

March 30, 1943.

L. ZUKMANN

2,315,101

DROP-OUT HALF-TONE NEGATIVE

Filed July 29, 1941

3 Sheets-Sheet 1

Fig. 1

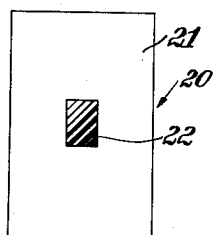


Fig. 2

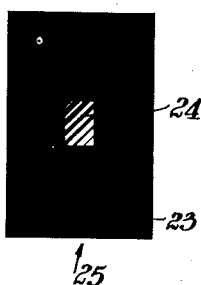


Fig. 3

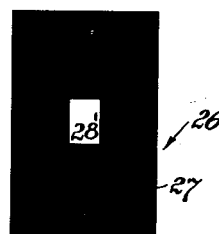


Fig. 4

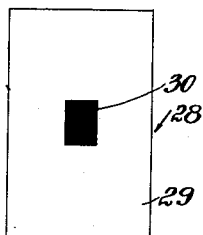


Fig. 5

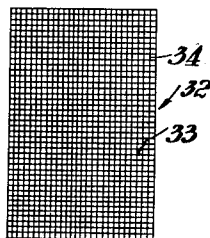


Fig. 6

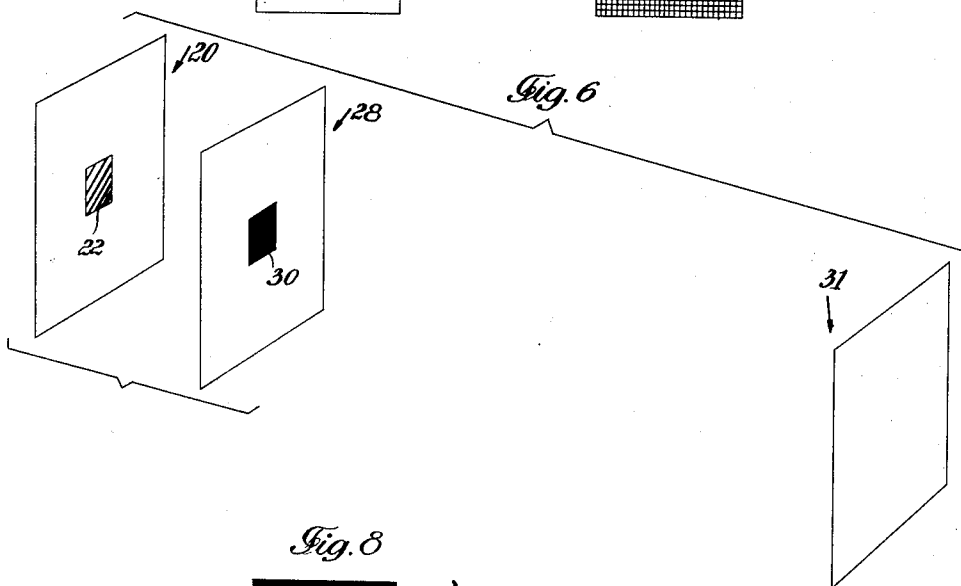
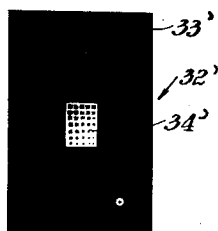


Fig. 8



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March 30, 1943.

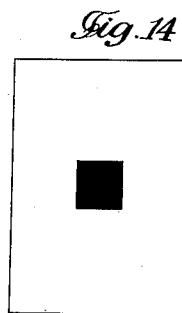
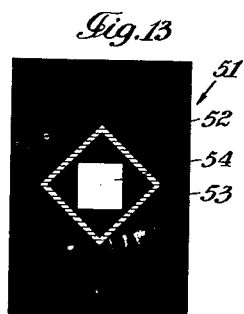
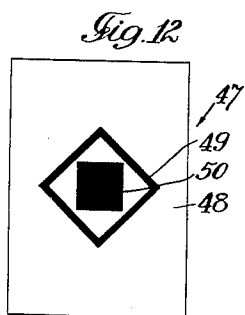
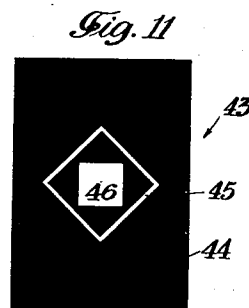
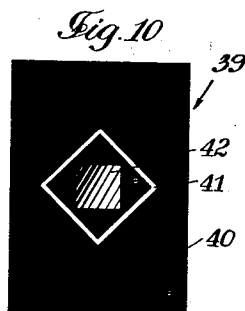
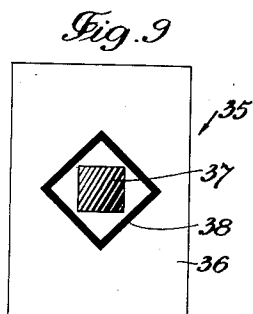
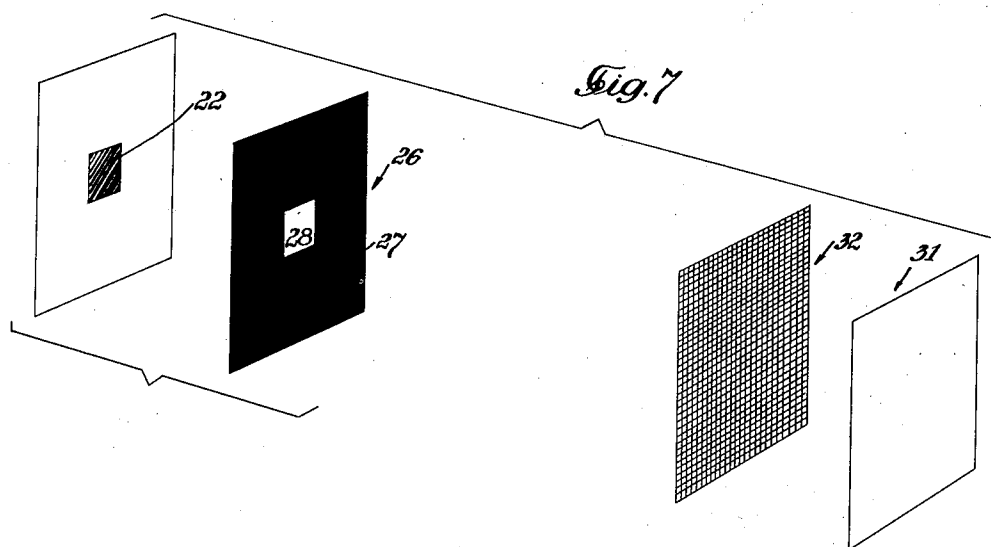
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DROP-OUT HALF-TONE NEGATIVE

