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GELATIN PRINTING PLATE PROCESS

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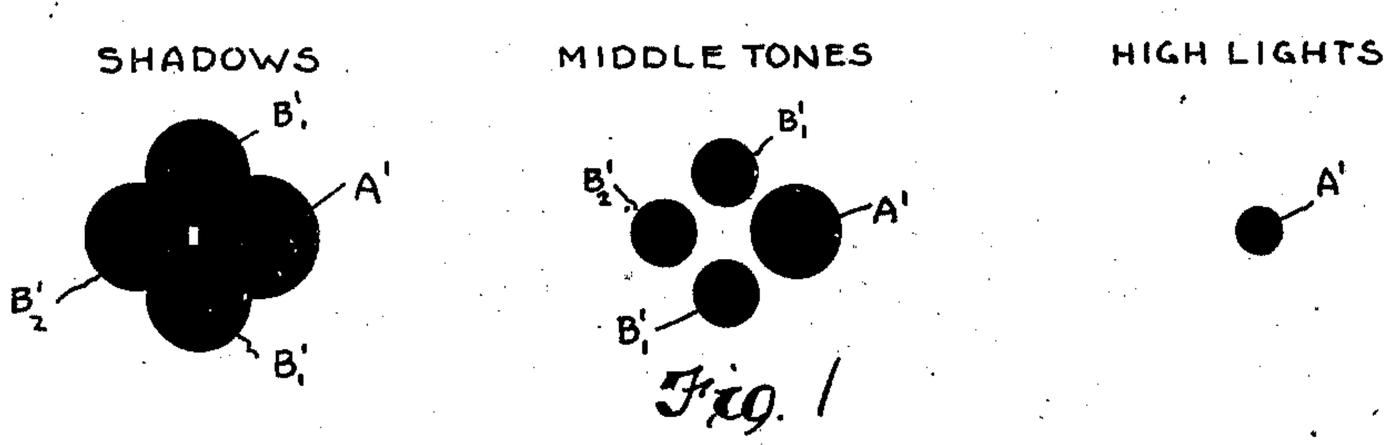

