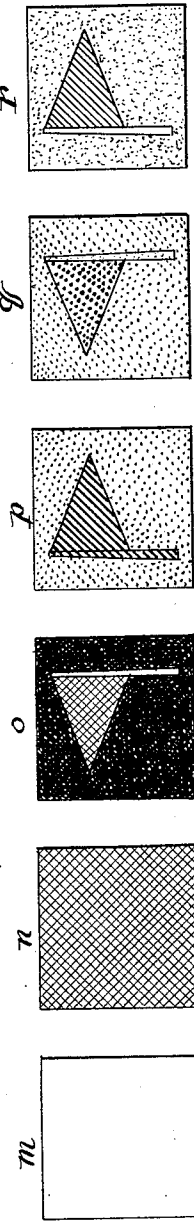
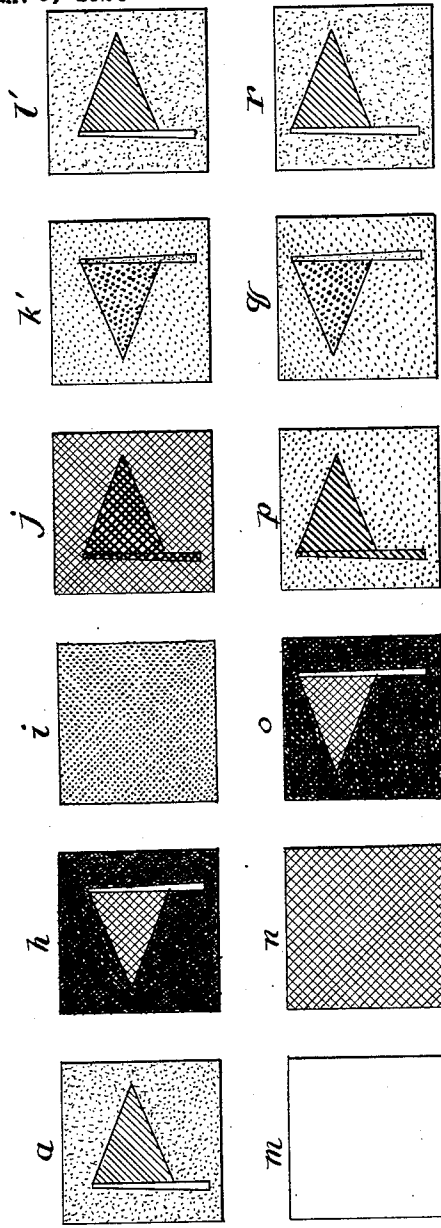
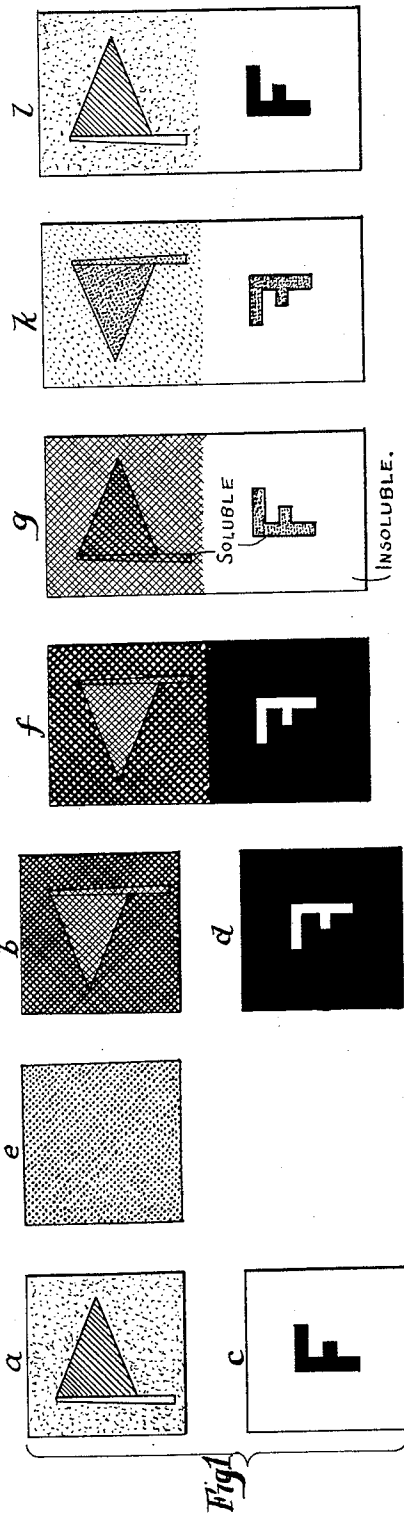


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ENGRAVING PROCESS

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ENGRAVING PROCESS.

