W. C. HUEBNER.

PROCESS OF PREPARING GRAINED TONE PHOTOGRAPHIC NEGATIVES AND POSITIVES AND PRODUCING PRINTING PLATES THEREFROM.

APPLICATION FILED MAR. 17, 1916.

1,300,729.

Patented Apr. 15, 1919.

Fig. 1.

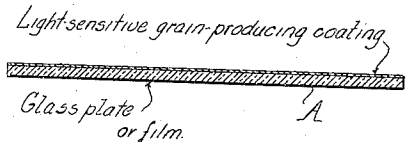


Fig. 2.

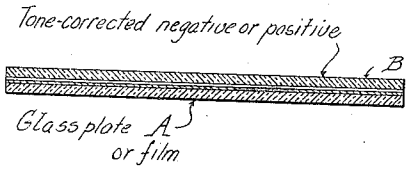
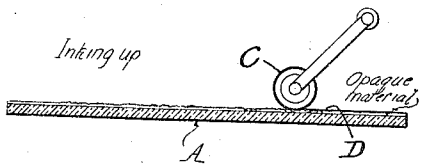
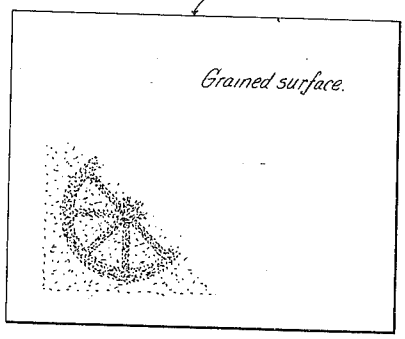


Fig. 5.



Developed plate A

Fig. 3.



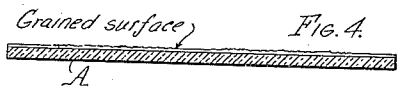
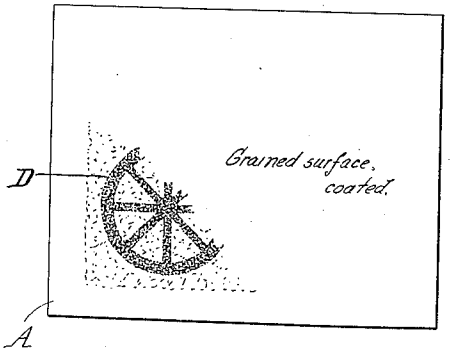


Fig. 4.

Fig. 6.



INVENTOR.

William C. Huebner.

By Wilkelm & Parker.

ATTORNEYS.

UNITED STATES PATENT OFFICE.

WILLIAM C. HUEBNER, OF BUFFALO, NEW YORK, ASSIGNOR TO HUEBNER-BLEISTEIN PATENTS CO., OF BUFFALO, NEW YORK.

PROCESS OF PREPARING GRAINED-TONE PHOTOGRAPHIC NEGATIVES AND POSITIVES AND PRODUCING PRINTING-PLATES THEREFROM.

1,300,729. Specification of Letters Patent. Patented Apr. 15, 1919.

Application filed March 17, 1916. Serial No. 84,880.

To all whom it may concern:

Be it known that I, WILLIAM C. HUEBNER, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Processes of Preparing Grained-Tone Photographic Negatives and Positives and Producing Printing-Plates Therefrom, of which the following is a specification.

This invention relates to a method for producing monotone or polychrome press printing plates of the kind which are made for example by photo-composing machines forming the subject matter of Letters Patent Nos. 954,291 and 954,292, both dated Jan. 23, 1912; 1,043,430, dated Nov. 5, 1912, and 1,201,048, dated Oct. 10, 1916, granted to W. C. Huebner, assignor to Huebner, Bleistein Patents Co., and also for preparing the negatives and positives used in making the press plates.

The photographic negatives or positives used in such machines should be of a more perfect and finished quality than heretofore attained by the ruled or grained screen methods, because the metal printing plates produced in these photo-composing machines are not adapted for local tone correction, as this would not be economical since the printing plate often carries the same subject repeated many times, and aside from the large amount of work involved, it is not possible to correct several repeats upon the printing plate exactly alike. It is imperative for practical and commercial production that the image formed upon the printing plate by the photographic negative or positive used in these machines must carry the required tones to reproduce the copy in a satisfactory manner.

In photo-mechanical reproduction methods where either half-tone ruled or grained screens are used for producing negatives and positives for making monotone or polychrome printing plates, it is found that the full tone values of the copy are not reproduced exactly, since the parts of the copy which are white, and the parts which are black, will carry a fine dot or grain in the negative. Also, that the light tones next to the whites will be darker, and the deep tones next to the blacks will be lighter, due to the use of these screens for producing printing units on the negative and positive, in order to adapt them for the successful production of photo-mechanical printing plates. The manipulation by timing and flashing through lens diaphragms or various shapes and sizes of stops, during exposure through the screens does not compensate for the loss of tone gradation, and the resulting image on the printing plate made from such screened negatives or positives is flat or gray in appearance when compared to the copy from which the negative or positive was made.

