

Nov. 14, 1944.

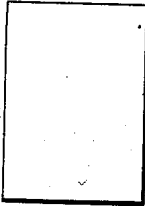
A. L. HUTTKAY

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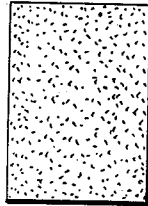
PROCESS OF PRODUCING DROP-OUT HALF-TONE NEGATIVES

Filed Aug. 25, 1942

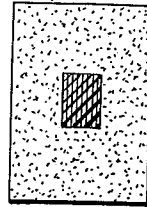
*Fig. 1*



*Fig. 2*



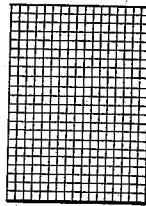
*Fig. 3*



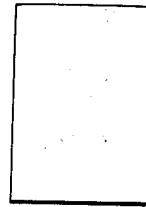
*Fig. 4*



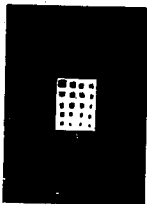
*Fig. 5*



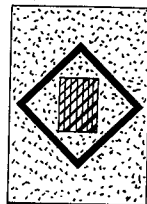
*Fig. 6*



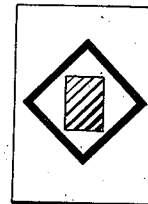
*Fig. 7*



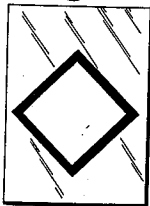
*Fig. 8*



*Fig. 9*



*Fig. 10*



*Fig. 11*



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## UNITED STATES PATENT OFFICE

2,362,826

PROCESS OF PRODUCING DROPOUT  
HALF-TONE NEGATIVES

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Application August 25, 1942, Serial No. 455,984

7 Claims. (Cl. 95-5)

This invention relates to new and improved processes of preparing printing plates, and more particularly relates to processes of eliminating all half-tone screening dots in the background or highlight sections of a drop-out half-tone negative. These processes are particularly adaptable for the type of photo-engraving and illustration commonly used for newspaper advertising.

An object of this invention is to provide simple processes of highlighting which are free from the prevailing lengthy and inexpedient methods, such as laborious hand-painting or hand-opaquing, or photographing with ultra-violet light, or use of filters, which methods are in many instances impractical and depend upon delicately balanced exposure relationships, and are mostly limited to certain types of drawings.

Another object of this invention is to provide processes which will greatly diminish the necessity of using skilled labor and which will facilitate the necessary manipulation preliminary to making the printing plate.

Still another object of this invention is to provide processes in which substantially no retouching or finishing operations are performed by hand, thus eliminating the necessity of manipulating wet films and of retouching or finishing operations upon the printing plates, and also eliminating the necessity of making a series of exposures upon these plates.

Briefly, the most important characteristic feature of all processes proposed herewith is the step of giving the tone sections of the original drawing from which the drop-out half-tone negative is to be made, such a color that also the lightest portions of these tone sections have a tint to which the light-sensitive photographic material on which the drop-out half-tone negative is made is little sensitive. In accordance with a preferred embodiment of the present invention, such a tint is obtained by coating the sheet on which the original drawing is made with a colorless coating solution and painting the tone sections of this drawing with a coloring solution containing in addition to the paint for creating the shades of these tone sections an additional chemical substance adapted to react with the above coating solution in such manner as to give at least the lightest portions of the tone sections of the drawing the required color, preferably a yellowish, brownish or reddish tint, to which the light-sensitive photographic material on which the drop-out half-tone negative is made, is little sensitive. From a drawing prepared in this way a drop-out half-tone negative can easily be prepared by

photographing this drawing successively through a half-tone screen and without interposing this screen on a light-sensitive photographic material, preferably a photographic film or plate; after developing the thus exposed film or plate, a drop-out half-tone negative will appear on it which will have substantially opaque portions corresponding to the high-light sections and half-tone portions corresponding to the tone sections of the original drawing. In case that the original drawing also contains line sections, it is easily possible to obtain a combined drop-out half-tone and line negative containing, in addition to opaque high-light portions and screened half-tone portions, also transparent portions corresponding to the line sections of the original drawing; the new processes by which such drop-out half-tone negatives and combined drop-out half-tone and line negatives may be obtained will be described below in detail.

