

Jan. 3, 1939.

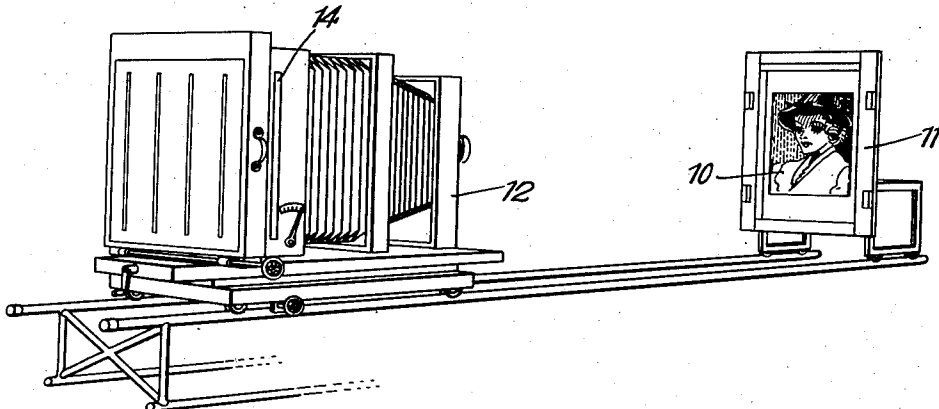
E. R. EATON

2,142,437

PROCESS OF MAKING PRINTING PLATES FOR MULTICOLOR PRINTING

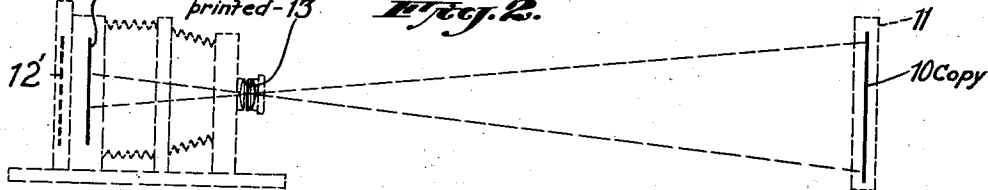
Filed March 31, 1938

Fig. 1



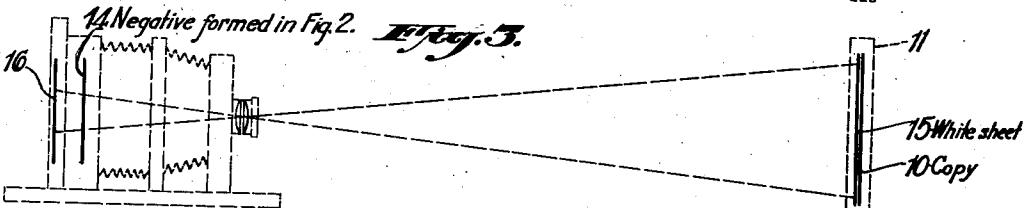
Light sensitive element 14
Filter of color to be printed - 13

Fig. 2.



14 Negative formed in Fig. 2.

Fig. 3.



16 Filter of complementary color - 17

Fig. 4.

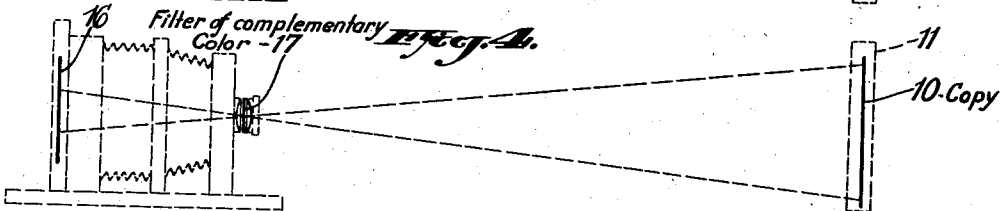
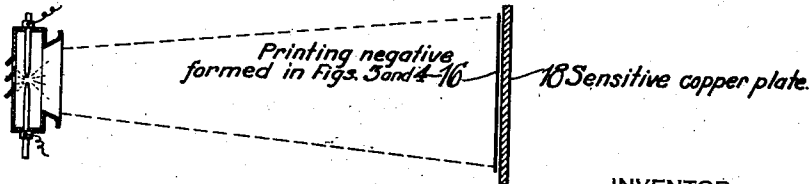


Fig. 5.



INVENTOR

EVERETT R. EATON.

BY

Benj. T. Vauber

ATTORNEY

UNITED STATES PATENT OFFICE

2,142,437

PROCESS OF MAKING PRINTING PLATES
FOR MULTICOLOR PRINTINGEverett R. Eaton, Darien, Conn., assignor to
McCall Corporation, New York, N. Y., a cor-
poration of Delaware

Application March 31, 1938, Serial No. 199,112

5 Claims. (Cl. 95—5.1)

My invention relates to improvements in multi-color or polychrome printing, and more particularly to improvements in the process of forming the plates for printing the various colors.

