(No Model.) 2 Sheets—Sheet 1.

M. LEVY.

HALF TONE SCREEN.

No. 591,653. Patented Oct. 12, 1897.

Fig. 1.

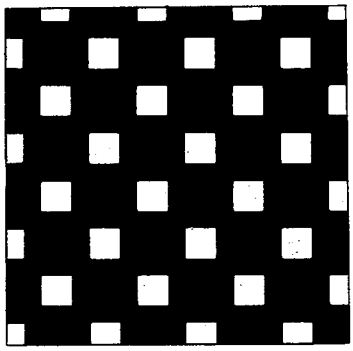


Fig. 1a

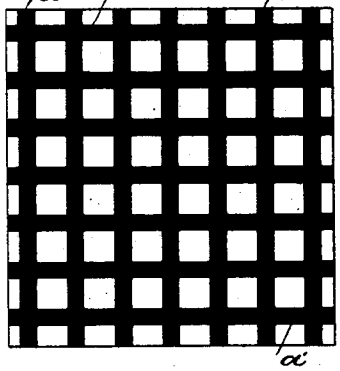


Fig. 1b

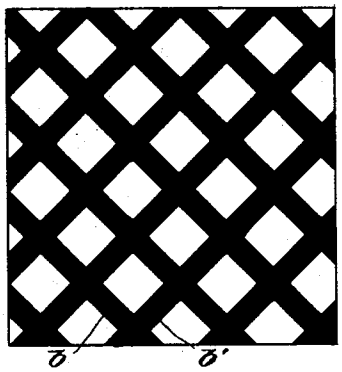


Fig. 2.

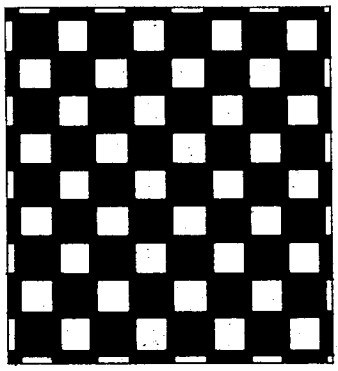


Fig. 2a

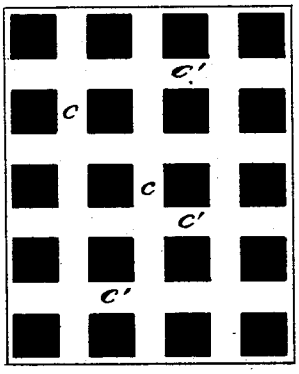


Fig. 2b

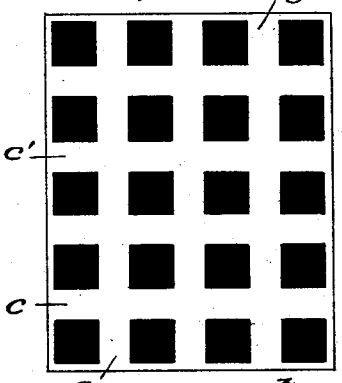


Fig. 3.

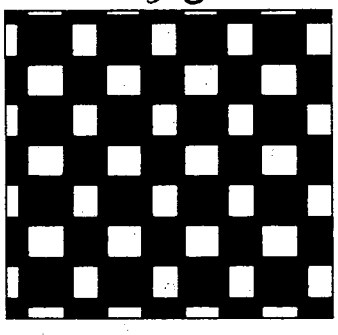


Fig. 3a

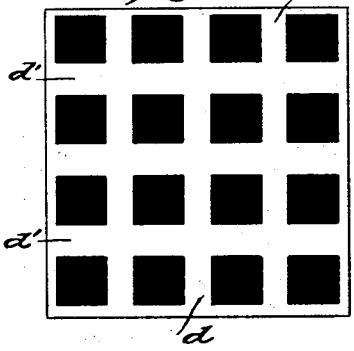
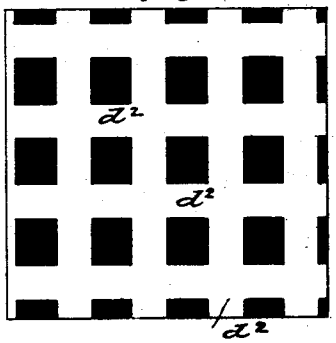


Fig. 3b



Max Levy

INVENTOR

WITNESSES

L. S. Elliott.

E. M. Johnson

By

Attorney

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

M. LEVY.

HALF TONE SCREEN.

No. 591,653. Patented Oct. 12, 1897.

Fig. 4.

