July 24, 1928. 1,677,965

A. FRUWIRTH

PROCESS AND MEANS FOR PRODUCING DESIGNS FOR REPRODUCTION

Filed Sept. 17, 1925

Fig 1

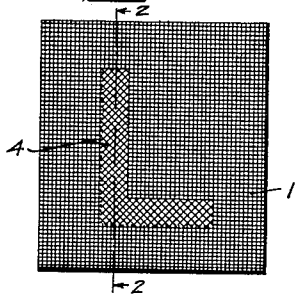


Fig 2

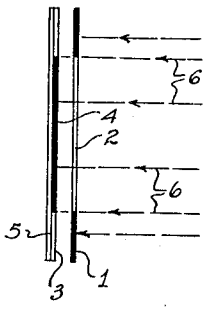


Fig 3

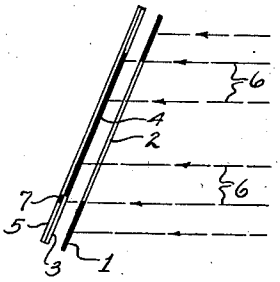


Fig 8

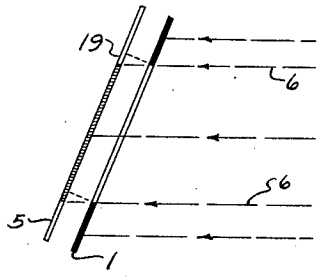


Fig 11

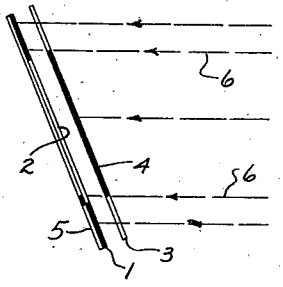


Fig 4

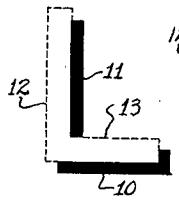


Fig 5

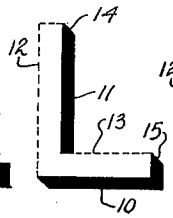


Fig 6

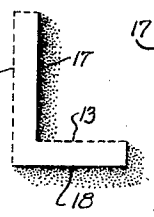


Fig 7

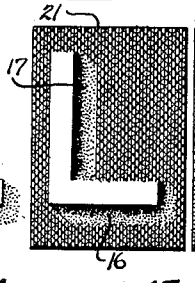


Fig 9

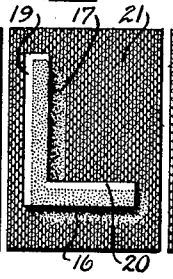


Fig 10

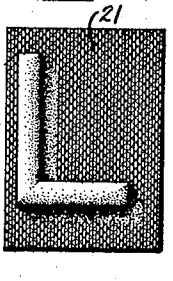


Fig 12

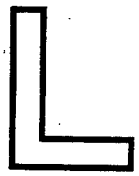


Fig 13

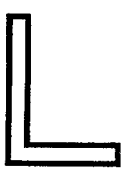


Fig 14

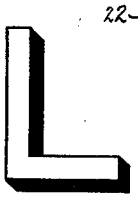


Fig 15

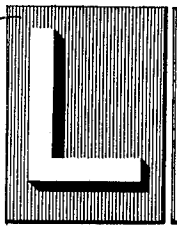


Fig 16

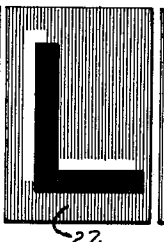
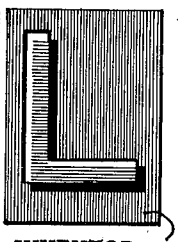


Fig 17



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Patented July 24, 1928. 1,677,965

UNITED STATES PATENT OFFICE.

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PROCESS AND MEANS FOR PRODUCING DESIGNS FOR REPRODUCTION.

Application filed September 17, 1925. Serial No. 56,820.

