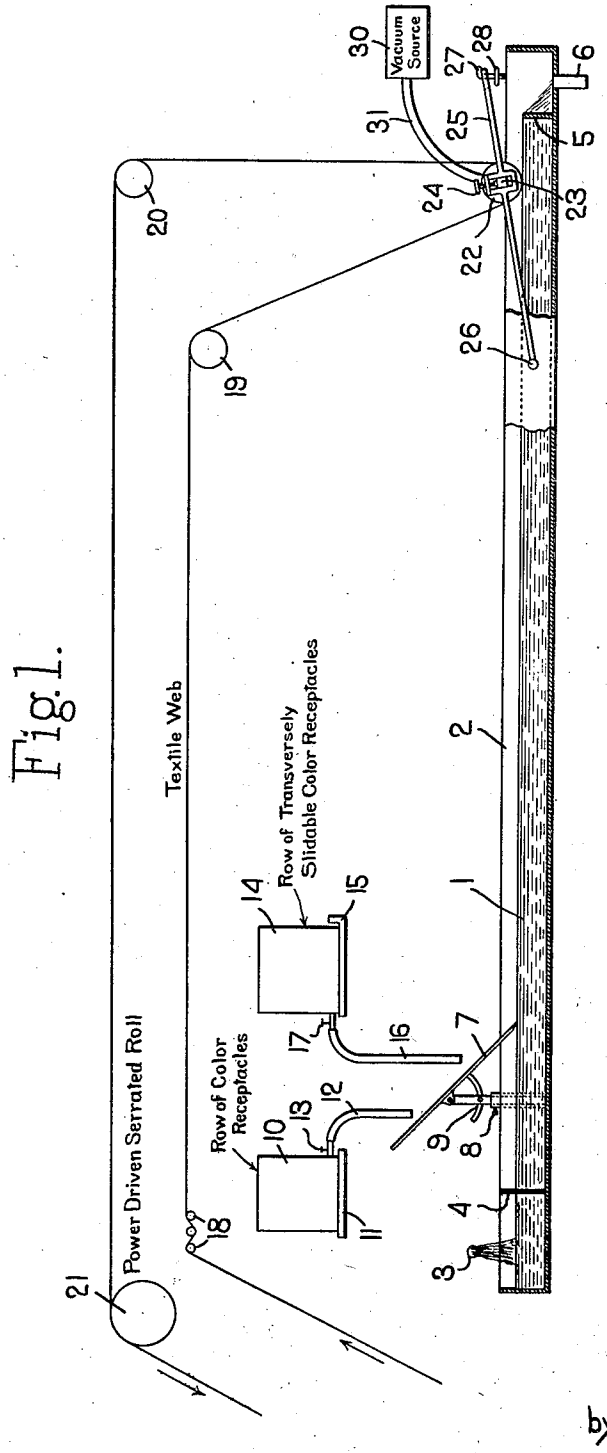


Fig. 1.

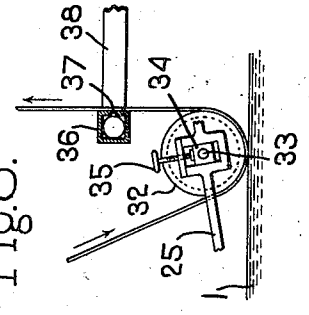


Fig. 3.

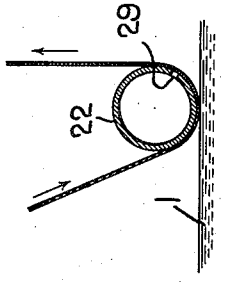


Fig. 2.

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UNITED STATES PATENT OFFICE

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PROCESS AND APPARATUS FOR COLORING TEXTILE WEBS

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This invention relates to a process and apparatus for imparting a variegated design to webs of air porous material and particularly to textile fabrics in a manner somewhat analogous to that of marbling wherein a mutable design of color is floated on the surface of a liquid carrier and is taken off the surface by the web of material.

In the decoration of paper and other similar and smooth and dense materials, satisfactory results are obtained by the application of the color thereto as a coating and it is the object of the present invention to render this type of process and apparatus effective in impregnating the material with the color so that it is dyed or colored throughout its substance. The invention renders it possible to color, impregnate, or dye air porous or textile fabrics of any degree of thickness from ordinary plain goods to high pile plush or pile goods.

