

UNITED STATES PATENT OFFICE.

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PHOTOTYPOGRAPHY.

SPECIFICATION forming part of Letters Patent No. 248,035, dated October 11, 1881.

Application filed January 31, 1881. (No model.)

To all whom it may concern:

Be it known that I, HANNIBAL GOODWIN, of the city of Newark, in the county of Essex and State of New Jersey, have invented an Improvement in Phototypography, of which the following is a specification.

By the processes now in use of preparing by photographic means a metallic or stone surface to be etched with an acid or its equivalent for letter-press or intaglio printing, or of so preparing it for lithographic printing, it is that part of the properly-sensitized film of organic matter covering the surface which at the outset is hardened by the light when exposed to its action through the medium of a negative or positive, as the case may be, that is finally retained and made to constitute the protecting covering in etching for letter-press or intaglio printing, or that constitutes the surface that is to take and hold the ink in lithographic printing.

My method is the reverse of this—that is to say, by my method the above-named hardened part of the said film is finally removed, and the surface of the plate or stone at first covered by it is by such removal laid bare for the action of the etching agent, while the surface that is at the outset overlaid by that part of the film that is unaffected by the light is finally protected from the action of the etching agent, or is prepared to take and hold the ink in lithographic printing.

I will proceed to describe the process by which I accomplish this result, and, first, the method of producing a metal or lithographic stone surface, etched in relief for letter-press printing:

I first flow the surface to be etched with a solution of albumen, gum, gelatine, or any equivalent, sensitized by a suitable salt, and dry it. I then expose this surface to light under a positive, not a negative. The positive may be either a photographic positive, in line or dot, or an ordinary printed engraving on paper, or a pen-and-ink sketch on paper, or an open meshed textile fabric, (lace, for example.) If the positive is a printed or sketched figure on paper, the paper should be white, and pervious or made pervious to light, so as to permit the transmission of sufficient light to produce the requisite photographic impression, and should be laid with the printed or sketched surface in con-

tact with the plate or stone. After the photographic impression is produced I apply a film of ink to the plate, which, besides the other office it performs, acts as a help to the eye in the development of the image, and then in the usual manner develop it—that is, remove the ink and albumen from only those parts of the plate which during the exposure were covered by the black lines of the positive, and are therefore left unaffected by the light. I then proceed to reverse this condition of things—that is, to cover with an acid-resisting film those parts of the surface that are now bare, and to remove the ink and underlying film of albumen from the other parts. To accomplish this result I proceed as follows: I first preferably dust powdered rosin or other fusible resin upon the plate, which will adhere only to the parts covered by the film. I brush off the surplus that does not adhere, thus removing it from the bare parts. I then heat till the resin just fuses. The resin is thus applied to thoroughly protect the albumen or gum underlying the ink on the covered parts from being penetrated by the chemical next to be applied. It is possible, by careful manipulation, using a very dilute solution of the acid next to be applied, and employing sufficient time, to dispense with the use of the resin; but I much prefer to employ it as described, as the protection it affords to the light-hardened film renders the following steps in the process less delicate and more certain. I now dip the plate for about a minute in a dilute solution of perchloride of iron or its equivalent in order to dissolve away all trace of albumen or gum that may be still lodged in or on the surface of those parts of the plate that are bare, and to prepare them to receive and hold the resinous or greasy matter now to be applied. Now, after properly drying the plate over heat, I preferably brush or dab on a thin film of a solution of asphalt (or its equivalent, such as wax, resin, or grease, singly or in combination) in turpentine or its equivalent, covering at least all the bare parts of the plate; and then with wads of cotton moistened with a proper solvent—such as turpentine—I remove quite closely the said turpentine solution, together with the ink remaining on the plate, leaving the albumen or gelatine that has been hardened by the light. I next flow the plate with the above turpentine

