(No Model.)

L. E. & M. LEVY.

SCREEN FOR PHOTOMECHANICAL PRINTING.

No. 492,333. Patented Feb. 21, 1893.

Fig. 1.

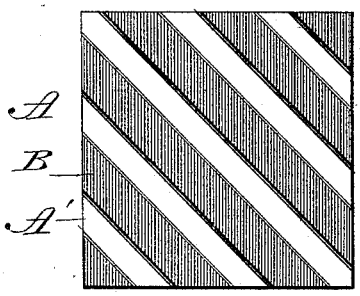


Fig. 2.

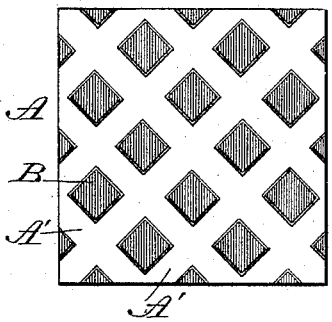


Fig. 3.

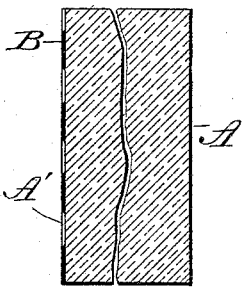


Fig. 4.

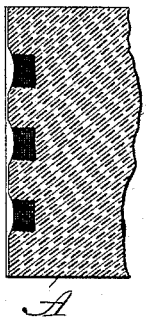


Fig. 5.

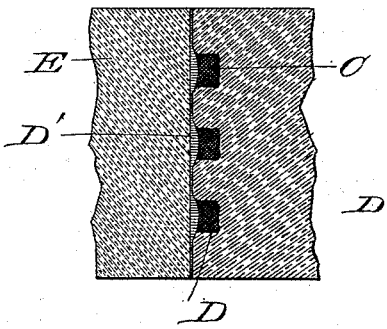


Fig. 6.

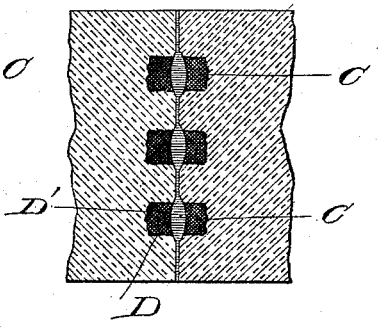


Fig. 7.

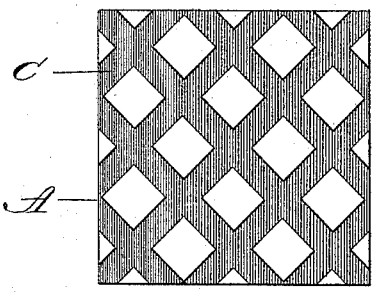
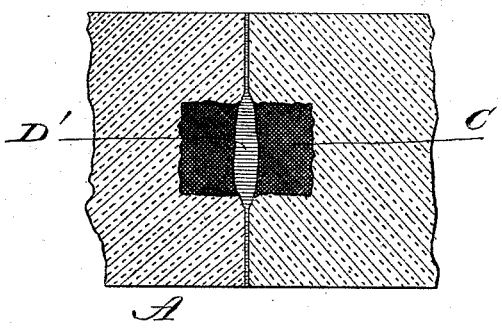


Fig. 8.



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UNITED STATES PATENT OFFICE.

LOUIS E. LEVY AND MAX LEVY, OF PHILADELPHIA, PENNSYLVANIA; SAID LOUIS E. LEVY ASSIGNOR TO MAX LEVY.

SCREEN FOR PHOTOMECHANICAL PRINTING.

SPECIFICATION forming part of Letters Patent No. 492,333, dated February 21, 1893.

Application filed April 13, 1891. Serial No. 388,787. (No model.)

To all whom it may concern.

Be it known that we, LOUIS E. LEVY and MAX LEVY, both citizens of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have jointly invented certain new and useful Improvements in Gratings or Screens which are Used in Making the so-called "Half-Tone or Cross-Line Engravings," the following being a full, clear, and exact description, 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 the letters marked thereon, which form a part of this specification.

This invention relates to improvements in gratings or screens which are intended for use in producing the so-called half-tone or cross-line engravings, the object being to provide a grating or screen in which the lines will be clear, sharp, solid and positive, so as be clearly defined and effective in use.

In the accompanying drawings which illustrate the invention the views represent a small part of the article enlarged or magnified.

Figure 1 is a plan view showing a glass plate with lines ruled in one direction through the etching ground which has been applied thereto. Fig. 2 is a similar view showing the lines ruled so as to cross each other. Fig. 3 is a vertical sectional view showing the appearance of the ground after being ruled, and the glass before it is etched. Fig. 4 is a vertical sectional view showing the plate after being etched, the ground being removed, the furrows being filled with opaque substance and the plate wiped or cleansed. Fig. 5 is a sectional view showing a completed plate with a cover glass. Fig. 6 is a sectional view showing two similar plates connected to each other. Fig. 7 is a plan view of a portion of a completed plate. Fig. 8 is a greatly enlarged sectional view.

