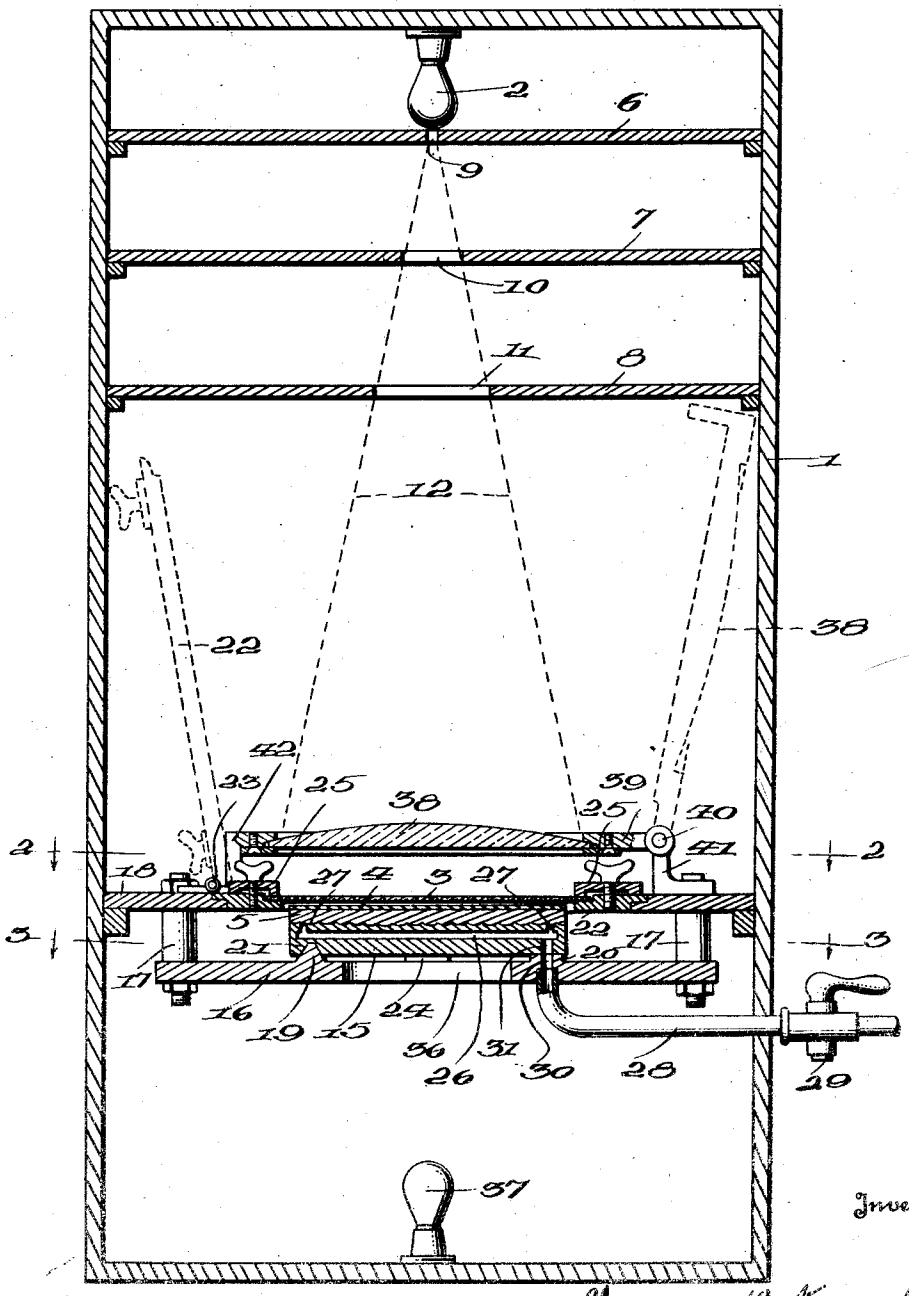
Dec. 29, 1931. C. W. KANOLT 1,838,312

METHOD AND APPARATUS FOR REGISTERING NEGATIVES WITH PRINTING SURFACES

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Fig. 1.



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Fig. 2.

