

UNITED STATES PATENT OFFICE.

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A CORPORATION OF NEW YORK.

ART OF MULTICOLOR-PRINTING.

No. 896,733.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOSEPH P. KNAPP, a citizen of the United States, and a resident of the city of New York, county of New York, and State of New York, have invented certain new and useful Improvements in the Art of Multicolor-Printing, of which the following is a specification.

My invention relates to the art of reproducing multicolor pictures or designs and more particularly to that art as carried out by photo-mechanical methods of printing.

In reproducing a colored picture by photo-mechanical methods, three printing surfaces are prepared from photographic images of the original in such a way that the printing portions of each printing surface represents all of one of three primary or complementary colors, as red, yellow and blue, which is necessary, when combined with the proper proportions of one or both of the other primary colors, to produce the various colors or shades of the original picture or design. The printing surfaces are then inked in their proper colors and impressions are made therefrom in exact register upon suitable material to produce a copy or fac-simile of the original. The perfection of the reproduction is dependent upon the perfection with which the various steps of the process are carried out. The printing portions of the printing surfaces must accurately represent the exact amounts of the various colors which are required in all their various tones or graduations in every minute portion of the picture or design to reproduce the same in all its various colors and shades; the inks used must be of the exact colors and of the exact consistency required; and the printing must be perfectly executed, not only as regards the register of the impressions, but also in regard to the impression of each color in all its exact tones and graduations at every part of the design.

Where it has been attempted to do this three-color work on multicolor presses without permitting the ink to dry between the impressions, much difficulty has been experienced. This is chiefly due to the fact that a portion of the paper, which has become more or less saturated with ink by the application of one or more of the colors of a design, will not receive additional ink, while the ink previously applied is still moist, as readily as a portion of the paper which has not received a charge of ink or on which previously applied ink has

become dry. This frequently causes an imperfection in the impression of a succeeding color wherever it overlies a preceding color or colors, and results in a false or imperfect coloring or finish of the completed picture or design. This defect is most noticeable in the darker shades or tints of the picture. To produce the blacks, for example, the three colors must be printed one on top of the other in exact register and in exactly the required proportions. Where the inks are dried between impressions this can be done with great precision. Where the inks are not allowed to dry between the impressions, however, it is difficult to print the second and later impressions with the perfection required to produce the desired results in three-color work.

My invention has for an object to provide a method of multicolor printing whereby these difficulties may be practically overcome and whereby excellent multicolor work may be produced on the three-color principle by means of multicolor presses, or presses in which the successive impressions are made in substantially instantaneous succession and without drying the ink between impressions.

With these and other objects in view my invention consists as to certain features in preparing a printing surface for the darkest or most definitive of the color values or shades of the design, preparing a plurality of printing surfaces for a set of complementary colors, and then printing upon paper or similar material with the printing surfaces thus prepared without permitting the ink of all the impressions to become dry between impressions, the darkest or most definitive of the colors being preferably printed while the portions of the paper which receive that color are in an unsaturated condition.

The printing plates for the primary colors are preferably prepared by photographic means, and this may be accomplished by the use of color screens in the usual manner. Three of these printing plates are preferably employed as usual, but obviously two or more may be prepared for each one of one or more of the primary colors and a series of impressions in the same or different shades of the color applied to the paper without departing from the principles of my invention. A plate suitable for the darkest or most definitive of the colors may be prepared in any

suitable manner, various ways in which this may be done being within the knowledge of those skilled in multicolor printing. This plate is preferably produced from the original by photographic means, a color screen being used which will bring out the lights and shades in their proper values. It is clear that it will also be within my invention to use more than one plate for this color if such practice should be found necessary or desirable.

The darkest color is preferably applied to the paper before any of the other colors are applied in order that a full, strong impression of that color may be obtained at every part of the picture or design. The other colors are then applied in the usual or any desired order. It will be found that the first color will be strengthened rather than weakened by the superposition of the other colors and that the imperfections in the impression of the latter colors resulting from one or more of the defects of shade impression and register will not appear in the finished picture, or will be so slight as not to seriously interfere with the quality of the work. The reason for this will be clear. The points where the greatest imperfections in the printing of the complementary colors exists is where the greatest overlapping of them occurs, and consequently where the darkest shades are to be produced. The dark shades, however, are produced in a perfect manner by the preliminary impression. Where the lighter colors or shades are produced there is little or no overlapping of the colors and consequently little or no imperfection in the printing.

