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METHOD OF FORMING STENCIL SHEETS

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The object of my invention is to provide a decalcomania for producing facsimiles of labels on bottles, which decalcomania will be relatively inexpensive to manufacture and apply.

A further object of my invention is to provide a decalcomania which may be inexpensively formed in a plurality of colors, each color of which will exactly register with the other colors. Heretofore, the manufacture of multi-colored vitreous transfers has been exceedingly costly and entailed great difficulty because of the care required to secure accurate alignment of the various colors. It has been impossible to commercially use the lithographic process with vitreous colors because vitreous ink is composed mainly of pulverized colored glass which does not lend itself to application by a roller. When the screen process of printing has been tried, it has been possible to use only a single color because of the almost impossibility of producing screens for the individual colors which accurately register with each other. As a result, only two processes of vitreous labeling are commercially employed. The first and most preferable comprises applying the "ink" directly to the bottle through a screen. Only one color can be used with such a process because a separate screen must be made for each subsequent color, which screens are more difficult to make and register on a bottle than they are on a flat piece of transfer paper.

The second process comprises using transfers, but, invariably, such transfers are made in a manner different than the applicant's. These transfers have all, to the applicant's knowledge, been made by the powdering process wherein the transfer paper is coated with lacquer or lithographers' varnish and before the varnish dries the powdered glass is dusted onto the sticky varnish to form the "ink." So little glass will stick to the varnish that subsequent applications must be made if an opaque label is to be had. These subsequent operations are not only expensive but tend to make the edges of the work blurry. It will be apparent that in labels requiring fine detail it is imperative that each color be applied all in one operation to prevent blurring. Even when several coats of the powder have been applied by dusting so little color is present that it is usually necessary to back up the designs with a separate layer of white glass.

In my improved process the color may be applied as thickly as desired, which not only forms better appearing labels but also gives sufficient rigidity to the transfer that it may be removed from the transfer paper and deposited on the bottle without danger of breakage.

Specifically, my invention relates to a new method of making screens whereby a plurality of colors may be successively applied to the transfer paper, and which screens will all be in accurate registry with each other to thus prevent overlapping of the colors.

My invention further relates to the composition of the transfer coating, my improved composition producing a transfer of greater mechanical strength to thereby be more easily slid off the paper and applied to the bottle, and one which will burn to a better finish than the present type of coating. Only the glass remains after firing so that any binder used must burn to a colorless ash and avoid checking of the glass. My improved composition is believed to produce a better label in this respect than other compositions now being used.

The reason that multi-colored screen work has not been successful is that in making the screens the tissue, as the sensitized material is known, must be exposed, then developed and then stretched over the screen. It has been practically impossible to control the expansion and stretch of the tissue in various directions so that the screens do not accurately register. With my improved process accurate registry is assured.

With these and other objects in view, my invention consists in the decalcomania, per se, and the steps comprising my improved process, as claimed in my claims and described in my specification.

To carry out my improved process a positive photographic glass plate is made for each color of the label, the plates being made in the conventional manner. Each plate has an area thereon corresponding to one of the colors desired. The glass plates should be of uniform size and the designs located thereon so that final registry of the colors is easily obtained.

After these plates are dried a coating of rubber solution is flowed over the emulsion side of each plate. This rubber solution consists of a colorless latex which rapidly dries to a very thin film which is hardly discernible to the eye but which is insoluble in water. The water insoluble film is very important in this method.

A coating of collodion is now flowed over the rubber film and after the collodion film has dried, it is waxed, at which time it is ready to receive a sensitized sheet of "carbon tissue." Before using, the tissue is soaked in a 5% solution of bichromate. Such tissue is a standard product usually of black appearance and having a gelatin coating

on one side. After being treated in the bichromate solution the tissue, while still wet, is placed against the waxed surface of the plate, just described, with the waxed surface against the gelatin side of the tissue. The tissue, while still wet, is exposed through the plate and is then washed in water at 120° F., at which time the paper is peeled off from the gelatin leaving the gelatin coating adhering to the waxed surface. The soluble portions of the gelatin are now washed away leaving a relatively thick negative film adhering to the positive plate. The plate is now placed in cold water at 55° to 65° F. It may be well to mention that the concentration of bichromate and the exposure time can be regulated to produce in an insoluble film of any reasonable thickness and one which is much thicker than the maximum desirable thickness of paint required on the transfer. The thickness of this gelatin film is quite important as it controls the thickness of paint on the decalcomania.

