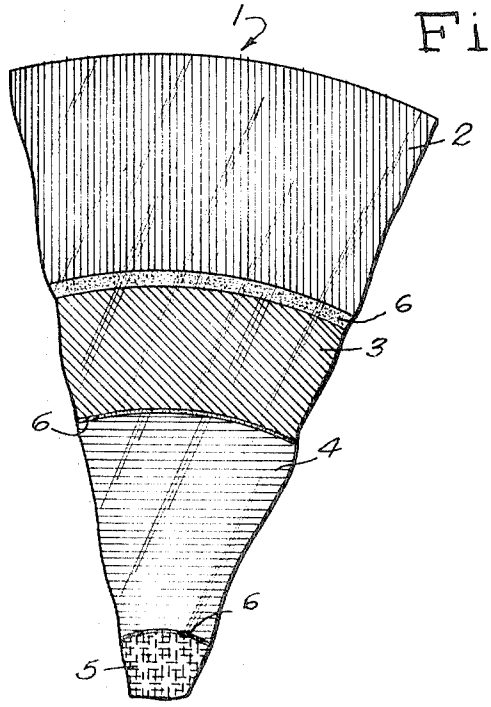
July 27, 1971 H. M. LUIG 3,595,651

FILM COLOR TRANSPARENCY AND METHOD OF MANUFACTURE

Filed Feb. 13, 1969

Fig. 1



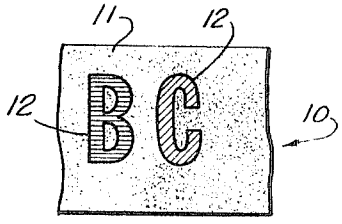
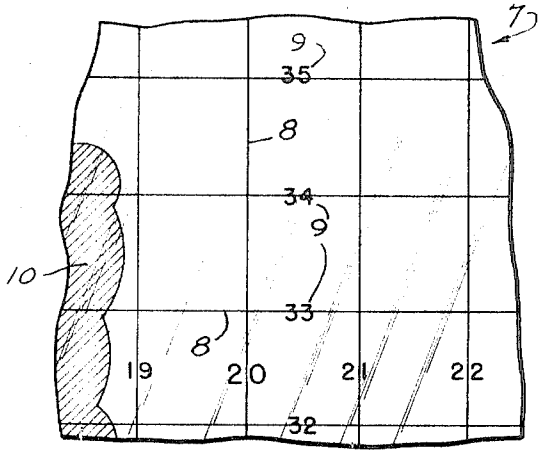


Fig. 3

Fig. 2



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FILM COLOR TRANSPARENCY AND METHOD OF MANUFACTURE

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Continuation-in-part of application Ser. No. 562,439, June 28, 1966. This application Feb. 13, 1969, Ser. No. 800,825

Int. Cl. G03c 5/00

U.S. Cl. 96—27 6 Claims

ABSTRACT OF THE DISCLOSURE

Method for making film color transparencies from black and white originals wherein photographic films exposed through conventional photomechanical processes are masked and the gelatin coating on either side of the exposed photographic film is treated successively with nontoxic water soluble dyes by a rub-on technique. The method provides an inexpensive rapid and safe means for making film color transparencies.

The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment to me of any royalty thereon.

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of my copending application Ser. No. 562,439, filed June 28,1966, now abandoned.

BACKGROUND OF THE INVENTION

(1) Field of the invention

The invention concerns the graphic arts and particularly the field of color transparencies.

(2) Description of the prior art

It is known in the art that a color transparency may be made by a dry diazo process wherein each final color after a preliminary drawing, is reproduced separately on a chemically predetermined color film. Each color must be positioned within a frame for projection, the final product being limited in size.

It is also known that a deep-etch process may be made by photomechanical procedure wherein each final color requires a separate drawing and a film positive made therefrom. The process employs a sheet of vinyl acetate coated with lacquer and photo-sensitized, onto which a positive is exposed. For each color the acetate must be developed, etched, dyed, washed, dried and resensitized for the next exposure. Drying time required for each color is a minimum of four hours.

In addition, a transparency may be made by exposing conventional color film to a multi-color rendition. However, often this procedure lacks vividness of color.

SUMMARY OF THE INVENTION

The invention herein disclosed includes the discovery that the absorbent coatings on photographic film may be treated through conventional masking techniques with nontoxic water soluble food colors to produce color transparencies.

It is an object of this invention to produce a wide variety of color transparencies through the use of a new, rapid method.

It is another object to produce color transparences through a rapid method incorporating relatively inexpensive materials.

It is another object to utilize new, rapid procedures using inexpensive materials to produce colored projection slides; transparent overlays for briefing boards, maps, charts, and diagrams; permanent, protective coverings for valuable documents; additions, framed or otherwise, for manuscripts; decorative displays and exhibits.

It is further an object of this invention to produce vivid color transparencies through the use of common water soluble food colors, and the absorbent gelatin coating on either side of exposed photographic film.

