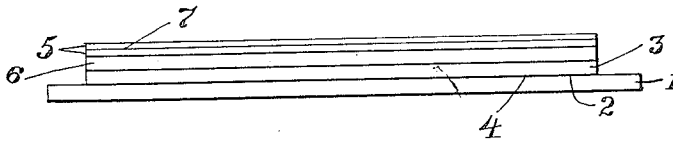


J. A. H. HATT.
PROCESS FOR PRODUCING PRINTING PLATES.
APPLICATION FILED OCT. 30, 1912.

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Patented Apr. 6, 1915.

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UNITED STATES PATENT OFFICE.

JOSEPH ARTHUR HENRY HATT, OF BROOKLYN, NEW YORK.

PROCESS FOR PRODUCING PRINTING-PLATES.

1,134,381.

Specification of Letters Patent.

Patented Apr. 6, 1915.

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To all whom it may concern:

Be it known that I, JOSEPH ARTHUR HENRY HATT, a citizen of the United States, residing in the borough of Brooklyn, in the city and State of New York, have invented new and useful Improvements in Processes for Producing Printing-Plates, of which the following is a specification.

The invention relates to a photo-mechanical process for producing printing plates having a developable screen figure and in certain aspects thereof more especially to the production of such printing plates having a grain or porous surface.

The objects of the invention will be set forth in part hereinafter, and will in part be obvious herefrom to those skilled in the art, together with various advantages, all of which are attained by the steps, instrumentalities and process pointed out in the accompanying claims.

The invention consists in the novel steps, processes and improvements herein shown and described.

The accompanying drawings, herein referred to, and constituting a part hereof, illustrate in a diagrammatic manner the carrying out of certain steps of the invention, and serve together with the accompanying description to explain the principles of the invention.

In carrying out my process, a suitable printing plate 1 is provided. The printing surface when consisting of metal is preferably slightly grained or given a texture other than the polished metal or the charcoaled surface of the metal. For many kinds of work I find that it is best to grain the plate with a very fine and sharp grain, although so far as concerns certain features of the invention, it may be carried out with other kinds of surfaces. Where the printing surface is of stone, it should have a porous or similar structure generally like the lithographic stone.

The plate, or the surface thereof to be used for printing, is preferably either slightly alkaline or neutral. This surface is covered with a layer or coating which is sensitive to the action of light, the best known agents for this purpose being bichromated albumin, bichromated albumin and gum arabic mixed, or bichromated glue, and various other suitable materials.

By using a plate surface of the general character indicated above, which may be

termed a non-smooth surface, the sensitized coating or layer will adhere more firmly to the surface of the printing plate. It is thus possible to very greatly reduce the degree of exposure of the sensitized surface in impressing the design thereon and thereby to leave the entire surface in better condition for producing a developable screen figure, while preserving the proportionate or relative degree or amount of exposure of the various parts of the plate by reason of the difference in the different parts of the negative or positive or other design. The light sensitive solution is usually flowed over the plate in liquid form, spread by centrifugal action to the desired thickness and then dried.

In accordance with certain features of the invention, I employ as the design creating instrumentality, a continuous tone negative or positive 3, that is, a negative or positive such as is usually produced photographically in which the tones or tints or shades are continuous or complete and not broken up as is the ordinary half tone negative. It will be understood that a continuous tone negative or positive may be used in the same manner, dependent upon the kind of sensitized coating used and the form of development employed, as will be well understood. So far as concerns certain features of the invention, however, other forms of design bearing or creating instrumentalities may be used.

In making the exposure, the negative or positive 3 is placed in contact with the sensitive surface 2 of the printing plate with the film side 4 in contact with the sensitized surface 2 of the printing plate. For the purpose of creating the dots or stipples or other screen figures in the printing plate, I employ a screen 5, which is interposed between the negative 3 and the source of light, and usually in contact with the negative 3. The screen 5, or the effective portion thereof, that is, the successive clear and tinted or ruled areas constituting or causing the screen figures, is distant from the sensitive surface 2 of the printing plate, the focal distance of the screen openings, that is, the openings of clear glass between the tints or rulings of the screens. I mean by "focal distance" the distance at which the light through the screen openings is concentrated or focused practically to a point. It is usual to have the screen of two plates of glass with the

effective surface of the screen on the inside for protection. The adjustment of the screen rulings or effective portion of the screen at the focal distance of the clear openings away from the sensitized surface may be secured by having the glass or other carrier for the screen and also the negative 3 of proper thickness. In this way, they all may be in close contact with each other.