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3 Sheets-Sheet 2



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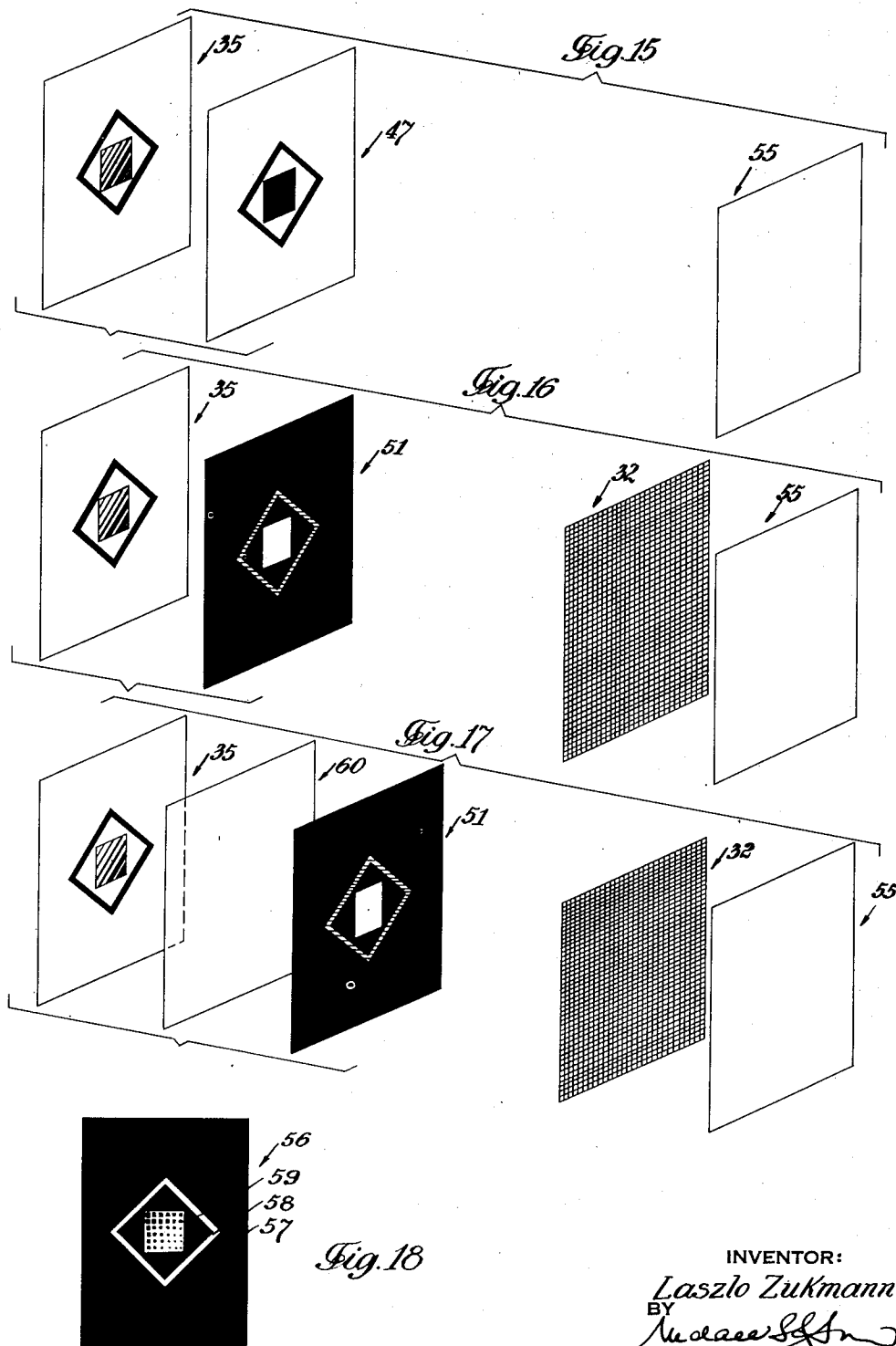
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DROP-OUT HALF-TONE NEGATIVE

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3 Sheets-Sheet 3



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21 22

UNITED STATES PATENT OFFICE

2,315,101

DROPOUT HALF-TONE NEGATIVE

Laszlo Zukmann, New York, N. Y.

Application July 29, 1941, Serial No. 404,572

24 Claims. (Cl. 95—5)

This invention relates to a new and improved process of preparing printing plates and more particularly to a process of eliminating all screening or dots in the background or high-light sections of a half-tone positive or negative. This process is particularly adaptable for the type of photoengraving and illustration commonly used for newspaper advertising.

