

March 20, 1962

M. MISTURINI  
COLOR PRINTING PROCESS

3,025,627

Filed Nov. 14, 1958

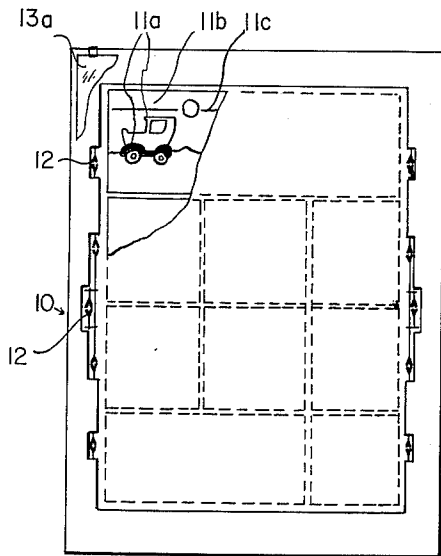


FIG. 1

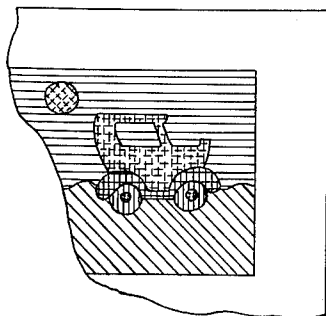


FIG. 4

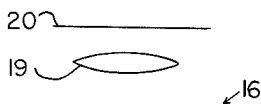


FIG. 3

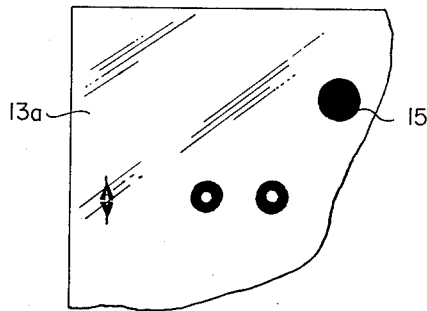


FIG. 2A

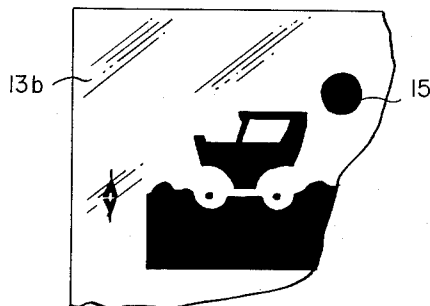


FIG. 2B

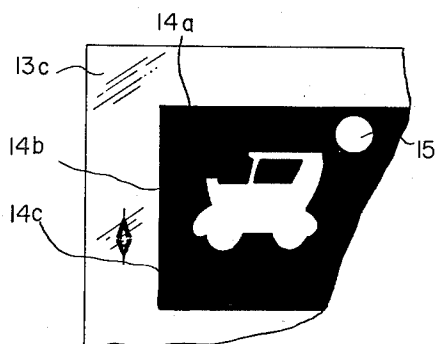


FIG. 2C

INVENTOR.

*Maris Misturini*

BY *John C. McCreger and*  
*James A. Evershman*

ATTORNEYS.

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3,025,627

## COLOR PRINTING PROCESS

Mario Misturini, Hicksville, N.Y., assignor to

James G. Minogue, Brooklyn, N.Y.

Filed Nov. 14, 1958, Ser. No. 774,010

2 Claims. (Cl. 41-26)

This invention relates to color printing and, more particularly, to improved methods and equipment for reproducing colored drawings.

The reproduction of colored drawings by printing is by present conventional practice time consuming and costly. In many cases, the results are of uncertain and sometimes low quality. To a large extent present processes, when passable results are obtained on a commercial scale, depend on the skills and techniques of a relatively large number of people. Not only is the work exacting but, at certain stages, highly perishable and incapable of salvage or correction in the event of error or damage. Good registration of the colors and outlines is a particularly critical problem.

Accordingly, it is one object of the present invention to provide an improved method and equipment for printing colored drawings such, for example, as colored comics and other art work for newspapers, magazines and promotional literature.