The object of the invention is further to provide in the process and apparatus for the removal of excess carrier liquid or water taken up by the web of material as it laps the color film off the surface of the carrier without disturbing the design imparted to the face of the material or blurring its outlines.

The object of the invention is further to secure the desired results by the application of suction throughout a transverse zone of the web to the back of the web after the contact of the color film therewith whereby the color is drawn into the material thoroughly impregnating it and whereby simultaneously any excess carrier liquid is removed from the material.

The general type of process and apparatus in which the invention is embodied is now a part of the prior art and therefore needs no extended description here. In its broad aspects a carrier body of water, preferably a gravity flowing stream in a trough, is employed with the stream moving slowly enough to maintain its upper surface perfectly smooth and unrippled. Color fluids of desired hues are prepared and gently laid onto the surface of the carrier so that they float thereon and are dispersed thereon in the required design. In an application of John C. Senior, Serial No. 443,622, filed concurrently herewith, there are disclosed color fluids and a method of controlling their dispersion on the surface of the carrier liquid suitable for impregnating or dyeing textile fabrics. After the color design is formed floating on the surface of the carrier liquid, it is carried thereby to a position where the web of material is brought barely into touching contact with the carrier surface while moving in the same direction so that the web laps off from the surface of the carrier the color film. Immediately after the color film is thus taken by the web, the present invention comes into play and the color is drawn into the web of material thoroughly impregnating it and, at the same time, the excess carrier liquid is removed through the back of the web. Thus air porous or textile fabrics of all types may be colored or dyed successfully, rapidly, and economically in a mutable design such as of the well-known marbleized character.

The nature and objects of the invention will appear more fully from the accompanying description and drawings and will be particularly pointed out in the claims.

The drawings illustrate chiefly in diagrammatic form one type of apparatus embodying the invention and for carrying out the process of the invention, but as this type of apparatus is now old in the art, it is only necessary to illustrate and describe it and its operation sufficiently to disclose the present invention.

In the drawings:

Fig. 1 is a side elevation, partially broken away, of the apparatus.

Fig. 2 is a detail of one form of means for guiding the web into lapping contact with the color film and applying suction to the web.

Fig. 3 is a detail of another form of means for the same purpose.

The carrier liquid 1, which is preferably water, is shown flowing in the long tank 2 toward the right. The carrier liquid is fed into the tank from a suitable supply pipe 3 and passes through a strainer 4 and over a dam 5 which determines the level of the top

surface of the carrier liquid and thence discharges through a suitable outlet 6.

The colors which make up the mutable design may be fed to or laid upon the surface of the liquid carrier in any variety and by any suitable means and but one such means is here illustrated. A smooth inclined plate or baffle 7 extends across the tank near the upstream end and is mounted, as indicated at 8, to be vertically adjustable and, as indicated at 9, to be angularly adjustable. Preferably this plate is mounted at such an inclination to the surface of the water or carrier liquid that color flowing therefrom will flow gently off the plate and merge onto the surface of the water and be traveling at about the same speed as the water. The lower edge of the plate is preferably sharpened and located just to clear the upper surface of the water carrier.

Colors suitable for the dyeing and impregnation of the porous or textile web and of the required variety of hues are fed onto the inclined plate 7 from a plurality of receptacles, one for each color. For example, a series of fixedly mounted tanks, one of which is shown at 10, is mounted on a platform 11 above the tank 2. A conduit 12 leads from each tank into the vicinity of the plate 7 and the flow from the tank therethrough is controlled by a suitable valve 13. Another row of transversely movable color receptacles, one of which is indicated at 14, is mounted to slide transversely on the platform 15 extending transversely above the tank 2. From each of these receptacles also leads a conduit 16 into the vicinity of the plate 7 and the flow of color therethrough is also controlled by a valve 17. The colors flow from the conduits 12 in streams down the inclined plate and blend or coalesce with colors from the conduits 16 as these conduits are moved transversely back and forth across the tank. Thus the color film made up of a variegated design controlled as desired flows off from the inclined plate 7 onto the surface of the liquid or water carrier 1. Other means, as already pointed out and as known in the art, may be employed for varying the character of the design of the color film and such means form no part of the present invention. In any event, the surface of the carrier liquid before it approaches the downstream end of the tank 2 is covered with a film of colors presenting the desired mutable design.