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My invention relates particularly to engraving of metallic or other plates or cylinders for use in mechanical printing, and is especially adapted for use in connection with engraving of copper cylinders or flat plates for use in rotary or flat bed printing presses, whereby photogravure prints may be economically and quickly produced. My improved process is also applicable to the production of line prints where half tones or medium lights or shadows are not present. It is particularly applicable to the reproduction of toned pictures and photographs having innumerable variations of light and shade or to the reproduction of a composite consisting of combined pictorial and printed matter where both line and type work are to be reproduced with a photograph or other pictorial print.

Heretofore, in carrying out the so-called rotogravure process, the following main steps have been considered necessary. First, a negative photograph is made on celluloid or glass from pictures and printed matter to be reproduced, it being necessary to separately photograph the pictures and the line work or printed matter and assemble the same by pasting or otherwise attaching to the celluloid or glass backing; second, from this composite negative a positive photographic print is made on transparent material, such as celluloid or glass; third, the positive so made is printed on the so-called "carbon tissue" which is a gelatine coated paper sensitized with potassium bichromate, or other similar sensitizing material. This printing is done by exposure of the carbon tissue to light, through the usual ruled screen and then through the composite positive. This last printing operation is known as the "carbon" printing process. Fourth, the exposed carbon tissue is applied when wet, under a rolling or rubbing pressure, called "squeegeeing" to the surface of a copper cylinder so that the gelatine adheres thereto, after which the paper backing is removed by treatment with hot water which also dissolves the soluble portions of the gelatine, leaving the insoluble bichromated gelatine on the cylinder, and the impressions thus transferred are then etched on the cylinder. Fifth, the type or line work is first etched by the use of the usual ferric chloride after covering the half tone portions with asphaltum. The etched portions are then

washed and dried and the asphaltum removed from the half tone or picture portions. Sixth, the previously etched type or line work is then covered with asphaltum and the tone pictures etched in a similar manner but with particular attention to the quality of the high lights and shadows, or the process is sometimes reversed and the toned pictures etched first and the line or type work last. Seventh, the asphaltum last applied is then removed and the cylinder thoroughly cleaned. It is then ready for the printing operation.

From the following description of my improved process, read with reference to the accompanying drawings, it will be noted that a number of the steps in the previous process of producing the engraved cylinder or plate are unnecessary and are eliminated with a consequent saving of time, labor, material and expense.

In the accompanying drawings Fig. 1 indicates the various surfaces produced in the successive steps of one form of my improved process when used in the production of a composite line and halftone gravure print; Fig. 2 indicates the successive steps when the screening is introduced at another point in the process; and Fig. 3 indicates the successive steps when the screening is produced only on the plate or cylinder to be engraved.

My improved process may be described as follows: First, the pictorial print or picture (a) submitted for reproduction is photographed as a negative impression (b) on a photographic film having a paper, celluloid or other suitable backing, either opaque or transparent, in reduced or enlarged size, according to the final reproduction required. I prefer to use for this purpose the well known "bromide" paper. The type or line matter (c) is also photographed on similar paper, (d) or other material, but preferably having a quality of sensitiveness adapted to give much greater contrast than that used for the pictures having many intermediate tones. The pictorial portions and also, the printed or line matter, if desired, may be screened to produce the necessary intaglio recesses or cups in the engraved cylinder or plate by having the photogravure copy screen (e) printed on the sensitive bromide paper before (or after) receiving the negative impressions of the picture (a), the screening being developed out simultaneously

with the negative impression made thereon. The screening may also be otherwise produced as hereafter described.