An object of this invention is to provide a simple process of high-lighting which is free from the prevailing, lengthy, and inexpedient methods.

Another object of this invention is to provide a process which will greatly diminish the necessity of using skilled labor and which will facilitate the production of printing plates.

Briefly, the proposed new process comprises the following steps:

First, from an original drawing having high-light and tone sections is prepared a negative, having substantially transparent portions corresponding to the tone sections, and substantially opaque portions corresponding to the high-light sections of the original drawing. In the following description such a negative will be called "half tone mask negative." If the original drawing has also line sections which should be reproduced as opaque continuous lines, first a negative is prepared which has transparent portions corresponding to the tone and line sections, and opaque portions corresponding to the high-light sections of the original drawing. In the following, such a negative will be called a "half tone and line mask negative."

Thereafter is prepared a positive having substantially opaque portions corresponding to the tone sections, and substantially transparent portions corresponding to the high-light sections of the original drawing. In the following description such a positive will be called a "half tone mask positive." If the original drawing contains also line sections which should be reproduced as opaque continuous lines, the mask positive will also have opaque portions corresponding to these line sections; in the following such a positive will be called a "half tone and line mask positive."

In case the original drawing contains only high-light and tone sections, the next step will consist in photographing the original drawing on a light-sensitive photographic material successively through the above defined half-tone mask negative and half-tone mask positive in such a manner that a half-tone screen is interposed between the drawing and the light-sensitive material when the drawing is photographed through the half-tone mask negative. In case the original

drawing contains also live sections, the original drawing may be photographed through a half-tone and line mask positive instead of the half-tone mask positive mentioned above.

This new process results in a drop-out half-tone negative having opaque portions corresponding to the high-light sections, and half-tone portions corresponding to the tone sections of the original drawing. In case the original contains also lines, i. e. is a combination of tone, line, and high-light sections, the new process results in a drop-out half tone and line negative having opaque portions corresponding to the high-light sections, half tone portions corresponding to the tone sections, and transparent portions corresponding to the line sections of the original drawing.

It should be noted that throughout this application the term, "high-light" is used to designate the sections of an illustration or drawing which are required to be printed in reproduction as pure white, or as free from screen pattern, and is usually considered as referring to background or "white" sections of an illustration. The term, "tone" sections refers to the shaded or dark parts of an illustration. The term, "line sections" refers to the continuous opaque lines appearing on an illustration. These terms are also to indicate areas on a negative which correspond to the designated sections in the original illustration.

Furthermore, it should be noted that the term, "negative" is used throughout the specification to designate photographic reproductions on whatever type of photographic material in which the high-light sections of the illustration appear opaque and the tone sections appear more or less transparent. In the same way, the term, "positive" designates photographic reproduction on whatever kind of photographic material, i. e., on paper, film, or photographic plate, in which the high-light sections of the illustration are substantially white or transparent and the tone values of the tone sections are substantially the same as on the original illustration.

Finally, it should be noted that the term, "drawing," as used throughout the specification and claims, should not be limited to the exact meaning of the word "drawing" but that this term also should comprehend other illustrations, e. g., also photographic or other illustrations if these are combined with a white background and this white background has to be reproduced without screening.

The novel features which I consider as characteristic for my invention are set forth in par-

ticular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof will be best understood from the following description of specific embodiments, when read in connection with the accompanying drawings, in which:

Fig. 1 illustrates a type of drawing having tone and high-light sections where, in printed reproduction, elimination of half tones is required in the high-light sections, i. e. in the sections shown in this figure in pure white;

Fig. 2 represents a continuous tone negative made from the drawing shown in Fig. 1;

Fig. 3 shows a half tone mask negative made from the continuous tone negative shown in Fig. 2;

Fig. 4 shows a half tone mask positive printed from the half tone mask negative shown in Fig. 3;

Fig. 5 represents a half tone screen of the usual type;

Figs. 6 and 7 are expanded views of photographic arrangements used for making a drop-out half tone negative from the original shown in Fig. 1;

Fig. 8 is a drop-out half-tone negative made in accordance with the present invention;

Fig. 9 illustrates a type of drawing having tone, line, and high-light sections;

Fig. 10 represents a continuous tone negative made from the drawing shown in Fig. 9;

Fig. 11 represents a half tone and line mask negative made from the continuous tone negative shown in Fig. 10;

Fig. 12 shows a half tone and line mask positive printed from the half tone and line mask negative shown in Fig. 11;

Fig. 13 shows a half tone mask negative produced by retouching the half tone and line mask negative shown in Fig. 11;

Fig. 14 shows a half tone mask positive produced by printing the half tone mask negative shown in Fig. 13; and

Figs. 15, 16, and 17 are expanded views of photographic arrangements used for making a drop-out half tone and line negative from the original shown in Fig. 9; and

Fig. 18 is a drop-out half-tone and line negative made in accordance with the present invention.

The process of producing a drop-out half tone negative from the original drawing 20 having, as shown in Fig. 1, high-light sections 21 and tone sections 22, comprises in accordance with one embodiment of the present invention the following steps:

First step.—From the original drawing shown in Fig. 1, the continuous tone negative 25 shown in Fig. 2 is made. This continuous tone negative has opaque portions 23 corresponding to the high-light sections, and negative tone portions 24 corresponding to the positive tone sections 22 of the original drawing 20. This continuous tone negative is made in the usual way.

Second step.—From this continuous tone negative the half tone mask negative shown in Fig. 3 is made by treating the continuous tone negative, shown in Fig. 2, while still wet with a photographic reducer until the tones of the tone portions disappear; thereafter, the thus produced half tone mask negative is fixed, washed, and finally dried. This results in the half tone mask negative 26 shown in Fig. 3; this mask negative has opaque portions 27 corresponding to the

high-light sections 21, and transparent portions 28' corresponding to the tone sections 22 of the original drawing.

