UNITED STATES PATENT OFFICE.

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PROCESS OF PRINTING IN COLORS.

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To all whom it may concern:

Be it known that I, JOSEPH ARTHUR HENRY HATT, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented new and useful Improvements in Processes of Printing in Colors, of which the following is a specification.

The invention relates to the art of printing in colors and more particularly to the preparation of the color plates by the photo-mechanical processes.

The usual process of color printing, as is well known, employs three plates. Each of the negatives for these three plates, in photo-mechanical work, is produced in the camera by using a color filter such that the sensitized plate takes from the original one of the primary colors whether it occurs in the original as such primary color or as a constituent color in one of the secondary colors. This process is repeated with two other sensitized plates, each of which selects one of the other two primary colors. These sensitized plates are then developed and a corresponding printing plate is made from each. These are then, as is further well known, printed in superposition, with correspondingly colored inks and reproduce the original with great accuracy and fidelity, the superposed impressions of the primary colors in the imprint reproducing the secondary colors substantially as they were in the original. Pictures in color have been also produced heretofore by the use of two plates only. Such plates, however, always have been prepared by hand according to an arbitrary color scheme. I believe myself to be the first to use two plates in securing color pictures photo-mechanically.

In the process of printing in colors included in this invention, instead of using with each sensitized plate a color filter which will cut out all the rays excepting those constituting one of the primary colors, I use with one sensitized plate a filter which transmits the rays that are complementary to the rays transmitted by the filter which is used with the other sensitized plate. By these means two negatives are secured each representing the colors from the original which are complementary to the colors represented by the other plate; two plates only being used as hereinabove stated. The break in the color scheme, that is, selecting what the two complementary colors shall be for the exposure with each of the plates, is determined largely by the nature of the subject and the effect desired.

By the process included in this invention it will be understood that color pictures are secured photo-mechanically by the use. of two negatives or two plates and by only two superposed impressions. While the resultant color reproductions are not as true to the original as the usual process employing the primary colors, above outlined, generally called the "three-color" process, it will be noted that there is one plate less to prepare and that the reproduction is secured from two imprints or impressions instead of from three. It will also be found that with this process results are obtained very much superior to the results secured from the use of the hand-prepared plates where but two plates are used, as a very excellent and pleasing blending and gradation of the colors and shades are secured. Furthermore, the expense of the photo-mechanical reproduction is much less than that where skilled hand labor is employed.

So far as regards the broader aspects of the invention, it may be used in conjunction with different steps or particular processes for securing printing surfaces of various kinds as may be desired. It may be employed to secure the usual half-tone printing plate, or it may be incorporated with other steps in securing printing surfaces of other characters, such for instance as the surfaces secured from Koerner's process, otherwise known as the "crinkle" process, or to secure printing surfaces of other kinds known to the art. In short, after the securing of the negatives in the manner contemplated by this invention the steps of the process may be varied in accordance with the kind of printing surface which it is desired to produce.

The particular manner of carrying out the steps of the process included by the invention which will be set forth at length herein, by way of example, will be a process having in view the production of a half-tone printing surface.

The photo-mechanical processes are generally used in copying paintings or other originals in colors. Such originals are usually mounted upon a suitable support before the camera and there may be used with the lens a prism or mirror or, if desired, a stripper negative may be made in cases where a

reversal between the original and negative is required. In certain processes it will be found, however, that a direct negative may be taken. A color filter is then placed in co-operative position with respect to the lens so as to permit only a certain color or colors to affect the sensitized plate which is exposed in the camera to the light passing from the original through the lens and color filter. After this exposure has been made another sensitive plate is placed in the camera and a color filter is now used which permits the color or colors to pass complementary to the color or colors passed by the color filter first used. During each of the exposures a half-tone screen, such as is well known in the art, is placed between the lens and the sensitive plate or the sensitive plate is acted upon by such half-tone screen independent of the exposure during which the original is impressed upon the sensitized plate. The use of the half-tone screen is for the usual purpose of breaking up the image so as to secure the proper tone values and printing action during the taking of impressions from the printing plates prepared from the negatives.

