Oct. 31, 1950 H. H. KUBESERIAN 2,528,007

METHOD FOR PRODUCING GRAVURE PRINTING PLATES

Filed Oct. 25, 1947

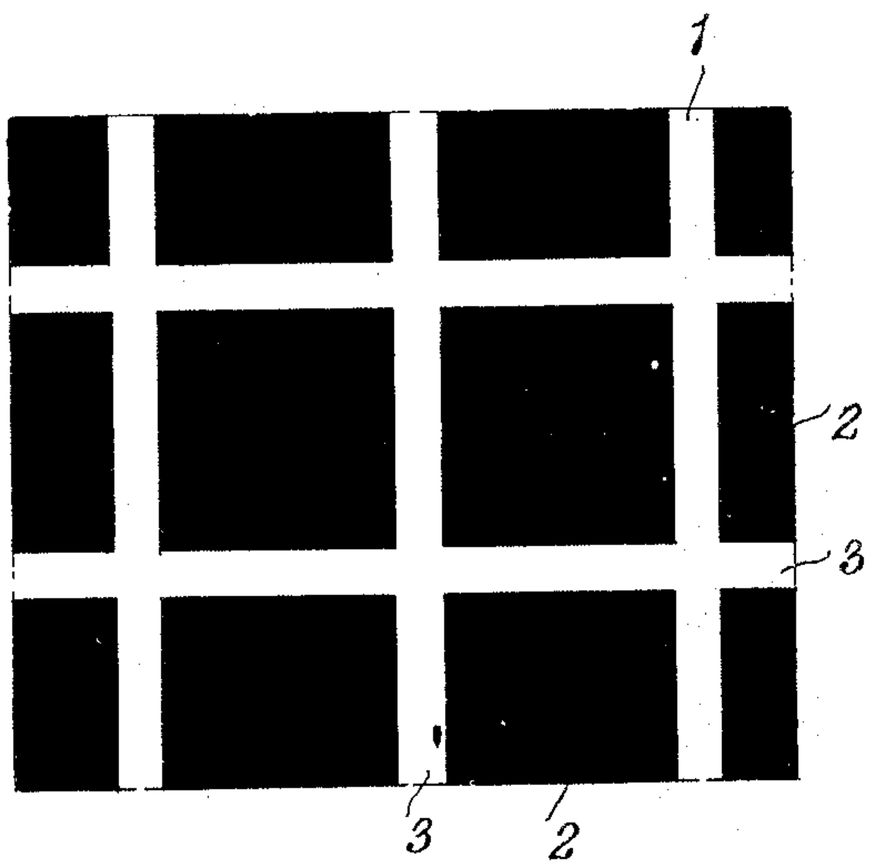



Fig. 1.