It should be noted that throughout this specification and claims, the term "high-light sections" is used to designate those sections of an illustration or drawing which are required to be printed in reproduction as pure white, i. e. free from screen pattern, and is usually used as referring to background or "white" sections of an illustration. The term "tone sections" refers to the shaded or dark section of the original illustration or drawing to be printed in reproduction as half-tones. The term "line sections" refers to the continuous opaque lines appearing on the original drawing.

Furthermore, it should be noted that the term "negative" is used throughout the specification and claims to designate photographic reproductions on any type of photographic material in which the high-light sections of the original illustrations or drawing appear opaque, the tone sections entirely transparent or white. In the same way, the term "positive" designates photographic reproductions on any kind of photographic material, i. e. on photographic paper, film or plate, in which the high-light sections of the original drawing are substantially white or transparent, the tone values of the tone sections substantially the same as in the original drawing, and the line sections entirely opaque. It is evident that if superimposed negatives are mentioned in the specification and claims, these negatives must consist of a photographic light-sensitive layer on a transparent base, as for instance photographic films or plates.

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 should also comprehend other illustrations, e. g. painted illustrations if these are combined with a white background which has to be reproduced without half-tone screening.

The novel features which are considered characteristic for the present invention are set forth in particular in the appended claims. The invention itself, however, 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 drawing in which:

Figure 1 illustrates a sheet of drawing paper or like material on which the original drawing is painted;

Figure 2 represents the sheet shown in Figure 1, coated with the above mentioned colorless coating solution;

Figure 3 represents the original drawing ready for use, consisting of the coated sheet shown in Figure 2 provided with tone sections painted with the coloring solution mentioned above;

Figure 4 shows a semi-finished original drawing of a different type, containing the half-tone sections painted with the above mentioned coloring solution on an uncoated sheet of the type shown in Figure 1;

Figure 5 shows a half-tone screen of usual type consisting of opaque screening on a transparent base;

Figure 6 shows a white sheet of paper used for the "flashing" step to be described below in detail;

Figure 7 shows a drop-out half-tone negative prepared in accordance with the present invention and having opaque portions corresponding to the high-light sections and half-tone portions corresponding to the tone sections of the original drawing;

Figure 8 shows an original drawing having high-light, tone and line sections and being prepared substantially in the same way as the original drawing shown in Figure 3;

Figure 9 shows a semi-finished original drawing having high-light, tone and line sections and being prepared in substantially the same way as the semi-finished original drawing shown in Figure 4;

Figure 10 shows a drop-out line mask having transparent portions corresponding to the high-light and tone sections and opaque portions corresponding to the line sections of the original drawing; and

Figure 11 shows a combined drop-out half-tone and line negative prepared in accordance with the present invention and 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.

In order to facilitate understanding of the above enumerated figures, it should be noted that in the same all white areas represent white high-light sections in the original drawing and white or transparent areas in the photographic negatives; all opaque areas in the figures represent line sections in the original drawing and opaque areas in the photographic negatives; all areas indicated in the figures by small equally shaped dots represent areas of the original drawing provided with the above mentioned coating solution; all areas in the figures indicated by vertical shading represent half-tone sections of the original drawing, tinted in accordance with the present inven-

tion; all areas in the figures indicated by square dots of varying size represent half-tone areas of the negatives; and finally all areas indicated in the figures by diagonal shading represent tone sections of the original drawing.