The web of air porous material such as the textile, for example, plain cloth or pile, fabric, is fed from a suitable supply, not shown, through tension and smoothing bars 18 above the tank over an idler 19, thence down around and past the means for guiding the web into lapping contact with the color film and the means for applying suction to the back of the web, thence up and around an idler 20, thence to suitable means for feeding or drawing the web through the apparatus such as the power driven serrated roll 21 and thence out of the machine for further finishing treatment in the usual manner.

In the construction illustrated in Figs. 1 and 2, a non-rotatable hollow cylinder 22 is supported at its ends in blocks 23 adjustably mounted, as by screws 24, in the frame 25. This frame is shown as of general U-shape pivoted at its ends 26 to the tank and at its center supported in the revoluble hook 27 adjustably mounted by the screw 28 on the tank. This is shown simply as an illustration of a means for accurately adjusting the cylinder 22 with respect to the surface of the water carrier 1 and as a means for enabling the entire frame 25 to be released and swung upward about its pivots 26 when it is desired to thread or unthread the web or have access thereto. When the parts are in working position, the cylinder 22 is positioned so as to guide the face of the web into proper lapping contact with the film of color floating on the water or liquid carrier 1. In this construction a slot 29 extends through the wall of the cylinder 22 at a suitable point above the line of lapping contact of the web with the color film and a suitable source of vacuum or suction 30 is connected by a flexible pipe 31 to one end of the hollow cylinder.

The web is drawn around the cylinder 22 at approximately the same speed as the travel of the water carrier, although there may be a slight differential in the speed with the corresponding change in the color design. The web laps the color film off from the surface of the liquid or water carrier and immediately the vacuum produced in the hollow cylinder acting through the slot 29 against the back of the web sucks the color into and through the fabric, causing it thoroughly to penetrate and dye the fabric and, at the same time, removes any excess of the liquid or water carrier from the web.

In some cases it may be desirable that the cylinder which thus guides the web into lapping contact with the color film be rotatable to assist in the ready progression of the web through the apparatus. A variation of the construction for this purpose is shown in Fig. 3. In this case the hollow cylinder 32 is provided at its ends with journals 33 mounted in bearing blocks 34 adjustable by the set screws 35 in the pivoted frame 25. In this case it is necessary that the means for producing suction at the back of the web be separate from the cylinder and for that purpose a suction box 36 is shown mounted just above the cylinder at the back of the web having a slot 37 opening against the back of the web and connected at one end by a pipe 38 to a suitable vacuum source. Again it will be seen that after the web has lapped up the color onto its face, it immediately passes the

slot 37 and the suction applied through this slot draws the color into the web, causing it thoroughly to penetrate and dye the web and at the same time removing any excess of the liquid or water carrier.

In each case, therefore, suction is applied through a transverse zone of the web to the back of the web after the contact of the color film therewith both to draw the color into the web and to remove excess carrier liquid.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is:

1. In the process of decorating an air porous web with a mutable design of color in which a color film floating on the surface of a travelling liquid carrier is brought into lapping contact with the travelling web and taken off thereby, the step of applying suction through a transverse zone of the web to the back of the web after the contact of the color film therewith to remove excess carrier liquid and to draw the color into the web.

2. In the process of dyeing a textile web with a mutable design of color in which a color film floating on the surface of travelling water is brought into lapping contact with the travelling web and taken off thereby, the step of applying suction throughout a transverse zone of the web to the back of the web after contact of the color film therewith to remove excess water and to draw the color into the web.

3. In an apparatus for imparting a mutable design of color to a web of air porous material wherein a color film is floated on the surface of a travelling liquid carrier, means for guiding the travelling web of material into lapping contact with said carrier surface to take off the color design therefrom, and means for applying suction throughout a transverse zone of the web to the back of the web after the contact of the color therewith to remove excess carrier liquid and to draw the color into the web.

4. In an apparatus for imparting a mutable design of color to a web of air porous material wherein a color film is floated on the surface of a travelling liquid carrier, a hollow guide extending transversely of and just above the surface of the travelling liquid carrier for guiding the travelling web of material into lapping contact with the carrier surface to take off the color design therefrom, the said guide opening from its interior to a transverse zone of the back of the web the face of which has contacted with the color film, and means for applying suction to the interior of the hollow guide to remove excess carrier liquid from the web and to draw the color into the web.

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

FRANK W. CLARK.