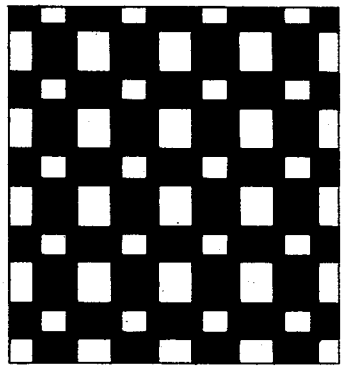


Fig. 4a

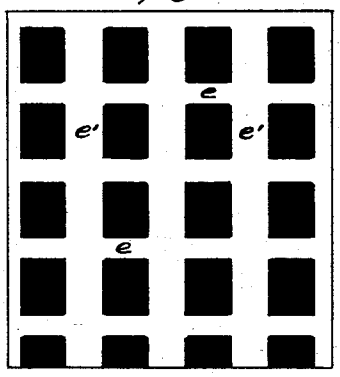


Fig. 4b

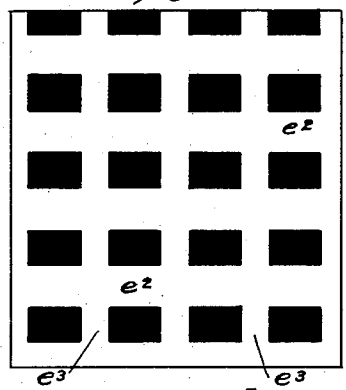


Fig. 5.

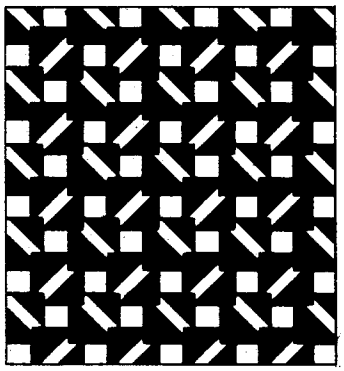


Fig. 5a

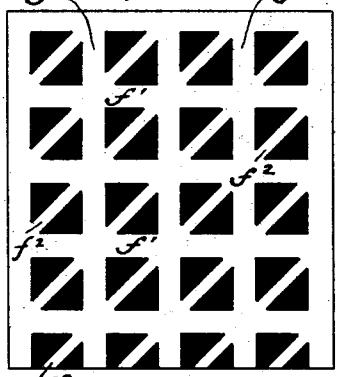


Fig. 5b

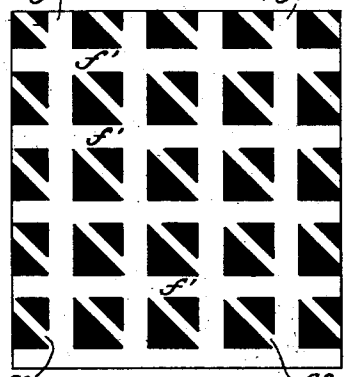


Fig. 6.

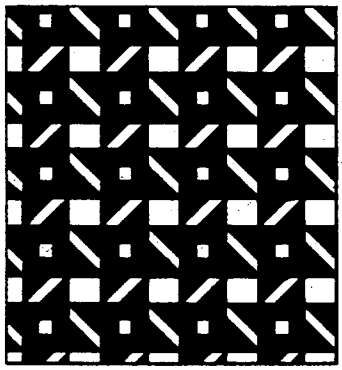


Fig. 6a

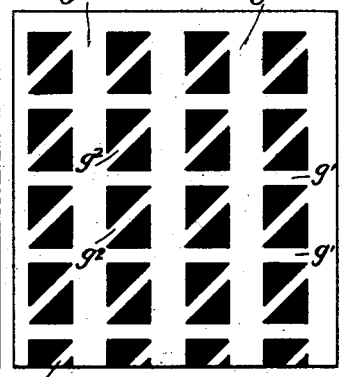
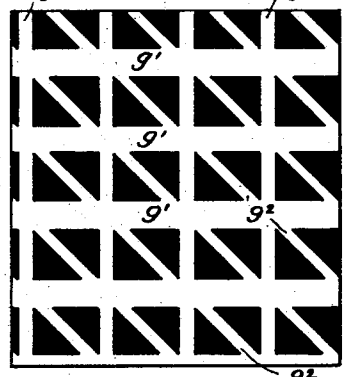


Fig 6b



Max Levy
INVENTOR

WITNESSES

D. S. Elliott

C. H. Johnson

By [illegible]
Attorney

THE BORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

MAX LEVY, OF PHILADELPHIA, PENNSYLVANIA.

HALF-TONE SCREEN.

SPECIFICATION forming part of Letters Patent No. 591,653, dated October 12, 1897.

Application filed June 30, 1896. Serial No. 597,608. (No model.)