Third step.—From this half tone mask negative 27 the half tone mask positive 28, shown in Fig. 4 is made, by printing the same on a photographic material consisting of a transparent base provided with a light-sensitive layer. After exposure, the print is treated in the usual way and results in a half-tone mask positive having transparent portions 29 corresponding to the high-light sections 21, and opaque portions 30 corresponding to the tone sections 22 of the original drawing 22.

Fourth step.—Thereafter, the half tone mask positive shown in Fig. 4, is superimposed on the original drawing in the way shown in Fig. 6, and the original drawing 20 photographed through the half tone mask positive 28 onto the light-sensitive photographic material 31. This photographic step results in exposure of all the portions of the light-sensitive surface of photographic material 31 corresponding to the high-light sections 21 of the original drawing which are covered only by the transparent portions 29 of the half tone mask positive 28 superimposed on the drawing 20; those portions of the light-sensitive surface of photographic material 31 which correspond to the tone sections 22 of the original drawing and are covered by the opaque portions 30 of the half tone positive, remain unexposed.

Fifth step.—Thereafter, the half tone mask positive 28 is removed and replaced by the half tone mask negative 26; it must be stressed that this change must be carried out without altering the relative position of the original drawing 20 and the partly exposed light-sensitive photographic material 31. The half tone screen 32 consisting of opaque screening lines 33 on a transparent base 34 is placed between the half tone mask negative 26 and the light-sensitive photographic material 31 in the way shown in Fig. 7. Then, the original drawing 20 is photographed through the half tone mask negative 26 and screen 32 unto the light-sensitive photographic material 31. As those surface portions of the photographic material 31 which correspond to the tone sections 22 are still unexposed, this exposure results in a screened, i. e. half tone negative image of the positive tone sections 22 of the original drawing on these unexposed portions of the photographic material 31.

Sixth step.—The photographic negative material is then developed, fixed, washed, and dried, as usual in making negatives. This treatment results in the drop-out half tone negative 32' shown in Fig. 8; this drop-out half tone negative has, in accordance with the present invention, opaque portions 33' corresponding to the high-light sections 21, and half tone, i. e., screened negative tone portions 34' corresponding to the positive tone sections 22 of the original drawing 20.

As stated above, the present process is particularly adapted for producing drop-out half tone and line negatives. Such negatives are to be made from drawings of the type shown in Fig. 9; such drawings 35 have high-light section 36, tone sections 37 and line sections 38. The process of producing from such a drawing a drop-out and half tone line negative comprises, in accordance with one preferred embodiment of the present invention the following steps:

Step one.—From the original drawing shown in Fig. 9, the continuous tone negative 39 is made

in the usual way. As shown in Fig. 10, this continuous tone negative 39 has opaque portions 40 corresponding to the high-light sections 36, transparent portions 41 corresponding to the line sections 38, and negative tone sections 42 corresponding to the positive tone sections 37 of the original drawing 35.

Step two.—From this continuous tone negative 39 is made the half tone and line mask negative 43, shown in Fig. 11, in the way described above. This mask negative 43 has opaque portions 44 corresponding to the high-light sections 36, and transparent portions 45 and 46 corresponding to the line sections 38 and tone sections 37, respectively, of the original drawing 35.

Step three.—From this half tone and line mask negative 43, shown in Fig. 11, the half tone and line mask positive 47, shown in Fig. 12, is made by photographic printing. This half tone and line mask positive 47 has transparent portions 48 corresponding to the high-light sections 36, and opaque portions 49 and 50 corresponding to the line sections 38 and tone sections 37, respectively, of the original drawing 35.

Step four.—Thereafter, the half tone and line mask negative 43, shown in Fig. 11, is transformed by opaquing the transparent line portions 54 into the half tone mask negative 51, shown in Fig. 13. This mask negative 51 has opaque portions 52 and 53 corresponding to the high-light sections 36, and line sections 38, respectively, and has transparent portions 54 corresponding to the tone sections 37 of the original drawing 35.

Step five.—Having thus made the half tone and line mask positive 47 and the half tone mask negative 51, and having at disposal also the half tone screen 32 shown in Fig. 5, the original drawing is photographed in different combinations with these masks and the screen: As shown in Fig. 15, the half tone and line mask positive 47 is superimposed on the original drawing 35 and the drawing is photographed through this mask on the light-sensitive photographic material 55 consisting of a light-sensitive emulsion on a transparent base. After exposure, the mask 47 is removed without altering the relative position of the drawing 35 and the photographic material 55.

Step six.—Thereafter, the half tone mask negative 51 is superimposed on the original drawing 35 and the half tone screen 32 is interposed between this half tone negative 51 and the light-sensitive photographic material 55. (See Fig. 16.) In view of the fact that during photographing the drawing through the half tone and line mask positive 47 in the way described above, the light-sensitive layer of the photographic negative material 55 will have been exposed only by the high-light sections of the original drawing, those portions of the light-sensitive layer which correspond to the line and tone portions 49 and 50 of the mask positive 47 remain unexposed. Now, when photographing the drawing through the half tone mask negative 51, only those portions of the negative material 55 which correspond to the tone portions 54 of the mask negative 51 will be exposed, while all other portions, particularly the unexposed line portions remain unexposed. As the tone sections 37 of the original drawing are photographed through screen 32 and the transparent tone portions 54 of the mask negative 51, they will finally appear on the negative photographic material 55 as half tone, i. e. screened tone portions.