The line and printed portions and the pictorial portions are then assembled as a composite negative print (*f*) on the same backing. Second, this composite negative print is then squeegeed face to face with a sheet of gelatinized and sensitized paper (*g*) known as "carbon tissue" similar to that used in the previous process above referred to, the bromide negative being wet with water and the carbon tissue wet with the sensitizing solution when squeegeed together. The sensitizing is accomplished by immersing the carbon tissue for about three minutes in a solution of bichromate of potash—one ounce, potassium-ferricyanide—one ounce, potassium bromide—one ounce, and water—eighty ounces, and after draining for a fraction of a minute, immersing in a solution comprising glacial acetic acid—one quarter of an ounce, hydrochloric acid—one quarter of an ounce, formaldehyde (40%)—five and one half ounces, and water—one hundred and ninety ounces. If the screen lines have not been produced previously on the composite negative print as above described, the carbon tissue (*i*) may have the screen lines printed thereon, after being sensitized with a three per cent potassium bichromate solution, by being exposed to light through the white line screen (*e*) which produces the insoluble gelatine lines on the carbon tissue. It is then dried and again sensitized as previously described before the composite print is squeegeed thereon. It is obvious that these operations of printing the screen lines and the picture respectively on the carbon tissue may be reversed. Third, the carbon tissue after being in contact with the bromide or similar print for fifteen minutes or more, according to quality or depth of tone desired, is stripped away from said bromide or similar negative leaving the carbon tissue (*j*) with the soluble and insoluble gelatine thereon which is placed in contact with a copper or metallic cylinder or a flat copper or metallic plate and the backing and the soluble portion of the gelatine removed with hot water as in the old process. Fourth, the cylinder is then etched, (*k*, *k'*) line work and half tone separately as in the old process or as an entirety by the use of ferric chloride without the necessity of separate etching of the type or line matter and the pictorial matter, as required in the former process, since this process gives a thickness of gelatine and resist making it possible to obtain required results in one etching.

The cylinder is then washed and is ready for making the print (*l*, *l'*), as is usual in the process of rotogravure printing.

As an alternative method of producing the screen lines on the cylinder or plate, a piece of

sensitized carbon tissue (*m*) may be exposed to light through the screen (*e*) as above described, then transferred directly to the cylinder or plate (*n*). When the backing and the soluble gelatine are removed, the insoluble gelatine lines only remain on the surface of the cylinder or plate.

The composite negative print, (*o*) without screen lines, is then squeegeed onto another sheet of carbon tissue (*p*) and the gelatine thereof transferred to the cylinder or plate (*n*), and super-imposed on the previously applied insoluble screen lines. The insoluble portions of this layer of gelatine are then washed away, after which the cylinder or plate (*q*) is ready for etching and printing (*r*) as before.

In view of the above description, it will be apparent that through the use of my process it becomes necessary only to make a single photographic bromide or other print of the matter to be reproduced, this being directly applied to the sensitized carbon tissue and the gelatine transferred therefrom to the cylinder which is immediately etched after removal of the paper backing. All photographic reproduction by exposure to light, except photographing for the first negative print and the formation of the halftone screen lines when the latter are formed separately, is thereby eliminated. The use of any transparent sheet material is consequently avoided.

Having thus described my invention, I do not wish to be understood as being limited to the details of procedure and the specific materials set forth, for various changes may be made by those skilled in the art without departing from the spirit and scope of my invention.

What I claim and desire to protect by Letters Patent is:

1. In the process of preparing a photo-gravure printing surface, the steps which comprise placing a negative image of the matter to be reproduced having dark portions and high lights of different densities formed on a film containing chemical substances which are adapted to produce corresponding degrees of insolubility in a sensitized gelatinous or similar film, in direct contact with such a gelatinous film, separating said image from said gelatinous film for a predetermined period, transferring the latter to the surface to be etched, removing all soluble portions of said gelatinous film, and etching said surface in the presence of its remaining insoluble portion.

2. In the process of preparing a photo-gravure printing surface which comprise the following steps, placing a negative silver bromide image of the matter to be reproduced in intimate contact with a sensitized gelatinous film whereby portions of said image cause corresponding portions of the

gelatine to become insoluble, and then transferring said gelatinous film to the surface to be etched.