solution of asphalt or resinous or greasy matter and distribute it thoroughly, which is best accomplished by a vigorous whirling in the turn-wheel, after which I keep the plate warm for a short space of time, especially if it be of zinc or other metal of a fat-holding capacity, in order that a portion of the turpentine may carry all that is possible of the asphalt, greasy, or resinous substance down into the plate, while the excess evaporates. This penetration of such agents into the plate has a considerable influence in lessening the tendency toward undercutting during the etching operation. Besides, there is now on the surface of the plate a thin sheet of the best acid-resisting substances. This application of asphalt or its equivalent, while it is very important, is not indispensable. When the surface is finally prepared for etching or for surface-printing the parts that are to be protected from the acid in etching or are to take the ink in surface-printing are, when the asphalt or equivalent is applied, covered not merely with a film of fatty ink, but the ink will be underlaid with a film of a substance which will contribute greatly to protecting the underlying surface of the plate or stone, preventing the acid from undercutting or making ragged lines. I next roll up the plate with ink, and then immerse it into a solution of very dilute hydrochloric acid or other solvent of light-hardened albumen or equivalent. This acid will attack and loosen from the metal the albumen, notwithstanding the covering of ink overlying it, as will be indicated, after a few minutes, by minute gas-bubbles, which will be found to cover the albumen ink-covered surfaces, while the resinous asphalt or greasy matter lying next the other portions of the plate, if such has been applied, and the overlying ink, or the ink alone if only ink has been applied, will remain unaffected. I then with a tuft of cotton sweep gently over the surface of the plate, when only the albumen and its overlying ink and resinous film will come away, leaving bare the portions of the plate underneath them, while the other parts will remain covered with the ink when ink alone has been applied, or will be penetrated by and covered with asphalt or its equivalent—wax or grease—and with a coating upon the asphalt of fatty ink, both together giving the most favorable protection to the parts covered against the action of the etching-acid. The surface thus prepared, whether metal or stone, is ready for surface-printing, as upon lithographic stone in ordinary lithographic printing, or to be etched with a suitable acid, in relief, in the ordinary way for letter-press printing.

Second, to produce a plate etched in intaglio for copper-plate printing, I proceed in all respects as above described, except that I employ a negative in place of a positive to get my photographic impression on my sensitized gelatine or albumen coated plate.

It will be obvious to all skilled in the art that, starting with a plate thus affected through

a negative and pursuing the process as described, a surface etched in intaglio will be the result.

The advantages of this method over any heretofore practiced are very great. One of the most important is the opportunity it affords for the employment of a positive instead of a negative as the medium for producing the photographic impression on the sensitized plate or stone to be etched in relief for letter-press printing.

a. There are, as is well known, inevitable difficulties in securing a photographic negative in very fine lines, because of the clouding and choking up of said lines in the operation of development and of intensification, which difficulties do not accompany a photographic positive, and hence results unobtainable by the former are secured by the latter.

b. As is well known, better definition in a picture upon metal or stone can be secured by contact photographic printing than when the picture is transferred.

c. A finer image can be gotten upon the plate through a positive than a negative. In fact this image is somewhat finer than the positive itself which is used, while a negative produces an image that is somewhat coarser than itself, the lines coming out broader than in the negative.

d. A majority of the subjects required to be produced are themselves positive, such as printed or penned sketches on paper, or open textile fabrics, and by my invention I can use them direct without the intervention of the camera.

e. The use of a positive will, while a negative will not, permit the application of resinous or greasy matter to the lines to be etched in relief previous to the application of fatty ink, whereby the said lines are protected from the etching-acid to a degree unobtainable by the simple application of ink or of albumen and fatty ink, so that the lines are etched with less raggedness and undercutting and less indentation of surface than by the ordinary process.

f. My process is more direct and simple and requires less time than the transfer process heretofore employed, and while not perhaps much more speedy than the ordinary direct method, it possesses many advantages over that method, as will be readily understood and appreciated by those skilled in the art.