10 In many cases a spacing device, to secure the proper relative positioning of the sensitive surface of the plate at the focal distance is employed, such as a plate of glass 6, as shown in the drawings by way of example. 15 7 indicates the preferred location of the screen rulings, between two plates of glass.

In accordance with one feature of the invention, I make the print darker, that is, carry the development farther than is actually required to get the relative effects of the design upon the plate. By this means I am able to get deep and solid shadows and can then by additional development bring up the high lights and intervening tones as desired. It will be understood that this may be effected by avoiding such over exposure of the entire sensitized surface or any part thereof such as would prevent the formation of the developable dot or other screen figure, that is, the screen figure of greatest intensity at its center and decreasing gradually outward toward its edges. By so printing or exposing the sensitive surface of the plate to excess or beyond the point actually necessary, the resulting image, after normal development is somewhat too dark or heavy. This permits further development in the parts desired light, while retaining the deep shadows darker or heavier than called for in the negative or positive, or to accentuate the difference between the high lights and deep shadows.

By having the screen located at the proper focal distance, as hereinbefore explained, the screen figure formed on the sensitive surface of the plate by the action of the light through the successive ruled or tinted and the clear or transparent areas, consists of a dot or other figure which is of great firmness at the center, due to the greater intensity of the light action and graduating or diminishing outwardly to the edges of the dot or other screen figure. The total relative size and intensity of the screen figures formed on the printing plate will be controlled by the various tones or variations in the negative dependent upon the image or design carried by the negative. This constitutes a developable screen figure upon the printing plate, as owing to the gradually decreasing firmness of each dot or screen figure from its center outwardly, any part of the surface of the printing plate may be developed locally to accentuate or eliminate any particular feature as desired. That is,

for instance, by developing any portion of the plate, the size or area of the dots may be diminished while, of course, their distance apart remains the same. In this way a solid black may be developed into a light gray if desired.

So far as concerns the general features of my process, it is immaterial what kind of screen is used in carrying out the process, but according to certain features and with certain kinds of work, I prefer to employ a screen having transparent areas as of clear glass and having intervening areas which are not entirely opaque but are to some extent light transmitting. I further prefer to employ for some kinds of work a screen having a plurality of consecutively adjacent areas of varying degrees of light transmitting power between the transparent or clear areas.

The sensitized printing plate, and the negative and screen are firmly held in position while subjected to light action to impress the screen and negative upon the surface of the plate. For this purpose they are usually placed in a printing frame in a well known manner. They are then placed in position before a source of light and preferably before a stationary arc or other suitable point of light 8. The light may be moved or have its position changed slightly during exposure, to produce harsher effects if desired. The light will be arranged at such distance from the sensitized surface of the printing plate as to secure the proper focal action evenly over all parts of the sensitized surface of the printing plate. That is, to have the rays of light divergent but at not too great an angle. The printing frame may be kept at a properly cool temperature by an electric fan, so that the albumin in the sensitized surface of the printing plate may not be coagulated by the heat from the lamp.

After the plate has been properly exposed, it may be removed from the printing frame and in a subdued light it is rolled up evenly in the ink and the plate is then immersed in water for development. The plate is then given a first or general development which may be done by rubbing lightly and evenly over the entire plate with a tuft of cotton while the plate is under water, and this development may be continued to a proper point, dependent upon the work to be done. The plate may also be locally developed at any point desired, and frequently it may be desirable to develop small details with camel's hair brushes and by treatment with a weak solution of ammonia or otherwise. After the plate has been developed to a proper point, it is dried and treated with a suitable acid resistant material, as by having powdered dragon's blood rubbed into it, the surplus then being cleaned off. The plate is heated to melt the dragon's blood to consti-

tute an etching resist. The plate is then etched planographically or for relief work.