The invention relates to a method of producing from a suitable original design an additionally ornamented or otherwise elaborated design-bearing product by control and variation in the relative positions and relative movements of the design-bearing elements and light-sensitive surfaces. More particularly the invention relates to a method of producing from pen and ink drawings, prints, letter-press proofs, or other originals, executed in sharp lines, a design-bearing product, such as a metal plate, by means of photography, and wherein the design has the appearance of being raised in relief, of being a reproduction of wood carving, clay or wax molding, castings, metal tablets and the like, these effects being produced by light action and by positioning and relative motion of the image-bearing and light-sensitive instrumentalities. The image-bearing product of my process may be a printing plate, either half-tone or line work, which may be completed by certain final and well-known steps added to the process of my present invention.

The invention consists in the novel steps, methods, articles, instrumentalities and improvements herein shown and described.

The accompanying drawings, which are very largely diagrammatic in character, illustrate certain of the instrumentalities employed, certain steps of the process, and certain products thereof, and together with the accompanying description illustrate one embodiment of the invention, both as to the method and product, and together with the description serve to explain the principles of the invention.

Of the drawings:—

Fig. 1 is an elevation of a negative and positive in associated relation for practicing the process;

Fig. 2 is a transverse vertical section on line 2—2 of Fig. 1, showing the instrumentalities thereof subjected to the action of parallel and perpendicular light rays;

Fig. 3 corresponds to Fig. 2, but shows the step of effecting a light impression obliquely through the negative and positive;

Figs. 4, 5, 6 and 7 are illustrations of products of certain steps of the invention;

Fig. 8 is a diagrammatic showing of a further step in the practice of the invention;

Figs. 9 and 10 are of the same character as Figs. 4 to 7;

Fig. 11 illustrates diagrammatically another step in carrying out certain steps of the invention;

Figs. 12 to 17 illustrate more or less diagrammatically different products of my invention.

In the present preferred manner of carrying out my invention, the original design-bearing element, or "copy" as it is called (which may be a line design produced by hand work, or by printing or otherwise), is photographed to produce a negative in the usual manner, and from this negative a positive is made by contact printing in the usual manner. This negative is usually in practical effect a line negative. The terms "negative" and "positive" need have no unnecessarily limited meaning with respect to the design, but it is understood that in their lights and shadows they are complementary to each other, and are of the same design and scale.

If the negative and positive of the design were placed in contact with each other, there would be no transmitted light action, as is well known. Also if they be spaced apart in exact register, and subjected to parallel light rays, there would be no transmitted light action, as is shown in Fig. 2.

By my invention, I bring a negative 1, with a light-transmitting design 2 thereon, into accurate register with a positive 3 having the complementary clear glass, and the opaque complementary design 4 thereon. The positive and negative in this registered relation are separated from each other by a short distance, and by any suitable means, as for instance an interposed plate of clear glass. A light-sensitive surface 5, which may be of any known or suitable kind, is carried on, or supported by, a glass plate or other suitable support, and is preferably placed in contact with the positive 3.

Light is provided from any suitable source (not shown) the light being projected in substantially parallel rays as indicated by 6. By my invention I cause the light rays 6 to pass through the transparent or translucent parts of the negative and positive in an oblique direction, as shown in Fig. 3. In the particular arrangement shown in Fig. 3, the oblique light action is effected by the light rays which pass through the upper part of the negative 1, strike upon the opaque parts of the positive 3, and have no effect

upon the light sensitive surface 5. The light rays passing through the lower part of the negative impinge upon and pass through translucent or transparent parts of the positive 3, and produce a light effect upon the light-sensitive surface 5 as shown at 7. The size or extent of the light impression made on the light-sensitive surface will depend on, and vary with, the angle of incidence of the parallel light rays on the negative and positive. The light sensitive surface, as stated, may be of any particular kind, and is preferably a developable paper of which there are many different varieties.