In carrying out our invention a ground and polished plate of glass is carefully selected, which is free from scratches or bubbles. This plate of glass is cleaned, and is covered with an etching ground, B, which may be of any suitable composition that will resist hydro-fluoric acid; which ground may be either flowed in solution, rolled, or dabbed on the plate.

In practice the plate of glass A is covered with a coating of iodized or bromized collodion, and prepared in a solution of nitrate of silver exposed to light and the silver precipitated with a suitable deoxidizer. This affords a better basis for an etching ground than does the glass itself, for by absorbing the resisting ground causes it to hold more firmly to the surface of the glass during the process of etching. The lines A′ A′ are ruled through the etching ground so as to expose the glass where the composition or coating is removed by the etching implement. The ruling, which consists of straight lines in extremely close proximity to each other—numbering from one hundred and twenty to about two hundred to the inch—are made by a dividing engine with a diamond point. These lines, which are usually parallel, may also cross each other at right angles. The plate with the lines A′ ruled through the etching ground is then exposed to the action of the hydro-fluoric acid, either liquid or fumes, the back of the plate being suitably protected against the action of the acid. By means of the hydro-fluoric acid the furrows, linear depressions or lines D are eaten into the glass to the desired depth, while the other part of the surface which is protected by the etching ground is not affected by the acid and remains in its original condition. The plate is now washed, or otherwise cleansed, and the whole of the lined surface is covered with a suitable opaque substance C, the body of which may be shellac and lamp black. This opaque substance C is thoroughly rubbed into the furrows, linear depressions or lines D, which are etched into the glass, and is allowed to partially dry and harden. The opaque substance is then removed from the surface of the glass so as to leave the lines furrows or linear depressions filled with a hardened opaque paste, which is designated in the drawings by the letter C. What we term the lines being the base portion of the linear depressions or furrows D, which has been filled with an opaque substance, as the upper inside edges of the lin-

ear depressions or furrows, next to the surface, are slightly roughened by the etching, which portion of the depressions or furrows is filled with the cement D′, which has the same index of refraction as the glass.

In etching the lines, linear depressions or furrows upon the plate or glass, no matter how fine the etching tool may be or how much care may be given to the manipulations, the action of the hydro-fluoric acid, or other biting acid which eats into the glass, will mar, bite or abrade the upper surface or edges, either by biting into the glass at this point or finding its way beneath the etching ground, so that the furrows or linear depressions instead of having sharp angular edges will be rounded or abraded, which seriously affects the results sought to be attained by the grating or screen; therefore, to overcome these imperfections the glass, after the opaque material has been placed in the lines is wiped, so that said opaque material lies below these rounded edges. The glass and opaque material are then covered with a suitable material D′, preferably balsam of fir or Canada balsam, which has the same index of refraction that the glass has. By employing Canada balsam the imperfections at the upper portions of the lines linear depressions or furrows are filled with a substance having the same index of refraction as the glass, and the liability of aberration of the rays and unequal refrangibility are to such a degree removed that they need not be considered in the use of such a grating or screen as is produced by our invention. A plate thus described may be protected on its ruled side by a cover glass, E, which may also be ruled in an opposite direction from the plate to which it is attached, both plates being prepared in the same manner, and Canada balsam is preferably used as a medium for joining together or connecting the two ruled glasses so as to practically produce a single plate in the center of which is the grating or lines.

A plate constructed as hereinbefore described will not obstruct or deflect the rays of light. The grating is not used to receive the picture, nor is the picture or any part thereof at any time fixed on the grating, but said grating in use is placed inside the camera between the lens and the sensitized plate upon which the photographic image is to be impressed.

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

1. A grating or screen for the purpose set forth, consisting of a glass plate having parallel linear depressions or furrows etched therein, the base or lower portion of said linear depressions or furrows being filled with an opaque paste to form lines, the portion of the linear depressions or furrows above the lines being filled with a medium having the same index of refraction as the glass, for the purpose set forth.

2. A grating or screen for the purpose set forth, consisting of two plates of glass each having parallel furrows, linear depressions or lines etched into one of its surfaces, the base portion of said furrows, linear depressions or lines being filled with opaque material, the lined glasses being cemented to each other, so that the lines will cross, by a substance having substantially the same index of refraction as the glass.

3. As an improved article of manufacture a grating or screen for photographic purposes in the production of half-tone plates, consisting of a plate of glass having parallel furrows, linear depressions or lines etched in one of the surfaces thereof, said furrows, linear depressions or lines being partially filled with an opaque material to form lines, the upper portion of said furrows, linear depressions or lines above the lines being filled with a covering of Canadian balsam, for the purpose set forth.

4. A grating or screen for photographic purposes in the production of half-tone plates, consisting of two plates of glass one having fine furrows linear depressions or lines in its surface, said furrows linear depressions or lines containing an opaque substance, the glass plates being cemented to each other to form one refracting medium with a ruling or network in its center, substantially as shown.

5. A grating or screen for photographic purposes in the production of half-tone plates, consisting of two plates of polished glass each having furrows linear depressions or lines etched into their faces, said furrows linear depressions or lines being partially filled with an opaque substance, the remaining portion of the furrows, linear depressions or lines being filled with Canada balsam, said plates being connected to each other so that the lined portions are adjacent to each other, for the purpose set forth.

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Witnesses:
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C. H. WALKER.