By using as a printing surface one which may be termed a non-smooth surface, such as a grained metal surface or a porous stone surface, the sensitized solution is consequently held much more firmly upon such surface than upon a smooth surface. Thus the time of exposure is reduced, as it is not necessary to indurate or oxidize the sensitized solution to so great an extent by the action of the light to insure its adhering safely to such surface, as where a smooth or polished metal plate or a polished or non-porous stone is used. The exposure may then be regulated and determined independently of any question of the adherence of the sensitized coating upon the surface of the plate. By so reducing the exposure, the exposed sensitized surface is in such condition that the operator in developing may take advantage of the resulting difference in firmness between the center or core of the dot or other screen figure, and the outer edges thereof. By the lesser exposure, as just described, the difference in firmness between the center and outer edges of the screen figure is preserved. This difference in firmness is obliterated through the longer exposure necessary to secure a proper adhesion of the sensitized coating upon the smooth or polished metal or the polished or non-porous stone. Such long exposure destroys the variety of the light action which I obtain by my process in each unit of the screen figure.

It will be understood further that by my process all modifications and harmonizing of the various tones of the negative and all the corrections usually secured through hand tooling, fine etching, overlays and underlays, and otherwise, are secured or effected directly and primarily in the development, and in the development the plate is brought to perfect printing condition. It will be understood that other objects and advantages are likewise secured, and that the steps described may be varied within the scope of the appended claims.

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

1. The process of making a printing plate which comprises sensitizing the surface of a plate, placing a screen, having successive areas of varying light transmitting power but carrying no design, at a distance from said sensitized surface equal to the focal distance of the clear screen openings, and placing a negative carrying the design between said screen and said sensitized surface, and exposing said sensitized surface to the action of light through said screen and negative to create on the surface of the plate a combined impression of the design and screen figures, said exposure being stopped

at a point when such screen figures are of greatest intensity at the center and decreasing in intensity outwardly therefrom when developed, and developing said surface.

2. The process of making a printing plate which comprises sensitizing the surface of a plate, placing a screen, having successive areas of varying light transmitting power but carrying no design, at a distance from said sensitized surface equal to the focal distance of the clear screen openings, and placing a negative carrying the design between said screen and said sensitized surface and with the film side of said negative in contact with said sensitized surface, and exposing said sensitized surface to the action of light through said screen and negative to create on the surface of the plate a combined impression of the design and screen figures, said exposure being stopped at a point when such screen figures are of greatest intensity at the center and decreasing in intensity outwardly therefrom when developed, and developing said surfaces.

3. The process of making a printing plate which comprises sensitizing the surface of a plate, placing a screen having successive areas of varying light transmitting power but carrying no design, at a distance from said sensitized surface equal to the focal distance of the clear screen openings, and placing a negative carrying the design between said screen and said sensitized surface and exposing said sensitized surface to the action of a point of light through said screen and negative to create on the surface of the plate a combined impression of the design and screen figures, said exposure being stopped at a point where such screen figures are of greatest intensity at the center and decreasing in intensity outwardly therefrom when developed, and developing said surface.

4. The process of making a printing plate which comprises sensitizing the surface of a plate, placing a screen, having successive areas of varying light transmitting power but carrying no design, at a distance from said sensitized surface equal to the focal distance of the clear screen openings, and placing a negative carrying the design between said screen and said sensitized surface, and exposing said sensitized surface to the action of a stationary point of light through said screen and negative to create on the surface of the plate a combined impression of the design and screen figures, said exposure being stopped at a point where such screen figures are of greatest intensity at the center and decreasing in intensity outwardly therefrom when developed, and developing said surface.

5. The process of making a printing plate which comprises sensitizing the surface of a plate, placing a screen, having successive

areas of varying light transmitting power but carrying no design, at a distance from said sensitized surface equal to the focal distance of the clear screen openings, and
 5 placing a negative carrying the design between said screen and said sensitized surface and with the film side of said negative in contact with said sensitized surface, and exposing said sensitized surface to the action of a stationary point of light through
 10 said screen and negative to create on the surface of the plate a combined impression of the design and screen figures, said exposure being stopped at a point where such screen figures are of greatest intensity at the center and decreasing in intensity outwardly therefrom when developed, and developing said surface.

6. The process of making a printing plate
 20 which comprises sensitizing a non-smooth surface of a plate such as a grained or porous surface thereof, by flowing a sensitizing solution thereover and drying it thereon, placing a screen, having successive
 25 areas of varying light transmitting power but carrying no design, at a distance from said sensitized surface equal to the focal distance of the clear screen openings, and placing a negative carrying the design between
 30 said screen and said sensitized surface, and exposing said sensitized surface to the action of light through said screen and negative to create on the surface of the plate a combined impression of the design and screen
 35 figures, said exposure being stopped at a point where such screen figures are of greatest intensity at the center and decreasing in intensity outwardly therefrom when developed, and developing said surface.