By selecting a proper axis of inclination for the spaced-apart positive and negative with respect to the light rays, greatly varied effects may be produced by the action of the light passing therethrough upon the light-sensitive surface 5, and the shape of the image impressed on the light-sensitive surface also may be correspondingly varied. Taking a negative and positive bearing the letter L shown in Fig. 1 by way of example, by inclining the negative and positive about a properly selected axis, a shading 10 may be produced, on the light sensitive surface 5, at the bottom of the letter and a corresponding shading 11 at the right-hand side thereof. It will be understood that this is merely an example of almost numberless effects which may be secured. The general outline of the remaining portions to the letter are indicated for sake of clearness in Fig. 4 by dotted lines 12 and 13, but it will be understood that in this instance these lines would not appear upon the light-sensitive surface 5, due to the complete blocking of the light rays by the combined action of the negative and positive. The light sensitive surface 5, after receiving the light impression as described, may then be developed, and be further treated in any known or desired manner to produce any desired final product, as for instance, a half-tone or line engraving printing plate.

By my invention further novel effects in the design produced upon the light-sensitive surface may be effected. If the spaced apart negative and positive and the light sensitive surface, in addition to being inclined to the parallel light rays 6 at a desired or predetermined plane or axis of inclination, are rocked about a selected or predetermined axis of inclination at uniform speed (or the light source may be correspondingly alternatively moved), the shadow effect of the letter will then be generally similar to Fig. 5, which includes in addition to Fig. 4 the oblique shadowed portions 14 and 15, thereby giving a more finished appearance to the letter.

If it is desired to produce a shaded effect instead of a solid tone or color image on the light-sensitive surface, the relative reciprocatory motion with respect to the light of the negative, positive and light-sensitive surface 5 about their axis may be varied in speed so that the parts next to the letter or other design will receive the greatest amount of exposure and light action, or vice versa. A gradated or vignetted effect may be produced on the light-sensitive surface as shown at 17 and 18 in Fig. 6. This effect may be intensified and also varied if the negative and positive and light sensitive surface are simultaneously rotated about two axes, or otherwise varied, the principle being the same.

My invention comprises also producing a background design on the light sensitive surface. To produce a background of uniform tone, and a complete outlining by this background of the letter or other design (in addition to the outlining provided by the shading already described), the light-sensitive surface, already exposed as previously described, may be placed in contact and register with the positive used alone, and subjected to an additional light exposure of short duration. The background may be gradated in tone if desired by varying the amount of exposure in the different parts. This would give the effect of the shaded letter for the design, with either solid or gradated shading outlined in white upon a gray background, as indicated at 21 in Figs. 7, 9 and 10.

To produce ornamentation or other additions upon, that is within the area of, the letter or design itself, which heretofore has been defined in white, these white portions of the letter or other design may be subjected to treatment as will now be described, or its equivalent. In the present preferred manner of carrying out this step, the light-sensitive surface 5 which has usually already been exposed to light in the manner previously described, is placed in register and in spaced-apart relation to the negative alone, as shown in Fig. 8. If the negative and the light-sensitive surface are again inclined to the direction of propagation of the light rays at substantially the same angle as was employed in the first exposure to the light rays, narrow edges 19 and 20, on the upper and left-hand side of the letter are protected from the rays of light, as shown at 19 in Fig. 8. After a brief exposure, and development of the light-sensitive surface, the body of the letter will be printed with the exception of those narrow light edges 19 and 20 at the upper and left-hand sides of the letter, as shown in Fig. 9. In this figure, also, this step is shown in connection with the production of a background for the letter, as already described, and as shown in Fig. 7, and this step is usually preferably employed in connection with the production of such a background for the letter.

If it is desired to give a rounded, or otherwise modified, effect to the surface of the letter or other design, this may be effected in accordance with my invention by reversing the position of the negative and positive with respect to the direction of propagation of the parallel light rays (as shown in Fig. 11), the positive in this instance being placed toward the light, the positive and negative being in their spaced-apart relation. The light-sensitive surface 5 in this case is placed in contact with the negative. The instrumentalities as just described are then subjected to exposure from the light rays, inclined in the opposite direction from that previously used.

The negative and positive and the light-sensitive surface are preferably kept in motion about their axis during this exposure. The edges of the letter next to the shadows and opposite to the light edging as shown in Fig. 9 will be gradated in shade, or vignetted, and the blending of this effect with that previously described will give a strong impression of roundness and of additional relief to the surface of the letter or other design, as is exemplarily shown in Fig. 10.