The above explanation will make the drawings of the present application so clear and easily understandable for everybody skilled in this art that further elaborate description may be omitted.

As already stated above, the most important part of the present invention consists in producing the original drawing in a certain new way not done heretofore. By giving the half-tone sections, especially the lightest portions of these sections of the original drawing, a yellowish, brown or reddish color, or a tint produced by combination of the above colors, an original drawing may be produced which will enable preparation of the finished drop-out half-tone negative without any drop-out masks or the like. The original drawing tinted as described above has only, to be photographed twice on the same light-sensitive material, e. g. film or plate, once with a half-tone screen interposed between drawing and negative material and once without interposing such a screen; the first exposure through the half-tone screen will result in an undeveloped screened negative having latent not visible screening dots in the half-tone portions as well as in the high-light portions of the negative; the second exposure, made without interposing a screen and without intermediate developing of the partly exposed plate or film, will not attack the half-tone portions of the negative plate or film, as the tone sections of the original drawing have a color to which the negative material is only little sensitive; this second exposure will, however, strongly influence the unexposed portions between the screening dots of the high-light portions and cause considerable blackening of the same in the final negative.

It should be stressed that during this second exposure it is necessary to interpose, between the drawing and the partly exposed plate or film, a fully transparent glass plate having the same refraction index as the glass plate used as base for the screen. This is necessary in order to ensure that the corresponding parts of the images are in register during the first and second exposures. The blackening caused by the second exposure need not be complete; in any case, it will cause at least a grey, mostly dark grey veil between the screening dots in the high-light portions of the negative which correspond to the high-light sections of the original drawing. The average blackening of these high-light portions will be sufficient to avoid appearance of any screening dots on positives produced from negatives made in the above described way.

It should be mentioned that it is necessary to tint the tone sections of the original drawing with colors to which the light-sensitive material used for the negatives is little sensitive; this means that for a specific light-sensitive material specific tints have to be chosen. As most light-sensitive negative materials, particularly those generally used, are little sensitive to yellow, brown and red, it is preferable to use these colors or combinations of the same for painting the tone sections of the original drawing.

It should furthermore be mentioned that it is advisable to expose the light-sensitive photographic material through the half-tone screen longer than usual and to make the second exposure without half-tone screen relatively brief so

as to ensure by the first exposure formation of screening dots in the half-tone portions of the negative and to avoid any visible influence of the second exposure on those half-tone portions.

Finally, it should also be mentioned that it is of advantage to use for developing the negatives produced in the above way a contrasty developer in order to obtain a strong dark grey veil between the screening dots in those portions of the negative which correspond to the high-light sections of the original drawing while keeping at the same time the areas between the screening dots in those portions of the negative which corresponds to the tone sections of the original drawing entirely or at least substantially transparent.

In accordance with a preferred embodiment of the present invention, the partial tinting of the original drawing needed for the new process is obtained by coating the sheet shown in Figure 1 on which the original drawing is to be made, with a colorless coating solution, thereby obtaining the coated sheet shown in Figure 2, and thereafter painting the tone sections of the drawing with a coloring solution containing, in addition to the paint for creating the shades of these tone sections, an additional chemical substance adapted to react with the coating solution applied to the sheet shown in Figure 1 in such a manner as to give the tone sections of the drawing or at least the lightest portions thereof a tint to which the light-sensitive photographic material on which the negative is prepared is little sensitive. An original drawing produced in this way and having tinted tone sections is shown in Figure 3.

It should be noted that it is also possible to paint first on the untreated sheet shown in Figure 1 the half-tone sections with a coloring solution, thereby obtaining the semi-finished drawing shown in Figure 4 and to coat thereafter at least the tone sections of this drawing with the above mentioned coating solution. Also this process will result in an original drawing of the type shown in Figure 3.