Fig. 1

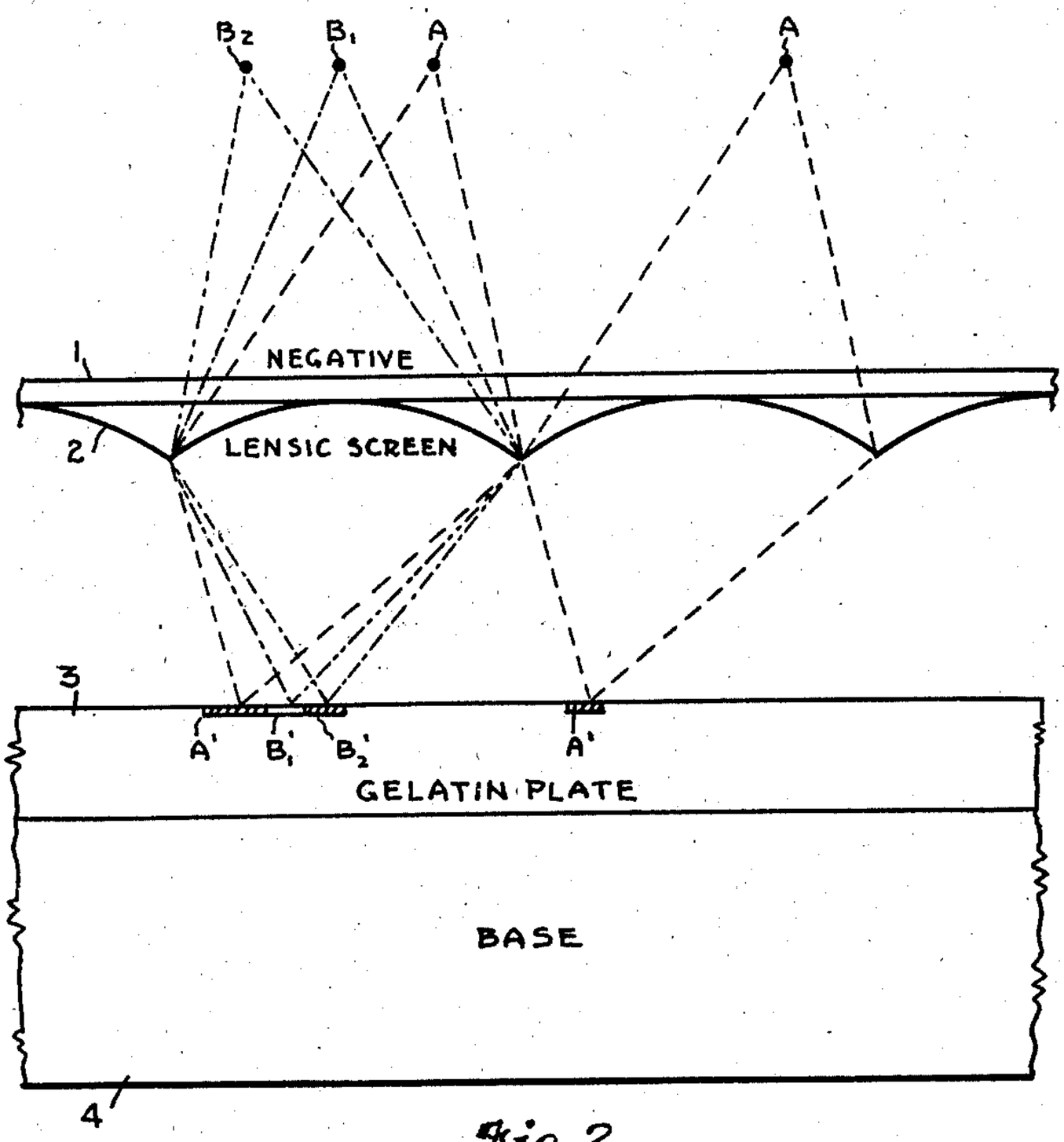

Fig. 2

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GELATIN PRINTING PLATE PROCESS

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9 Claims. (Cl. 95—5)

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The present invention relates to a planographic (i. e., as distinguished from intaglio or relief) reproduction process involving the direct impression or printing of ink from a gelatin printing plate on to the paper upon which the reproduction is desired to be made. The particular reproduction process to which my invention relates is commonly termed the photogelatin printing plate process; and is also sometimes known as the heliotype or albertype, the latter name being derived from the originator, Joseph Albert (France, 1866).

Briefly outlined, the photogelatin printing process involves the exposure to light of a sensitized plate or sheet of gelatin, through a negative copy of the image which is desired to be reproduced. The gelatin plate is treated with sensitizing agents, usually potassium dichromate and chrome alum, whereby the gelatin is hardened in proportion to the amount of light received upon its surface. The so sensitized gelatin plate is then dampened and inked. The harder portions are adapted to receive more ink and less water; and conversely, the softer portions of the gelatin take up more water and less ink. Hence, upon direct impression or printing of the gelatin plate upon the paper to which the ink is to be transferred, a positive reproduction of the negative is made.

Heretofore, only continuous or solid tone reproductions have been made by the above described photogelatin printing process. This process has been subject to certain difficulties, more prominent of which are the relatively short life of the gelatin plate, the tendency for the harder, solid portions thereof to crack and produce rippling effects, and the inability to reproduce the proper values of middle tones and high lights.

The general object and nature of my present invention is to improve the photogelatin printing process and to overcome the above-mentioned difficulties by imparting a half-tone or interrupted tone effect in the photogelatin printing plate. This results in the breaking up of the hardened, solid or continuous tone areas of the gelatin plate into a multiplicity of hardened dots, whereby a longer life of the plate itself, as well as more accurate and faithful reproduction of the original copy or image, is rendered possible.