Another object of the invention is to provide an improved method and equipment for printing colored drawings in which accurate color registration is readily obtained.

Still another object of the invention is to provide an improved method and equipment for preparing color negatives for use in the preparation of printing plates.

In accordance with the present invention, a line or key engraving plate is prepared based on the artist's drawing which is to be printed. This plate, which can be made in accordance with standard engraving techniques, includes all of the drawn lines and shading which the artist executed in the preparation of his master copy, but carries no color information. The line or key plate includes in its margins registration indicia which are normally printed with each black and white print made from the key plate.

In accordance with the invention, the key plate is treated, as by the application of coatings, to facilitate marking on the plate surfaces. Preferably the raised portions and undercut portions are caused to appear in contrast. The technician or "tint layer" can then scratch or otherwise mark color boundary lines, guide lines, or the like in the coatings which are visible to him but which do not reproduce in prints or other mechanically rendered copies taken from the key plate later in the process. The key plate carrying its marked coatings is then selectively inked by inking only its registration indicia, after which a flexible, transparent sheet material is superimposed on the plate, pressed against the registration indicia and secured in position. A wash representing one of the three primary colors of the original colored drawings is now applied to the upper surface of the transparent sheet while superimposed on the key plate which is visible therebeneath for reference.

Three successive washes are sequentially prepared on three separate transparent sheets, each placed on the key plate and each having printed on its underside by direct contact the registration indicia. Preferably each wash sheet is prepared using a yellow water color, treated with a non-crawl medium, the tones ranging from pale yellow to blackened yellow or full black to cover the gradations or tones of the primary color on the master copy. The yellow color of the wash is not related, however, to the primary color represented. The three wash sheets are then photographed by placing the transparent sheets in a

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processing camera with the verso or underside of the sheets facing the film so that the camera photographs, in addition to the registration marks printed directly thereon, the absolutely flat, coplanar surface of the wash material in intimate engagement with the transparent sheet. The washes, being applied to the surface of the transparent sheet which does not face the camera can be applied more quickly and with less difficulty than by the conventional technique of application to the front face of the wash sheet. This is so because for any given wash sheet, using tone gradations, it is not necessary, after a given tone grade has been applied to the sheet to apply the adjacent color grade precisely along the line of demarcation from the first. In other words, once the boundary line between color grades is established by the technician by applying the first wash tone, the adjacent or contiguous second tone can be applied so that it overlies the first because, as seen from the front of the transparent sheet, the boundary therebetween will remain unchanged. Because the washes are done directly and sequentially from the key plate, parallax distortions are obviated and absolute accuracy of positioning of registration indicia is obtained.

It will be recalled that the wash sheets are placed in the camera backwards so that the camera sees the underside of the washes. This reverses in the manner of a mirror-image the orientation of the color data on the sheet. The image is again reversed by action of the camera so that the final photoengraving will appear reversed, resulting, when the photoengraving is printed, in a correctly oriented, positive rendition.

A preferred procedure for carrying out the present invention is described below, having reference, where necessary, to the accompanying drawings, in which:

FIGURE 1 is an illustration, partly diagrammatic in nature, of a key or line engraving plate as used in the practice of the present invention;

FIGURES 2A, 2B, and 2C are diagrammatic representations in plan view of three wash sheets;

FIGURE 3 is a view, partly schematic in nature, in enlarged scale and taken in vertical section, illustrating how each wash sheet is mounted in a camera; and

FIGURE 4 is a sketch of a portion of the colored drawing corresponding to the key plate of FIGURE 1 and the wash sheets of FIGURES 2A, 2B and 2C, with cross-hatching added to indicate color areas.

The process of the present invention is described below in connection with the printing of colored drawings, of which colored comics are a representative example. FIGURE 4 shows a colored comic drawing typical of this art, although a wide range of colored drawings, colored photographs, or the like, can also be reproduced. In one process used in the past, the colors are reproduced based on the work of artisans called tint layers who superimpose washes in gradations of intensity on wash sheets respectively representative of the three primary colors, the wash sheets thereafter being processed photographically to make printing plates. In most cases, the three primary colors, magenta, cyan and yellow, are used, both individually and in combination to achieve the full color spectrum.