Step seven.—The negative photographic ma-

terial 55 is then developed, fixed, washed, and dried as usual in making negatives. This treatment results in the drop-out half tone and line negative 56, shown in Fig. 18; this drop-out half tone and line negative has, in accordance with the present invention, opaque portions 57 corresponding to the high-light section 36, transparent portions 58 corresponding to the line sections 38, and half tone, i. e. screened negative tone portions 59 corresponding to the tone sections 37 of the original drawing.

Step eight.—As well known in making half tone screen negatives, it is expedient to perform another operation which is universally used and is called, "flashing." Without this flashing there would be no screening in the darker parts of the half tone portions of the negative because the corresponding sections of the original drawing reflect little or no light. The purpose of the flashing is to create this screening in the darker half tone portion of the negative. If this flashing operation were performed in the usual way, the screening would appear not only in the half tone portions but also in the line portions of the negative; the continuity and transparency of these line portions would thereby be broken up and the object of the present invention defeated.

This difficulty is overcome by flashing through the half tone mask negative 51, as shown in Fig. 17. In performing the flashing operation, a sheet of white paper 60 is placed immediately behind mask 51 replacing the original drawing 35, or arranged between this drawing and the mask. Since on the half tone mask negative 51 all portions corresponding to the line sections 38 have been retouched, i. e. painted out, and since all portions corresponding to the high-light sections 36 are opaque, the portions of the negative corresponding to these high-light and line sections remain, also after flashing, free from screening, but the half tone portions appear also in the darker parts with screening.

From the drop-out half tone and line negative produced in the above described way, the next stages of the usual process can be carried out either by operating directly on the zinc plate or by making a positive, whichever happens to be more convenient.

Although the above described embodiments are the preferred ones, modifications of the new process within the limits of the present invention are possible. Such modifications are, for instance, the following:

It is possible to reverse the photographic steps, i. e., to photograph the original drawing first through the mask negative and the screen, and then through the mask positive. This reversed process has the same result as the above described processes:

Furthermore, in the process of making a drop-out half tone and line negative, it is possible to use a half tone mask positive of the type shown in Fig. 14 instead of the half tone and line mask positive 47 shown in Fig. 12. This half tone mask positive could be used for the process step shown in Fig. 15 with the same result, i. e. without altering the picture produced by this step on the light-sensitive photographic material 55. This is caused by the fact that the line sections 38 of the original drawing 35 are also opaque and, therefore, it is unnecessary to superimpose upon these opaque line sections 38 of the original drawing the opaque portions 49 of the half tone and line mask positive 47.

Furthermore, it is also possible to prevent the

flashing of the unexposed line portions on the final negative by another method than the one described above. This other method consists in using for the process step shown in Fig. 16 the half tone and line mask negative 43 shown in Fig. 11 instead of the retouched half tone mask negative 51 shown in Fig. 13. This mask negative 43, however, is not superimposed on the original drawing in register with the same, but shifted by the approximate thickness of the lines in two directions before flashing. The result then will be that while the lines now would appear as white lines on the drawing and consequently would reflect light unto the photographic material 55 through the half tone screen 32, this, nevertheless, would not be harmful since the light so reaching the final negative would fall upon already fully exposed portions and therefore would cause no changes.

What is claimed as invention and desired to be secured by Letters Patent of the United States is:

1. In a process of producing a drop-out half tone negative from an original drawing comprising highlight and tone sections, the steps of making a half tone mask negative having substantially transparent portions corresponding to the tone sections and substantially opaque portions corresponding to the highlight sections of the original drawing, making a half tone mask positive comprising substantially opaque portions corresponding to the tone sections and substantially transparent portions corresponding to the highlight sections of the original drawing, and photographing said original drawing on a light-sensitive photographic material successively through each of said masks with a half tone screen interposed between the drawing and the light-sensitive material when the drawing is photographed through the half tone mask negative.

2. In a process of producing a drop-out half tone negative from an original drawing comprising highlight and tone sections, the steps of making a half tone mask negative having substantially transparent portions corresponding to the tone sections and substantially opaque portions corresponding to the highlight sections of the original drawing, making a half tone mask positive comprising substantially opaque portions corresponding to the tone sections and substantially transparent portions corresponding to the highlight sections of the original drawing, superimposing said masks one after another unto said original drawing, and photographing said drawing on a light-sensitive photographic material through each of said superimposed masks with a half tone screen interposed between said drawing and said light-sensitive material when the drawing is photographed through the half tone mask negative.

3. In a process of producing a drop-out half tone and line negative from an original drawing having highlight, line and tone sections, the steps of making a half tone mask negative having substantially transparent portions corresponding to the tone sections and substantially opaque portions corresponding to the highlight and line sections of the original drawing, making a half tone mask positive having substantially opaque portions corresponding to the tone sections and substantially transparent portions corresponding to the highlight and line sections of the original drawing, and photographing the original drawing on a light-sensitive photographic material

successively through each of said masks with a half tone screen interposed between the drawing and the light-sensitive material when the drawing is photographed through the half tone mask negative.

4. In a process of producing a drop-out half tone and line negative from an original drawing having highlight, line and tone sections, the steps of making a half tone mask negative having substantially transparent portions corresponding to the tone sections and substantially opaque portions corresponding to the highlight and line sections of the original drawing, making a half tone mask positive having substantially opaque portions corresponding to the tone sections and substantially transparent portions corresponding to the highlight and line sections of the original drawing, superimposing said masks one after another unto said original drawing, and photographing said drawing on a light-sensitive photographic material through each of said superimposed masks with a half tone screen interposed between said drawing and said light-sensitive material when the drawing is photographed through the half tone mask negative.