The texture of the letter or corresponding design may be otherwise varied than by shading as already described. As for instance, a negative or positive, which I will conveniently call a "texture negative", may be employed. This negative could be a photographic reproduction from specimens of wood, marble, grained or art papers, or in fact anything within the fancy or taste of the operator. This extra "texture negative" may be interposed between the negative 1 and the positive 2 and constitute the spacing-apart instrumentality, or it may be placed between the positive and the light-sensitive surface 5. By such use the reproduction of the texture in the letter, or other design, will be automatically effected in connection with carrying out the steps already described.

The immediate product of the process as already described is a positive print or photograph with various shadings or tints running from pure white to black, and with intermediate tones of gray, and producing various and artistic effects within and about the design, entirely by the light action, as modified by the position and motion of the various instrumentalities. Such a positive print lends itself readily to making photo-engravings or printing plates by the half-tone process, although it is obviously adapted to other uses as well. It is practicable also to produce as the direct product of the process photographs for use in ordinary line process work.

In the present preferred manner of carrying out my invention for line process work, the negative and positive are properly tilted and kept stationary during the exposure, as already described, to produce the shadow etching, producing the effect illustrated in Fig. 4, or, by uniform motion of these instrumentalities about a properly selected axis, the effect shown in Fig. 5 may be produced. To produce backgrounds for the design, negatives of sharp line formations, dots, grain, patterns, and the like, may be created by using negatives. Also the body of the letter may be treated, as in the general manner already described but producing figures or texture adaptable for line reproduction, proceeding substantially as already described. In practicing the method for use in producing line process work, special care must be taken that the source of light be at a relatively great distance, and that it be as small as possible, in order to project a sharp, and in practical effect parallel, beam of light onto the negative and positive, and to prevent the possibility of light creeping around the negative or positive, especially in view of the fact that the various instrumentalities are not in contact with each other.

A complete outline letter or other design may be produced, either larger or smaller than the corresponding parts of the negative and positive, or both larger and smaller. In Fig. 12 an outline letter is shown, the outline being on the outside of the design, while in Fig. 13 a similar outline is shown formed on the inside of the design. In producing the effect shown in Fig. 12 the arrangement is similar to that in Fig. 3 and the light-sensitive surface 5 is in contact with the positive. In Fig. 13 a letter is shown, the outline being on the inside of the design. In producing the effect of Fig. 13, the positions of the instrumentalities are reversed, and in this instance the positive is toward the light, and the light-sensitive surface is in contact with the negative as shown in Fig. 11. The whole assembly is suitably tilted and rotated about the axis of inclination and usually kept in motion during a prolonged exposure to secure the positive black lines.

If it be desired to combine these effects with a strong block letter effect, this may be done by combining the procedures previously described as to Figs. 12 and 5, as will now be obvious, and as shown in Fig. 14.

In Fig. 15 a corresponding effect, with the letter or other design in white and with a conventional black block letter shadow is shown, with a line background 22. This may be effected by using a negative of a ruled background. After the block letter design is imparted to the light-sensitive surface 5, as in the manner already described, the surface 5 is subjected to light action through a line negative, the letter or other design being opaque on the line negative, thereby producing a background the same as, or similar to, the background 22 in Figs. 15, 16 and 17.

The effect shown in Fig. 16 is produced by printing the letter or design on the light-sensitive surface 5 while in contact with the negative 3 only. The light-sensitive surface after being so exposed is laid in register with, but separated by a small space from, the positive, the line background negative being preferably interposed between them, and the whole is inclined to the direction of the light rays, and an additional exposure is made.

In Fig. 17 there is shown a skeleton letter as in Fig. 12, a shadow letter as in Fig. 4, and a light or clear edge tint or area within the letter as shown in Fig. 9. The background is printed in by direct contact from a combination letter positive and background negative.

It will be obvious that the foregoing steps may be employed for the production of images or lettering appearing to be in relief, as follows:

The shadows around the letters are produced by spacing apart the positive and negative and exposing the printing surface, in contact with the positive, to the action of oblique light passing through both negative and positive.

