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[54] **METHOD OF PRODUCING POLYCHROMATIC PRINTS**

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[58] **Field of Search** ..... 96/17, 27 R, 33, 35, 41, 96/42, 44, 30

[56] **References Cited**

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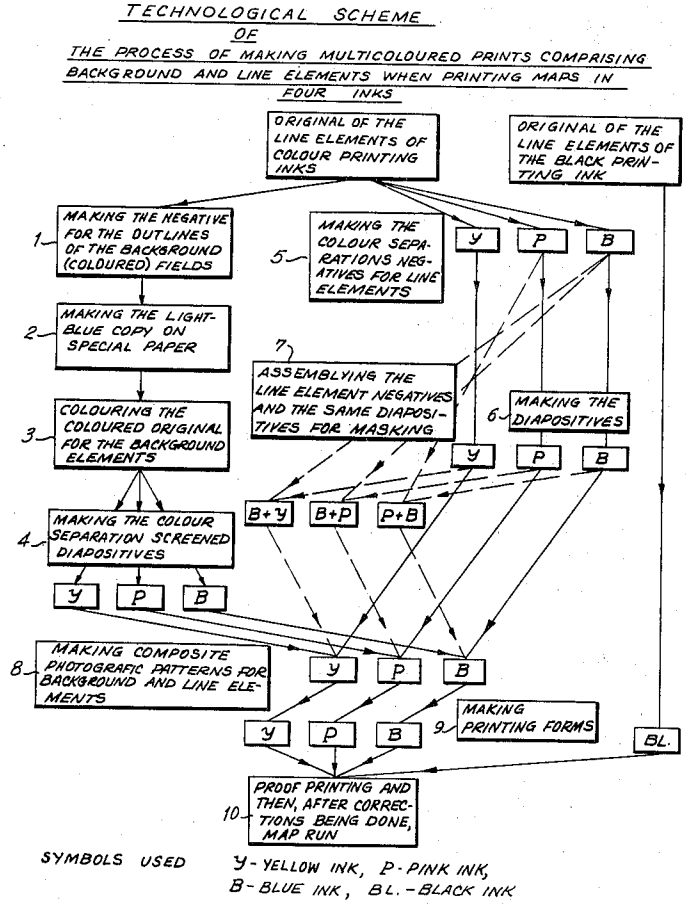
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[57] **ABSTRACT**

