May 4, 1948. J. P. DOBBINS 2,441,010

REFLEX REPRODUCING PROCESS

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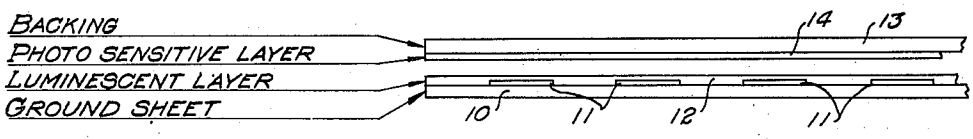


FIG. 1

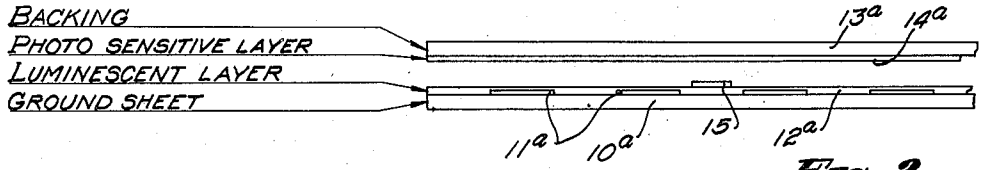


FIG. 2

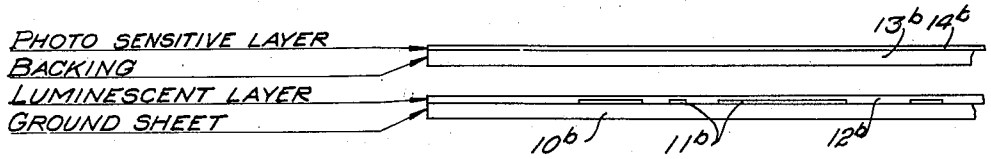


FIG. 3

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REFLEX REPRODUCING PROCESS

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3 Claims. (Cl. 95—5)

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The present invention relates to the art of reproducing drawings, written matter, and other graphic material, and has as one of its objects to provide a process whereby an impression may be transferred from a drawing, picture, printed page, or any flat surface having light and dark areas thereon, directly to a photosensitized surface without the necessity for projecting light rays through the drawing, printed sheet, picture, or the like.

A more specific object of the invention is to provide an improved method of forming templates on sheets of opaque material such as, for example, sheet metal, directly from a drawing which may be prepared upon a similar opaque sheet. To this end, the invention contemplates the provision of a source of light which is interposed between the drawing or other original matter, and the photo-sensitized sheet, the source of light being in the form of a sheet or layer of luminescent material which is activated prior to the bringing together of the original and the photo-sensitized sheet.

Another object of the invention is to provide an improvement in reflex photo printing, such as to make it possible, for example, to reproduce the printed page of a book simply by placing between that page and the adjacent page, a sheet of photo-sensitive material and closing the book upon said sheet.

The invention may be adapted not only to the forming of a print directly from the original (in which case the print would be a negative; i. e., lights and shadows would be reversed in the print, as compared to the original) but also to the forming, from a negative thus produced, of positive prints in which the lights and shadows correspond to those of the original.

The invention comprises novel steps and novel arrangements of steps, which will more fully and plainly appear in the course of the following description. However, this description merely includes, and the accompanying drawing merely shows, certain embodiments of the invention, which are given by way of illustration or example only.

In the drawings, like reference characters designate similar parts in the several views.

Fig. 1 is a sectional diagram showing one way in which the process may be carried out.

Fig. 2 is a similar view showing a slight modification which will take care of errors and permit of emphasizing or enlarging certain details during the carrying out of the process.

Fig. 3 is another similar view showing a modification whereby a positive or forward print may be obtained direct from the reproduced matter in a single operation.

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Referring now to Fig. 1 in particular, there is shown a ground sheet at 10, with drawings, diagrams, writings or other delineations of any character, indicated at 11, on its upper or obverse surface.

The ground sheet 10 may be paper, cardboard, wood, metal, or any other equivalent sheet material, and the obverse surface thereof and the delineations 11 thereon, are of contrasting characteristics such that one of them is light-reflecting, while the other is light absorbing. For example, the obverse surface of the ground sheet may be in the form of a white or light colored enamel or other suitable light-reflecting material, and the delineations 11 may be formed in black ink or dark soft lead pencil capable of absorbing the majority of the light which impinges thereon.