It is quite evident and needs no explanation at all for anybody skilled in this art that there is not the slightest technical difficulty in preparing or choosing two chemical solutions which each per se is colorless which, however, when mixed with each other react as required for the new process proposed herewith, namely result in a yellowish, brownish or reddish tint of the drawing paper to which both are applied. Therefore the present invention is fully and sufficiently characterized by stating that the coating and coloring solutions used have to be chosen in such a way as to react with each other as stated above.

A preferred embodiment of the new above described process comprises the following steps:

First the drawing paper shown in Figure 1 is coated with a relatively weak sodium thiosulphate solution, e. g. a solution composed of 10 parts of sodium thiosulphate dissolved in 90 parts of water. After the thus produced coated sheet shown in Figure 2 is completely dry, the tone sections are painted on this sheet with a coloring solution containing, besides the grey or black paint generally used, also uranium nitrate as substance adapted to react in the required way with the above mentioned sodium thiosulphate solution used for coating the drawing sheet. For practical purposes, it is preferable to add the uranium nitrate to the water which is generally used for painting the tone sections of the drawing, preferably in a high concentration, e. g. one part of uranium nitrate to two parts of water.

When the tone sections of the drawing are painted with the above mentioned coloring solution, the uranium nitrate contained in the same will react with the sodium thiosulphate contained in the coating solution applied to the drawing sheet and the lighter parts of the tone sections will acquire a yellowish tint to which the generally used negative films and plates on which the drop-out half-tone negatives are made are only little sensitive.

After producing the original drawing in the above described way, the same is first photographed through the half-tone screen shown in Figure 5 and then without this screen. For this latter exposure, the half-tone screen has to be removed without changing the relative position of the drawing and the plate on which the negative is made and a fully transparent glass plate having the same thickness as the glass plate on which the screen is laid has to be interposed between the drawing and the plate. After this double exposure, the plate is developed in the usual way, preferably using a highly contrasty developer, and the drop-out half-tone negative shown in Figure 7 is obtained.

Sometimes, particularly when the tone sections of the original drawing contain very dark portions, it is necessary to perform in combination with preparing the drop-out half-tone negative another operation which is universally used and is called "flashing." Without this flashing, there would be no screening in the darker portions of the half-tone areas of the negatives because the corresponding sections of the original drawing reflect little or no light. For this purpose, a third exposure is made, namely the white sheet shown in Figure 6 is interposed between the original drawing shown in Figure 3 and the half-tone screen shown in Figure 5 and photographed on the light-sensitive photographic material. This flashing step then creates the screening needed in the darker portions of the half-tone areas of the negative.

The process of producing combined drop-out half-tone and line negatives from original drawings containing high-light, tone and line sections is very similar to the above described process of producing drop-out half-tone negatives and therefore only the differences between the two processes will be described below in detail. After preparing the half-tone sections of the original drawing as described above, the line sections are made in a color to which the light-sensitive photographic material on which the negative is made is not sensitive at all. Preferably, these sections are painted on the original drawing with black paint or ink which results in an original drawing of the type shown in Figure 8. In the same way as described above in connection with the semi-finished original drawing shown in Figure 4, it is possible also in this case to prepare first the semi-finished drawing shown in Figure 9 and to coat it with the coating solution, e. g. sodium thiosulphate solution, as described above.

The photographic steps for producing the finished combined drop-out half-tone and line negative shown in Figure 11 from the original drawing shown in Figure 8 are also the same as described above in connection with making the drop-out half-tone negative 7. The only difference between the photographic steps of the two processes is created by the fact that, if the flashing operation is used for producing drop-out, half-tone and line negatives of the type shown in

Figure 11, it cannot be performed in the usual way as the screening would appear not only in the half-tone areas but also in the line areas of the negative; the continuity and transparency of these line areas would thereby be broken up and the object of the present invention defeated. Therefore, it is necessary to make a drop-out line mask of the type shown in Figure 10, consisting of a transparent sheet provided with opaque portions corresponding to the line sections of the original drawing. During the flashing step, i. e. during photographing of the white sheet shown in Figure 6 through the half-tone screen shown in Figure 5, this drop-out line mask is placed between the sheet and the screen, avoiding thereby formation of screening dots in those areas of the negative which correspond to the line sections of the original drawing.