While the aforementioned plate is still wet a fine mesh screen is placed over the gelatin side and pressed uniformly against the gelatin. The screen may be either a fine mesh silk screen as is commonly used in the screen printing process or it may be a wire mesh screen which stands up better with ceramic paint. A screen of 200 threads per inch has proved very satisfactory. The gelatin and screen is now allowed to dry and the screen is pulled away from the positive plate. The bichromate and gelatin adhere to the screen. It will be noted that from the time of exposure until after the screen has dried, the "tissue" never leaves the glass plate so that it is held in an exact uniform position at all times. The dried screen is thus an exact negative of the photographic positive.

A screen is made for each of the colors to be applied and inasmuch as each of the positive plates is in exact register with each other, it follows that each of the screens must be in exact register.

In making the decalcomania, transfer paper is placed in a conventional screen printing machine and the first screen is brought down against the paper with the gelatin side of the screen against the paper. The proper color of ceramic paint is then squeegeed through the screen onto the paper. The colored paint which forms the background of the label is preferrably applied first, then the color of the next importance is applied and finally the remaining color or colors.

After the transfers have been dried they may be handled with ease, the ceramic paint adhering to the paper which prevents the destruction of even the smallest detail. When it is desired to place the transfer upon the bottle, it is dipped in water for a few minutes until the decoration as a whole starts to slide across the paper. The decoration is then slipped edgewise from the paper onto the work. The bottle with the transfer thereon is then heated to approximately 1100° F. where all the colors of paint fuse at one time as a unit to the bottle. In order that the bottles may not crack, they are gradually brought up to this temperature and gradually cooled in the conventional manner.

As has been mentioned, labels formed from ceramic paint, even by the dusting process, are brittle because the composition of such paint is principally pulverized glass. In order to prevent cracking of such labels, I have found that by mixing lacquer with the pulverized glass and applying the mixture of lacquer and glass through the screen, a relatively hard durable film of the required thickness is formed on the transfer paper. It has been suggested that a lacquer layer be provided upon which the pulverized glass is dusted, but it is believed that the applicant's process wherein he mixes lacquer with the pulverized glass is unique in the art. Less pitting of the surface results than when the lacquer is applied as a layer.

Among the many advantages arising from the use of my improved decalcomania and method of making same, it may be well to mention that labels or decorations of fine detail and of many colors may be formed with one firing upon the work, which thereby materially reduces the cost over those processes requiring several firings. With my improved method of making the screens exact register of the colors is possible in forming the transfers; whereas, in the past, it was not commercially possible to produce a series of screens which would exactly register.

Still further, by forming the screens with various sensitivities and exposures, it is possible to regulate the depth of the bichromate film in accordance with the amount of color desired. For example, black "ink," having a very good covering power, is not required to be nearly as thick as one of the lighter colored "inks." Because of this a considerable saving is brought about as only the amount of ceramic paint absolutely necessary is used in making the transfer.

Still further, by mixing the lacquer with the pulverized glass before applying it to the screen, a decalcomania having a deposit thereon of uniform composition is maintained. Thus, when the decalcomania is being fired, the lacquer vaporizes from the whole body of the design so that the design dries uniformly on each bottle without checking. Where the lacquer is applied as a base upon which the powder is dusted, the lacquer must vaporize or burn away through the paint which tends to check the paint. In my improved process the lacquer is uniformly distributed through the paint so that when it dries, the check marks are much reduced and less conspicuous than with the former process.

Some changes may be made in the sequence of the various operations comprising my improved method without departing from the spirit of my invention and it is my intention to cover by my claims such changes as may reasonably be included within the scope thereof.