To all whom it may concern:

Be it known that I, MAX LEVY, a citizen of the United States of America, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Screens for Making Photomechanical Printing-Plates; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention relates to photomechanical gratings or screens for producing printing-surfaces in carrying out the half-tone process; and it consists in a different arrangement of the apertures of the screen by means of which it becomes possible to make negatives as required for half-tone printing on gelatin dry plates and of a quality and with a facility which it is impossible to obtain with the aid of a screen as heretofore produced. In making a half-tone plate with the aid of a screen what takes place is that through each aperture in the screen is formed a distinct image of the lens-aperture, and the half-tone negative consists of a regular series of reproduced images of the lens-aperture. In order to develop these images clearly, it is necessary to resort to the use of vigorous intensifiers which shall have the property of building up to the maximum opacity parts of the image having a relatively weak deposit as developed. It will be obvious that in an image of a square placed as above indicated, formed through an aperture in the ordinary cross-lined screen, the corners of the image will fall behind the sides of the aperture, and as the image is not formed at the point that would be the real focus for the lens-aperture, regarding the screen-aperture as a pin-hole acting in the well-known manner of pin-hole photography, it follows that a large portion of the light forming the image will fall behind the opaque line of the screen and that this portion of the image will be much weaker than the portion formed by the light which has come directly through the aperture of the screen, the developed image thus formed, notwithstanding that it is in form a full image of the aperture in the lens, will have all its corners so weak as to show but an apparently round or octagonal image before intensification. At the same time that the intensification develops these separate images by building up the weaker parts in greater proportion than the denser ones the effect of the entire picture suffers material loss, as is well attested by all practical workers in this field.

With a screen having apertures arranged with their corners adjacent it will be apparent that with the same conditions as indicated as the most favorable for the screen formed of cross-lines the separate images of the lens-aperture formed through these apertures in the screen will lie directly in the direction of the sides of these apertures, and that as a consequence any portion of the image not of full strength will be equal on all sides and the images will fully overlap each other exactly at the point where this overlapping is necessary to give the effect of a dot in the high light of the reproduction, and for the same amount of increase of size of image over screen-aperture in this arrangement the maximum excess would be but one-half of what is required in the present screen.

By the aid of a screen, which I will describe, it is possible to make a so-called "screen-negative" on a gelatin dry plate that will have approximately the same printing qualities as the best wet-collodion negative that can be produced with a screen formed of cross-lines, and the result in such a negative will have far more of the delicate gradations of light and shade of the original than will the wet-collodion negative as at present produced. The improved screen will also be of advantage over the present form in connection with the wet-collodion process as at present employed. The results to be produced by these screens are similar in general character to those produced with cross-line screens as set forth in the patents issued to me February 21, 1893, No. 492,333, and June 19, 1894, No. 521,659; but a more delicate gradation of light and shade in the negative will always be produced with the new screen than with the form in general use.

In carrying out my invention I may use a

screen constructed in a variety of ways, either by photography, by ruling opaque lines on a transparent ground, or by ruling transparent lines through an opaque ground, one of the leading features of my improved screen being in the fact that it presents opaque blocks or squares of such size that their corners overlap.

In the accompanying drawings, Figure 1 is a view showing a screen made by ruling opaque lines on a transparent ground, and in producing such a screen two plates are employed and ruled, as shown in Figs. 1^a and 1^b, these plates being superimposed upon each other, so that the rulings will cross each other at forty-five degrees, and thus produce large rectangular opaque squares, adjacent to which are relatively smaller transparent squares, the opaque squares being arranged so that the corners overlap each other. Fig. 2 shows one style of screen formed by ruling or producing transparent lines upon an opaque ground, the lines on both plates being on the same scale. Fig. 3 is a view of a screen which is similar to Fig. 2, except that the two plates are differently ruled. Fig. 4 is a further modification of a plate produced as shown in Figs. 2 and 3. Figs. 5 and 6 are views showing gratings or screens produced in the same manner as Figs. 3 and 4, each plate having an additional diagonal line, the diagonal lines being spaced differently to give different results.

In making a screen as shown in Fig. 1 I rule upon a transparent plate, as glass, lines a and a', which cross each other at right angles, these lines being spaced equidistant. I then rule a second plate, as shown in Fig. 1^b, with lines b and b', which are of a greater distance apart than the lines a and a' and also of greater thickness, thus producing two plates having opaque cross-lines, which are placed one upon the other, so that the several lines will cross each other at an angle of forty-five degrees, thereby producing a grating or screen which is practically made up of a series of opaque squares the corners of which overlap each other and provide intermediate rectangular transparent apertures the corners of which are adjacent to each other.

It will be noted that in the construction of a screen as hereinbefore described there is a preponderance of opacity to the plate relative to the transparent ground.

The screen shown in Fig. 2 is produced by ruling through an opaque ground or by photography, and if made by ruling the two plates are placed together to provide rectangular transparent apertures and opaque squares the corners of which overlie each other. To produce this screen, the transparent lines of the two plates are of equal width and equally spaced, said lines c and c' crossing each other at right angles, and as a consequence leave upon the plates opaque squares all of the same size. When these plates are placed one upon the other face to face, they produce the screen shown in Fig. 2, in which the corners of the opaque squares overlap each other and in which the transparent squares are much nearer together than could be produced by a screen ruled as in Figs. 1^a and 1^b.