5. In a process of producing a drop-out half tone and line negative from an original drawing having highlight, line and tone sections, the steps of making a half-tone mask negative having substantially transparent portions corresponding to the tone sections and substantially opaque portions corresponding to the highlight and line sections of the original drawing, making a half tone and line mask positive having substantially opaque portions corresponding to the tone and line sections and substantially transparent portions corresponding to the highlight sections of the original drawing, superimposing said masks one after another unto said original drawing, and photographing said drawing on a light-sensitive photographic material through each of said superimposed masks with a half tone screen interposed between said drawing and said light-sensitive material when the drawing is photographed through the half tone mask negative.

6. In a process of producing a drop-out half tone negative from an original drawing having highlight and tone sections, the steps of making a half tone mask negative having substantially transparent portions corresponding to the tone sections and substantially opaque portions corresponding to the highlight sections of the original drawing, making a half tone mask positive having substantially opaque portions corresponding to the tone sections and substantially transparent portions corresponding to the highlight sections of the original drawing, photographing the original drawing on a light-sensitive photographic material first through said half tone mask positive, and then photographing said original drawing again on the same light-sensitive material through said half tone mask negative and a half tone screen interposed between said mask and the light-sensitive photographic material.

7. In a process of producing a drop-out half tone negative from an original drawing having highlight and tone sections, the steps of making a half tone mask negative having substantially transparent portions corresponding to the tone sections and substantially opaque portions corresponding to the highlight sections of the original drawing, making a half tone mask positive having substantially opaque portions corresponding to the tone sections and substantially transparent

portions corresponding to the highlight sections of the original drawing, superimposing said half tone mask positive on said original drawing, photographing the same through said superimposed mask positive on a light-sensitive photographic material, removing said mask positive, superimposing on said drawing said half tone mask negative, interposing between said superimposed mask negative and said light-sensitive photographic material a half tone screen and photographing said drawing through said mask negative and said half tone screen on the light-sensitive material without altering the relative position of the drawing and the light-sensitive material.

8. In a process of producing a drop-out half tone and line negative from an original drawing, having highlight, line and tone sections, the steps of making a half tone mask negative having substantially transparent portions corresponding to the tone sections and substantially opaque portions corresponding to the highlight and line sections of the original drawing, making a half tone mask positive having substantially opaque portions corresponding to the tone sections and substantially transparent portions corresponding to the highlight and line sections of the original drawing, photographing thereafter the original drawing on a light-sensitive photographic material first through said half-tone mask positive, and then photographing said original drawing again on the same light-sensitive material through said half tone mask negative, and a half tone screen interposed between said mask and the light-sensitive photographic material.

9. In a process of producing a drop-out half tone and line negative from an original drawing having highlight, line, and tone sections, the steps of making a half tone mask negative having substantially transparent portions corresponding to the tone sections and substantially opaque portions corresponding to the highlight and line sections of the original drawing, making a half tone mask positive having substantially opaque portions corresponding to the tone sections and substantially transparent portions corresponding to the highlight and line sections of the original drawing, superimposing said half tone mask positive on said original drawing, photographing the same through said superimposed mask positive on a light-sensitive photographic material, removing said mask positive, superimposing on said drawing said half tone mask negative, interposing between said superimposed mask negative and said light-sensitive photographic material a half tone screen, and photographing said drawing through said mask negative and said half tone screen on the light-sensitive material without altering the relative position of the drawing and the light-sensitive material.

10. In a process of producing a drop-out half tone and line negative from an original drawing having highlight, line and tone sections, the steps of making a half tone mask negative having substantially transparent portions corresponding to the tone sections and substantially opaque portions corresponding to the highlight and line sections of the original drawing, making a half tone and line mask positive having substantially opaque portions corresponding to the tone and line sections and substantially transparent portions corresponding to the highlight sections of the original drawing, photographing the original drawing on a light-sensitive

photographic material first through said half tone and line mask positive, and then photographing said original drawing again on the same light-sensitive material through said half tone mask negative and a half tone screen interposed between said mask negative and the light-sensitive photographic material.

11. In a process of producing a drop-out half tone and line negative from an original drawing having highlight, line and tone sections, the steps of making a half tone mask negative having substantially transparent portions corresponding to the tone sections and substantially opaque portions corresponding to the highlight and line sections of the original drawing, making a half tone and line mask positive having substantially opaque portions corresponding to the tone and line sections and substantially transparent portions corresponding to the highlight sections of the original drawing, superimposing said half tone and line mask positive on said original drawing, photographing the same through said superimposed mask positive on a light-sensitive photographic material, removing said mask positive, superimposing on said drawing said half tone mask negative, interposing between said superimposed mask negative and said light-sensitive photographic material a half tone screen, and photographing said drawing through said mask negative and said half tone screen on the light-sensitive material without altering the relative position of the drawing and the light-sensitive material.

12. In a process of producing a drop-out half tone negative from an original drawing having highlight and tone sections, the steps of photographically making a half tone mask negative having substantially transparent portions corresponding to the tone sections and substantially opaque portions corresponding to the highlight sections of the original drawing, making a half tone mask positive having substantially opaque portions corresponding to the tone sections and substantially transparent portions corresponding to the highlight sections of the original drawing by preparing a photographic print of said half tone mask negative, superimposing said masks one after another unto said original drawing, and photographing said drawing on a light-sensitive photographic material through each of said superimposed masks separately in such a manner that a half tone screen is interposed between said drawing and said light-sensitive material when the drawing is photographed through the half tone mask negative.

13. In a process of producing a drop-out half tone and line negative from an original drawing having highlight, line and tone sections, the steps of photographically making a half tone mask negative having substantially transparent portions corresponding to the tone sections and substantially opaque portions corresponding to the highlight and line sections of the original drawing, making a half tone mask positive having substantially opaque portions corresponding to the tone sections and substantially transparent portions corresponding to the highlight and line sections of the original drawing by preparing a photographic print of said half tone mask negative, and photographing said original drawing on a light-sensitive photographic material successively through each of said masks with a half tone screen interposed between the drawing and the light-sensitive material when the draw-

ing is photographed through the half tone mask negative.

