

UNITED STATES PATENT OFFICE.

ADAM STEPHAN, OF WAVERLEY, NEAR SYDNEY, NEW SOUTH WALES,
AUSTRALIA, ASSIGNOR TO ROBERT SANDS, OF SYDNEY, NEW SOUTH
WALES, AUSTRALIA.

HALF-TONE PHOTOLITHOGRAPHY AND THE LIKE.

No. 818,574.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ADAM STEPHAN, photolithographer, a citizen of the Commonwealth of Australia, and a British subject,
5 residing at Bourke street, Waverley, near Sydney, State of New South Wales, Australia, have invented new and useful Improvements in Half-Tone Photolithography and the Like, of which the following is a specification.

My invention relates to improvements in the work of half-tone photolithography, photo-etching, chromophotolithography, and other photo-illustrated processes which produce a more successful result than has been
15 hitherto attained, particularly when applied to multiple-color half-tone chromophotolithography and multiple-color letterpress printing.

A process now in use for half-tone three-color work, principally for letterpress-blocks, is to take negatives through color-filters for the set of three. From these negatives good
25 up. From these prints three more negatives are taken through a cross-line or other grained screen, giving a grained or broken-up set of negatives to print from, or the negatives are taken through color-filters and the
30 cross-line or grained screen in one operation. In both cases the mirror or prism is used. For fine work this process is good, but expensive. Where large work is required with bold open grain for bill or poster work, the
35 prints show mottled patterns, lines and fine work being broken up and lines which should be sharp having ragged edges.

According to another process for half-tone chromophotolithographic or letterpress printing, one negative only being used, the necessity of using a screen for the purpose of procuring a grain has been avoided by the preparation of a gelatin emulsion for coating the transfer medium, of which the result is a
45 granulated surface; but this method of procuring a grain is not effective according to the process hitherto in use, which consists in pressing the transfer medium several times upon a lithographic stone upon which ink has
50 been rolled for the purpose of inking the sheet before printing from the negative, which impairs the grain. Further, this method has never been applied to multiple-

color half-tone chromophotolithography or letterpress printing for which my invention is specially adapted.

According to the process invented by me I am able to work from the original negatives taken from the subjects copied and to procure all gradations of tone, no screen, mirror, or prism being used and no transpositions of the negatives being required. The transfers and final printing from such negatives show the subjects as the eye sees them. The grain given by my process does not form pattern on the print or picture procured when printing in three or more colors, no matter how coarse the grain obtained. There are three operations only according to my invention—first, that of taking negatives; secondly, the preparation of transfers, and, thirdly, the transfer to litho stone or metal for the lithographic principle of printing or to metals or other substances for etching or engraving letterpress-blocks or for other purposes in mechanical printing.

My invention is carried out in the following way in the application thereof to color-work: For multiple-color chromophotolithographic or multiple-color letterpress printing three photographic negatives are generally taken by me from the picture or object to be copied through color-filters only for the set of three colors on ordinary dry plates, celluloid films, or collodion wet plates. The emulsion I prepare for coating the transfer medium consists of one ounce preferably of Nelson's patent opaque gelatin or any good soft gelatin soaked for half an hour in five, five and a half, six, or six and a half ounces of cold water, according to the grade of grain required, six and a half ounces being used for the finest grain. To this solution is added, while at a temperature of 120° Fahrenheit, say two grains of common alum dissolved in one ounce of warm water, the whole being strained. A roll of paper, pliable celluloid film or pliable sheets of thin metal is then coated with the before-mentioned emulsion by passing the surface of the sheet over the emulsion contained in a trough suitable for the purpose. The sheet is then hung up to dry.

In carrying out my process I have prepared for use a series of sheets or rolls of material used coated with the said emulsion (giving a granulated surface,) which may be

considered as Nos. 1, 2, 3, and 4, No. 1 giving the finest grain. I take any one of these numbers which I may consider best suited for the prints to be obtained, sensitize the same with a solution of bichromate of potash, and when dry I lay the same face upward, and held at one end with a clip on an even slab of plate glass or a lithostone. I then pass a soft-nap lithoroller worked up in a good stiff retransfer-ink over the surface until the sheet is evenly coated. I then pass over the surface a hard smooth lithoroller with or without a little stiff ink until the grain required shows very dimly. The inking of the sheet with such soft-nap roller, together with the subsequent use of the hard lithoroller, enables me to get the grade of grain required, which remains intact and unimpaired in the course of the subsequent process. If using the hard roller with light pressure, the grain is light or comparatively light, according to the granulation of the surface. If using such roller with increased pressure, the grain is coarse or comparatively coarse, and I can use the hard roller so as to give a fine or a comparatively fine grain on one part and a coarse or comparatively coarse grain on the other. The time occupied in so coating with ink and the use of the said rollers is about one minute, and the transfer medium is then complete for printing. The sheets or transfer mediums so prepared are then printed as bichromate prints from the original color negatives which have been taken. The prints so taken are reinked with such soft-nap lithoroller and soaked from five to thirty minutes in water, developed with soft sponges, and hung up to dry, and when dry are ready for transfer to the lithostone or metal, from which prints will be taken, or the transfer may be made to copper, zinc, or other metal and be etched in the ordinary manner for letterpress - printing. The transfers are slightly damped in a damp book in ordinary manner before transferring to stone or metal. The like process is applicable to color-work in which two negatives taken through color-filters, or one negative only taken through a color-filter, may be required for the picture or object to be copied.