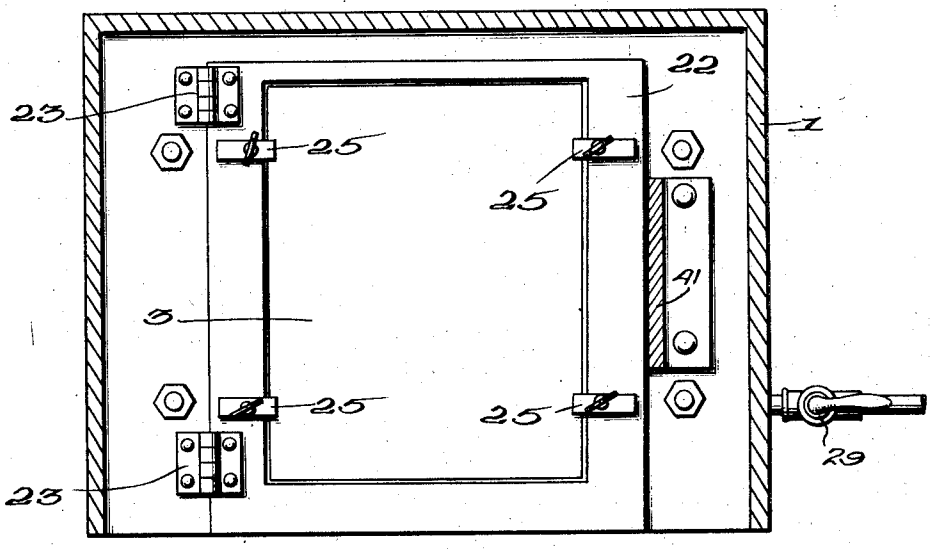
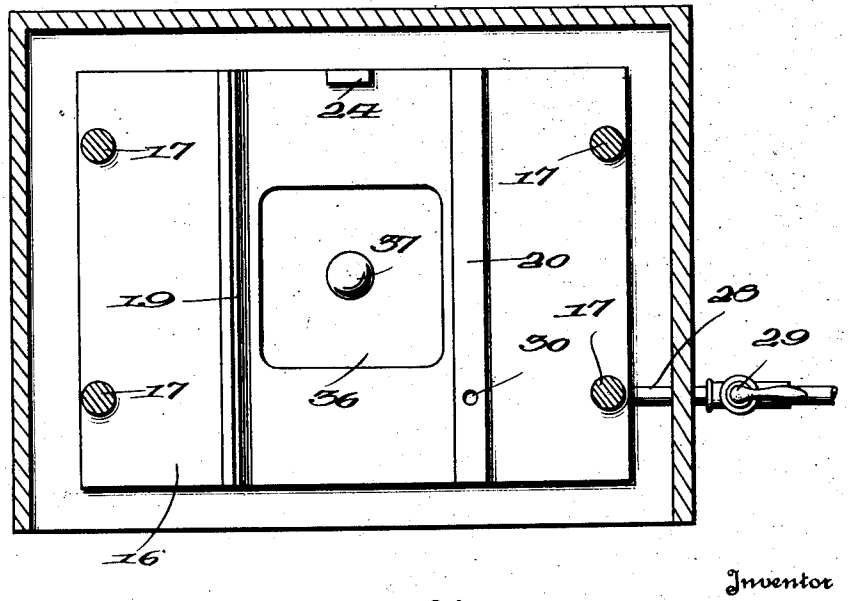


Fig. 3.



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Fig. 5.

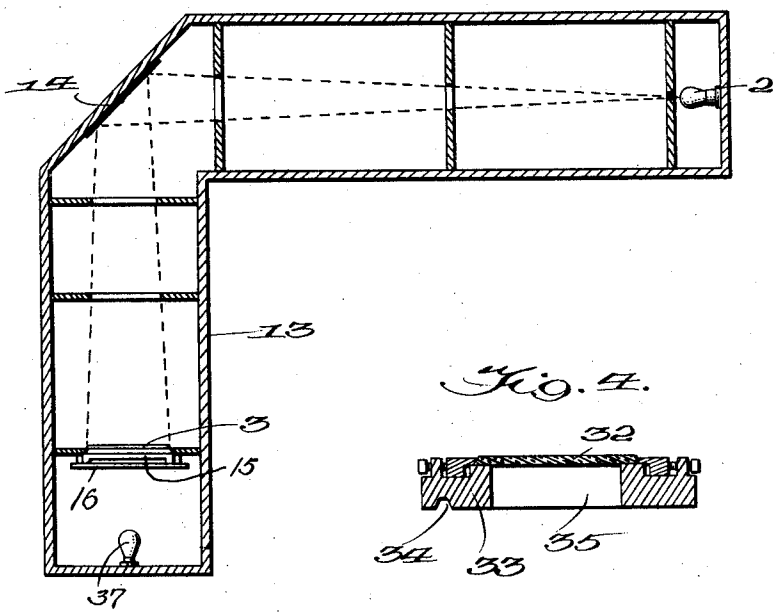


Fig. 4.