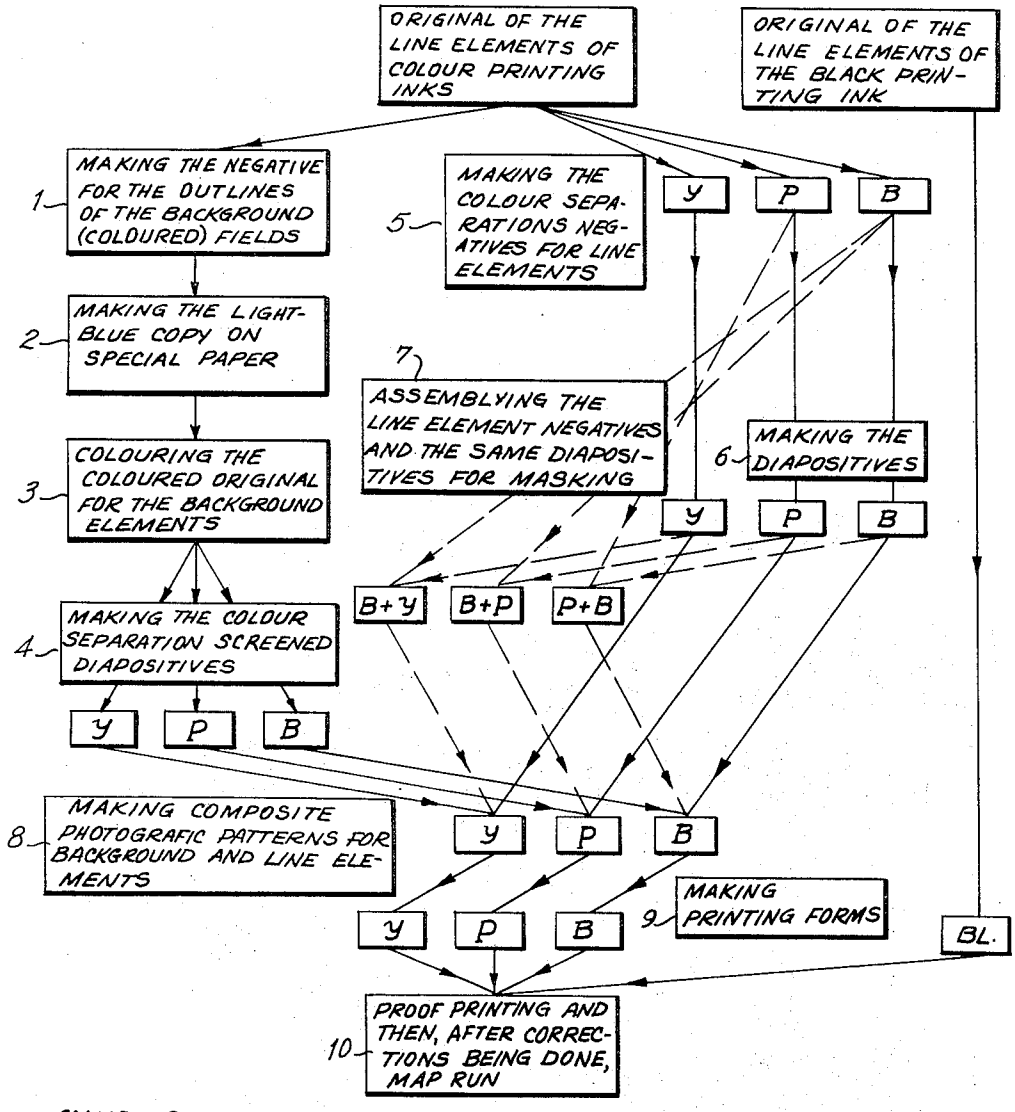
The method provides for making three photographic patterns of linear elements and three photographic patterns of background elements, each including a single yellow, pink or blue color of the basic cold colors.

Then the single-color photographic patterns of the linear and background elements are copied for producing combined photographic patterns. The combined photographic patterns are used for making color separation printing forms.

3 Claims, 1 Drawing Figure



TECHNOLOGICAL SCHEME
OF
THE PROCESS OF MAKING MULTICOLOURED PRINTS COMPRISING BACKGROUND AND LINE ELEMENTS WHEN PRINTING MAPS IN FOUR INKS



SYMBOLS USED Y - YELLOW INK, P - PINK INK, B - BLUE INK, BL. - BLACK INK

METHOD OF PRODUCING POLYCHROMATIC PRINTS

The present invention relates to polygraphy, and more particularly, the invention relates to production of multicolored impressions comprising background and linear elements and to the field of production of geographical maps.

The known method of making geographical maps includes the making of colored and linear originals used for making color separation photographic patterns and then printing forms which, in turn, are used for producing polychromatic impressions by means of successive printing on paper.

According to the widely known methods, the photographic and printing patterns of linear and background elements of polychromatic geographical maps are made separately due to a large size of the maps (from 70 × 80 cm to 80 × 110 cm). Owing to this fact, geographical maps and atlases are printed with a great number of printing inks, at single-surface printing — with 8 and more printing inks.

In this case the most labor-consuming process of reproduction of the color background of maps is based on the use of four- or five-stage gradation color reproduction with linear and point screens which are selected by means of various "color scales of printing inks." The photographic patterns of the background color of maps are usually made on transparent plastic materials by hand by the method of "smearing" or "removal of an inactinic layer" followed by copying the required screens. All these operations are effected by a specially developed "schedule of tone design of a map." The number of the background patterns may be equal to 4 and more. The photographic patterns of linear elements are made either by means of photographic reproduction of design (publisher's) originals with subsequent retouching of obtained negatives or by the method of engraving. The number of the linear patterns may be as high as 4 and even more.

When printing maps with the use of such a large number of patterns, the quality of the issue is deteriorated due to inavoidable errors in the process of coinciding the outlines on paper.

In addition, the known method is disadvantageous in high consumption of labor during the making of the photographic patterns as well as in high cost of the issue owing to inefficient operation of the machines when the print is repeatedly run through the machine. In this case the number of strokes is determined by the number of colors of the map.

