UNITED STATES PATENT OFFICE.

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PROCESS FOR MAKING PRINTING-PLATES.

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To all whom it may concern:

Be it known that I, CHRISTOPHER WILLIAM LUTTERMAN, a citizen of the United States, residing at Norwood, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Processes for Making Printing-Plates, of which the following is a specification.

My invention relates to a process of forming or preparing printing plates or surfaces primarily for lithographic reproduction by a series of photographic steps.

The primary object of my invention is to form a printing surface by photographically producing a half-tone paper enlargement in the form of a negative, which, by direct contact with a sensitized printing plate on exposure results in a reproduction of the original subject, with a preservation of the original artistic effects. The time, labor and cost in the preparation of a printing plate are reduced to a minimum. The artistic value of the product is enhanced and the natural and artistic tone values of the original preserved as well as the delicate refinements, which to a large degree are lost under the well-known methods of preparing the subject upon printing plates.

The method employed consists in first producing a negative of the subject upon a glass plate and preferably by using a color filter if necessary to aid in separating the colors, with the exposure and development of the plate or negative to produce a proper gradation.

As a second step in the process, I produce a half-tone positive by the use of a relatively fine screen placed a suitable distance in rear of the lens and before the sensitized plate, with the negative placed before the lens, and a light reflected preferably upon a white sheet of paper placed before the negative. A small diaphragm is used in the lens throughout the entire exposure. In making a screen positive from the negative made as heretofore described it is possible to maintain distinct individuality of all of the dots in the half-tone positive. By this step the proper gradation and all the tones are perfectly rendered and in true reproduction of the negative, the smallest white dot being in the dark portions which are the high lights in the original and the smallest black dot being in the light portions which are the shadows in the original, all the dots being perceptibly maintained. In this half-tone positive the dark portions of the first negative, are those portions which are light in the original and in consequence will be light in the positive, and the same condition exists with the dark portions, *i. e.* dark in the original, light in the negative and dark in the positive.

In fact, a half-tone positive is produced, a refinement maintained and owing to the density of the negative the dots are not diminished nor overlapped but are merely defined through the actinism of the reflected rays penetrating the negative, maintaining the same relative uniform gradation of the negative.

As a third step to the process, the positive half-tone obtained in the second step is projected upon a paper coated with a highly sensitive emulsion and which projection can be as an enlargement of the half-tone positive or a size desired for the lithographic reproduction. The enlargement, however, is the important aim in the use of this process, enabling the following steps to be conveniently and practically carried on in making large-sized printing plates. At this step the high lights are characterized by the absence of the intensified or pronounced dot individuality, through a combination of diffusion of the reflected rays around the light dots in the half-tone positive by the side action of the large area of light surrounding the dot in the high lights, and as the light dots are the smallest and faintest their effectiveness is perceptibly lost in this step. This third step of taking an enlarged negative directly on paper from the glass half-tone positive is important and its significance should be understood with relation to the previous steps and the characteristics which it imparts to the finished product or printing plate. Assume, for illustration, that the original subject is a man in a dark suit of clothes with a linen collar, the collar, of course, will be the lightest portion, or, in other words, represent the high lights in photographic nomenclature. In the glass negative first taken, the collar will be black, in the glass half-tone positive, second taken, the collar will again be white, and the mesh of the screen will appear as small black dots or the conventional half-tone effect, and in

the third step, when the subject is enlarged to produce a negative half-tone directly on paper, the collar will again appear as black, but the dots will have been substantially eliminated, because in the enlarging, the dots on the collar portion of the glass positive are surrounded by a white field and the rays projecting therefrom in enlarging are diverged so that they comingle and become diffused upon the exposed paper, the collar again becoming black on this paper negative and characterized by an absence or marked reduction of the dots as compared to the half-tone positive, in so far as the collar portion is concerned.

Thus in the fourth step, which consists in forming a positive half-tone on the printing surface by direct contact and printing from the paper negative half-tone, the collar will again be white and notably free from the half-tone dots, while the darker portions of the image will be defined by the half-toning effect, constituting raised surfaces which will impart ink to the lithograph, the collar portion being relatively low owing to the relative absence and density of the raised dots, so that no ink will be imparted to the lithograph and the collar will be white thereon. The other more or less shaded portions of the surface will be reproduced on the lithograph in their relative gradations, so that the resulting lithograph printed from the plate will be a true reproduction of the subject with the artistic effects and relative light and shade effects preserved intact.

If the dot is required in the high lights for more satisfactorily printing some colors, such as for instance, buff and gray, the dot in the high lights is made larger or more pronounced by a prolonged exposure when making the half-tone positive, or by making the first glass negative thinner or developing the same lighter. Thus if the dot in the half-tone positive in the high lights is of larger area, it will considerably retard the diffusion of the light rays toward the medial point of the dot, thereby producing a more pronounced dot in the high lights in the half-tone paper enlargement and if not developed out will have their resulting effect in the transfer upon the printing plate.

In fact, with my process by exposure and development it is possible at the last stage in the enlargement upon the developing paper to produce a negative, in which the individuality of the artist is maintained and with the lights and shadows artistically graded. The half-tone effect is practically lost in the printing plate and it might be said that a lithographic impression is obtained, more delicate and harmonious than under the well known methods of producing lithographic stone printing plates.

Fourth step: After the half-tone paper negative has been properly finished, it is placed in direct contact with a metal plate or stone which has been previously sensitized with a bichromatized colloid, the paper is held or clamped smoothly over the surface and so maintained and exposed to the light, obtaining a print upon the sensitive printing plate. After a proper exposure, the plate is developed and etched, either flat or in relief, to suit the particular purpose or press-work. This preparation of the printing plate is carried on under the well known methods common in the art.

In making a plate print, the density of the dot can be readily varied in making a darker or lighter print by more or less exposure. The shadow dot may be eliminated entirely, making it possible to make corrections in color not taken care of by proper color separation in the first step of the process in making printing plates for color reproduction.

Having described my invention, I claim:—

1. The herein described process for forming a lithographer's plate, which consists, in first taking a negative photograph of the subject upon a sensitized glass plate, and developing said plate; second, in taking a half-tone positive photograph of said negative upon a sensitized glass surface, using a screen and diaphragm arranged to form dots throughout all portions of the positive, and developing said positive; third, taking an enlarged negative photograph of said half-tone positive upon a sensitized surface suitable for photographically printing therefrom, effectually eliminating the dots in the high lights during this third step, and developing said negative; fourth, photographically printing from said enlarged negative upon a sensitized lithographer's plate, and finally etching and finishing said plate to form a printing surface.

2. The herein described process of forming a lithographer's plate which consists, in first taking a negative photograph of the subject upon a sensitized glass plate, and developing said negative; second, in taking a half-tone positive photograph of said negative upon a sensitized glass surface, using a relatively small diaphragm and fine screen so placed as to form dots throughout all portions of the positive, creating dots in the high lights as well as in the lower lights of the positive, and developing said positive; third, taking an enlarged negative photograph of said half-tone positive upon a sensitized surface suitable for photographic printing therefrom and effectually reducing the dots in the high lights during the third step so as to produce substantially pure high lights in the resultant enlarged negative, developing said negative; fourth, photographically printing directly from

said enlarged negative upon a sensitized lithographer's plate and finally finishing said plate, to produce a printing surface characterized by an absence of dots in the high lights and the presence of dots in the lower lights, relatively graded to reproduce the true tone values of the original subject.

In testimony whereof, I have hereunto set my hand.

CHRISTOPHER WILLIAM LUTTERMAN.

Witnesses:

OLIVER B. KAISER,

CLARENCE B. FOSTER.