5 In the general process of forming plates for printing in several colors, a plate is provided with a light sensitive coating and is printed from a negative which in turn has been exposed to certain selected color rays reflected from the copy to be reproduced. Generally four printing plates are employed one of which prints in black and the others of which print respectively in yellow, red or blue.

15 Two sets of primary colors are available and may be used in different parts of the process of forming and printing to produce a multi-color picture. One set of primary colors consisting of yellow, magenta and cyan blue of various tones and shades gives their color effects by absorbing all of the rays projected on to them except the particular rays of the colors they represent. These primary colors are, therefore, known as "subtractive" colors. It is this set that is used in printing to produce the colored picture. When combined in appropriate proportions these different colors will produce black.

25 The other set of primary colors, which are red, green and blue violet of various shades and tints acts by projecting their respective color rays and are, therefore, known as "additive". Accordingly various combinations of these color rays produce corresponding shades and tints and when all are present in proper proportions produce a white light or color.

35 These two sets of primary colors are complementary to each other; that is, the yellow is complementary to the blue violet, the magenta complementary to the green and the cyan blue complementary to the red. Photographically the additive color combined with a complementary subtractive color would be neutralized because all of its rays would be absorbed by the latter.

45 The usual procedure heretofore used in reproducing in colors for photo-engraving as, for example, offset, gravure, and certain other reproductive processes, is to place the copy on a copy-board of a special camera, known as a photo-engraver's camera, and to make the desired number of color separation negatives, usually four, through a halftone screen using suitable sensitive photographic material, the result being a halftone negative. From these halftone negatives prints are made on copper and etched. Due to the inherent shortcomings of the sensitive materials, the color filters, the printing inks em-

ployed and the paper on which the work is to be printed, it has been found necessary to further balance or correct the deficiencies in these various elements by etching or burnishing the copper plate.

5 In the making of the original set of color separation negatives, from which the copper plate is to be made, the negative for the yellow printing plate is made through a blue violet filter which does not transmit the yellow rays from the copy being photographed, but intercepts them. Accordingly the result is as though these yellow portions of the photograph were black and they form a clear area in the negative formed by the exposure of the photo-sensitive element. These clear areas in the negative will print black on a copper plate and, therefore, remain unetched and form a corresponding color applying surface on the resulting copper plate.

20 Similarly, in making the negative for the red printing plate a green filter is used, and for the blue printing plate a red filter is used. In the case of the black plate, a light orange yellow or similar filter is employed which will register the various colors of the copy in their relative brightness as the eye sees them. Photographically all that would be required to produce an original would be three plates, but better results are generally obtained when a black plate is added. In the photographing of a colored original, black always photographs as such on all plates.

35 It is highly undesirable under an extreme black area to have, for example, the yellow, red and blue as heavy in those areas as it naturally photographs because in the four color processes a wet color printing it is impossible to combine or to cause the various printing inks to lie one on the other when the tones in all plates are extremely heavy. It has been found, for example, 40 that the combined strength of all of the tones in a heavy black should not exceed 200 per cent. This figure being, however, arbitrary and variable with the kind of inks used and the other conditions of printing.

45 Also in the photographing of a colored original it is generally found that in the blue violets, for example, the yellows are not eliminated as sufficiently as they should be, that in the reds the greens are too strong, and that in the greens the reds are too strong.

50 In my present invention the color is photographically corrected and a sufficient amount of color is eliminated in the various color plates under the heavy black areas in suitable propor-

tion and in various degrees depending on the original.

The process of forming the negatives for the various color plates is illustrated on connection with the accompanying drawing in which Fig. 1 is a perspective view of a photo-engraving camera in which the various negatives may be formed. Fig. 2 is a diagrammatic sketch showing the manner in which a corrective negative is formed. Figs. 3 and 4 illustrate successive steps in the formation of a final negative by exposure first to the corrective negative and then to the copy, and Fig. 5 is a diagrammatic illustration of the printing of a copper plate through the final negative. In the embodiment of the invention illustrated in the accompanying drawing, the original 10 is placed on a copyboard 11 of a photo-engraver's camera 12 and focused for the desired size of plate, the image being focused on to a ground glass plate 12' in the usual manner.

In the specific example shown in the accompanying drawing, the arrangement is such as to focus for reduced size but it will be understood that it may be focused for the same, or even for a larger size, if desired. A color filter 13 is then inserted in the usual position in the lens of the camera. This color filter will be complementary to the color that is to be used in making the final halftone negative. Assuming that a plate is to be made for printing the yellow color or tone, the filter 13 will be complementary to blue violet, that is, it will be yellow or yellow orange filter.