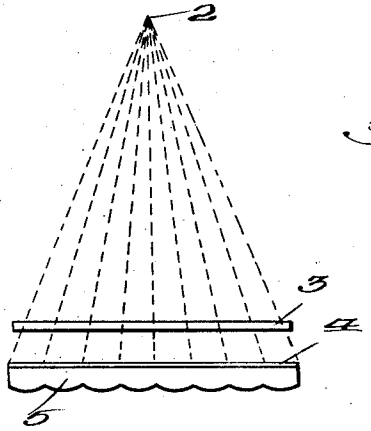
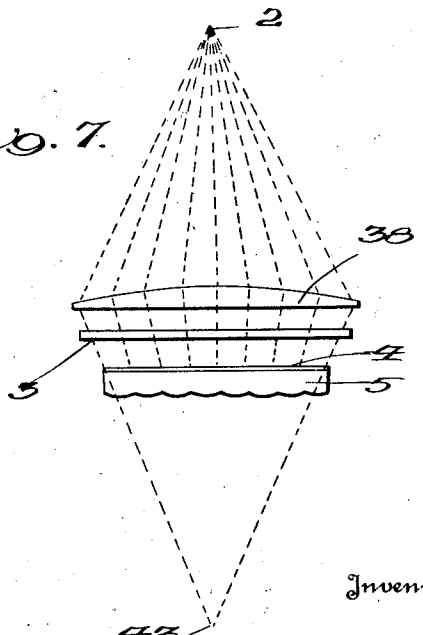


Fig. 6.

Fig. 7.



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UNITED STATES PATENT OFFICE

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METHOD AND APPARATUS FOR REGISTERING NEGATIVES WITH PRINTING SURFACES

Application filed December 9, 1929. Serial No. 412,858.

This invention relates to an improvement in registering devices for the production of stereoscopic pictures and to a method of printing from a stereoscopic negative.

This is an improvement on the invention set forth in my prior application Serial No. 372,738, filed June 21, 1929.

The object of the present invention is to overcome the difficulty that arises when the ribbed celluloid or similar material changes its dimensions slightly after the ribs have been formed in it. If it should expand or contract to a considerable extent, its ribs would no longer fit the grooved plate which supports it during the exposure, and if a print was made on the celluloid in contact with the photographic negative, the print on the celluloid would not be properly located relative to the ribs on the opposite side thereof.

The present improvement effectively overcomes this difficulty and provides for proper registry even when the celluloid has expanded.

A changeable or stereoscopic picture of the type referred to herein comprises a sheet of celluloid or other suitable material having one surface ribbed to form cylindrical lenses and the opposite side coated with a suitable photographic sensitive substance such as gelatin, on which the picture is exposed.

In the accompanying drawings:

Fig. 1 is a vertical sectional view through the complete device;

Fig. 2 is a horizontal section on the line 2—2 of Fig. 1;

Fig. 3 is a similar view on the line 3—3 of Fig. 1;

Fig. 4 is a detached sectional view of the holder for the lined screen to be used in connection with the invention;

Fig. 5 is a vertical section showing a slight modification of the box or casing for the device; and

Figs. 6 and 7 are diagrammatic views illustrating the principle of the invention.

In the drawings, the size of the ridges on the celluloid and its support is exaggerated for the sake of clearness.

In the form shown in Fig. 1, a box or casing is designated generally by the numeral 1 and may be open at one side, as shown in Figs. 2 and 3, or have a suitable door to gain access to the interior thereof. Supported in the top of the box or casing 1 is a source of illumination, such as an electric lamp 2, which is arranged immediately above a photographic negative 3. Immediately beneath the negative 3 is a layer of sensitized gelatin 4 carried on the smooth face of the celluloid sheet 5. The photographic sensitized material 4 is thus spaced slightly from the negative 3. As light from the lamp 2 passes through the negative 3 onto the photographic sensitized material 4, the spacing of the latter from the negative is such that the diverging rays from the lamp form on the surface 4 an image of the negative, which is enlarged sufficiently to match the ridges in the celluloid sheet 5, which has become expanded after the ridges have been formed in it.