14. In a process of producing a drop-out half tone and line negative from an original drawing having highlight, line and tone sections, the steps of photographically making a half tone and line mask negative having substantially transparent portions corresponding to the tone and line sections and substantially opaque portions corresponding to the highlight sections of the original drawing, making a half tone and line mask positive having substantially opaque portions corresponding to the tone and line sections and substantially transparent portions corresponding to the highlight sections of the original drawing by preparing a photographic print of said half tone and line mask negative, making from said half tone and line mask negative by opaquing the transparent line portions of said negative a half tone mask negative, superimposing said half tone mask negative and said half tone and line mask positive onto said original drawing in either succession, and photographing said drawing on a light-sensitive photographic material through each of said superimposed masks separately in such a manner that a half tone screen is interposed between said drawing and said light-sensitive material when the drawing is photographed through the half tone mask negative.

15. In a process of producing a drop-out half tone and line negative from an original drawing having highlight, line, and tone sections, the steps of photographically making a half tone and line mask negative having substantially transparent portions corresponding to the tone and line sections and substantially opaque portions corresponding to the highlight sections of the original drawing, making from said half tone and line mask negative by opaquing the transparent line portions of said negative a half tone mask negative having substantially transparent portions corresponding to the tone sections and substantially opaque portions corresponding to the highlight and line sections of the original drawing, making from said half tone mask negative a half tone mask positive having substantially opaque portions corresponding to the tone sections and substantially transparent portions corresponding to the highlight and line sections of the original drawing by preparing a photographic print of said half tone mask negative, superimposing said half tone mask negative and said half tone mask positive onto said drawing in either succession, and photographing said drawing on a light-sensitive photographic material through each of said superimposed masks separately in such a manner that a half tone screen is interposed between said drawing and said light-sensitive material when the drawing is photographed through the half tone mask negative.

16. In a process of producing a drop-out half-tone and line negative from an original drawing having highlight, line, and tone sections, the steps of photographically making a half tone and line mask negative having substantially transparent portions corresponding to the tone and line sections and substantially opaque portions corresponding to the highlight sections of the original drawing, making a half tone and line mask positive having substantially opaque portions corresponding to the tone and line sections and substantially transparent portions corresponding to the highlight sections of the original drawing by preparing a photographic print of said half tone and line mask negative, making from said half

tone and line mask negative by opaquing the transparent line portions of said negative, a half tone mask negative, superimposing said half tone and line mask positive on said original drawing, photographing the same through said superimposed mask positive on a light-sensitive photographic material, removing said mask positive, superimposing on said drawing said half tone mask negative, interposing between said superimposed drawing-mask negative assembly and said light-sensitive photographic material a half tone screen, and photographing said drawing through said mask negative and said half tone screen on the light-sensitive material without altering the relative position of the drawing and the light-sensitive material during the successive photographing of said drawing on said light-sensitive material through said masks.

17. In a process of producing a drop-out half tone and line negative from an original drawing having highlight, line, and tone sections, the steps of photographically making a half tone and line mask negative having substantially transparent portions corresponding to the tone and line sections and substantially opaque portions corresponding to the highlight sections of the original drawing, making from said half tone and line mask negative by opaquing the transparent line portions of said negative a half tone mask negative having substantially transparent portions corresponding to the tone sections and substantially opaque portions corresponding to the highlight and line sections of the original drawing, making from said half tone mask negative a half tone mask positive having substantially opaque portions corresponding to the tone sections and substantially transparent portions corresponding to the highlight sections of the original drawing by preparing a photographic print of said half tone mask negative, superimposing said half tone mask positive on said original drawing, photographing the same through said superimposed mask positive on a light-sensitive photographic material, removing said mask positive, superimposing on said drawing said half tone mask negative, interposing between said superimposed drawing-mask negative assembly and said light-sensitive photographic material a half tone screen, and photographing said drawing through said mask negative and said half tone screen on the light-sensitive material without altering the relative position of the drawing and the light-sensitive material during the successive photographing of said drawing on said light-sensitive material through said masks.

18. In a process of producing a drop-out half tone negative from an original drawing having highlight and tone sections, the steps of making from said drawing a continuous tone negative on a photographic material consisting of a light-sensitive layer on a transparent base, treating said continuous tone negative while still wet with a photographic reducer until the tones of the tone sections disappear, fixing, washing, and finally drying the thus produced half tone mask negative having substantially transparent portions corresponding to the tone sections and substantially opaque portions corresponding to the highlight sections of the original drawing, making a half tone mask positive having substantially opaque portions corresponding to the tone sections and substantially transparent portions corresponding to the highlight sections of the original drawing by preparing a photographic print of said half tone mask negative, superimposing

said masks one after another onto said original drawing, and photographing said drawing on a light-sensitive photographic material through each of said superimposed masks separately in such a manner that a half tone screen is interposed between said drawing and said light-sensitive material when the drawing is photographed through the half tone mask negative.

19. In a process of producing a drop-out half tone and line negative from an original drawing having highlight, line, and tone sections, the steps of making from said drawing a continuous tone negative on a photographic material consisting of a light-sensitive layer on a transparent base, treating said continuous tone negative while still wet with a photographic reducer until the tones of the tone sections disappear, fixing, washing, and finally drying the thus produced half tone and line mask negative having substantially transparent portions corresponding to the tone and line sections and substantially opaque portions corresponding to the highlight sections of the original drawing, making a half tone and line mask positive having substantially opaque portions corresponding to the tone and line sections and substantially transparent portions corresponding to the highlight sections of the original drawing by preparing a print of said half tone and line mask negative, making from said half tone and line mask negative by opaquing the transparent line portions of said negative a half tone mask negative, superimposing said half tone mask negative and said half tone and line mask positive onto said original drawing in either succession, and photographing said drawing on a light-sensitive photographic material through each of said superimposed masks separately in such a manner that a half tone screen is interposed between said drawing and said light-sensitive material when the drawing is photographed through the half tone mask negative.