The tint with the light edge is printed on the face of the lettering by exposing the printing surface to oblique light passing through the negative alone, no positive being used, and the printing surface being spaced from the negative.

The shading on the shadow side of the face of the letter is then produced by exposing the printing surface to the action of oblique light passing through the spaced apart positive and negative, with the printing surface in contact with the negative.

Finally, a background may be printed behind the letters by combining the positive with a special background negative and exposing straight through both.

Sharp outlines will result from exposure to oblique light with the negative and positive held stationary. Diffused and softened shadows and high lights are created by an additional revolving of the negative and positive combinations during exposure.

In order to produce lettering which appears to be carved out, that is, intagliated below the surface as distinguished from lettering appearing to be in relief as above described, it is necessary to reverse the positions of the positive and negative as described in the foregoing series of operations.

For example, to produce the shadow within the letter, the printing surface, in contact with the negative, is exposed to oblique light passing through the spaced apart positive and negative. The next exposure is made through a spaced positive alone, no negative being used. For the third exposure the negative and positive are spaced apart, with the printing surface in contact with the positive.

The background may now be printed in by exposing through a background negative and the image negative, with the printing surface in contact with the image negative, or the background negative can be placed between the image negative and the printing surface, according to whether a sharply outlined or slightly diffused effect is desired.

The process is adaptable likewise for making color printing plates, either in half-tone or in line, or for other color printing processes. Instead of performing the various sequential steps as already described on one and the same light-sensitive surface, each step, or various successive steps, are photographed separately on a new or different light-sensitive surface, in accordance with the method hereinbefore described. From each of these separate prints, or other light-sensitive surfaces, a suitable printing plate is prepared by the usual, or other subsequent steps. These may be proved in an ordinary proof press in the different colored printing inks on a sheet of proofing paper, as for instance in black for the shadows, green for the face of the letter or ornamental or other design, and brown for the background, or in any other suitable color combinations as may be desired.

For the purpose of carrying out the invention already described, I have invented a box or holder, provided with a frame and clamps for receiving and holding the negative and positive and the light sensitive member in correct register, and properly spaced apart, and permitting interchange of positions between these various instrumentalities as may be necessary or desired. My apparatus provides also for using a texture negative with or without a clear glass plate, or other proper instrumentality, as the spacing means between the negative and positive.

This box or holder which I have invented also has means for effecting the desired variable inclination relatively to the source of light, either about a single axis, or simultaneously about two axes, by means of proper pivot bearings, and with clamping or other suitable holding means; and also provides means, such as handles or gearing for rocking or oscillating the box or holder, with the contained instrumentalities, either about one or both axes. This mechanism provides means for interchanging the position of the various members and instrumentalities without disturbing or losing the correct register, and permits the use of either a negative or a positive alone, and either in contact with, or spaced away from, the light-sensitive surface.

It will be understood that the invention is not limited to the precise forms of instrumentalities, nor to the exact described man-

ner of practicing the various steps of the invention, but that changes may be made therefrom without departing from the principles of the invention or sacrificing its chief advantages.

What I claim is:—

1. The process of producing a printing plate or other design bearing surface which comprises making a negative of an original, making a positive of the original, placing the negative and positive in spaced apart relation, placing a light-sensitive surface in contact with the positive, and exposing the light sensitive surface to light passing obliquely through the spaced-apart negative and positive.

2. The process of producing a printing plate or other design bearing surface which comprises making a negative of an original, making a positive of the original, placing the negative and positive in spaced apart relation, and exposing a light-sensitive surface to rays of light passing obliquely through the spaced apart negative and positive, and moving them together about an axis during said light exposure.

3. The process of producing a printing plate or other design bearing surface which comprises making a negative of an original, making a positive of the original, placing the negative and positive in spaced apart relation, placing a light-sensitive surface in contact with the positive, and exposing the light sensitive surface to light passing obliquely through the spaced-apart negative and positive, and moving them together about an axis during said light exposure.

