Jan. 27, 1925. 1,524,499

L. BASSANI

PHOTOCHROMOGRAPHICAL PROCESS

Filed June 23, 1920

Fig. 1.

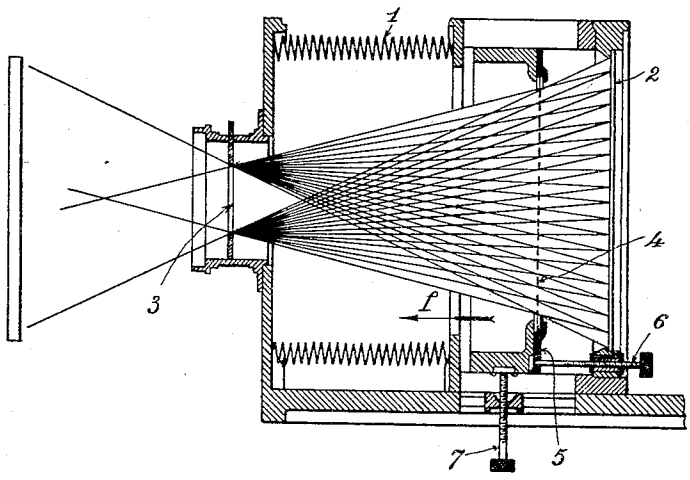



Fig. 2.

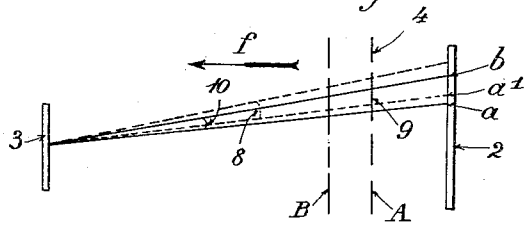



Fig. 4.

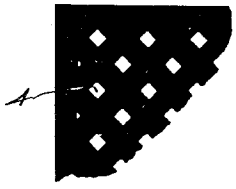
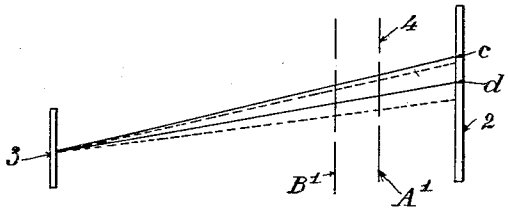



Fig. 3.




INVENTOR
LAURENT BASSANI
BY
ATTORNEY

Patented Jan. 27, 1925. 1,524,499

# UNITED STATES PATENT OFFICE.

LAURENT BASSANI, OF NEUILLY-SUR-SEINE, FRANCE.

## PHOTOCHROMOGRAPHICAL PROCESS.

Application filed June 23, 1920. Serial No. 391,118.

*To all whom it may concern:*

Be it known that I, LAURENT BASSANI, subject of the King of Italy, residing at 4 Rue d'Armenonville, Neuilly-sur-Seine, Seine, in the Republic of France, have invented new and useful Improvements in Photochromographical Processes, of which the following is a specification.

My invention relates to improvements in photochromographical processes.

In the reproduction of colored pictures, photomechanical processes have been long used in lithography for selecting colors in combination with the use of a reticulated screen. It was thus possible to reduce to a minimum the labor of the specialists or chromists who formerly effected by hand the selection of the colors. This process then made it possible to execute with 4, 5 or 6 colors which in ordinary lithography would necessitate 10, 12 or 14 colors, i. e. 10, 12 and 14 proofs of the same design.

Experts have however acknowledged that important improvements have still to be made in said industrial printing methods.

Researches in connection with the printing of large numbers of prints have disclosed the following difficulties: First it was necessary to use a special paper or couched paper and second, in order to obtain delicacy and vigor in the print, it was necessary to have recourse to photogravure methods.

The above disadvantages were apparently removed by the use of the "offset" printing machines which enable any number of prints to be run off on any desired grained paper or on fabrics (linen, cloth, plush, silk, etc.). However this condition was only possible by faithful execution of the following preliminary steps:

Preparing good photomechanical reticulated plates.

Transferring on copper by exposure to light.

Transferring directly or through an intermediate surface upon a lithographic stone.

Transferring through an intermediate surface upon the printing plate of the machine.

The photogravure operation appeared a requisite since it alone permitted retouching of the screen net on the picture obtained, which net is the necessary vehicle for the printing ink but the appearance of which, especially in the light parts of the picture removes all delicacy from the image and is detrimental in obtaining half-tones and shadings whereby the prints lack in sharpness and even in vigor.