7. The process of making a printing plate
 40 which comprises sensitizing a non-smooth surface of a plate such as a grained or porous surface thereof, by flowing a sensitizing solution thereover and drying it thereon, placing a screen, having successive
 45 areas of varying light transmitting power but carrying no design, at a distance from said sensitized surface equal to the focal distance of the clear screen openings, and placing a negative carrying the design between
 50 said screen and said sensitized surface, and exposing said sensitized surface to the action of light through said screen and negative but stopping said exposure at
 55 a point to preserve the difference in intensity between the center and edges of the dot or other screen figures, and developing said surface.

8. The process of making a printing plate
 60 which comprises sensitizing the surface of a plate, placing a screen, having successive areas of varying light transmitting power but carrying no design, at a distance from said sensitized surface equal to the focal
 65 distance of the clear screen openings, and

placing a negative carrying the design between said screen and said sensitized surface, and exposing said sensitized surface to the action of light through said screen and negative to create on the surface of the
 70 plate a combined impression of the design and screen figures, said exposure being stopped at a point where such screen figures are of greatest intensity at the center and decreasing in intensity outwardly therefrom
 75 when developed, and developing said surface and locally developing the plate at various points, and rolling up and etching said plate.

9. The process of making a printing plate
 80 which comprises sensitizing the surface of a plate, placing a screen, having successive areas of varying light transmitting power but carrying no design, at a distance from said sensitized surface equal to the focal
 85 distance of the clear screen openings, and placing a negative carrying the design between said screen and said sensitized surface and with the film side of said negative in contact with said sensitized surface, and exposing
 90 said sensitized surface to the action of light through said screen and negative to create on the surface of the plate a combined impression of the design and screen figures, said exposure being stopped at a
 95 point where such screen figures are of greatest intensity at the center and decreasing in intensity outwardly therefrom when developed, and developing said surface and locally developing the plate at various
 100 points, and rolling up and etching said plate.

10. The process of making a printing
 105 plate which comprises sensitizing the surface of a plate, placing a screen, having successive areas of varying light transmitting power but carrying no design, at a distance from said sensitized surface equal to the focal distance of the clear screen openings, and placing a negative carrying the design
 110 between said screen and said sensitized surface and with the film side of said negative in contact with said sensitized surface, and exposing said sensitized surface to the action of a point of light through said
 115 screen and negative to create on the surface of the plate a combined impression of the design and screen figures, said exposure being stopped at a point where such screen figures are of greatest intensity at the center and decreasing in intensity outwardly therefrom when developed, and developing said surface, and locally developing the plate at various points, and rolling up and etching
 120 said plate.

11. The process of making a printing
 125 plate which comprises sensitizing the surface of a plate, placing a screen, having successive areas of varying light transmitting power but carrying no design, at a distance
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from said sensitized surface equal to the focal distance of the clear screen openings, and placing a negative carrying the design between said screen and said sensitized surface and with the film side of said negative in contact with said sensitized surface, and exposing said sensitized surface to the action of a stationary point of light through said screen and negative to create on the surface of the plate a combined impression of the design and screen figures, said exposure being stopped at a point where such screen figures are of greatest intensity at the center and decreasing in intensity outwardly therefrom when developed, and developing said surface, and locally developing the plate at various points, and rolling up and etching said plate.

12. The process of making a printing plate which comprises sensitizing a non-smooth surface of a plate such as a grained or porous surface thereof, by flowing a sensitizing solution thereover and drying it thereon, placing a screen, having successive areas of varying light transmitting power but carrying no design, at a distance from said sensitized surface equal to the focal distance of the clear screen openings, and placing a negative carrying the design between said screen and said sensitized surface, and exposing said sensitized surface to the action of light through said screen and negative to create on the surface of the plate a combined impression of the design and screen figures, said exposure being stopped at a point where such screen figures are of greatest intensity at the center and decreasing in intensity outwardly therefrom when developed, and developing said surface, and locally developing the plate at various points, and rolling up and etching said plate.