After the negatives have been developed the subsequent steps are the same as in the usual half-tone process. If what is generally known as the enamel process is followed, a suitable solution is made from albumen or gelatin and water with bichromated ammonia for a sensitizing agent. The metal plate which is to form the printing plate is sensitized with this solution and exposed to the action of light under the half-tone negative, the action of the light, of course, varying closely with the varying tones of the negative. After this the plate is "developed," that is, the chromated colloid coating is dissolved by the action of water where it has not been rendered insoluble by the action of light, leaving a protecting coating upon the face of the plate, which represents the picture carried by the negative in all its fine gradations of light and shade. The plate is then etched with a suitable solution, the coating left on by the development acting as the resist to protect the parts of the surface which are not to be acted upon by the etching fluid and partly protecting those parts only partly to be acted upon, leaving the parts which are to be cut away exposed fully to the action of the etching fluid. Any suitable etching fluid may be used, such as a strong solution of iron prochlorid. As these steps in themselves are not new they are described only in a general way. The plate is then ready for printing excepting that good work is usually submitted to more or less hand tooling and great care is exercised in mounting so as to secure a proper impression.

Where the "crinkle" process is used or processes adapted for producing a planographic printing surface the half-tone screen is dispensed with in making the exposure in securing the negative. As any desired process may be followed after the negatives are secured, the various steps which may be employed to secure the different kinds of printing surfaces after the negatives are produced will not be set forth herein.

Any suitable color scheme may be used in making the negatives in the process included in this invention, as hereinbefore indicated, depending upon the effect desired to be produced and upon the nature of the original. For instance, a filter composing only the crimson rays and another filter composing only the green may be used together to produce the two plates, or cyan blue and red may be used, or yellow and violet, or other complementary colors. Any color sensitive plate may be employed, various ways of manufacturing these being well known to the art, and such plates may also be secured already prepared.

It is not absolutely necessary to follow the same color scheme with the inks as was followed in making the exposures, as frequently very excellent effects may be produced by using a different color scheme. The color filters used, furthermore, need not be exactly complementary but only substantially so, the broad idea being to make two different color aspect negatives from the same original and to print the resulting plates in superposition in colors which produce a pleasing result.

What I do claim as my invention and desire to secure by Letters Patent, is:

1. The process of printing in colors which comprises making a negative of an original by subjecting a sensitive plate to a part of the reflected light rays or colors from the original, then making a second negative by subjecting a second sensitive plate to the substantially complementary light rays or colors from the original, making printing plates from the said negatives, and taking imprints therefrom in superposition.

2. The process of printing in colors which comprises making a negative of an original by subjecting a sensitive plate to a part of the reflected light rays or colors from the original, then making a second negative by subjecting a second sensitive plate to the substantially complementary light rays or colors from the original, making printing plates from the said negatives, and taking imprints therefrom in superposition in substantially correspondingly colored inks.

3. The process of printing in colors which comprises making a negative from an original through a color filter adapted to transmit certain colors, then making a second negative from the original using a color filter which transmits substantially the complementary colors to those transmitted by the

first filter, making printing plates from the said negatives, and printing therefrom in superposition.

4. The process of printing in colors which comprises making a negative from an original through a color filter adapted to transmit certain colors, then making a second negative from the original using a color filter which transmits substantially the complementary colors to those transmitted by the first filter, making printing plates from the said negatives, and taking imprints therefrom in superposition in substantially correspondingly colored inks.

5. The process of printing in colors which comprises making a negative of an original by subjecting a sensitive plate to a part of the reflected light rays or colors from the original, then making a second negative by subjecting a second sensitive plate to the substantially complementary light rays or colors from the original, making printing plates from the said negatives, inking one of the said plates, inking the other of the said plates with an ink substantially complementary to the first ink, and taking impressions in superposition from the said plates.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

JOSEPH ARTHUR HENRY HATT.

Witnesses:

JOHN D. MORGAN,

CLARA PHILLIPS.