The present invention has for its purpose to remove said difficulty. It permits to dispense with adjusting or retouching the net on the picture by subsequent operations such as in photogravure and to obtain the desired result by purely photomechanical means. It thus permits to transfer directly suitably reticulated photographic plates by exposure to light upon any lithographic surfaces (stones, zinc, etc.) which after being prepared as usual (by inking, gumming, acidifying, etc.) can be used for printing either by transfer or directly.

By means of the invention, an important economy is thus realized in time and materials. It permits to use the "offset" machines to the best advantage and to obtain on the same, considerable numbers of prints upon any desired paper, fabric, etc.

The improved method essentially consists in taking from the original whatever it may be (water colour, printing or real subject) for one and the same color and in identical conditions, two photographic plates which are exactly alike (superposable and carefully in register with each other.

The first plate is strong, so far as duration of exposure and developing are concerned so that the thinnest details and the lightest shades of the original will appear. It is obtained by arranging a suitable screen in the camera in front of the sensitized plate and progressively shifting said screen horizontally along the axis of the camera during the exposure.

The second plate is taken in the same conditions, but the screen is subjected during exposure to an axial and a transverse displacement, which latter is preferably vertical.

The above displacements, which are independent of the variation in the initial position of the screen as indicated in text-books on physics will, so to speak, effect a mechanical selection of the parts of the net which are to be preserved from those which should be reduced or removed.

The accompanying drawing shows diagrammatically how the light rays will act in accordance with the displacements of the screen.

Fig. 1 is a vertical section of a camera

adapted for use in carrying out the improved method.

Figs. 2 and 3 are diagrammatical views showing various positions of the light rays.

Fig. 4 is an elevational view of a fragment of a reticulated screen shown on an enlarged scale.

1 is the camera in which is arranged, between the sensitized plate 2 and diaphragm 3, a suitable stippled or reticulated screen 4 mounted in a frame 5 which may be shifted horizontally along the axis of the camera when a micrometric screw 6 is rotated and vertically when another micrometric screw 7 is actuated.

The construction of the actuating mechanism for operating the screen comprises the screws 6 and 7, maintained at their ends in the frame carrying the screen, the screws being screwed respectively in the nuts 12 and 15. The nut 12 is slidably mounted in the groves 13 formed in the side walls of the aperture 14 provided in the lower wall of the camera. The nut 15 having a square outer section is slidably mounted in a groove 17 of the frame supporting the sensitized plate; said nut is lateraly maintained by two cheeks 16 bearing on said latter frame and is prevented from rotating about itself by the outer square section thereof.

It is pointed out that the vertical displacement of the nut 16 under the action of screw 7 is very small. The displacement which is necessary to bring a line of the screen to the position formerly occupied by the next line is at most 1/50 of an inch, i. e. the coarsest screens have 50 lines to the inch.

Figs. 2 and 3 show on a larger scale the paths of the light rays in the camera in accordance with the displacements of the screen. Fig. 2 relates to the first photographic plate and Fig. 3 to the second.

In taking the first plate which should furnish an image upon which all the details will appear, the screen 4 is shifted progressively during exposure, by means of the screw 6 in an axial direction as shown by the arrow *f*. A maximum reduction of the net is thus obtained even in the lighest shades. Fig. 2 shows that when the screen 4 is shifted from position A to position B, any light beam 10 issuing from a point $3^1$ of the screen 3 and obturated by the part 9 of the screen is shifted to the position shown at 8 in dotted lines, so that the unexposed part *a b* of the plate is substantially reduced to $a^1$ *b*. It is thus seen that by a displacement of the screen in an axial direction, as explained, the net produced on the sensitized plate can be reduced in any desired proportion.

In obtaining the second plate, which will furnish the dark shades and the junction thereof with the medium shades, the screen is shifted during exposure in a horizontal direction by means of the screw 6 and vertically by means of the screw 7. The horizontal displacement has for its purpose to move away the screen the necessary distance so as to obtain a sufficiently reduced image so far as the value of the shades is concerned. The displacement in the vertical direction has for its purpose to cause the screen image to disappear in all places where required. Fig. 3 shows that when the screen is shifted from position $A^1$ to position $B^1$, the part *c d* of the sensitized plate which was shielded from the influence of the light rays by the screen is subjected on its turn to the action of said rays on its whole part $dd^1$, the remaining part $cd^1$ alone being not touched by the beam issuing from the point $3^1$ of the diaphragm 3. It is obvious that said part $cd^1$ may be reduced as much as wanted by shifting the screen in sufficient proportions.