A further object of my invention is to provide half-tone effects of different dot formations, viz., half-tones of different numbers of lines per inch in a single print.

Additional objects and advantages of my invention shall become apparent as the following description proceeds.

To the accomplishment of the foregoing and

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related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims, the annexed drawing and the following description setting forth in detail certain means and one mode of carrying out the invention, such disclosed means and mode illustrating, however, but one of various ways in which the principle of the invention may be used.

In said annexed drawing—

Fig. 1 illustrates, in greatly magnified form, the nature of the interrupted tone or half-tone dots which are imparted to the photogelatin printing plate and in turn are printed in ink upon the reproduced copy; and

Fig. 2 is a more or less diagrammatic illustration showing the manner in which the sensitized gelatin plate is exposed to light rays, the latter being dispersed into a plurality of dots or focal points; and also, illustrating the manner in which different numbers of dots per unit area are imparted to the sensitized gelatin plate.

Now referring more particularly to the drawing, there is shown a negative print 1 such as a photograph film or plate imposed on the lensic screen 2, which in turn is placed over the sensitized gelatin plate 3 (the screen 2, being placed directly in contact with the gelatin plate 3, is thus known in the art as a "contact screen"), the latter being mounted upon a suitable supporting base 4 of metal or glass. The lensic screen 2 is of the nature such as more fully described and covered in my prior U. S. Patents Nos. 1,887,872 and 1,991,888. The negative 1 is a continuous tone negative containing the reverse of the image which is desired to be reproduced by the photogelatin printing process. The negative 1, screen 2 and gelatin plate 3 may all be assembled in a photographic printing apparatus such as disclosed in my prior U. S. Patent No. 1,909,939.

As light rays from the source indicated at A pass through the continuous tone negative 1 and thence through the lensic screen 2, they form hardened areas or dots A′ on the sensitized gelatin plate 3 by the action of the small lenses or lenticular elements of the screen 2. The size of the dots A′ is governed by the density of the negative 1. That is to say, the more dense the negative, or a particular portion thereof, the smaller the dots; and contrariwise, the less dense the negative, the larger the dots A′.

Thus, the relatively more dense or darker portions of the negative 1 will be transferred to the surface of the gelatin plate 3, through the above described light exposure in the form of relatively small dots such as indicated under the legend

"High lights" in Fig. 1. Similarly, the lighter or relatively less dense portions of the negative 1 will be transferred in the form of larger hardened dots, resulting in the reproduction of the middle tones and shadows, as also represented in Fig. 1.

The dot shown under "High lights" in Fig. 1 and each right-hand dot shown under "Shadow" and "Middle tone," each such dot being marked A', correspond to and represent the imprint of the dots A' in Fig. 2 which are formed by exposure of light rays from the light source A. In other words, the dots A' have a concentration corresponding to the concentration of the lenses of the lensic screen 2. Thus, for example, if the screen 2 has 150 lenses per inch (corresponding to 150 lines per inch in a mechanical or ruled screen), the dots A' will be of a corresponding concentration.

Next, the light source is multiplied and moved laterally, or parallel to the plane of the negative 1, screen 2 and plate 3, to the positions represented at B_1 and B_2. The focal point of the light rays from the sources B_1 and B_2, as refracted through the lenses of the lensic screen 2, will then be at the points B_1' and B_2', thus establishing additional hardened dots in the surface of the gelatin plate 3 alongside the previously exposed dot A'. As shown in Fig. 2, the two light sources B_1, B_2 are shown laterally spaced to the left of the light source A. Since two dots or imprints B_1', B_1' are shown under the "Shadows" and "Middle tones," respectively, represented in Fig. 1, there are actually two light sources B_1, but due to the two dimensional restrictions, only one of them is shown in Fig. 2. In other words, each one of the dots B_1' and B_2' in Fig. 1 are formed by exposure from an individual light source transmitted through the lenses of the screen 2. A photographic printing apparatus, such as shown in my prior U. S. Patent No. 1,090,939, having multiple light sources or lamps mounted in spaced relationship to each other and adapted to transmit light rays at different angles through the negative 1 and lensic screen 2, can be suitably adapted to performing the above described operation.