3. In the process of preparing a photogravure printing surface, in combination with the formation of tone-screen lines at a suitable point therein, the steps which comprise placing a negative image on a photographic paper containing silver, formed in intimate contact with a sensitized gelatinous film whereby portions of said image cause corresponding portions of the gelatine to become insoluble, and then transferring said gelatinous film to the surface to be etched.

4. In the process of producing a photogravure printing surface, in combination with the formation of tone-screen lines at a suitable point therein, the steps which comprise placing a negative formed on silver bromide paper, in intimate contact with a sensitized gelatinous film whereby portions of said negative cause corresponding portions of the gelatine to become insoluble, transferring said film to the surface to be etched, removing the soluble portions of the gelatine, and then etching said surface.

5. In the process of producing a photogravure printing surface, in combination with the formation of tone screen lines at a suitable point therein, the steps which comprise placing a negative formed on silver bromide paper of the matter to be reproduced, in intimate contact with a sensitized gelatinous film whereby darker portions of said negative cause portions of the gelatine to become correspondingly insoluble, transferring said film to the surface to be etched, removing the soluble portions of said film, and then etching said surface.

6. In the process of producing a photogravure printing surface, the steps which comprise assembling separate photographic paper negatives, of the line and pictorial matter to be reproduced, on a common backing to form a composite negative, said negatives of the pictorial matter having photogravure screen lines formed thereon and having less contrast than the line negatives, placing said composite negative in face-to-face intimate contact with a sensitized gelatinous film for a predetermined time interval, whereby certain portions of said film are rendered insoluble, transferring said film to the printing surface, removing the soluble portions of said film and etching said surface.

7. The process of preparing a photogravure printing surface which comprises the following steps: placing a photographically produced negative silver image of the matter to be reproduced in intimate contact with a gelatinous film in the presence of a chromate salt, removing said gelatinous film and transferring it to a photogravure surface,

washing away all soluble portions of said gelatinous matter, and etching said surface.

8. The process of preparing a photogravure printing surface which consists in placing a negative silver image of the matter to be reproduced in intimate contact with a gelatinous film in the presence of a chromate salt, whereby portions of said gelatinous film corresponding to said image are rendered insoluble in direct proportion to the amount of silver present, transferring said film to a metal printing surface, washing away all soluble portions of said film, and etching said surface.

9. The process of preparing a photogravure printing surface which comprises the following steps: placing a photographically produced negative image formed on a silver bromide film, of the matter to be reproduced, in intimate contact with a sensitized gelatinous film in the presence of a bi-chromate of an alkali, a ferricyanide of an alkali, a soluble halid salt of an alkali, and water to cause an insoluble condition in certain portions of said gelatinous film corresponding to said negative image, transferring said gelatinous film to a printing surface, removing all soluble portions of said gelatinous film, and etching said surface in the presence of the remaining portion of said film.

10. The process of preparing a photogravure printing surface which consists in placing a photographically produced negative image formed on a silver bromide film, of the matter to be reproduced, in intimate contact with a gelatinous film in the presence of a chromate salt, whereby a chemical action takes place between said silver bromide image and said chromate salt to cause certain portions of said gelatinous film to become insoluble in direct proportion to the amount of silver present in the negative image, transferring said gelatinous film to a previously prepared metal surface, washing away the soluble portions of said gelatinous film, and etching said surface in the presence of the remaining gelatin.

11. The process of producing a photogravure printing surface which comprises the following steps: placing a photographically produced negative image formed on a silver photographic paper of the matter to be reproduced in intimate contact with a gelatinous film sensitized with a chromate salt whereby portions of the gelatin in contact with said image are rendered insoluble in direct proportion to the silver present at the points of contact, transferring and placing said gelatinous film in contact with the printing surface to be engraved, dissolving and removing all soluble portions of said gelatin, and etching said surface in the presence of the remaining gelatin.

12. The process of producing a photogravure printing surface which comprises the

following steps: placing a photographically produced bromide paper negative of the image to be reproduced, in a moistened condition, in face-to-face intimate contact with a
 5 gelatinous film sensitized and moistened with a solution containing a chromate of salt, continuing said contact for a predetermined time interval whereby portions of said gelatinous film in contact with said image are rendered
 10 insoluble in direct proportion to the silver present, removing said film, transferring and squeegeeing it to the surface to be engraved, washing away all soluble portions of said film, and etching said surface in the presence of
 15 the remaining gelatin.