The delineations 11 may either be in the form of lines placed upon the obverse surface of the ground sheet 10, or may be in the form of a mask covering the obverse surface of the ground sheet 10, except for lines that are scored therethrough to expose said obverse surface. In either case, the delineations 11 and obverse surface of the ground sheet 10 are of reflecting and non-reflecting properties, respectively, or vice versa.

The first step in the process is the application to the ground sheet, delineated in any manner according to the foregoing, of a layer of light-permeable luminescent material as indicated at 12, which may be transparent or translucent or permeable in any degree suitable to the subject matter of delineations on the ground sheet or the apparent distinctions therebetween. Preferably the luminescent, light-permeable layer, is a lacquer which may be sprayed on the ground sheet 10 to cover its obverse face and the delineations thereon. Such a lacquer may be composed of the following:

1. A phosphorescent material such as calcium or zinc-sulfide.

2. A film forming vehicle or binder such as ethyl cellulose.

3. A solvent, such as toluol, a xylol, or mixture of similar ingredients.

4. A plasticizer, such as dibutyl phthalate.

5. A resin, such as Beckacite #1112, supplied by Reichold Chemical Corporation.

Having thus coated the ground sheet 10 and the delineations 11, of whatever character, the next step is to apply, to a suitable backing sheet

13, a light-sensitive or photo-sensitive layer 14. This step is, of course, taken in a dark space or one sufficiently protected from light, so that a printing surface will be ready prior to the next step. The material 14 may be of any commercial photo-sensitive material of a good grade.

With the printing surface thus ready, the ground sheet 10 with its luminescent material 12 is exposed to light such as ordinary daylight or fluorescent light for a short period, say twenty seconds, or is otherwise activated in any suitable or acceptable manner, and the prepared photo-sensitive surface 14 is then applied to the activated, luminescent coating 12 and maintained or held, in any suitable manner, between suitable surfaces capable of having pressure exerted thereagainst, during the exposure of the photo-sensitive layer 14 by the absorbed light of the luminescent layer 12. The time of such exposure will, of course, depend upon the conditions and materials, and must be properly judged in each case.

Assuming the backing sheet 13 to be of opaque material, the photo-sensitive material, layer, or coating 14 will, when developed by the usual photographic developing process well known to those skilled in the art, exhibit a true negative, from which a true positive print will be obtained by a repetition of the foregoing process, using the negative in place of the ground sheet 10 and its delineations 11, and applying thereto the luminescent, light-permeable coating 12 of Fig. 1.

By "true negative" is meant a backward print of the original, with a reversal of the lights and shadows with respect to the original, and by "true positive" is meant a forward print with the lights and shadows corresponding to the original.

In the printing operation, the light from those portions of the luminescent layer 12 which overlies the reflecting areas of the ground sheet 10, will strike the photo-sensitized surface both as direct rays and rays reflected from the reflecting surface, while the light rays from those portions of the luminescent layer which overlie the light absorbing portions of the obverse surface 10 will strike the photo-sensitized surface primarily in the form of direct rays. These latter rays will, therefore, be of much lower intensity than the other rays, and as a result there will be produced a print negatively corresponding to the original.

In another of its aspects, the invention makes it possible to copy the printed page of a book simply by placing a sheet of previously activated transparent or translucent luminescent material in contact with the printed page and placing, in contact with the other side of the luminescent sheet, the photo-sensitized surface of a sheet of printing material, and then closing the book so as to press the two sheets of material firmly in contact with each other and with the page to be reproduced. Thus, the invention provides a very simple method of reproducing printed pages.

Similarly, an opaque drawing, such as an original on a metal sheet, may be transferred directly to a metal template sheet having a photo-sensitized surface by interposing between the original and the template sheet, a sheet of previously activated luminescent material.