From the foregoing description, it will be seen that a multiple of the dots per unit area or lines per inch of the screen 2 can thus be transmitted to the half-tone effects developed on the gelatin plate 3. Thus for example, if the lensic screen 2 has 150 lenses per inch corresponding to 150 lines per inch of the ordinary mechanical half-tone screen, the dots B_1 and B_2 will be developed upon the gelatin plate at a concentration in the middle tones and shadows twice as great or corresponding to 300 lines per inch. This relative concentration of the half-tone effects is illustrated in Fig. 1 where the shadow and middle tone dots have twice the concentration of the high light dots. Both concentrations of half-tone dots are imparted to a single gelatin plate by the simple expedient of making the light sources A and B_1, B_2, respectively, of different intensities sufficient to produce a hardening effect in the gelatin plate 3. The light source A is made of such intensity as to harden the gelatin plate through all portions of the negative 1, namely the shadows, middle tones and high lights; and the light sources B_1, B_2 are made of such intensity as to harden the gelatin plate through only the relatively less dense portions of the negative 1, namely, the shadows and middle tones, and excluding the high light portions thereof.

Accordingly, the density or concentration of the half-tone effects on the gelatin plate 3 will be substantially as indicated in Fig. 1, with the shadows and middle tones of a density corresponding to 300 lines per inch, and the high lights of a density corresponding to 150 lines per inch.

Subsequent to the hardening or exposure of the gelatin plate 3 as above described, it is placed in a suitable mechanical printing apparatus and its surface is first dampened and then inked. The non-hardened, or unexposed portions of the gelatin plate 3 absorb water and repel ink, whereas the hardened portions, or half-tone, hardened dots, absorb the ink and repel water. The gelatin plate 3 after such dampening and inking is then directly impressed upon the paper upon which it is desired to print the image or the positive of the negative 1.

The performance of my above-described process can be modified, particularly in the case of commercial production, by first forming a half-tone negative photographic film and then using the latter in the hardening of the sensitized gelatin plate. In such modification, a sensitized photographic film is substituted for the gelatin plate 3 in the representation shown in Fig. 2. This results in the making of a half-tone positive print on the photographic film. Such positive half-tone print is then in turn transferred or photographically printed upon a second photographic film forming a negative half-tone print which is in turn placed over the sensitized gelatin plate and the half-tone image thereon imparted to the gelatin plate in the form of hardened dots. The so produced gelatin plate is then used as a direct printing medium as hereinabove described in the case of the gelatin plate 3.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims or the equivalent of such be employed.

I therefore particularly point out and distinctly claim as my invention:

1. In a photogelatin printing plate process, dispersing light rays through a multiple minute lens screen, exposing to such dispersed light rays a sensitized gelatin plate adapted to harden upon exposure to light and forming dots by such light source, then forming other dots by a light source of different intensity.

2. In a photogelatin printing plate process, transmitting light rays through a continuous tone negative, dispersing the light emanating therefrom through a multiple minute lens contact screen, exposing to the resultant dispersed light rays a sensitized gelatin plate adapted to harden upon exposure to light, and forming dots by such light source, then forming other dots by a light source of different intensity, whereby an interrupted tone pattern is imparted to the surface of said gelatin plate.

3. In a photogelatin printing plate process, transmitting light rays through a continuous tone negative, dispersing the light emanating therefrom through a lensic screen, exposing a photographic film to the resultant dispersed light rays and forming dots by such light source, then forming other dots by a light source of different intensity, whereby an interrupted tone pattern is imparted to the surface of said photographic film as a positive print, photographically printing said positive print upon a photographic film thereby forming a half-tone negative print, and exposing

a sensitized gelatin plate adapted to harden upon exposure to light to light rays passing through said half-tone negative print.