Such defects are remedied by reëtching, burnishing, overlaying, and underlaying the printing plates when the plates are made from relief printing. But when the negatives or positives are made for planographic printing, these tone defects must be corrected on either the negative, the positive or on the photo-printed planographic stone or plate. This is a time-consuming operation and has been found in practice to seriously delay the execution of orders, on account of the extra labor of correcting the light and dark tones on the negatives.

The negatives made through ruled or grained screens cannot give satisfactory results unless they are tone corrected by hand, to eliminate the false tones rendered by the use of the screens, and this hand operation requires much experience, skill and good judgment in manipulating the tones and is a costly and time consuming operation.

It is the object of this invention to overcome these defects and meet the specific requirements and conditions created by the use of photo-composing machines by providing a process for preparing, without the use of screens, grained tone negatives and positives on transparent or semi-transparent material, such as glass or films, with tone gradations of the image broken up into opaque and transparent or semi-transparent grains or units, and producing the printing plates from the negatives or positives thus prepared.

The accompanying drawing illustrates the hereindescribed method of producing photographic printing plates. In said draw-

ing Figure 1 shows in section a plate or film A provided with a light-sensitive grain-producing coating. Fig. 2 shows in section the plate shown in Fig. 1, in position beneath a tone corrected negatve or positive plate B ready for exposure to light. Fig. 3 is a face view of the printing plate A after is has been exposed to light and developed and showing the grained surface. Fig. 4 is a sectional view of the plate shown in Fig. 3. Fig. 5 is a sectional view showing the opaque material D being applied to the grained surface plate shown in Fig. 4. Fig. 6 is a face view of the grained surface plate A after being coated with the opaque material D.

It has been found in practice that a continuous tone negative or positive on a grained glass plate B can be tone corrected quickly and with certainty as to the desired tone values, and that if this tone corrected negative or positive is placed face down in contact with a suitable light-sensitive grain-producing coating on a transparent or semi-transparent plate A and exposed to light, the image can be developed and broken up into opaque and transparent, or semi-transparent grains, which carry a far greater tone range from black to clear white, and give a more faithful reproduction of all intermediate tones of the positive than can be secured by the use of screens.

The function of the opaque grains so produced is to block the passage of light, and the function of the transparent or semi-transparent grains is to permit the passage of light to act upon a sensitized printing plate, and this light action forms the image either in positive or negative as desired, upon the printing plate. The result is that with very little hand work, a highly satisfactory print is produced directly upon the metal printing plate, also that when exposed and repeated in the photo-composing machine hereinbefore referred to, this print on the metal printing plate yields a finer quality of work and longer editions from the plates than can be attained by other methods of grain printing. Many duplicate or repeat exposures can be made through this grained tone negative or positive upon a suitably sensitized metal plate and the negative or positive can be stored away for future use.

A subject in colors can be reproduced by this process as follows:—

A photographic negative of the subject is made preferably on grained glass, a violet color filter being used or the subject being illuminated with violet light, according to the method used. During exposure the yellow color of the copy is separated from the other colors and a record negative of the yellow color is made.

Record negatives of the red and blue colors are made in a similar manner by the use of a green color filter or green light and an orange color filter or orange light respectively.

A photographic positive B is then made from each of these negatives, preferably upon grained glass plates, by either the wet plate or dry plate method.

These positives B, when dry, are tone-corrected by hand. The tones can be darkened by application of suitable mediums, such as fine graphite powders or pastes, the fine tooth of the grained glass plate providing a ready hold for these mediums, and the tones can be lightened or entirely removed by the use of some suitable medium, such as powders of cuttlebone, or pumice, or other gritty substance.

After correcting errors in tones of defective color separations, or making other desired changes, the positive B is laid face down upon a plate A (preferably slightly grained) of glass or other suitable transparent or semi-transparent material, having a light-sensitive grain-producing coating. A coating solution of gelatin, potassium bichromate, ammonium bichromate, calcium chlorid, ether, alcohol and water is suitable for this purpose. The positive B is exposed to light with its face in contact with this sensitized surface, a piece of black felt being preferably placed at the back of the sensitized plate to avoid halation. Instead of first making a negative and then making a positive from this and tone-correcting the positive, it is possible to make the negative in grained glass and tone-correct this plate and use it instead of the positive for printing on the light-sensitive grain-producing surface.

After exposure, the sensitized plate A is developed. If the above specified sensitive coating is used the plate is developed in water until all of the bichromate is washed out and the plate is then allowed to dry. The portions of the gelatin acted upon by the light do not absorb moisture but the parts not affected by light do absorb moisture and swell accordingly. These moist parts will repel greasy ink or the like while the parts affected by light will repel moisture and accept greasy ink or analogous opaque substance which can be applied by a sutable composition roller C or in other ways. If it is desired to render the grain carrying the opaque ink or matter more dense, the surface can be dusted with deflocculated graphite, lampblack or other powder D which will adhere to the link.