The invention is illustrated in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 depicts a multi-colored film transparency with solid colored areas outlined in black imposed upon the gelatin coating on a clean film positive made photographically from an original drawing;

FIG. 2 depicts a reversal positive in which film is exposed to a drawing and given only the first development step of a conventional reversal process development thereby producing a faint image which is utilized, in addition to FIG. 1, to accomplish screen and rule patterns plus a choice of colors for type, outlines, and screen and/or rule patterns; and

FIG. 3 depicts a negative used to color or tint the gelatin coating on type, open window areas, and outlines on black or dark backgrounds.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The invention may be more specifically described by reference to the drawings and the following examples:

Example I

A clean film positive was made from an original drawing. The gelatin coated film was transparent with black line work and type images. All areas not desired for the first color were masked. Masking mediums may vary, but when several masking mediums are used each must be impervious to another and its solvent, and all must be impervious to water. Suggested mediums and their respective solvents are:

Medium:	Solvent
Asphaltum	Turpentine.
Plastic inks	Specific ink's thinner.
Lacquer	Specific lacquer's thinner or acetone.
Rubber cement	Specific brand's thinner or naphtha.

Each masking medium was applied with a brush, and allowed to dry before application of the next. After application of the masking mediums to the transparent gelatin coated film positive the area selected for coloring was dusted lightly with french chalk. The chalk acts as a filler, preventing seepage, and promotes reception of color. A runover of masking medium into an undesired area may be removed by the respective medium's solvent on a swab, or through the use of a round pointed stick or a toothpick, provided the film surface is not scratched. The absorbent gelatin coating on either side of an anti-halation backed film may be worked; however, the back side is preferred, thereby reducing the possibility of damaging the photosensitized emulsion side.

Food color was then applied to the gelatin coating using a large wad of cotton or a small swab, depending on the size of the area to be covered. The color was applied with a rapid circular motion for even coverage until the desired density was reached. The color grows deeper with rubbing. Food colors may be used full strength, or diluted with water for pastel shades. Colors

may be premixed or applied on top of each other for the shade desired. The colored gelatin dries in about three minutes.

After each application dries the next masking medium is removed with its respective solvent, and a new mask is applied to cover the areas previously colored. This procedure was followed until all the desired colors were applied. Then, the previously colored areas were uncovered with each masking medium's solvent. Each particular graphic presents its own problems therefore this procedure must be varied by the artist to meet each problem. In case of a mistake in the application of color, the color may be removed from the gelatin coating by rubbing the area with clear or detergent ammonia. The area is then submerged in cold running water and following this allowed to dry. The positive can then be re-used when thoroughly dry. For correction of small areas a mask may be applied before swabbing the area with ammonia.

Referring specifically to FIG. 1, the gelatin coating of the transparent film positive **1** is to receive four colors, red **2**, green **3**, blue **4**, and yellow **5**. The black lines **6** correspond to the image. The green **3** and yellow **5** areas were covered with asphaltum, and red and blue food colors were rubbed into the gelatin coating of their respective areas, **2** and **4**. After the colored gelatin dried, the asphaltum was removed with its solvent, turpentine. Then the red **2** and blue **4** areas were covered with asphaltum and green **3** and yellow **5** colors were applied to the gelatin coating. Finally the asphaltum was removed with turpentine.

The process of this example may be applied to the gelatin coating of either orthochromatic film or a continuous tone black and white positive on panchromatic film. When a continuous tone positive is used, the colors are modified with black and grey tones, which, if too deep to permit the desired brilliancy, may be removed by aplying bleach to remove the emulsion. After the emulsion is removed color is applied to the absorbent gelatin coating on the back of the film to the area selectively bleached.

Duplicate color transparencies may be made from the end product of this example directly, or an intermediate color negative may be made. Photoprints may then be made in color or black and white from this negative.

Example II

If the transparency to be prepared requires colored numerals, type, lines, screens and rule patterns, it can be prepared from a reversal positive, a positive made directly from a positive or a negative made directly from a negative, wherein the second development of the conventional reversal process development is not performed. This reversal film also permits, if required, solid areas of color to be added the absorbent gelatin coating on the back, non-photosensitized side. The film positive **7** was made from the original drawings, and given the first development of the conventional reversal process development, but the second developing of the reversal process was eliminated. This produces an extremely faint image. The film is completely cleared of the exposed photo emulsion down to the film base and fixed, washed and dried. The faint image remaining on the photo emulsion side will absorb color while the film base will not absorb color. Therefore, referring to FIG. 2, the gelatin coating on lines **8** on film base **7** are colored with food coloring by application thereto with a wet swab followed by wiping the excess with a dry swab. The excess color is removed from the surrounding cleared film base leaving the colored gelatin lines. Numerals **9** may be colored in the same manner. A mask is not required unless colors are to be butted. Film base **7** has on its back an anti-halation gelatin coating. Solid color **10** was applied to the gelatin coated back side in the manner described in Example I. In addition, lines **8** and numerals **9** may be colored with any conventional stain using the procedure described in this example, providing the stain will be absorbed by the gelatin coating on the image **8** and **9** rather than the film base **7**.