4. In a photogelatin printing plate process, passing light rays from a predetermined source progressively through a continuous tone negative and a lensic screen, exposing a sensitized gelatin plate adapted to harden upon exposure to light to the dispersed light rays emanating from said screen and forming dots by such light source, then forming other dots by a light source of different intensity.

5. In a photogelatin printing plate process, transmitting light rays through a continuous tone negative, dispersing a portion of the light rays passing through said negative into a given number of separate focal points per unit area, transmitting a second group of light rays through said negative at a slightly different angle by a light source of different intensity, dispersing said second group of light rays into a multiple of said given number of separate focal points per unit area, exposing to both groups of such dispersed light rays a sensitized gelatin plate adapted to harden upon exposure to light and forming dots by such light source, then forming other dots by a light source of different intensity, whereby interrupted tone patterns of different concentrations per unit area are imparted to the surface of said gelatin plate.

6. In a photogelatin printing plate process, transmitting light rays from a predetermined source through a continuous tone negative, dispersing the light emanating therefrom through a lensic screen having a given number of lenses per inch, transmitting a second group of light rays through said negative and said screen from a source removed from that of said first-named light rays and of different intensity whereby the focal points of said second group of light rays dispersed through said screen occur at points removed from the focal points of said first transmitted and dispersed light rays, exposing a sensitized gelatin plate adapted to harden upon exposure to light to both groups of the so dispersed light rays and forming dots by such light source, then forming other dots by a light source of different intensity, whereby interrupted tone patterns of different numbers of dots per inch are imparted to the surface of said gelatin plate.

7. In a photogelatin printing plate process, transmitting light rays through a continuous tone negative dispersing the light emanating therefrom through a lensic screen having a given number of lenses per inch, transmitting a second group of light rays through said negative and said screen from a source removed from that of said first-named light rays and of different intensity whereby the focal points of said second group of light rays dispersed through said screen occur at points removed from the focal points of said first transmitted and dispersed light rays, exposing a light sensitive photographic film to both groups of the so dispersed light rays and forming dots by such light source, then forming other dots by a light source of different intensity, whereby interrupted tone patterns of different numbers of dots per inch are imparted to said photographic film in the form of a positive print, photographically printing said positive print upon a photographic film thereby forming a half-tone negative print, and exposing a sensitized gelatin plate adapted to harden upon exposure to light to light rays passing through said half-tone negative print.

8. In a photogelatin printing plate process, passing light rays from a predetermined source progressively through a continuous tone negative and through a lensic screen having a given number of lenses per inch, transmitting a second group of light rays through said negative and through said screen from a source removed from said predetermined source and of different intensity, whereby the focal points of said second group of light rays dispersed through said screen occur at points laterally removed from the focal points of said first transmitted and dispersed light rays, exposing a sensitized gelatin plate adapted to harden upon exposure to light to both groups of the so dispersed light rays and forming dots by such light source, then forming other dots by a light source of different intensity, whereby interrupted tone patterns of a different number of dots per inch are imparted to the surface of said gelatin plate.

9. In a photogelatin printing plate process, passing light rays from a predetermined source progressively through a continuous tone negative and through a lensic screen having a tone dispersing property on the order of 150 lenses per inch, transmitting a second group of light rays of different intensity through said negative and said screen from a source laterally removed from said predetermined source whereby the focal points of said second group of light rays dispersed through said screen occur at points laterally removed from the focal points of said first transmitted and dispersed light rays, and exposing a sensitized gelatin plate adapted to harden upon exposure to light to both groups of the so-dispersed light rays whereby two interrupted tone patterns having densities on the order of 150 dots per inch and 300 dots per inch respectively are imparted to the surface of said gelatin plate.

VICTOR C. ERNST.

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