The process is begun by the preparation from the master or original drawing of FIGURE 4 of a key or line engraving plate identified by the numeral 10 in FIGURE 1. The engraving plate 10 can be made by conventional, automatic engraving machinery and techniques based on photographic reproduction of the black and white areas of the master copy. The finished engraving plate includes raised portions 11a corresponding to each black portion in the original drawing and recessed or undercut portions 11b corresponding to either white or colored portions. On the periphery of the line engraving plate there

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are formed registration indicia 12 which are capable of reproduction by printing. Conventionally, engraving plates are treated on their bare metal with a coating which is normally dark. In accordance with the present invention, contrast with the dark coating of undercut surfaces 11b is achieved by rolling a removable, light colored ink or paint over the surface of the plate to color the raised or unengraved portions 11a. Before beginning his work of preparing the washes, the tint layer can scratch or otherwise mark in the dark and light coated surfaces of the engraving plate guide lines 11c which assist him to reproduce boundary lines between two different colors or between tones of the same color, this being done by referring visually to the artist's master copy. These boundaries are those not set off in the master copy by black outlines or black color masses, which would already be present in the engraving plate. The guide lines so marked on the engraving plate do not change the character of the plate insofar as its printing ability is concerned, although, as will now be described, they convey uniform information to the tint layer in the preparation of the several color washes.

In the practice of the present invention, the registration indicia 12 are inked, leaving the drawing lines 11 uninked, and a single, transparent sheet, a fragment 13a of which is illustrated in FIGURE 1, is secured in place as by taping or clamping. These sheets are also illustrated in FIGURES 2A, 2B and 2C by the numerals 13a, 13b and 13c respectively. A preferred material for the sheets is a polyester plastic marketed under the trademark "Cronar," such material being flexible but inelastic. Pressure is applied to the upper surface of the superimposed sheet to cause the registration indicia 12 to print their marks on the underside thereof. It will be assumed that the wash sheet 13a is the magenta or red sheet, i.e., the wash sheet from which the printing plate for the red colors or tones is made.

From this point the wash is prepared by the tint layer, who, referring to the artist's original work in color and to the engraving plate beneath the sheet having its raised lines 11a and guide lines 11c, applies a wash to the top surface of the sheet 13a, as with a brush, for example, filling in all of the red areas. In other words, everywhere a red tone appears in the original work, the tint layer applies the wash to the sheet using as guides the lines on the engraving 10 which are clearly visible through the superimposed and immobilized transparent sheet 13a.

In most cases, a range of tones or gradations of color are desired, e.g., pale pink to full red. These are achieved through the wash process by applying corresponding tonal gradations in the wash. Referring, for example, to FIGURE 2C, which is the "blue" sheet, there are illustrated three gradations of blue, 14a, 14b, and 14c, becoming progressively more pale moving from top to bottom and blended together. The guide line 11c of FIGURE 1 defines the boundary for the sun 15, which is to be of orange or a combination of red and yellow from the sheets 13a and 13b. Thus, the blue terminates at the outer edges of the boundary, whereas, in the sheets 13a and 13b the washes representing red and yellow terminate at the inner edges of the same "invisible" boundary line. It will be understood that the boundary line per se does not appear except in engraving plate 10 where it is represented by the visible but non-printing mark or line 11c which is common to all three sheets.

For reasons which will be presently made apparent, in cases where some contrast rather than blending is desired, the tint layer in applying the two successive tones of the same wash need only exercise care and precision in rendering the first boundary line of the first tone. The next adjacent or contiguous tone can be quickly applied, actually running over and actually superimposing itself on the previous tone. When viewed from the opposite side of the transparent sheet, as is the case in the practice of the present invention, the overlapping of the second

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tone will not be visible, and the carefully worked boundary will be retained. (In this connection it should be noted that the color washes are opaque and that it is the light reflected from the wash rather than the light transmitted through the wash which is used to convey the color intelligence.) Were the top surfaces of the wash sheets to be used, the tint layer would be forced to exercise care in the putting down of both tones because the first applied tone would, if roughly applied, cover the boundary intelligence of the guide lines below and the second tone, if roughly applied would be reproduced in the final print.