An object of the present invention is to improve the quality of printing, to reduce consumption of labor, to accelerate and reduce the cost of the process of producing multicolored prints particularly polychromatic geographical maps.

These and other objects are attained due to the fact that in the process of producing polychromatic prints, according to the invention, three photographic patterns of the background elements and three photographic patterns of the linear elements are, made respectively, by a single yellow, pink, and blue color of the basic cold colors, then the single-color photographic patterns of the background and linear elements are copied in combination for obtaining color separation of combined photographic patterns containing the background and linear elements and used for making printing forms, in which case during the copying of the photographic patterns of the blue printing ink the linear elements of the pink printing ink are masked, while during the copying of the photographic patterns of the pink and yellow printing inks the linear elements of the blue printing ink are masked.

The proposed method makes it possible to produce polychromatic prints with the use of only three color separation photographic patterns, in which case the consumption of labor is considerably reduced. The printing of impressions with the use of three patterns allows the efficiency of printing machines to be increased so that the process of making polychromatic prints is fast and economically expedient due to the reduced number of strokes.

In order to produce the combined photographic patterns, it is necessary to make the negatives and diapositives of the linear and background elements of the above-said three inks of the basic cold colors, and to successively copy the single-coloured diapositives on the light-sensitive material of the photographic pattern, in which case, before copying the diapositive of the blue printing ink, the pattern is masked by exposing on its light-sensitive material the negative of the linear elements of the pink printing ink in register with the diapositive of the linear elements of the blue printing ink. Before copying the diapositive of the pink printing ink, the masking is effected by exposing the negative of the linear elements of the blue printing ink in register with the diapositive of the linear elements of the pink printing ink, while before copying the diapositive of the yellow printing ink the masking is effected by exposing the negative of the blue printing ink in register with the diapositive of the yellow printing ink.

The diapositives of corresponding printing inks, are obtained by making a color original on paper having a baryta layer with a gelatin coating and by photographing it through light filters.

The invention will be better understood from a consideration of the following detailed description of an example of making prints of a geographical map and from the FIGURE.

First, a linear black-and-white original containing all the linear titles and denominations which must be colored is made on paper.

The original is drawn on paper glued to a rigid foundation or on etched plastics. The black-and-white original is made on the same material (this original contains only those titles and denominations which must be black on the paper).

The linear original is photographed and four photographic negatives are obtained. The contours of the color fields are outlined on one of the negatives for subsequent making of the colored original. The remaining three negatives are subjected to color separation retouching for blue, yellow, and pink printing inks, of the basic cold colors, and three color separation diapositives of the linear elements are produced by contact printing.

The negative of the contour of the colored fields is used for making a light-blue copy on paper with a baryta layer and gelatin coating (it is possible to use fixed photographic paper applied onto a rigid base). In this case the optical density of the copy is equal to 0.4–0.5 units.

The original is colored upon the light-blue image of the contour of the colored fields.

Each field of the original before the coloring is smeared from the external side of the contours by a 3 percent solution of a material known as "celluloid" dissolved in acetone and colored with an oil-soluble dyestuff. The coloring is effected at a horizontal position of the original by applying onto the "smeared" portion of the paper a coloring solution composed of an acidic organic dye, glycerine, 8 percent polyvinyl glue and water in the ratio of 0.04 : 4 : 1 : 5 with subsequent removal of the coloring solution and varnish.

The uniformity of coloring is checked by means of light-filter spectacles whose spectral characteristics are close to those of camera filters. The original is corrected as follows: subduing color contrast of the paint by means of 4 percent polyvinyl glue or 0.5 percent aqueous solution of ammonia, and by distortion of color by means of a solution composed of calcium hypochlorite, crystalline sodium carbonate and water taken in the ratio of 2 : 1 : 100.

The colored original obtained by the above-described method is used for making three diapositive screen color separation of the background elements respectively of yellow, pink, and blue printing inks of the basic cold colors by using the process of photomechanical color separation.

The color separation diapositives of the background elements may be obtained either with the help of a copying camera or by using electronic color correctors with a plane opticomechanical scanning.