For special, scientific, or soft-tint work the original negatives taken through the known color-filters can be used for any further shade of color other than pure yellow, blue, or red by increased or less exposure when printing the transfer medium from the original negative.

By means of the process described a more even tone and color besides giving more complete detail can be procured than in the half-tone hitherto produced by screens or otherwise in photomechanical processes; but the same would come under the general designation of "half-tone" work.

The process described is the same for pho-

tolithography in half-tone other than color-work with the use of one original negative. All classes of half-tone work can be done in the three or more colors from an inch in size up to the largest printing-surface obtainable, and a number of different subjects can be transferred to a lithostone or a metal plate for printing, engraving, or etching.

Except for pictures of small size I use, preferably, pliable sheets of celluloid, which do not stretch or shrink like paper in the process of transfer, in which case the colors do not fit when the print, if large, is taken in the three different colors. Pliable metal plates may also be used for very large transfer mediums, but not with the advantage attending the use of celluloid. The celluloid or metal films may be cleaned and used again repeatedly.

According to my invention prints in three colors can be taken from a litho stone, or plate, and representations can be etched on metal to be printed as blocks with letterpress without requiring any manipulation by the artist. Transfer mediums prepared and treated in the manner stated and printed from the original negatives give perfect three-color work, furnishing the grain or graduated tone required, gradations from heavy shades to high lights, and leaving all lines, curves, angles, and fine points sharp and clear instead of the same being broken down, obliterated, blurred, or ragged, according to any existing or known process. In my said process the negatives control the transfer medium and the grain to the finest hair-line, and, although the grain may be coarse, no matter how open the grain for large work—such as bill-posters, &c.—lines and detail are sharp and high lights clear.

The result of my process is a finished production, which has not hitherto been obtained. The colors produced in the prints are permanent in lithographic work, and copies can be easily printed in the ordinary lithographic way or by letterpress, the time occupied in production and in cost of production being enormously decreased.

My invention applies to half-tone photo-etching or half-tone photo-engraving, as well as half-tone photolithography.

The results attained by me are mainly derived by inking a transfer medium coated with a gelatin emulsion, so as to give a granulated reticulation, with a soft-nap lithoroller before and after taking a print from the original negative and manipulating such transfer medium with a hard dry roller, also before taking a print from the original negative. Other means of imparting a grain to the surface of a transfer medium while printing from the negative in substitution for an emulsion giving a granulated reticulation might be resorted to in carrying out my process, but not so effectually, and the same would be covered by my invention.

The portion of my process immediately before mentioned has been the result of considerable observation and experiment, particularly in the application thereof to half-tone chromolithography.

I do not claim separately as my present invention the preparation of a transfer medium coated with a gelatine emulsion in such a way as to give a grain reticulation, nor the preparation of the emulsion, as before stated, for procuring the same. Neither do I claim separately as my present invention printing a transfer medium which will give a grain direct from an original negative, although the same was never applied before to color-photolithography.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The herein-described process consisting in coating a transfer medium with a gelatin emulsion so as to give a grain reticulation then passing an inked soft-nap lithoroller over the same, then manipulating said medium with a hard dry lithoroller, then printing such medium from the original negative and finally reinking such transfer medium with the soft-nap lithoroller before developing the same for transfer to the stone or metal used.

2. The herein-described process consisting in passing an inked soft-nap lithoroller over a transfer medium to which a grain is imparted in any way then manipulating said medium with a hard dry lithoroller, then printing such medium from the original negative, and reinking such transfer medium with the soft lithoroller before developing the same for transfer to the stone or metal used.

3. The herein-described process consisting in passing an inked soft-nap lithoroller over a transfer medium or transfer mediums coated with a gelatin emulsion so as to give a grain reticulation, then manipulating said medium with a hard dry lithoroller, then printing such medium or mediums from the original negative or negatives through a color-filter or color-filters, and reinking such

transfer medium or mediums before developing the same for transfer to the stone or metal used.

4. The herein-described process consisting in passing an inked soft-nap lithoroller over a transfer medium or transfer mediums to which a grain is imparted in any way, then manipulating said medium or mediums with a hard dry lithoroller, then printing such medium or mediums from the original negative or negatives through a color-filter or color-filters, and reinking such transfer medium or mediums with the soft lithoroller before developing the same for transfer to the stone or metal used.

5. The herein-described process consisting in coating a transfer medium with a gelatin emulsion so as to give a grain reticulation, then passing an inked soft-nap lithoroller over said medium, then printing the medium from the original negative, and then passing the inked soft-nap lithoroller over the medium again.

6. The herein-described process consisting in passing an inked soft-nap lithoroller over a transfer medium to which a grain is imparted in any way, printing said medium from the original negative and then passing said lithoroller over the medium again.

7. The herein-described process consisting in manipulating a transfer medium coated with a gelatin emulsion so as to give a grain reticulation with a hard dry lithoroller, and then printing said medium from the original negative.

8. The herein-described process consisting in manipulating a transfer medium to which a grain is imparted in any way with a hard dry lithoroller, and then printing said medium from the original negative.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ADAM STEPHAN.

Witnesses:

ALFRED DE LISSA,
CARRIE E. DWYER.