4. The process of producing a printing plate or other design bearing surface which comprises making a negative of an original, making a positive of the original, placing the negative and positive in spaced apart relation, exposing a light-sensitive surface to rays of light passing obliquely through the spaced apart negative and positive, and moving them together about an axis during the light exposure, and varying the speed of rotation to gradate the light effect.

5. The process of producing a printing plate or other design bearing surface which comprises making a negative of an original, making a positive of the original, placing the negative and positive in spaced apart relation, placing a light-sensitive surface in contact with the positive, and exposing the light-sensitive surface to light passing obliquely through the spaced-apart negative and positive, and moving them together about an axis during the light exposure and varying the speed of rotation to gradate the light effect.

6. The process of producing a printing plate or other design bearing surface which comprises making a negative of an original, making a positive of the original, placing the negative and positive in spaced apart relation, placing a light-sensitive surface in contact with the positive, and exposing the light sensitive surface to light passing obliquely through the spaced-apart negative and positive, and then exposing said light-sensitive surface in contact with the positive to light through the negative alone to produce a shaded background about the design.

7. The process of producing a printing plate or other design bearing surface which comprises making a negative of an original, making a positive of the original, placing the negative and positive in spaced apart relation, exposing a light-sensitive surface to rays of light passing obliquely through the spaced apart negative and positive, and further exposing the light-sensitive surface in spaced away relation to the negative to light passing through the negative.

8. The process of producing a printing plate or other design bearing surface which comprises making a negative of an original, making a positive of the original, placing the negative and positive in spaced apart relation, exposing a light-sensitive surface to rays of light passing obliquely through the spaced apart negative and positive, and further exposing the light-sensitive surface in spaced away relation to the negative to light passing obliquely through the negative.

9. The process of producing a printing plate or other design bearing surface which comprises making a negative of an original, making a positive of the original, placing the negative and positive in spaced apart relation, exposing a light-sensitive surface to rays of light passing obliquely through the spaced apart negative and positive, further exposing the light-sensitive surface in spaced away relation to the negative to light passing through the negative, and moving the negative about an axis during said light exposure to give a shaded effect on the design.

10. The process of producing a printing plate or other design bearing surface which comprises making a negative of an original, making a positive of the original, placing the negative and positive in spaced apart relation, exposing a light-sensitive surface to rays of light passing obliquely through the spaced apart negative and positive, further exposing the light-sensitive surface in spaced away relation to the negative to light passing obliquely through the negative, and moving the negative about an axis during said light exposure to give a shaded effect on the design.

11. The process of producing a printing plate or other design bearing surface which comprises making a negative of an original, making a positive of the original, placing the negative and positive in spaced-apart relation, exposing a light-sensitive sur-

face to rays of light passing obliquely through the spaced apart negative and positive, and moving them together about a plurality of axes during said light exposure.

12. The process of producing a printing plate or other design bearing surface which comprises making a negative of an original, making a positive of the original, placing the negative and positive in spaced-apart relation, placing a light-sensitive surface in contact with the positive, and exposing the light sensitive surface to light passing obliquely through the spaced-apart negative and positive, and moving them together about a plurality of axes during said light exposure.

13. The process of producing a printing plate or other design bearing surface which comprises making a negative of an original, making a positive of the original, placing the negative and positive in spaced-apart relation, exposing a light-sensitive surface to rays of light passing obliquely through the spaced apart negative and positive, and moving them together about a plurality of axes during the light exposure and varying the speed of rotation to gradate the light effect.

14. The process of producing a printing plate or other design bearing surface which comprises making a negative of an original, making a positive of the original, placing the negative and positive in spaced-apart relation, placing a light-sensitive surface in contact with the positive, and exposing the light sensitive surface to light passing obliquely through the spaced-apart negative and positive, and moving them together about a plurality of axes during said light exposure, and varying the speed of rotation to gradate the light effect.

15. The process of producing a printing plate or other design bearing surface which comprises making a negative of an original, making a positive of the original, placing the negative and positive in spaced-apart relation, exposing a light-sensitive surface to rays of light passing obliquely through the spaced-apart negative and positive, and submitting the design portion of the light-sensitive surface to light action through a texture negative.