Although the above described embodiments are the preferred ones, modifications of the new processes within the limits of the present invention are possible. Thus, for instance, it is possible to reverse the photographic steps in all processes where the drawing is photographed consecutively through a half-tone screen and without that screen. It is also possible to reverse the application of the reacting ingredients of the coloring and coating solutions: thus, for instance, it is possible to coat the drawing sheet with a solution containing uranium nitrate and to add sodium thiosulphate to the coloring solution.

Without further analysis, the foregoing will so fully reveal the gist of my invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What I claim as new and desire to secure by Letters Patent is:

1. A process of producing on a light-sensitive photographic material from an original drawing having high-light and tone sections a drop-out half-tone negative having opaque portions corresponding to said high-light sections and half-tone portions corresponding to said tone sections, said process comprising the steps of coating the sheet on which said original drawing is made with diluted sodium thiosulphate, painting the tone sections of said drawing with a coloring solution containing uranium nitrate in addition to the paint for creating the shades of said tone sections, thereafter photographing the thus prepared original drawing successively through a half-tone screen and without interposing said screen on said light-sensitive photographic material and also placing, before, between or after said photographic steps, a highly light-reflecting, preferably white, sheet, in front of said drawings and photographing said sheet through said half-tone screen in order to obtain screening dots also in the dark areas of the half-tone portions of the drop-out half-tone negative.

2. A process of producing on a light-sensitive photographic material from an original drawing having high-light and tone sections a drop-out half-tone negative having opaque portions corresponding to said high-light sections and half-tone portions corresponding to said tone sections, said process comprising the steps of painting the

tone sections of said original drawing with a coloring solution containing, in addition to the paint for creating the shades of said tone sections, also uranium nitrate, coating at least the thus prepared tone sections of said original drawing with a sodium thiosulphate solution, thereby causing reaction between the uranium nitrate contained in said coloring solution and the sodium thiosulphate and thus giving at least the lightest portions of the tone sections of said drawing a yellowish tint to which said light-sensitive photographic material is only little sensitive, thereafter photographing the thus prepared original drawing successively through a half-tone screen and without interposing said screen on said light-sensitive photographic material and also placing, before, between or after said photographing steps, a highly light-reflecting, preferably white, sheet in front of said drawings and photographing said sheet through said half-tone screen in order to obtain screening dots also in the dark areas of the half-tone portions of the drop-out half-tone negative.

3. A process of producing on a light-sensitive photographic material from an original drawing having high-light and tone sections a drop-out half-tone negative having opaque portions corresponding to said high-light sections and half-tone portions corresponding to said tone sections, said process comprising the steps of applying to that surface of a drawing sheet on which said original drawing is to be made a sodium thiosulphate solution, painting on the thus treated drawing sheet the tone sections of said drawing with a coloring solution containing in addition to the paint for creating the shades of said tone sections also uranium nitrate, causing thereby a reaction between the uranium nitrate contained in said coloring solution and the sodium thiosulphate and thus giving at least the lightest portions of the tone sections of said drawing a yellowish tint to which said light-sensitive photographic material is only little sensitive, thereafter photographing the thus prepared original drawing successively through a half-tone screen and without interposing said screen on said light-sensitive photographic material and also placing, before, between or after said photographing steps, a highly light-reflecting, preferably white sheet in front of said drawings and photographing said sheet through said half-tone screen in order to obtain screening dots also in the dark areas of the half-tone portions of the drop-out half-tone negative.