I claim as my invention:

1. The method of producing printing screens comprising, applying a water insoluble film upon the emulsion side of a rigid photographic plate of the design to be printed, then applying wetted carbon tissue over said film, then exposing said tissue through said plate, then developing said tissue, then drying said tissue while still on said plate, and then stripping said tissue from said plate along the outer surface of said film.

2. The method of producing printing screens comprising, applying a water insoluble film over the emulsion side of a rigid photographic plate of the design to be printed, then applying a wetted carbon tissue over said film, then exposing said tissue through said plate, then developing said tissue and while still wet pressing a fine mesh screen into the undissolved portions of said tissue, then drying said tissue and screen while still upon said plate, and then stripping said tissue and screen from said plate along the outer surface of said film.

3. The method of producing printing screens

comprising, forming a rigid photographic plate of the design to be printed, then applying a transparent rubber coating over the emulsion side of said plate, then applying wetted carbon tissue over said coating, then exposing said tissue through said plate, then developing said tissue, then drying said tissue upon said plate, and then stripping said tissue from said plate along the outer surface of said coating.

4. The method of producing printing screens comprising, forming a rigid positive plate of the design to be printed, then applying a transparent rubber coating over the emulsion side of said plate, then applying wetted carbon tissue over said coating, then exposing said tissue through said plate while still wet, then developing said tissue and while still wet pressing a fine mesh screen into the undissolved portions of said tissue, then drying said tissue and screen while still upon said plate, and then stripping said tissue and screen from said plate along the outer surface of said coating.

5. The method of producing printing screens comprising, forming a rigid positive plate of the design to be printed, then applying a film of colorless latex over the emulsion side of said plate, then applying a coating of collodion over said latex film, then waxing said collodion coating, then applying wetted carbon tissue to said waxed surface, then exposing and developing said tissue while still wet, then drying said tissue upon said plate, and then stripping said tissue from said plate along the outer surface of said film.

6. The method of producing printing screens comprising, forming a rigid positive plate of the design to be printed, then applying a film of colorless latex over the emulsion side of said plate, then applying a coating of collodion over said latex film, then waxing said film, then applying wetted carbon tissue to said waxed surface, then exposing said tissue through said plate while still wet and developing same, then pressing a fine mesh screen into the undissolved portions of said tissue, then drying said tissue and screen while still upon said plate, and then stripping said tissue and screen from said plate along said waxed surface.

7. The method of producing a printing screen comprising, forming a transparent positive plate of the design to be printed, then applying a water insoluble transparent film over the emulsion side of said plate, then applying a sensitized coating upon said insoluble film, then exposing said sensitized coating through said plate and developing same, then placing a fine mesh screen upon said developed coating while still wet and pressing same into said coating, then allowing the screen and coating to dry, and then stripping said screen from said plate along the outer surface of said insoluble film.

8. The method of producing a printing screen comprising, forming a transparent positive plate of the design to be printed, then applying a transparent rubber coating over the emulsion side of said plate, then applying a sensitized coating upon said rubber film, then exposing said sensitized coating through said plate and developing same, then placing a fine mesh screen upon said developed surface and pressing same into place, then allowing said coating and screen to dry while on said plate, and then stripping said plate from said screen along the outer surface of said rubber film.

9. The method of forming a printing screen comprising, photographing a positive transparent plate of the design to be printed, then flowing a transparent rubber solution over the emulsion side of said plate, then applying a coating of collodion on said rubber film, then waxing the outer surface of said collodion coating, then applying, while wet, a tissue sensitized in a 5% bath of bichromate solution with the gelatin side of the tissue next to said collodion surface, then exposing said bichromate through said plate and subsequently peeling off said tissue leaving the gelatin portion of said tissue upon said collodion surface, then washing said plate until the soluble portions of the gelatine have been removed, then placing a screen upon said gelatin while it is still wet, then allowing the screen and gelatin to dry as a unit upon said plate, and then stripping said screen from said plate along the line of said waxed surface.

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