Instead of a vertical displacement, a transverse displacement might also be imparted to the screen.

Said displacements can be effected either once or a plurality of times according to the effects sought for or the character of the original to be reproduced.

The reticulated plates obtained are then treated by usual means and the images can be transferred by exposure to light onto any printing surfaces: stone, zinc, etc.

It is to be understood of course that the present invention may be applied in black and white reproduction work as well as color work and with this purpose in mind my process contemplates obtaining by photomechanical means, images having very pure whites and strong blacks, the images giving at the same time all of the details of the model. This problem consists in eliminating the black points left by the net or screen in the whites of the photographic plate without in any way impairing the details or causing the latter to disappear; it might be said on the contrary that the present process conserves all the details of the image without reducing the intensity of the blacks.

The method according to the invention consists in preparing for each object to be photographed, two photographic plates which, as stated will each serve for obtaining a separate printing plate. The final printing will be effected upon the sheet of paper or other material with said two printing plates by successively applying the latter in such manner that the final reproduction of the subject will consist of the superposition on the sheet of paper or the like of the two prints obtained with said printing plates. The first of the said photographic plates may be obtained in the usual manner and if desired a slight displacement may be given to the screen in the direc-

tion of the optical axis of the camera, such displacement being effected by adjustment of the screw 6.

The second photographic plate is obtained by shifting the screen along the axis of the camera if desired, but it is particularly essential that the screen be adjusted in its own plane, i. e. in a plane perpendicular to the said axis, in the present instance the plane referred to being vertically disposed.

The effect which is obtained by this displacement of the screen in a plane perpendicular to the optical axis of the camera may be explained, as follows, with particular reference to Figure 3; the positions of the screen 4 indicated $A^1$ and $B^1$, and spaced slightly apart along the said axis for the sake of clearly illustrating the invention, show the openings $t$ through which the projected rays of light pass. The full lines show the path of light rays governed by the $A^1$ position of the screen, while the dotted lines show the path of the light rays in the adjusted position $B^1$ of the screen. The screen 4 is disposed in its lowermost position $A^1$ during the greater part of the exposure, the rays passing through the opening $t$ will illuminate the sensitized plate on a portion indicated $f.\ g.$ which as is well known in the photogravure art, gives upon the final print a white circle. When the screen is shifted from position $A^1$ to $B^1$, the portion of the plate behind the opening $t$ which is now acted upon by the rays, is designated $f^1, g^1$, whereby the whole surface acted upon is $f\ g^1$. The result on the final print is a slight translation of the white circle. Regarding the translation on the light and dark portions of the image, which portions correspond to the lighted and dark portions of the model, it will be apparent that the small black dots corresponding to the unaffected parts of the sensitized plate will disappear.

It will be seen that the first plate obtained without any displacement of the screen or with a slight displacement thereof along the optical axis of the camera, will give all the fine details of the model, but the result obtained will have neither strong whites nor strong blacks. On the contrary, in the second plate obtained by adjusting the screen in its own plane, the black dots have entirely disappeared from the white portions, while the dark portions have been but very slightly affected by the displacement of the white circles, in which case the dark portions have still retained sufficient intensity. Subsequent printing both images on the same sheet of paper or the like will present the black dots from the first plate only while the blacks will be further strengthened by the superposition of the black portions of both images.

The desirable results thus obtained are made possible by shifting the screen in its own plane, i. e. perpendicularly to the optical axis of the camera.

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

1. The herein described method of making negatives from which printing plates may be produced, which consists in making successive exposures of sensitized surfaces through a screen, and shifting the screen after the first exposure in a plane at right angles to the axis of the camera.

2. The method of making negatives from which printing plates may be produced which consists in making successive exposures through a screen of superposable sensitized plates, and shifting the screen during the exposure of the second plate in a plane at right angles to the axis of the camera.

3. The method of making negatives from which printing plates may be produced which consists in making successive exposures through a screen of two superposable sensitized plates, shifting the screen progressively away from the sensitized surface during exposure of the first plate in a direction parallel to the axis of the camera, and thereafter shifting the screen during the exposure of the second plate in both an axial and transverse direction with respect to the axis of the camera.

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

LAURENT BASSANI.