To secure good results by this method, it is desirable that the rays of light should originate from a source approaching a point and should contain little or no scattered light. For this purpose a plurality of diaphragms or partitions 6, 7 and 8 are placed in the box or casing 1, as shown in Fig. 1.

The uppermost diaphragm 6 has a relatively fine or small opening 9 close to the lamp 2. The other diaphragms 7 and 8 have openings therein gradually increasing in size and are designated by the numerals 10 and 11, respectively.

The openings 9, 10 and 11 are just large enough to permit of passage of direct rays of light from the lamp 2 to all parts of the negative 3. The boundaries of these rays of light are designated in Fig. 1 by the numeral 12. The diaphragms and the inner surfaces of the box or casing 1 should be painted solid black to minimize reflections.

To best avoid scattered light, it is desirable that the lamp 2 should be at a considerable distance from the negative 3. This distance may be increased without making the apparatus too high, by using a casing of the general form shown in Fig. 8, which casing is designated generally by the numeral 13. As shown, it is approximately L-shaped and

has the lamp 2 in one end thereof and a mirror 14 in the path of the light from the lamp 2, which mirror is set at an angle to reflect the light onto the negative 3, which is arranged in the bottom of the casing.

Referring to Fig. 1, it is shown that the ribbed celluloid 5 is supported on a grooved plate 15 having grooves of the general shape shown in Figs. 6 or 7. In order to utilize a piece of ribbed celluloid that has expanded slightly, it is necessary to have this grooved plate fit rather closely the piece of celluloid and to locate it at just the right distance below the negative to give the correct degree of enlargement to the image.

To accomplish this, the plate 15 is supported by a plate 16 rigidly connected by posts 17 with a fixed plate 18 supported in the box or casing 1. This suspends the bed-plate 16 from the plate 18 and insures permanently correct alignment of the parts. The bed-plate 16 is provided with an inverted V-shaped ridge 19 and a flat ridge 20, upon which the grooved plate 15 is supported, the latter being provided with a groove 21 to receive the rib 19. The distance of the top of the plate 15 from the negative 3 will depend upon the thickness of this plate. A set of grooved plates may be provided with very slightly different dimensions, such that for any degree of expansion likely to be found in the celluloid, a plate will be at hand that will fit it sufficiently closely. The thickness of each plate should be such as to give the correct enlargement for the particular size of celluloid it fits. Since the amount of expansion likely to occur in the celluloid is slight, this may be accomplished without an excessively large number of plates.

The proper distance between the negative and the sensitized surface may be easily calculated. This distance is the product of the distance from the lamp to the negative and the fraction by which the celluloid has expanded.

Each of the grooved plates, such as 15, is provided with a groove 21 to receive the ridge 19 and a flat surface to ride over the ridge 20. This insures an accurate location and orientation of these plates.

To facilitate putting a grooved plate 15 in place, especially when the plate is to be close to the negative 3, the latter is carried by a plate 22 (see Fig. 2), which is hinged at 23 to the supporting plate 18, the hinges being accurately made so that the plate 22 carrying the negative may be turned back to the position shown in dotted lines in Fig. 1.

When the negative is thus raised, the grooved plate 15 may be slid into place over the ridges 19 and 20 until it reaches the stop 24 at the back, as shown in Figs. 1 and 3. The negative 3 is fixed to the plate 22 by means of clamps 25.

In order to hold the celluloid sheet 5 flat on the grooved plate 15, a vacuum system may be employed, similar to that set forth in my prior application Serial No. 372,738, filed June 21, 1929, and above referred to.

The plate 15 has inner channels 26 which have several outlets 27 to the grooved surface of the plate. A vacuum is supplied by a vacuum pump or a suitable source of vacuum (not shown), which is connected with the inner channels 26 through a pipe 28 and is controlled by a valve 29. The pipe 28 is connected with a hole 30 in the bed-plate 16 and through the flat top ridge 20. The grooved plate 15 has a corresponding registering opening 31 which registers with the opening 30 when the plate 15 is moved back against the stop 24 and in its proper position. This connects the pipe 28 with the inner channels 26 in the grooved plate 15.