With the camera thus properly focused on the ground glass plate a panchromatic plate 14 is then inserted immediately in front of the ground glass plate, as shown in Fig. 2, this plate being as close to the plate 12' as circumstances will permit so as to bring it as nearly as possible into focus and is then exposed to the original 10. The resulting negative is then developed, fixed, washed and allowed to dry. The plate 14 is then replaced in the position it occupied when exposed, as is shown in Fig. 2. The original or copy 10 on the copyboard 11 is then covered with a sheet of white paper 15, as shown in Fig. 3, and the ground glass focusing plate 12' is then replaced by a panchromatic or other light sensitive plate 16 which is to form the final printing negative. A halftone screen is placed in the usual position immediately in front of the plate 16. The plate 16 is then given an exposure for a sufficient length of time to build up lighter those areas in the copy which are intensely black, and further to filter out the unwanted blue violets.

This is accomplished inasmuch as those areas in the original which were of a blue violet color are now transparent on the color separation negative 14 inasmuch as a yellow filter was used in the making of the negative. The white light from the sheet 15 will, therefore, pass through these areas and act on the corresponding part of the plate 16. This also applies to all areas that are black in the original copy.

After giving this preliminary or accessory exposure, the negative 14 and white sheet 15 are removed and the regular exposure is given to the copy through a blue violet filter 17, as shown in Fig. 4, in the usual manner. The negative is then finished in the usual way. From it the photosensitive surface of a copper plate 18 may be printed in the usual way as indicated in Fig. 5.

A similar procedure is followed in making a negative for the red printing plate in which case the photographic mask is one made through a magenta filter and the regular exposure given

through the green filter. The negative used for making the blue printing plate is made with a photographic mask made through a blue green filter and the regular exposure is given through a red filter.

The correction negative 14 used when making the screen negative for the black plate is the same correction negative that was made from the magenta filter. And the screen negative for the black plate is made in identically the same way as the screen negatives for the yellow, red and blue, except that the exposure to the white sheet of paper is not given, the only exposure being the correction exposure which is given to the copy through the correction negative, and in addition to that the usual exposure given to the black plate. Only three correction negatives are, therefore, required for three colors and black. In many cases it is only necessary to make two correction negatives as sometimes the same correction negative may be used for both the yellow and red.

By making the photographic masks through filters complementary to the ones heretofore employed, and generally closely approximating the actual printing inks that are ultimately to be used in printing the job and to the photographic procedure above set forth by a flash exposure of the white paper through the photographic mask, the yellows, red and blues may be eliminated under dense blacks as well as the photographing of undesired colors in respective color negatives. This aids in color correction. Further color correction can be achieved by removing the white sheet of paper and continuing the exposure of the copy through the photographic mask.

It will be understood that further correction or changes may be made in usual methods, etching, etc., in the plate formed by the above method. However, in using the above method the necessity for such further correction is largely eliminated.

Various modifications may be made by those skilled in the art without departing from the invention as defined in the following claims.

What I claim is:

1. In the making of printing plates for multi-color printing, a process which comprises exposing a light sensitive element to the copy through a filter of the color to be printed to form a negative, developing and fixing said negative, exposing a light sensitive element first to a white background through said negative and then directly to the copy through a filter complementary to the color to be printed, developing and fixing the negative thus formed and printing therethrough on to a copper plate to be etched.

2. In the making of printing plates for multi-color printing, a process which comprises exposing a light sensitive element to the copy through a filter of the color to be printed to form a continuous negative, developing and fixing said negative, exposing a light sensitive element to an assembly of said copy, a white sheet on said copy and said negative on said white sheet in register with said copy and then exposing said copy directly through a filter complementary to the color to be printed, developing and fixing the negative thus formed and printing and etching a printing plate therefrom.

3. The process for making printing plates for multi-color plates which comprises exposing a light sensitive element to additive rays of color to be printed reflected from a copy to thereby form a negative, developing and fixing said neg-

ative, exposing a light sensitive element first to a white sheet through said negative in register with said copy and then directly to the copy through a filter complementary to the color to be printed, developing and fixing the negative thus formed and printing and etching a printing plate therefrom.

4. The process for making a plate for multi-color printing, which comprises exposing a light sensitive element to filtered light from a copy to be reproduced of approximately the same shade as the color to be printed to thereby form a corrective negative, developing and fixing said negative, exposing a light sensitive element first to said negative superposed on and registering with said copy and with a light reflecting sheet between said copy and said negative and then in

superimposed position directly to the copy through a filter complementary to the color to be printed, developing and fixing the printing negative thus formed and printing and etching a plate therefrom.

5. In the making of printing plates for multi-color printing, a process which comprises exposing a light sensitive element to the copy through a filter of the color to be printed to form a negative, developing and fixing said negative, exposing a light sensitive element first to a white light through said negative and then directly to the copy through a filter complementary to the color to be printed, developing and fixing the negative thus formed and printing therethrough on to a copper plate to be etched.

EVERETT R. EATON.