It is not essential that the darkest color of a set of colors shall be, under all circumstances, the one printed first in point of time. Thus it obviously would be within my invention to print one or more of the lighter tints or colors before the darkest color is printed, but it is preferable that the portion of the paper which is to receive the latter be not so saturated with ink in a moist or fresh state as to prevent a good impression on the paper.

The particular shade of the dark color is immaterial. It may be a black or a brown, or any other dark color or shade. It is also immaterial what particular set of complementary colors or shades is used.

The essential feature of the invention is that for the purpose of producing multicolor printing on the three-color principle in a multicolor press, an additional impression in a fourth color is printed to give depth of shadow and life or brilliancy to the picture; and to produce the best results, this fourth color should be applied to the paper while the portions thereof which are to receive that color are in an unsaturated condition. The rapidity with which the colors are applied is also immaterial so long as there is not enough time allowed between impressions to permit

the ink which has been applied to the paper to become substantially dry.

It will be seen that the particular mode of procedure by which my invention, in its broader aspects, may be carried into effect may be greatly varied without departing from the main principles of my invention and without sacrificing the chief advantages thereof.

What I claim, and desire to secure by Letters Patent, is:—

1. The improvement in the art of multicolor printing, which consists in preparing a plurality of printing surfaces for a set of complementary colors, preparing an additional printing surface for the darkest or most definitive of the color values or shades of the design, and then printing upon paper or similar material with the printing surfaces thus prepared in substantial register and without permitting the ink to dry between impressions, substantially as described.

2. The improvement in the art of multicolor printing which consists in preparing a printing surface for the darkest or most definitive of the color values or shades of the design, preparing a plurality of printing surfaces for a set of complementary colors, and then printing upon paper or similar material with the printing surfaces thus prepared without permitting the ink to dry between impressions, the darkest or most definitive color being printed while the portions of the paper which receive that color are in an unsaturated condition, substantially as described.

3. The improvement in the art of multicolor printing, which consists in preparing a printing surface for the darkest or most definitive of the color values or shades of the design, preparing by photographic means a plurality of printing surfaces for a set of complementary colors, and then printing upon paper or similar material with the printing surfaces thus prepared without permitting the ink to dry between impressions, the darkest or most definitive color being printed while the portions of the paper which receive that color are in an unsaturated condition, substantially as described.

4. The improvement in the art of multicolor printing, which consists in preparing by photographic means three printing surfaces for three complementary colors, preparing an additional printing surface for the darkest or most definitive of the color values or shades of the design, and then printing from the printing surfaces in substantial register without substantial drying intervals between impressions, the darkest color being printed before the other colors are printed, substantially as described.

5. The improvement in the art of photo-mechanical multicolor printing, which consists in preparing by photographic means a

plurality of printing surfaces, one for a black or a similar dark or definitive color, and others for a set of complementary colors, and then printing from the printing surfaces in substantial register without substantial drying intervals between impressions, the black or similar color being printed while the portions of the paper which receive that color are in an unsaturated condition, substantially as described.

6. The improvement in the art of photo-mechanical multicolor printing, which consists in preparing by photographic means four printing surfaces, one for a black or similar dark or definitive color, and three others for three complementary colors, and then printing from the printing surfaces in substantial register without substantial drying intervals between impressions, the black or similar color being printed before the other colors are printed, substantially as described.

7. The improvement in the art of multicolor printing, which consists in preparing a plurality of printing surfaces for a set of complementary colors, preparing a printing surface for the darkest or most definitive of the color values or shades of the design, and making impressions from the printing surfaces thus prepared in substantial register; the impressions from the printing surfaces for the complementary colors being made without permitting the ink to dry between the impressions, substantially as described.

8. The improvement in the art of multicolor printing, which consists in preparing a plurality of printing surfaces for a set of com-

plementary colors, preparing a printing surface for the darkest or most definitive of the color values or shades of the design, making an impression from the printing surface for the definitive color, and then making impressions from the printing surfaces for the complementary colors in substantial register with the first impression and without permitting the ink to dry between the impressions, substantially as described.

9. The improvement in the art of multicolor printing which consists in making impressions in substantial register from a series of plates constructed to print a set of complementary colors and a dark definitive color, the impression from at least one of the plates for printing the complementary colors being made without permitting the ink of a previous impression to become dry.

10. The improvement in the art of multicolor printing which consists in making impressions in substantial register from a series of plates including plates constructed to print a set of complementary colors and a plate constructed to print a definitive color, the impression from at least one of the plates for printing the complementary colors being made without permitting the ink of a previous impression to become dry.

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

JOSEPH P. KNAPP.

Witnesses:

GEO. H. BARNES,
JOSEPH H. FREEMAN.