Before prints are to be made from the negative 3, this negative must be properly located on the plate 22 before it is secured in place by the clamps 25. For this purpose, a lined screen 32 (see Fig. 4) is used, as also set forth in my above referred-to application, and is used in the same way as therein pointed out. This lined screen is mounted in a support 33, having a groove 34 to fit over the ridge 19, the opposite side being flat to ride on the ridge 20.

When the negative is to be located in the correct position, the plate 33 carrying the lined screen 32 is put in place on the bed-plate 16 in the position occupied in Fig. 1 by the grooved plate 15 carrying the celluloid sheet 5.

The thickness of the plate 33 is such that when this is done and the negative is put in place, it is practically in contact with the lined screen 32. The plate 33 and the bed-plate 16 contain central openings 35 and 36, respectively, through which light from a lamp 37 in the bottom of the box or casing may pass up through the lined screen and the negative, which enables the operator to position the negative relatively to the lined screen. After being thus located, the lined screen 32 is removed and the grooved plate 15 carrying the celluloid sheet 5 and the sensitized layer 4 is inserted in its place, as above described, after which the printing may take place by exposing the negative under the lamp 2, after which it may be removed and developed in the usual way.

The principle of this operation is shown diagrammatically in Fig. 6, in which some of the dimensions are exaggerated for the sake of clearness. In this figure, the rays of light are indicated by dotted lines passing through the lines of the negative and falling on corresponding lines on the sensitized surface 4 in registry with the bottoms of the grooves on the opposite surface of the celluloid 5.

A method applicable when the celluloid

has contracted to slightly smaller dimensions than it had when first formed will now be described.

For this purpose, a convex or plano-convex lens 38 is provided, as shown in Fig. 1, and is placed in the horizontal position therein illustrated. When using the invention in connection with celluloid which had slightly expanded, as above described, this lens is turned back to the dotted line position of Fig. 1, but when the celluloid has contracted it is used in the full line or horizontal position of Fig. 1. The lens is of such focal length that the rays of light from the lamp 2 are rendered slightly convergent by passing through the lens. If the celluloid 5 is placed slightly below the negative 3, the image produced on the celluloid will be slightly smaller than the image on the negative. A number of plates similar to the plate 15 would be provided with grooves slightly closer together than the picture strips on the negative, and each plate would have such a thickness that the image formed on the celluloid it supports will register properly with the grooves in the opposite side of the celluloid.

The lens 38 is carried in a mounting 39 hinged as at 40 to a supporting bracket 41 carried by the plate 18. A projection 42 on the mounting is adapted to rest against the plate 22 or the plate 18 when the lens is in the horizontal position to support the edge opposite the hinge 40. When the lens is not required, it is turned back to the position shown in dotted lines in Fig. 1.

The principle of this operation is shown diagrammatically in Fig. 7, where some of the dimensions are exaggerated for the sake of clearness. The rays of light are indicated by dotted lines passing through the strips of the picture in the negative 3 being converged by the lens 38. The images of the boundaries fall upon lines of the photographic sensitive surface 4 in registry with the bottoms of the grooves on the opposite surface of the celluloid 5.

If the rays from the lens 38 were not obstructed they would come together at a focus 43, as shown in Fig. 7. The proper distance between the negative and the sensitized surface may be easily calculated. This distance should be the product of the distance from the negative 3 to the focal point 43, multiplied by the fraction by which the celluloid has shrunk.

I claim:

1. A process of making changeable or stereoscopic pictures on a sensitized surface of a sheet of material, the opposite surface thereof being ridged, comprising holding said sensitized surface spaced from a negative and printing from said negative onto the sensitized surface.

2. A process of making changeable or stereoscopic pictures on a photographically sensitized surface of a sheet of material, the opposite surface thereof having ridges formed therein, comprising holding said sensitized surface opposing and spaced from a negative, and while thus holding the surface and negative in spaced relation causing an exposure of the negative onto the sensitized surface.

3. A process of making changeable or stereoscopic pictures on a photographically sensitized surface of a sheet of material, the opposite surface thereof having ridges formed therein, comprising registering a negative with a lined screen, removing the lined screen, holding the sheet of material in a position approximately corresponding therewith, and with the sensitized surface spaced from the negative, and printing from said negative onto the sensitized surface.

4. A process of making changeable or stereoscopic pictures comprising forming ridges in a face of a sheet of material, coating the opposite side with photographically sensitive material, holding said photographically sensitive surface spaced from a negative, and printing from said negative onto the surface.