20. In a process of producing a drop-out half tone and line negative from an original drawing having highlight, line, and tone sections, the steps of making from said drawing a continuous tone negative on a photographic material consisting of a light-sensitive layer on a transparent base, treating said continuous tone negative while still wet with a photographic reducer until the tones of the tone sections disappear, fixing, washing, and finally drying the thus produced half tone and line mask negative having substantially transparent portions corresponding to the tone and line sections and substantially opaque portions corresponding to the highlight sections of the original drawing, making from said half tone and line mask negative by opaquing the transparent line portions of said negative a half tone mask negative having substantially transparent portions corresponding to the tone sections and substantially opaque portions corresponding to the highlight and line sections of the original drawing, making from said half tone mask negative a half tone mask positive having substantially opaque portions corresponding to the tone sections and substantially transparent portions corresponding to the highlight and line sections of the original drawing by preparing a photographic print of said half tone mask negative, superimposing said half tone mask negative and said half tone mask positive onto said drawing in either succession, and photographing said drawing on a light-sensitive photographic material through each of said superimposed masks separately in such a manner that a half tone screen is

interposed between said drawing and said light-sensitive material when the drawing is photographed through the half tone mask negative.

21. In a process of producing a drop-out half tone and line negative from an original drawing having highlight, line, and tone sections, the steps of making from said drawing a continuous tone negative on a photographic material consisting of a light-sensitive layer on a transparent base, treating said continuous tone negative while still wet with a photographic reducer until the tones of the tone sections disappear, fixing, washing, and finally drying the thus produced half tone and line mask negative having substantially transparent portions corresponding to the tone and line sections and substantially opaque portions corresponding to the highlight sections of the original drawing, making a half tone and line mask positive having substantially opaque portions corresponding to the tone and line sections and substantially transparent portions corresponding to the highlight sections of the original drawing by preparing a print of said half tone and line mask negative, making from said half tone and line mask negative by opaquing the transparent line portions of said negative a half tone mask negative, superimposing said half tone and line mask positive on said original drawing, photographing the same through said superimposed mask positive on a light-sensitive photographic material, removing said mask positive, superimposing on said drawing said half tone mask negative, interposing between said superimposed drawing-mask negative assembly and said light-sensitive photographic material a half tone screen and photographing said drawing through said mask negative and said half tone screen on the light-sensitive material without altering the relative position of the drawing and the light-sensitive material during the successive photographing of said drawing on said light-sensitive material through said masks.

22. In a process of producing a drop-out half tone and line negative from an original drawing having highlight, line, and tone sections, the steps of making from said drawing a continuous tone negative on a photographic material consisting of a light-sensitive layer on a transparent base, treating said continuous tone negative while still wet with a photographic reducer until the tone of the tone sections disappear, fixing, washing, and finally drying the thus produced half tone and line mask negative having substantially transparent portions corresponding to the tone and line sections and substantially opaque portions corresponding to the highlight sections of the original drawing, making from said half tone and line mask negative by opaquing the transparent line portions of said negative a half tone mask negative having substantially transparent portions corresponding to the tone sections and substantially opaque portions corresponding to the highlight and line sections of the original drawing, making from said half tone mask negative a half tone mask positive having substantially opaque portions corresponding to the tone sections and substantially transparent portions corresponding to the highlight and line sections of the original drawing by preparing a photographic print of said half tone mask negative, superimposing said half tone mask positive on said original drawing, photographing the same through said superimposed mask positive on a light-sensitive photographic material, removing said mask positive,

superimposing on said drawing said half tone mask negative interposing between said superimposed drawing-mask negative assembly and said light-sensitive photographic material a half tone screen and photographing said drawing through said mask negative and said half tone screen on the light-sensitive material without altering the relative position of the drawing and the light-sensitive material during the successive photographing of said drawing on said light-sensitive material through said masks.

23. In a process of producing a drop-out half tone negative from an original drawing having highlight and tone sections, the steps of making a half tone mask negative having substantially transparent portions corresponding to the tone sections and substantially opaque portions corresponding to the highlight sections of the original drawing, making a half tone mask positive having substantially opaque portions corresponding to the tone sections and substantially transparent portions corresponding to the highlight sections of the original drawing, photographing the original drawing on a light-sensitive photographic material first through said half tone mask positive, photographing said original drawing again on the same light-sensitive material through said half tone mask negative and a half tone screen interposed between said mask negative and the light-sensitive photographic material, and then placing behind said half tone

mask negative a light-reflecting, preferably white, sheet, and photographing said white sheet through said half tone screen and half tone mask negative.

24. In a process of producing a drop-out half tone and line negative from an original drawing, having highlight, line and tone sections, the steps of making a half tone mask negative having substantially transparent portions corresponding to the tone sections and substantially opaque portions corresponding to the highlight and line sections of the original drawing, making a half tone mask positive having substantially opaque portions corresponding to the tone sections and substantially transparent portions corresponding to the highlight and line sections of the original drawing, photographing thereafter the original drawing on a light-sensitive photographic material first through said half tone mask positive, photographing said original drawing again on the same light-sensitive material through said half tone mask negative and a half tone screen interposed between said mask negative and the light-sensitive photographic material, and then placing behind said half tone negative a light-reflecting, preferably white, sheet, and photographing said white sheet through said half tone screen and half tone mask negative.

LASZLO ZUKMANN.