13. The process of producing a photogravure printing surface which comprises the following steps: placing a photographic paper containing a silver salt, on which a negative image of the subject to be reproduced has been projected and developed, in face to
 20 face intimate contact with a gelatinous film sensitized and moistened with a solution containing potassium bichromate—one part, potassium ferricyanide—one part, potassium
 25 bromide—one part, and water 80 parts, continuing said contact for a predetermined time interval whereby portions of the gelatin film in contact with the negative image are rendered
 30 insoluble in direct proportion to the silver present, transferring and squeegeeing said film to the surface to be engraved, washing away all soluble portions of said gelatin and etching said surface in the presence of
 35 the remaining gelatin.

14. The process of preparing a photogravure printing surface which consists in placing a sensitized photographic paper which has been photographically exposed to the
 40 matter to be reproduced and developed to produce a negative image containing reduced silver in intimate contact with a gelatinous film in the presence of a solution containing a chromate salt, whereby portions of said
 45 gelatinous film contacting with the silver image are rendered insoluble in direct proportion to the silver present, transferring said film to a metal surface on which an insoluble gelatin screen formation has previously been applied, dissolving and washing
 50 away all soluble portions of said gelatin film and etching said surface in the presence of the remaining gelatin.

15. The process of producing a photogravure printing surface which comprises the following steps: placing a negative silver
 55 image on a photographic paper of the matter to be reproduced, in intimate contact with a gelatinous film having an insoluble screen formation thereon, said film being sensitized with a solution containing a chromate salt whereby the remaining soluble portions of
 60 said film are rendered insoluble in direct proportion to the silver present in said image, transferring and placing said film in

contact with the printing surface to be engraved, dissolving and removing all soluble portions of said gelatin, and etching said surface in the presence of the remaining
 insoluble gelatin.

16. The process of preparing a photogravure printing surface which consists in sensitizing a gelatinous film with a solution containing potassium bichromate, light
 70 printing a half tone screen formation on said sensitized film, resensitizing said light printed film with a solution containing potassium bichromate, potassium ferricyanide and potassium bromide, placing said film in a moist
 75 condition in intimate face to face contact with a negative image, on silver bromide paper, of the matter to be reproduced whereby portions of said film not already rendered insoluble by the light printing of said screen
 80 formation thereon are also rendered insoluble in direct proportion to the silver present in said image, transferring said film to a metal printing surface, washing away all insoluble portions of said film and etching
 85 said surface in the presence of the remaining film.

17. The process of preparing a photogravure printing surface which consists in
 90 light printing a photogravure screen formation on a photographic paper sensitized with a silver salt, photographing the matter to be reproduced on said screened paper, chemically treating said paper to produce a negative image in reduced silver of the matter
 95 to be reproduced superimposed on the screen formation, placing said negative image in intimate contact with a gelatinous film in the presence of a solution containing a chromate salt whereby portions of said film contacting with the silver image are rendered
 100 insoluble in direct proportion to the silver present, transferring said film to a metal printing surface, washing away all soluble portions of said film, and etching said surface.

18. The process of preparing a photogravure printing surface which consists in
 105 light printing a photogravure screen formation over a photographic exposure, on a paper sensitized with a silver salt, of the matter to be reproduced, chemically treating said paper to produce a negative image in reduced silver of said matter and said
 110 screen formation, placing said negative image in intimate contact with a gelatinous film previously sensitized with a solution containing a chromate salt whereby portions of said film contacting with the silver image are rendered insoluble in direct proportion
 115 to the silver present, transferring said film to a metal printing surface, washing away all soluble portions of said film and etching said surface.

19. The process of preparing a photogravure printing surface which consists in plac-
 120 125 130

ing a negative photograph, containing reduced silver, of the matter to be reproduced in intimate contact with a gelatinous film in the presence of a solution containing a chromate salt, whereby portions of said gelatinous film contacting with the silver image are rendered insoluble in direct proportion to the silver present, removing said film

from said image, light printing a photog-
vure screen formation on said film without
further sensitizing, transferring said film to
a metal printing surface, washing away all
soluble portions of said film and etching
said surface. 10

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RAYMOND N. GETCHES.