g. Many of the difficulties and objectionable results that are incident to the common transfer processes are obviated by mine, such as the frequent failure of the image on the transfer-paper to develop; the liability of carrying away very fine lines in the operation of developing the image on the transfer-paper; the blocking up of small spaces in making the transfer; the liability to spoil the work by the slipping of the transfer-paper upon the plate in laying it in; the injury often caused by the puckering of the transfer when the pressure of the press is applied; the failure that sometimes occurs to pro-

duce a complete transfer by reason of the non-penetration of the ink into the plate after the pressure is applied, thus leaving the image or part of it on the paper; the mischief often done from the filling up of the smallest spaces by the application of fresh ink after the transfer is made upon the metal.

h. As is well known, raggedness of line in ordinary processes of etching in relief arises largely from the reinking, rosining, and melting, which are necessary immediately after the first shallow etching, whereas by the penetration of the surface by an oily asphalt the first etching may be carried so deep that the after application of ink and rosin cannot produce such raggedness.

The preliminary steps of the process I have above described up to the point at which the photographic impression is produced upon the film of sensitized gelatine or albumen through the medium of either a negative or positive, the removal from the surface of the metal or stone of the parts of the film not hardened by the light, and the covering with ink of the hardened parts of the film that remain, are not new; but heretofore when this stage has been reached the practice has been, whether by the direct or transfer process, to immediately commence the etching operation by the application of the acid, either for a relief or for an intaglio, or the surface without further modification is used for surface-printing; but by my new process, having reached the stage or condition last above referred to, I proceed to reverse the conditions of the surface—that is to say, to reverse the film image now on the surface—and to cover the now bare parts with a film that shall constitute the image to be reproduced. By this reversal of the conditions of the surface it results that, if a positive is used as the medium for getting the photographic impression on the sensitized gelatine or albumen covered plate or stone, the same positive or image is produced for the printing-surface, and if a negative is used as such medium the same negative is produced for the printing-surface.

The process described in the last preceding paragraph I believe to be new, as is also the process described of covering the protected parts of the plate or stone under the ink with a film of asphalt or its equivalent, such as rosin, wax, grease, &c., singly or in combination.

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

1. In the process of relief etching on a metal or stone surface with an acid for the production of printing-surfaces, the employment of a

positive as the medium of getting a photographic impression in the sensitized film of albumen or analogous substance, and using such photographic impression in the operation of covering with a protecting-film of fatty ink or its equivalent the parts only of said metal or stone surface that are not to be cut by the acid in the etching process, substantially as described.

2. In the process of intaglio etching a metal or stone surface with acid for the production of intaglio-printing surfaces, the employment of a negative as the medium of getting a photographic impression in the sensitized film of albumen, and using said photographic impression in the operation of covering with a film of fatty ink or its equivalent the parts only of said metal or stone surface that are not to be cut by the acid in the etching process, substantially as described.

3. In the process of etching with acid metal or stone surfaces for the production of printing-surfaces, the method herein described of covering with a protecting-film of a substance that will resist the etching agent only those parts of the said surface that are not to be cut thereby, consisting, first, in covering said surface entirely with a film of albumen or its equivalent properly sensitized, so that the action of the light is to harden and render insoluble in water the albumen; then submitting said prepared surface to the action of light under either a negative or positive, and washing away the parts of the film not affected by the light in the usual way; then applying to this surface a dilute solution of perchloride of iron or its equivalent—such as a mixture of verdigris and sal-ammoniac—to dissolve away the remaining foreign matter from the bare parts of the surface and prepare it to receive and hold the substance next to be applied; then covering the surface with a film of asphalt, grease, or its equivalent, deposited from a solution; and, lastly, removing by the use of a suitable solvent the remaining film of albumen that has been hardened by the light and its overlying asphalt, leaving the parts of the surface not intended to be cut by the etching agent, or that are intended to take and hold the ink, covered by the film of asphalt or equivalent, substantially as described.

Witness my hand this 27th day of January, 1881.

HANNIBAL GOODWIN.

Witnesses:

A. G. W. VERMILYA,
HENRY EICHLING.