It is to be understood that the negative 13—14, can be used in other manners for the production of a positive forward (or backward) print. Thus, if the backing sheet 13 is of transparent material, this negative 13—14 can be laid, 14 down, on a sheet of sensitized paper (or other base) and then printed by light from above, giving a forward positive print. Or the negative can be laid face up, on the sensitized sheet, and printed by light from above, giving a backward positive print.

It has been assumed that the ground sheet 10 is opaque and light-reflective, and that the delineations 11 are of black ink, which is absorptive of light and not reflective. The ground sheet 10 can be transparent and colorless and laid upon a white sheet of light-reflecting paper.

If the material 11 is a solid object, e. g., a metal template, its upper surface should be non-reflecting, e. g., it could be first given a coat of dull black paint.

In all cases, the upper surface of material 11 should be light-absorbing (non-reflecting or substantially so).

By thus initially coating the ground sheet and its delineations, or the negative, as the case may be, such coating forms a surface as is exemplified in Fig. 2, which may receive suitable delineations on its surface, after it has hardened, either for the purpose of correction of the delineations of the ground sheet or by way of addition thereto, or emphasizing thereof. Thus, this figure, in which the ground sheet is indicated at 10*a*, the delineations thereon, at 11*a*, and the luminescent, light-permeable layer at 12*a*, shows further delineations 15 on the surface of the latter layer. The photo-sensitive coating is seen at 14*a* in this figure on a backing 13*a* which latter may be of light-permeable material, either transparent or translucent, so that after developing, the print will appear backwardly at the coated face of the backing, or may be viewed forwardly at the uncoated face of the backing.

Moreover, as exemplified in Fig. 3, where the ground sheet, delineations thereof, and luminescent, light-permeable coating thereon, appear, respectively, at 10*b*, 11*b* and 12*b*, the backing sheet 13*b* may be faced toward and against the activated luminescent layer 12*b*. In this instance the backing layer or sheet 13*b* will be permeable to light rays and the result of the exposure, when developed, will give a forward print (negative) when viewed from the coated surface of the backing sheet, and a true negative when viewed from the side 13*b*.

According to either form of the invention, and apart from the necessary protection from light during certain steps of the process, it is possible to readily carry out the same without regular laboratory equipment and, in particular, without the printing frames and light boxes now commonly required in reflex printing.

The element 15 of Fig. 2 is merely an alternative or additional feature. One feature of the present process is that it will reproduce most any surface. For instance, it will reproduce the grain of wood by merely covering the wood with the luminescent material. The luminescent material would not have to be limited to the light portions of the wood, but may be applied evenly thereover.

While I have illustrated and described what I now regard as the preferred embodiments of my invention, the steps and sequences of steps are, of course, subject to modifications without departing from the spirit and scope of my invention. I, therefore, do not wish to restrict myself to the particular forms, steps or sequences of steps described hereinbefore, but desire to avail myself of all modifications that may fall within the scope of the appended claims.

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

1. The process of reproduction by reflex printing comprising the steps of applying to matter which is to be reproduced and which is first delineated on an opaque base material a substantially uniform layer of light-permeable material capable of being rendered luminescent, activating said layer by exposure thereof to light, placing a layer of photo-sensitive material against said luminescent material to thereby imprint said delineated matter on said photo-sensitive layer by means of light which luminesces from said luminescent material and reflects from said delineated matter, removing the photo-sensitive layer as thus exposed and developing the same.

2. The process of reproduction by reflex printing comprising the steps of applying to matter first delineated on a base material and which is to be reproduced, a substantially uniform layer of a material which, when activated by exposure to light, is capable of rendering luminescent—in the sense that light is emitted by reflection—the matter to be reproduced, placing against, and exposing to, matter so rendered luminescent, a photographic sheet, thus reflectively to imprint the latter solely by the light of said luminescent material, and removing and developing the said photo-sensitive sheet after exposure thereof.

3. The process of reproduction by reflex printing comprising the steps of applying to matter first delineated on a base material and which is to be reproduced, a substantially uniform layer of material capable of rendering the matter luminescent in the sense that it is illuminated for printing purposes, activating said luminescent material by exposure to light, placing a photo-sensitive sheet of material against said layer and printing said matter, as thus exposed, solely by the luminescence of the material so applied, and finally removing and developing the exposed photo-sensitive sheet.

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