The copying camera is used for making half-tone color separation negatives with the use of color separation light filters for yellow, pink and blue printing inks of the basic cold colors. Then the light correction masks are made and, after coinciding them with the negatives, the corrected screen diapositives for the three printing inks of the basic cold colors are obtained by means of a contact copying frame. The negatives and masks are made with due consideration to the gradation characteristics of the original and contact screen. The half-tone negatives are made on normal isopanchromatic film; the color correction masks are made on soft isoorthochromatic film; the screen diapositives are made on super-contrast isoorthochromatic film.

During the operation of the electronic color correction devices with a plane opticomechanical scanning the color separation screen diapositives are cut with the help of light filters whose spectral characteristics are similar to the spectral characteristics of the printing inks; the programming of the color correction is effected with the help of a reproduction curve obtained experimentally.

By using the color separation screen diapositive negatives and diapositives of the linear elements as well as the color separation of the background elements, combined photographic patterns are obtained.

The combined photographic pattern is a photographic pattern containing both linear and background elements.

The combined photographic patterns of the linear and background elements for the three printing inks of the basic cold colors are made on a rigid transparent plastic material through positive copying by means of coloring the plastic material or the celluloid which has been previously applied thereon. In this case, in order to obtain pure and bright colors of the linear elements, the screen points are eliminated on the corresponding portions of the background elements by means of cross-type masking. For this purpose, the masking negative of the linear elements or the masking negative coincided with the diapositive of the linear elements is first exposed onto the plastic material with a light-sensitive layer, thereby hardening the layer on those portions where the screen points of the given points must not be present. Then the image of the screen diapositive of the background elements is coincided, exposed, developed, and colored with a coloring alcoholic solution. After that, the light-sensitive layer is again applied onto the plastic material, thus introducing the diapositive image of the linear elements for the same printing ink that is used for the background. The obtained three combined photographic patterns of yellow, pink and blue printing inks are used for making the printing forms.

When making the combined photographic patterns of a blue printing ink, the masking is effected by the linear negative of the pink printing ink coincided with the linear diapositive of the blue printing ink; when making the combined photographic pattern of the pink printing ink the masking is effected by the negative of the blue printing ink coincided with the diapositive of the pink printing ink; when making the combined photographic pattern of the yellow printing ink the masking is effected by the negative of the blue printing ink coincided with the diapositive of the yellow printing ink.

The above-described three combined photographic patterns for yellow, pink and blue printing inks are used for making corresponding printing forms. These forms and the black-ink form are used for printing a colored sample. The colors are corrected and the impressions are printed taking into account the color corrections.

We claim:

1. A method of producing polychromatic prints including background and linear elements, comprising the steps of making a color original containing only background elements and an original containing only linear elements, making on the basis of said originals by way of color separation three photographic patterns of background elements and three photographic patterns of linear elements, respectively, one per yellow, pink and blue colors of the basic cold colors, combined copying of the single-color photographic patterns of the background and linear elements during which there is effected masking of the linear elements of the pink printing ink when obtaining the photographic pattern of the blue printing ink and masking of the blue printing ink when obtaining the photographic patterns of the pink and yellow printing inks, as a result of which color-separation combined photographic patterns comprising the background and linear elements are obtained; said combined photographic patterns being used for making printing forms for producing said polychromatic prints, the colors of the background and linear elements being formed by the combination of the basic cold colors.

2. The method of claim 1 wherein said originals are used to make separation negatives and diapositives of the linear elements and screen separation color diapositives of the background elements of the three basic color inks, whereas to obtain said color-separation combined photographic patterns the said single color diapositives of the linear and background elements are successively copied onto a light-sensitive material, but

prior to copying the diapositive of the background elements of the blue printing ink the pattern is masked by exposing on the same material the negative separation of the linear elements of the pink printing ink in register with the diapositive of the linear elements of the blue printing ink which was made from the negative separation of the linear elements of the blue printing ink, while prior to copying the screened diapositive of the background elements of the pink printing ink the masking is effected by exposing on the same material the negative separation of the linear elements of the blue printing ink in register with the diapositive of the linear elements of the pink printing ink separation negative, and prior to copying the screened diapositive of the background elements of the yellow printing ink the masking is effected by exposing the negative separation of the line elements of the blue printing ink in register with the diapositive made from the color separation negative of the yellow printing ink line elements.

3. A method as claimed in claim **1,** wherein the color original is made with the use of organic dyes on paper having a baryta layer with a gelatin coating and is photographed through light filters to obtain the diapositives of the background elements.

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