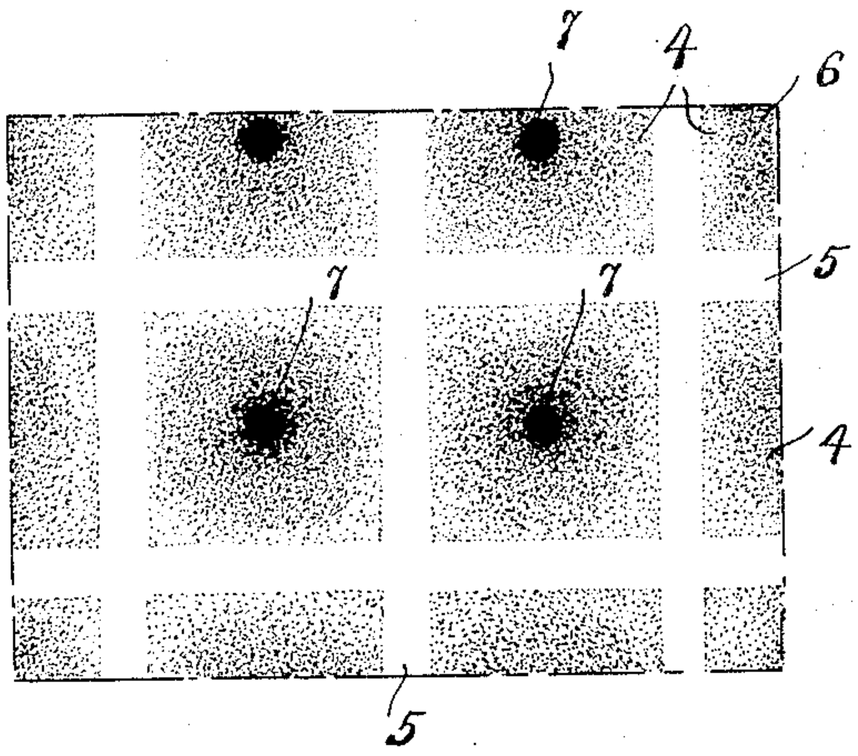
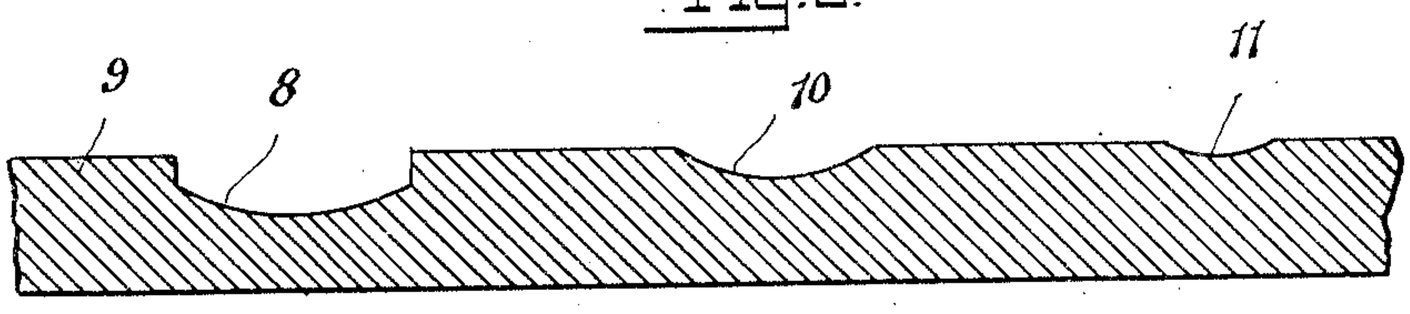



Fig. 2.

Fig. 3.

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Patented Oct. 31, 1950 2,528,007

# UNITED STATES PATENT OFFICE

2,528,007

## METHOD FOR PRODUCING GRAVURE PRINTING PLATES

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Application October 25, 1947, Serial No. 782,172

2 Claims. (Cl. 95—5)

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This invention relates to means and methods for producing printing plates used in rotogravure printing machines, and one of the objects of the invention is to provide a means and method by which a most satisfactory reproduction of high lights, middle tones and shadow details in the resultant printing will be assured.

At the present time, plates employed in rotogravure printing are produced by exposing a transparency on sensitized paper or so-called carbon tissue to light to reproduce the picture on the tissue; then the tissue is exposed again through a lined or reticulated screen which defines the separated areas across the print that subsequently produce the etched cavities in the metallic plate. The film from the carbon tissue is transferred to the metallic plate and is developed to leave on the plate the reproduction, which is then etched by acid to form the image to be reproduced. The cavities which carry the ink to be transferred to the paper, and which are produced by the etching process, are of equal size or area but are of unequal depth; the deepest cavities containing the most ink and consequently depositing the most ink on the paper to produce the blackest areas of the reproduced picture. Cavities of medium depth contain a moderate amount of ink and hence produce the middle tones, while the cavities of a shallow depth contain only a relatively insignificant amount of ink and thus produce the very light tones or the highlights of the image. It will be clear from the foregoing, that the faithful reproduction of an image is dependent upon the depth of the cavities produced in the printing plate. This requirement is particularly critical in those areas which represent the middle and lighter parts of the picture since a slight deviation from the correctness of cavity depth will result in an easily discernible overtoned or undertoned area. It will be clear from the foregoing, that the optimum sought by all etchers is the production of plates having cavities of precisely the correct depth, but this has been found extremely difficult due to the fact that the gauging of the depth of the cavities by eyesight, aided by a magnifying glass, is almost impossible since the change of color in the cavity and the duration of the etching operation are imperfect standards by which to determine the condition of the etched plate.