Figs. 3 and 4 are modified forms of Fig. 2, the completed plates presenting overlapping opaque blocks forming square apertures combined with oblong apertures, said square and oblong apertures alternating in the direction of their diagonals. The screen shown in Fig. 3 is made up of two plates, Figs. 3^a and 3^b, one having vertical rulings d, crossed at right angles by rulings d' of a greater width than the rulings d, and the other plate having rulings d^2 d^2, both of which are of the same width as the ruling d' and equally spaced. When the two plates are placed one upon the other, they will produce a screen or grating presenting a series of relatively large oblong apertures arranged horizontally according to their greatest width, and a second series of smaller oblong apertures arranged vertically, the larger and smaller apertures succeeding each other alternately in the direction of their diagonals. In this, as in the other screens, the opaque blocks overlap each other. In Fig. 4 one of the plates is ruled with a comparatively fine line e, which is crossed by a much wider line e', to produce upon the plate Fig. 4^a oblong blocks arranged in vertical series according to their greatest length, and in Fig. 4^b the horizontal transparent lines e^2 are of greater width than the vertical lines e^3 to present opaque blocks in horizontal series, according to their greatest width. When these two plates are placed one upon the other, they will present a screen, Fig. 4, in which there are relatively larger and smaller transparent squares succeeding each other alternately in the direction of their diagonals, the corners of the oblong opaque blocks of the separate plates overlapping each other.

In Fig. 5 I have shown a screen in which the plate Fig. 5^a is ruled with cross-lines f and f' through an opaque ground, leaving opaque blocks or squares, and said squares are crossed diagonally by narrow rulings f^2, said rulings intersecting the center of the squares. The rulings upon the plate Fig. 5^b are similar, presenting cross-lines and diagonal lines, but in this case the diagonal lines cross the opaque blocks to one side of their center, as shown, thereby presenting upon the plate Fig. 5^a triangular opaque blocks of equal size and upon the plate Fig. 5^b triangular opaque blocks of different sizes. When these plates are placed one upon the other, they produce the screen shown in Fig. 5, presenting transparent squares and intermediate oblong apertures the ends of which are formed by the overlapping corners of the opaque triangles.

Fig. 6 is a modification of Fig. 5, and in this case the plates Figs. 6^a and 6^b, which make up the screen, are ruled with transparent lines upon an opaque ground, the cross-lines g and g' being of different width to first present oblong blocks, and said blocks are

crossed diagonally by thinner lines g^2, which cross the center of said blocks, as shown. In Fig. 6^a the oblong blocks are arranged vertically according to their greatest width, and in Fig. 6^b said oblong blocks are arranged horizontally. By this arrangement the two plates when placed together present relatively larger and smaller transparent blocks succeeding each other alternately in the direction of their diagonals, and between said transparent blocks, vertically and horizontally, are formed oblong apertures positioned diagonally.

Screens constructed as herein shown and described obviate the objection appertaining to the printing-surface, wherein both the black and white dots are connected by thin lines.

With my improved screen the dots appear in their proper size and are disconnected to produce a superior printing-surface, and the screen may be termed "automatic," as it does not depend to the same extent for successful use upon the screen-aperture.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A grating or screen presenting transparent rectangular apertures on an opaque ground, said apertures being so positioned that they succeed each other in the direction of their corners, the opaque portions of the screen being formed of larger blocks the corners of which overlap, substantially as shown.

2. A grating or screen made up to present a series of rectangular transparent apertures adjacent to which are rectangular opaque portions the corners of which overlie each other, substantially as shown, whereby a grating or screen is produced having a less proportion of transparency than opacity.

3. A grating or screen made up of a pair of plates each having different rulings so that when positioned one adjacent to the other, the completed screen will consist of transparent rectangular apertures on an opaque ground, said apertures succeeding each other in the direction of their diagonals, and opaque portions formed of larger blocks the corners of which overlap.

4. A grating or screen for the purpose set forth made up to present a series of rectangular transparent apertures which succeed each other in the direction of their diagonals and are separated by opaque blocks which also succeed each other in the direction of their diagonals, each succeeding opaque portion being intersected by a transparent line, substantially as shown.

5. A grating or screen presenting opaque rectangular portions the corners of which overlap, said opaque portions being intersected or divided to provide transparent portions which are so arranged as to be alternately at right angles with each other, and intermediate transparent rectangular portions which succeed each other in the direction of their diagonals.

In testimony whereof I affix my signature in presence of two witnesses.

MAX LEVY.

Witnesses:
E. L. WOODWARD,
C. A. HAUSSER.