When the ink has been treated thus, the image will be represented thereon by opaque and transparent or semi-transparent grains and the plate can be used as a photographic negative. This plate which carries the grained tone image, after being dried and

also preferably varnished to preserve it, can be placed in a photo-composing machine, such as mentioned, together with a sensitized press plate, and the machine operated as required to make a single or duplicate and repeat exposures on the press plate. The passage of light is blocked by the opaque grains but the light passes through the transparent or semi-transparent grains and acts upon the sensitive surface of the press plate. After suitable development, the image or images in grained tone gradations is or are produced upon the press plate, from which many thousand impressions can be taken in a suitable press. This grained tone negative or positive A on glass can be used indefinitely for the production of printing plates. It can be stored away and used whenever convenient as it does not deteriorate by use, since it only passes light to the sensitized press plate during exposure.

For producing monotone printing plates it is of course only necessary to make and correct one photographic positive of the copy, and make one grained tone negative therefrom, the same being made in the manner explained.

It is not intended to limit this invention to the particular formula above described for the light sensitive grain producing solution, as other ingredients can be used provided they are prepared so as to maintain a proper balance of opaque and transparent units to produce proper tone gradations. Opaque matter can also be applied to this grained surface in ways other than above described, as for instance by flowing with suitable chemicals or opaque solutions which will adhere to the desired parts, and dusting these parts with suitable powders, thus producing opaque, transparent and semi-transparent grains which will make up a screenless grained tone negative suitable for photographic printing upon the sensitized surfaces of printing plates or cylinders.

The plate or film could also be rolled up with a transparent greasy material on the light hardened portions and an opaque non-greasy solution flowed over the entire plate in which case this opaque material adheres only to the parts containing moisture and is repelled by the greasy portions.

Another alternative method is to roll up the plate with a greasy tacky substance, either of opaque or semi-transparent nature, as for instance tacky varnish, and dusting with fine opaque powder, such as graphite, lampblack, or fine bronze powders, after setting, combining and drying the surplus or loose particles of powder lying between the opaque grains can be cleaned off the plate by an air blast or by brushing carefully with a soft brush or other suitable means.

Instead of glass plates, transparent or semi-transparent films of celluloid or the like can be used as a base for carrying the grain producing solution, so these can be applied to either flat metal printing plates or to curved metal surfaces such as intaglio printing cylinders.

I claim as my invention:—

1. A process of preparing, without the use of screens, grained tone negatives and positives, consisting in providing a transparent or semi-transparent plate or film with a light sensitive grain producing coating, exposing the same to light under a suitable image and developing the same, thereby producing a surface having grains which will receive and grains which will repel a coating material and then applying opaque material to said surface to provide opaque and transparent or semi-transparent grains which make up the image and are adapted respectively to block and permit the passage of light for acting upon a sensitized printing surface.

2. A process of preparing, without the use of screens, grained tone negatives and positives, consisting in providing a transparent or semi-transparent plate or film with a light sensitive grain producing coating, exposing the same to light under a suitable image and developing the same, thereby producing a surface having grains which will receive and grains which will repel a greasy opaque material, and then applying the greasy opaque material to the surface to provide opaque and transparent or semi-transparent grains which make up the image and are adapted respectively to block and permit the passage of light for acting upon a sensitized printing surface.

3. A process of preparing without the use of screens, grained toned negatives and positives, consisting in making a photographic negative or positive of a subject on transparent or semi-transparent material, and tone correcting said negative or positive, providing a transparent or semi-transparent plate or film with a light sensitive grain producing coating, exposing the same to light under said corrected positive and developing the same, thereby producing a surface having grains which will receive and grains which will repel a coating material, and then applying opaque material to said surface to provide opaque and transparent or semi-transparent grains which make up the image and are adapted respectively to block and permit the passage of light for acting upon a sensitized printing surface.

4. A process of preparing, without the use of screens, grained tone negatives and positives, consisting in providing a transparent or semi-transparent plate or film with a light sensitive grain-producing gelatin coating, exposing the same to light under a suitable image and developing the

same thereby producing a surface having light hardened grains and moisture swelled grains which will repel a coating material, and then applying opaque material to said surface to provide opaque and transparent or semi-transparent grains which make up the image and are adapted respectively to block and permit the passage of light for acting upon a sensitized printing surface.

5. A process of producing press printing surfaces, consisting in preparing, without the use of screens, a grained tone negative or positive, by providing a transparent or semi-transparent plate or film with a light sensitive grain producing coating, exposing the same to light under a suitable image and developing the same, thereby producing a surface having grains which will receive and grains which will repel a coating material, then applying opaque material to said surface to provide opaque and transparent or semi-transparent grains which make up the image and are adapted respectively to block and permit the passage of, and then exposing a sensitized printing surface to light through said grained tone negative or positive.

Witness my hand this 15th day of March, 1916.

WILLIAM C. HUEBNER.

Witnesses:
C. W. PARKER,
A. L. MCGEE.