16. The process of producing a printing plate or other design bearing surface which comprises making a negative of an original, making a positive of the original, placing the negative and positive in spaced-apart relation, exposing a light-sensitive surface to rays of light passing obliquely through the spaced-apart negative and positive, and simultaneously submitting the design portion of the light-sensitive surface to light action through a texture negative.

17. An instrumentality for use in making designs for photo-mechanical reproduction which comprises a negative and positive spaced apart and a member having a light-sensitive surface in contact with the positive.

18. An instrumentality for use in making designs for photo-mechanical reproduction which comprises a negative and positive, a texture negative in conjunction therewith, and a member having a light-sensitive surface in contact with the positive.

19. The process of producing a design bearing surface which comprises making a negative of an original, making a positive therefrom, placing the negative and the positive in spaced apart relation, exposing a light sensitive surface in contact with the positive to rays of light passing obliquely through the spaced apart negative and positive, exposing said light sensitive surface, while spaced from said negative, to rays of light passing obliquely through said negative alone, and exposing said light sensitive surface in contact with the negative to rays of light passing obliquely through the spaced apart positive and negative.

20. The process of producing a design bearing surface which comprises making a negative of an original, making a positive therefrom, placing the negative and the positive in spaced apart relation, exposing a light sensitive surface in contact with the positive to rays of light passing obliquely through the spaced apart negative and positive, exposing said light sensitive surface, while spaced from said negative, to rays of light passing obliquely through said negative alone, exposing said light sensitive surface in contact with the negative to rays of light passing obliquely through the spaced apart positive and negative, and exposing said light sensitive surface to rays of light passing perpendicularly through said positive and a background negative.

21. The process of producing a design bearing surface which comprises making a negative of an original, making a positive therefrom, placing the negative and the positive in spaced apart relation, exposing a light sensitive surface in contact with the positive to rays of light passing obliquely through the spaced apart negative and positive while simultaneously rotating the assembly of light sensitive surface, positive and negative about an axis, exposing said light sensitive surface, while spaced from said negative, to rays of light passing obliquely through said negative alone, and exposing said light sensitive surface in contact with said negative to rays of light passing obliquely through the spaced apart positive and negative while simultaneously rotating the assembly of light sensitive surface, negative and positive about an axis.

22. The process of producing a design bearing surface which comprises making a

negative of an original, making a positive therefrom, placing the negative and the positive in spaced apart relation, exposing a light sensitive surface in contact with the positive to rays of light passing obliquely through the spaced apart negative and positive while simultaneously rotating the assembly of light sensitive surface, positive and negative about an axis, exposing said light sensitive surface, while spaced from said negative, to rays of light passing obliquely through said negative alone, exposing said light sensitive surface in contact with said negative to rays of light passing obliquely through the spaced apart positive and negative while simultaneously rotating the assembly of light sensitive surface, negative and positive about an axis, and exposing said light sensitive surface to rays of light passing perpendicularly through said positive and a background negative.

23. The process of producing design bearing surfaces to be used in making color printing plates, which comprises making a negative reproduction and a positive reproduction of a line original, and from these making a plurality of photographic prints bearing respectively modifications of the design, one such print being produced by spacing apart said reproductions and exposing a light sensitive surface to rays of light passing obliquely therethrough, another such print being produced by exposing another light sensitive surface to rays of light passing obliquely through only one of said reproductions, and separately utilizing said prints so made for making printing plates for respectively different colors.

24. The process of producing design bearing surfaces to be used in making color printing plates, which comprises making a negative reproduction and a positive reproduction of a line original, and from these making a plurality of photographic prints bearing respectively modifications of the design, one such print being produced by spacing apart said reproductions and exposing a light sensitive surface to rays of light passing obliquely therethrough, another such print being produced by exposing another light sensitive surface to rays of light passing obliquely through only one of said reproductions, another such print being produced by spacing apart said reproductions and exposing another light sensitive surface to rays of light passing obliquely through said reproductions in reverse order with respect to the first named exposure, and separately utilizing said prints so made for making printing plates for respectively different colors.

In testimony whereof, I have signed my name to this specification.

ARTHUR FRUWIRTH.