5. A process of making changeable or stereoscopic pictures comprising forming ridges in a face of a sheet of material, coating the opposite side with photographically sensitive material, holding the photographically sensitive surface spaced from a negative, and while thus holding the surface and negative in spaced relation causing an exposure of the negative onto the sensitized surface.

6. A process of making changeable or stereoscopic pictures comprising forming ridges in a face of a sheet of material, coating the opposite side of said sheet with photographically sensitive material, registering a negative with a lined screen, removing the lined screen, holding the sheet of material in a position approximately corresponding therewith, with the sensitized surface spaced from the negative, and printing from said negative onto the surface.

7. A process of making changeable or stereoscopic pictures comprising registering a negative with a lined screen, holding in opposed and spaced relation to the negative the sensitized surface of a sheet of ribbed transparent material, and printing on the sensitized surface by exposing the negative to light on the opposite side thereof from the sensitized surface.

8. A method of making changeable or stereoscopic pictures comprising forming ridges in a face of a sheet of material, coating the opposite side with photographically sensitive material, registering a negative with a lined screen, and removing the lined screen, applying the sheet of material in a position approximately corresponding with that formerly occupied by the lined screen, with the sen-

sitized surface spaced from the negative, and printing from said negative onto the surface by exposing the negative to light on the opposite side thereof from the surface.

9. A process of making changeable or stereoscopic pictures from a negative bearing a stereoscopic image comprising registering the negative with a lined screen, holding in opposed and spaced relation from the negative the sensitized surface of a sheet of ribbed material, and printing on the sensitized surface from the negative.

10. A process of making changeable or steroscopic pictures from a lined negative bearing a streoscopic image, comprising registering the negative with a lined screen, holding in opposed and spaced relation from the negative, the sensitized surface of a sheet of ribbed transparent material, and printing from said negative onto the sensitized surface.

11. A device of the character described comprising supporting means for a negative, and means for holding a ribbed sheet of material having a sensitized surface in opposed and spaced relation from the negative, to vary the dimensions of the exposed portions between the negative and sensitized surface.

12. A device of the character described comprising means for supporting a negative, a supporting frame having ribs carried thereby, and a support slidably mounted on said ribs for supporting a sheet of material having a sensitized surface in opposed and spaced relation from the negative.

13. A device of the character described comprising means for supporting a negative, a supporting frame having ribs carried thereby, a supporting plate slidably mounted on the ribs and for supporting a sheet of material having a sensitized surface, with said surface in opposed and spaced relation from the negative, and means for exposing the negative onto said sensitized surface, comprising a source of light spaced a substantial distance from and on the opposite side of the negative from the sensitized surface.

14. A device of the character described comprising a casing, means for supporting a negative therein, a base plate disposed beneath said supporting means, a plate for holding a sheet of material, having a sensitized surface, with said surface in opposed and spaced relation from the negative, and interfitting means between the base plate and the holding plate permitting slidable adjustment of the holding plate to properly position the sensitized surface relative to the negative.

15. A device of the character described comprising a casing, means for supporting a negative therein, a base plate disposed beneath said supporting means, a plate for holding a sheet of material, having a sensitized surface, with said surface in opposed and spaced relation from the negative, and interfitting means between the base plate and the holding plate permitting slidable adjustment of the holding plate to properly position the sensitized surface relative to the negative, a source of light on the opposite side of the negative from the sensitized surface and spaced a substantial distance therefrom, and diaphragms or partitions within the casing having openings therethrough for the passage of light to the negative, said openings beginning with approximately a point size nearest the source of light and gradually increasing in size toward the negative.

16. A device of the character described comprising a casing, means for supporting a negative in said casing, means for supporting a sensitized surface in spaced relation from the negative, a source of light for exposing the negative onto the sensitized surface, and spaced a substantial distance therefrom, and partitions or diaphragms disposed in the casing and having openings therein for the passage of light to the negative, said openings beginning with an approximately point size nearest the source of light and gradually increasing in size toward the negative.

17. A device of the character described comprising a casing, means for supporting a negative therein, means for supporting a sheet of ribbed material having a photographically sensitive surface opposite the ribbed portion, said sensitized surface being supported in spaced relation from the negative and opposed thereto, a source of light arranged on the opposite side of the negative from the sensitized surface, and a convex lens arranged between the source of light and the negative.

In testimony whereof I affix my signature.

CLARENCE W. KANOLT.