The primary object therefore, of the present invention, is to provide a method by which the etching of the plate can be accurately determined, such method including also the employment of a tone screen the details of which will hereinafter appear.

In the accompanying drawing, in which an illustrative embodiment of the invention is disclosed, Fig. 1 is a face view of a small portion in enlarged form of the conventional reticulated screen employed in the production of rotogravure

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plates; Fig. 2 is a face view of a small portion in enlarged form of my improved tone screen, and Fig. 3 is an enlarged sectional view of a portion of a rotogravure plate showing how the same is etched for dark tones, middle tones and highlights.

As previously stated, the production of a rotogravure plate involves the exposure of a transparency bearing the image to be reproduced on a sensitized sheet of carbon tissue, and then the carbon tissue is exposed to light through a line screen of the reticulated form shown in Fig. 1. Such a screen 1 is composed of transparent material or film provided throughout its area with a plurality of opaque squares 2 which are equally spaced apart to provide a plurality of crossed transparent or white lines 3. This arrangement constitutes the structure of a usual gravure line screen, the light lines 3 thereof, when exposed on the carbon tissue, producing enclosing walls around each of the squares under which the image is formed.

The improved tone screen 6 is shown in Fig. 2 and it will be therein noted that the same is composed of a plurality of squares 4 separated by the transparent or white lines 5. These tone squares 4 are identical in size and shape to the opaque squares 2 on the screen 1 since the tone squares must register therewith when the tone screen is exposed on the carbon tissue after the line screen 1 has been previously exposed thereon. It is to be noted that the squares 2 in the screen 1 are completely opaque or of uniform density for their entire areas, while the squares 4 in the tone screen 6 are of varying density. That is to say, each of the squares 4 is provided with a central, very small, opaque or nearly opaque dot or spot 7, which can be referred to as a "core," and the density of the shading within the square very gradually decreases from the center or core 7 to the four edges of the square. Near the edges of the square 4 the density of the shading gradually fades out to a very light tone or to complete or near complete transparency. The arrangement of the shading from complete opacity at the center of the square to complete or almost complete transparency at the marginal edges of the square may be varied and experiments will develop the required shading.

In carrying out the improved method, the carbon tissue is exposed by being placed against the transparency bearing the picture; the tissue is then exposed by being placed against the line screen 1 and then the line screen is removed and the tissue is placed against and exposed through the tone screen 6. In positioning the tone screen relative to the tissue, the screen 6 is accurately placed so that its squares 4 register precisely over the positions formerly occupied by the squares 2 on the previously-exposed screen 1. Thus, when the line and tone screens are suc-

cessively printed on the carbon tissue there will be a combination printing from the two types of reticulations borne by the respective screens 1 and 6. The two screens 1 and 2 being successively printed on the carbon tissue, will probably require different times of exposure, the correct timing being soon ascertained by the operator.