13. The process of making a printing plate which comprises sensitizing a non-smooth surface of a plate such as a grained or porous surface thereof, by flowing a sensitizing solution thereover and drying it thereon, placing a screen, having successive areas of varying light transmitting power but carrying no design, at a distance from said sensitized surface equal to the focal distance of the clear screen openings, and placing a negative carrying the design between said screen and said sensitized surface, and exposing said sensitized surface to the action of light through said screen and negative but stopping said exposure at a point to preserve the difference in intensity between the center and edges of the dot or other screen figures, and developing said surface.

14. The process of making a printing plate which comprises sensitizing the surface of a plate, placing a screen having successive areas of varying light transmitting power but carrying no design, at a distance

from said sensitized surface equal to the focal distance of the clear screen openings, and placing a negative carrying the design between said screen and said sensitized surface, and exposing said sensitized surface to the action of light through said screen and negative to create on the surface of the plate a combined impression of the design and screen figures, said exposure being carried to such point that the resulting image after normal development will be too dark or heavy and further developing the lighter parts of the plate, whereby the full shadows are relatively heavier than called for by the negative or positive, and developing said surface.

15. The process of making a printing plate which comprises sensitizing the surface of a plate, placing a screen, having successive areas of varying light transmitting power but carrying no design, at a distance from said sensitized surface equal to the focal distance of the clear screen openings, and placing a negative carrying the design between said screen and said sensitized surface and with the film side of said negative in contact with said sensitized surface, and exposing said sensitized surface to the action of light through said screen and negative to create on the surface of the plate a combined impression of the design and screen figures, said exposure being carried to such point that the resulting image after normal development will be too dark or heavy and further developing the lighter parts of the plate, whereby the full shadows are relatively heavier than called for by the negative or positive and developing said surfaces.

16. The process of making a printing plate which comprises sensitizing the surface of a plate, placing a screen having successive areas of varying light transmitting power but carrying no design, at a distance from said sensitized surface equal to the focal distance of the clear screen openings, and placing a negative carrying the design between said screen and said sensitized surface and exposing said sensitized surface to the action of a stationary light through said screen and negative to create on the surface of the plate a combined impression of the design and screen figures, said exposure being carried to such point that the resulting image after normal development will be too dark or heavy and further developing the lighter parts of the plate, whereby the full shadows are relatively heavier than called for by the negative or positive, and developing said surface.

17. The process of making a printing plate which comprises sensitizing the surface of a plate, placing a screen having successive areas of varying light transmitting power but carrying no design, at a distance

5 from said sensitized surface equal to the focal distance of the clear screen openings, and placing a negative carrying the design between said screen and said sensitized surface and with the film side of said negative in contact with said sensitized surface, and exposing said sensitized surface to the action of a stationary point of light through said screen and negative to create on the surface of the plate a combined impression of the design and screen figures, said exposure being carried to such point that the resulting image after normal development will be too dark or heavy and further developing the lighter parts of the plate, whereby the full shadows are relatively heavier than called for by the negative or positive, and developing said surface.

10 18. The process of making a printing plate which comprises sensitizing the surface of a plate, placing a screen having successive areas of varying light transmitting power but carrying no design, at a distance from said sensitized surface equal to the focal distance of the clear screen openings, and placing a negative carrying the design between said screen and said sensitized surface and with the film side of said negative in contact with said sensitized surface, and exposing said sensitized surface to the action of a stationary point of light through said screen and negative to create on the surface of the plate a combined impression of the design and screen figures, said exposure being carried to such point that the resulting image after normal development will

be too dark or heavy and further developing the lighter parts of the plate, whereby the full shadows are relatively heavier than called for by the negative or positive, and developing said surface.

19. The process of making a printing plate which comprises sensitizing a non-smooth surface of a plate such as a grained or porous surface thereof, by flowing a sensitizing solution thereover and drying it thereon, placing a screen having successive areas of varying light transmitting power but carrying no design, at a distance from said sensitized surface equal to the focal distance of the clear screen openings, and placing a negative carrying the design between said screen and said sensitized surface, and exposing said sensitized surface to the action of light through said screen and negative to create on the surface of the plate a combined impression of the design and screen figures, said exposure being carried to such point that the resulting image after normal development will be too dark or heavy, and further developing the lighter parts of the plate, whereby the full shadows are relatively heavier than called for by the negative or positive, and developing said surface.

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

JOSEPH ARTHUR HENRY HATT.

Witnesses:

JOHN D. MORGAN,
 ROSE MENK.