4. A process of producing on a light-sensitive photographic material from an original drawing having high-light and tone sections a drop-out half-tone negative having opaque portions corresponding to said high-light sections and half-tone portions corresponding to said tone sections, said process comprising the steps of applying to that surface of a drawing sheet on which said original drawing is to be made a solution containing uranium nitrate, painting on the thus treated drawing sheet the tone sections of said drawing with a coloring solution containing sodium thiosulphate, thereby causing reaction between the uranium nitrate and the sodium thiosulphate contained in said coloring solution and thus giving at least the lightest portions of the tone sections of said drawing a yellowish tint to which said light-sensitive photographic material is only little sensitive, thereafter photographing the thus prepared original drawing successively through a half-tone screen and without inter-

posing said screen on said light-sensitive photographic material and also placing, before, between or after said photographing steps, a highly light-reflecting, preferably white, sheet in front of said drawing and photographing said sheet through said half-tone screen in order to obtain screening dots also in the dark areas of the half-tone portions of the drop-out half-tone negative.

5. Process of producing on a light-sensitive photographic material from an original drawing having high-light, line and tone sections a drop-out half-tone and line negative having opaque portions corresponding to said high-light sections, transparent portions corresponding to said line sections and half-tone portions corresponding to said tone sections, said process comprising the steps of making an original drawing with line sections of a color to which said light-sensitive photographic material is not sensitive, preferably black, and tone sections of such a color that also the lightest portions of said tone sections have a tint to which said light-sensitive photographic material is slightly sensitive, making also, in addition to said original drawing, a drop-out line mask consisting of a transparent sheet having opaque areas corresponding to the line sections of said original drawing, photographing said original drawing through a half-tone screen, photographing thereafter a highly light-reflecting, preferably white, sheet through said half-tone screen with said drop-out line mask interposed between said white sheet and said screen, and finally photographing said drawing on said light-sensitive photographic material directly, interposing neither said screen nor said mask.

6. Process of producing on a light-sensitive photographic material from an original drawing having high-light, line and tone sections a drop-out half-tone and line negative having opaque portions corresponding to said high-light sections, transparent portions corresponding to said line sections and half-tone portions corresponding to said tone sections, said process comprising the steps of making the line sections of the original drawing of a color to which said light-sensitive photographic material is not sensitive, preferably black, and tinting the tone sections of said original drawing in such a manner that also the lightest portions of said tone sections have a tint to

which said light-sensitive photographic material is only little sensitive, making also, in addition to said original drawing, a drop-out line mask consisting of a transparent sheet having opaque areas corresponding to the line sections of said original drawing, photographing said original drawing through a half-tone screen, photographing thereafter a highly light-reflecting, preferably white, sheet through said half-tone screen with said drop-out line mask interposed between said white sheet and said screen, and finally photographing said drawing on said light-sensitive photographic material directly, interposing neither said screen nor said mask.

7. Process of producing on a light-sensitive photographic material from an original drawing having high-light, line and tone sections a drop-out half-tone and line negative having opaque portions corresponding to said high-light sections, transparent portions corresponding to said line sections and half-tone portions corresponding to said tone sections, said process comprising the steps of coating the sheet on which said original drawing is made with a colorless coating solution, painting the tone sections of said drawing with a coloring solution containing in addition to the paint for creating the shades of said tone sections an additional chemical substance adapted to react with said coating solution in such a manner as to give at least the lightest portions of the tone sections of said drawing a tint to which said light-sensitive photographic material is little sensitive, making the line sections of said drawing of a color to which said light-sensitive photographic material is not sensitive, preferably black, making also, in addition to said original drawing, a drop-out line mask consisting of a transparent sheet having opaque areas corresponding to the line sections of said original drawing, photographing said original drawing through a half-tone screen, photographing thereafter a highly light-reflecting, preferably white, sheet through said half-tone screen with said drop-out line mask interposed between said white sheet and said screen, and finally photographing said drawing on said light-sensitive photographic material directly, interposing neither said screen nor said mask.

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