The carbon tissue is next transferred to the metal plate in the conventional manner; the paper is stripped off; the developing takes place, and the etching operation is begun. It is known that the action of the etching acid on the metal begins soonest under those parts of the resist which were left unexposed to the action of light during the printing of the tone screen 6 on the carbon tissue, since those parts which received the greatest amount of light during the exposure are hardened thereby. Since the central portion, or opaque or nearly opaque, spot or core 7 at the center of each of the squares 4 in the tone screen 6 has prevented the passage of light through this central area of each of the squares 4, it is obvious that the etching fluid will first begin the erosion of the plate at this central location in each of the defined squares. This applies to all of the squares 4, reproduced on the plate, namely, those covering the blackest portions of the image as well as those covering the middle tones and highlights, with the natural difference that the cores of the latter squares will begin to be etched later than those of the darker tones.

As the etching progresses, the etching at the centers of the squares, namely, those portions of the squares defined by the spots or cores 7, with gain not only in depth but also in area, this being due to the eventual penetration of the resist by the etching fluid starting around the opaque core 7 and gradually spreading around said core as the tone shading in the squares 4 of the tone screen becomes lighter and lighter, thus permitting the dot produced by the etching to grow larger and larger within the confines of the square until it reaches the edges of the square to be there halted by the lines or walls of the screen. The etching first begins at the cores of those squares which cover the blackest area of the image and the next areas to be etched will be those in the next lightest area down to the highlights, the latter being the last to be etched.

The process of the spreading of the cores in the squares covering the blackest portion of the image will undoubtedly be completed by reaching the edges of the squares, or the walls of the line screen 1, before the completion of the etching operation. Being thus confined, the etching acid in these squares will gain only in depth. This is illustrated in Fig. 3 wherein the depth of penetration of the plate by the etching acid operating in an area intended to be reproduced as a dark or true black is indicated at 8, the plate being indicated at 9. While the black portions of the image, reproduced by the ink received in the cavity 8 will be of proper blackness, they will not be overinked or likely to cause the loss of finer shadow details. The result is attained by reason of the fact that the cavities 8 which produce the blacks of the image are not of uniform depth, but are deeper at the center and shallower around their edges. In Fig. 3 also is shown the manner in which the etching fluid will act to produce a cavity 10 for the ink intended to produce a middle tone and a cavity 11 for the production of a lighter tone.



In carrying out the improved method, the etcher will be required to watch the etching procedure only sufficiently to note when the etching has reached a point to be halted, namely, before the cores at the center of each of those squares which produce the highlights have been etched too deeply to avoid overtoning. This can be ascertained very readily after slight experimentation since the size of the highlight dots will be plainly visible under a magnifier.

Since the highlight dots on the printed paper will be the smallest and result in more white space between the dots covering a highlight area and as we follow up the next and heavier tone areas, the white spaces will grow smaller and smaller until they reach the maximum size in heavier tones and finally the blackest areas of the image.

Having described one embodiment of the invention, it is obvious that the same is not to be restricted thereto, but is broad enough to cover all structures coming within the scope of the annexed claims.

What I claim is:

1. The method of producing rotogravure plates comprising, light-exposing a carbon tissue through a transparency of continuous tone image placed against it, thereafter light-exposing the carbon tissue through cross-lined gravure screen placed against it and having its lines transparent and the areas between its lines opaque, then light-exposing the tissue through a screen placed against it and having the same lineage but having transparent lines and the areas between said lines of graduated density varying from an opaque core or center to near-transparency at the lines, said latter screen when placed over and against the tissue being positioned so that its lines register over the position occupied by the lines of the first screen when the same was placed in position over the tissue.

2. The method of producing rotogravure plates comprising, light-exposing a carbon tissue through a transparency of continuous tone image placed against it, thereafter light-exposing the carbon tissue through a cross-lined gravure screen placed against it and having its lines transparent and the areas between its lines opaque, then light-exposing the tissue through a screen placed against it and having the same lineage but having transparent lines and areas between said lines of graduated density varying from an opaque central part or core to near-transparency at the lines which surround said area, said latter screen when placed over and against the tissue being positioned so that its lines register over the positions occupied by the lines of the first screen when the same was in position over the tissue, the two screens being exposed for different exposure periods.

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