It is preferred in the practice of the present invention to use yellow water color as the basic medium for preparing all of the washes, regardless of the colors, red, blue or yellow, represented thereby. The yellow washes are preferably water colors combined with a non-crawl medium such as that marketed under the tradename "Brawn" which enables the color to be flowed onto the glazed surface of the plastic sheets. The wash is prepared in a range of color gradations by providing a range of mixtures of yellow and white, pure yellow, yellow and black, and black. For most purposes eight wash color gradations are adequate to achieve color faithful reproduction. These color grades or tones, ranging from pale yellow to black, are applied so that black represents the deepest or fullest tone of the original work. For example, a full red area would be represented on the wash sheet corresponding to red by black or possibly highly blackened yellow, whereas, pale pink would be represented by pale yellow. The finished wash sheets are then preferably affixed to white carrier sheets, placing the painted or colored surface against the surface of the carrier sheet. In this fashion, the relatively more perishable water color material is protected from damage by the relatively tough plastic transparent sheet to which the underside of the wash colors are applied. As will be described below, in accordance with the present invention, the wash sheets can be retained in this protected mounting configuration throughout the remainder of the process.

The three wash sheets corresponding to the three primary colors are sequentially prepared using the same engraving plate 10, so that all three sheets will carry accurate and correlated registration data and will be based on common guide lines and other color information. Because the washes are taken directly from the key plate, rather than across glass viewing sheets, parallax distortions are obviated both with respect to the color applications on the wash sheets and with respect to the registration marks.

The three wash sheets 13 are then placed sequentially in a photoengraving camera 16 by placing the mounted sheets in the camera against a back-up plate 17 so that the underside of the sheet, i.e., the side which was facing the engraving plate 10, is exposed to the film. A glass plate 18 secures the sheet, which is then photographed, by reflected light, by means of the image cast on the film 20 by the lens system 19. This presents color to the camera as it appears when viewed through the transparent sheet so that absolutely flat, even-textured appearance is attained. The negatives from the camera are processed automatically in accordance with standard photoengraving techniques to prepare color mats from which printing plates are cast. Placing the color washes in the camera to photograph the back surface thereof will reverse the image. This image from the back side of the color wash is then reversed by the camera lens, and the so-called negative from the camera will reverse once again when the printing plate or mat is prepared therefrom. Thus, a reversed image will appear on the printing plate, which image will be reversed by the printing operation to bring the final product into its original phase or orientation.

While the invention has been described above having

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reference to a preferred process, it will be understood that it can be modified in certain respects while still retaining the benefits of high quality reproduction at decreased cost. The invention should not, therefore, be regarded as limited except as defined by the following claims.

I claim:

1. In a method which is part of the reproduction by printing of multiple-color originals including outlines and colored portions, the steps of preparing a line engraving plate of the outlines of the colored drawing to be printed, the plate including marginal registration indicia, marking the engraving plate with visible guide lines indicative of color boundaries in the original, said lines being so applied as to render no impression on a print taken from the engraving plate, inking the registration indicia, superimposing on said line engraving a transparent sheet, causing the registration indicia to be printed on the underside of the sheet, and preparing on the upper surface of each sheet, while it is in intimate engagement with the line engraving and immobilized thereon to maintain exact registration with the registration indicia, a wash of pig-

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ment representative of a color selected from among red, yellow and blue, the wash being applied in gradations of intensity to represent areally the concentrations of the primary color represented thereby in the colored original to be reproduced, and utilizing said guide lines as guides in the preparation of the color wash.

2. The method as set forth in claim 1, including the step of applying contrasting tones to the engraving plate in the raised and engraved portions thereof, said visible guide lines being inscribed in said applied tones.

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