In addition to photo-lithographic film this procedure may be applied to a black and white continuous tone reversal. After eliminating the second development, the image will be an apparent grey approximately 40% tonal quality. The absorbent gelatin coated image is receptive to color and will be modified with grey.

A fluorescent effect may be achieved with this product. The continuous tone gelatin colored reversal is secured emulsion side up to plain or tinted Plexiglas. Infrared or another radiated lighting means placed behind the composite produces the fluorescent effect.

When a photographic reversal positive film is exposed to a half-tone screen original the application of white paint, ink, tempera or another conventional water soluble white color to the faint gelatin coated image will produce a white half-tone image on a transparent base. This is an inexpensive method for producing white screens to overlay copy in making Xerox or other electro-static reproductions. Present commercially available large size screens are extremely expensive. This process would produce usable, large size screens at very little cost.

Another method of implementing the process of this example would be in making, for example, a simulated **4** color process separation from black and white art for printing. Although the original may be in color or black and white it should be retouched; it should also be of continuous tone, not screened. Using the procedure of this example the original is used to make four reversal positive transparencies, screening, preferably with a 150 line screen angled as follows:

one at 90° to be colored yellow
one at 75° to be colored magenta
one at 15° or 105° to be colored cyan
one at 45° to be colored black.

The above degrees notation refers to horizontal rotation of the screen relative to a common zero point. Each of these four reversal positives is made by the method discussed above, i.e., by giving the exposed film the first development step of the conventional reversal process development, but not performing the second development. Each of the four reversal positives is selectively colored applying the rub-on technique to the gelatin of the emulsion image with solid areas being colored on the back as described. The four positives may then be registered for a visual preview. With the use of filters, reproduction negatives may be made, compositing with line positives and line negatives for drop-out type, grids, and annotations, as required.

In order to produce a fast usable simulated 4/color process color separation the original copy is overlayed with a white screen and with the use of filters for selective transmission, four Xerox copies are made on a stable base such as parchment, paper, plastic or linen. One reversal positive minus the second developing from each Xerox copy is then made. No screening is required as the white screen used in copying has broken up the detail in a random pattern, making the end result comparable to continuous tone printing. The gelatin coating of each reversal positive image is selectively colored with solid areas being colored on the gelatin coated back side as previously discussed. If only one rub-on color, such as magenta, is used reproduction negatives can be made by direct contact without the use of filters.

It would appear that the method of this example could have a wide variety of applications as, for example, in the photographic reproduction of printed circuits on a plastic base.

EXAMPLE III

When a black background is desired a negative is used. Referring to FIG. 3 the negative **10** has a black background **11** and clear detail **12**. To color letters **12** the

absorbent gelatin coating on either side of the film may be used and masking may be applied as in Example I. In addition, masking tape may be used. Negative **10**, as did the positive **1** in FIG. 1, has an anti-halation gelatin coating on the back and the clear photographic image comprises photographic gelatin emulsion on the other side. The film **10** has not been cleared of emulsion as was done with film **7** in Example II. Masking tape was applied to letter B, and brown food color was applied to the absorbent gelatin coating of the unmasked letter. Then, letter C was masked and blue color was applied to the absorbent gelatin coating consisting of letter B. If liquids are used for masking the procedure is identical to Example I.

It will be appreciated that there may be many variations of my process of constructing colored transparencies from standard absorbent gelatin coated photographic film and common, commercial food coloring, using selective masking procedures.

I claim:

1. A process for staining a transparent photographic reversal positive exposure having an anti-halation coating on one side and an exposed negative image in the light sensitive photographic emulsion coating on the other side which comprises:

(a) clearing exposed areas of said photographic emulsion coating from said reversal positive exposure;

(b) selecting an area of the unexposed image of said photographic emulsion side of said reversal positive exposure to be colored with stain;

(c) selecting a stain, to be used to stain said selected area, said stain being absorbable by said unexposed image but not by the adjacent cleared area;

(d) coloring said selected area with said selected stain; and

(e) removing the unabsorbed stain from said photo emulsion side of said reversal positive exposure.

2. A process according to claim **1** and further comprising:

(a) selecting an area on the non-photosensitized, anti-halation side to be colored with stain;

(b) selecting a water-soluble food coloring to be used to stain said selected area;

(c) selectively covering said anti-halation side of the reversal positive exposure with a masking medium, said masking medium being impervious to water;

(d) dusting said selected area with french chalk;

(e) staining said selected area with said selected water-soluble food coloring;

(f) drying said stained selected area; and

(g) removing said selectively applied masking medium.

3. The process of claim **1** wherein the photographic reversal positive is exposed to a half-tone screen to form the image of the screen in the light sensitive emulsion coating of the reversal and the exposed emulsion is removed, the selected area is the unexposed image, and the stain selected is white; so that when the image is stained, a white screen transparency results.

4. The process of claim **1** wherein the photographic reversal positive is exposed on the light sensitive emulsion coating through a pre-angled half-tone screen and exposed areas of said photographic emulsion coating are cleared from said reversal positive to form an extremely faint half-tone image of a continuous tone original.

5. The products produced by the process recited in claim **1**.

6. The product produced by the process recited in claim **3**.

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