

UNITED STATES PATENT OFFICE.

PROCTOR R. SHUGG AND GEORGE BOYLE, OF NEW YORK, N. Y.

PROCESS OF MAKING RELIEF PRINTING PLATES OR BLOCKS.

SPECIFICATION forming part of Letters Patent No. 292,181, dated January 22, 1884.

Application filed March 19, 1883. (No specimens.)

To all whom it may concern:

Be it known that we, PROCTOR R. SHUGG and GEORGE BOYLE, of the city and State of New York, have invented an Improvement in the Process of Making Relief Printing Plates or Blocks Adapted to the Requirements of the Type-Printing Press, of which the following is a specification.

The drawings or prints from which engraved plates are to be made should be in clear black without medium shades, on a white or light ground. For example, a page is selected from any newspaper that is printed in black type on white paper. From the page we obtain a photographic negative in the ordinary manner, either reducing or enlarging the same. After developing and fixing the negative, and before it is dry, it is treated successively to a solution of sulphate of copper and nitrate of silver, for the purpose of intensifying the parts corresponding to the white parts of page to such density that they will intercept the light in the subsequent printing on the sensitive block. Those parts of the negative corresponding to the block-type on the page should remain clear and transparent to transmitted light, and the more perfect and decided the contrast between the black and white parts of the negative the more dense and opaque the parts corresponding to the white parts of the page, and the more clear and transparent these parts corresponding to the black parts of the page the better adapted to the successful production of a perfect relief plate.

The preparation of the sensitive composition block, afterward to be developed into the relief engraved plate to be used to print from on the printing-press is effected as follows: Prepare in an iron pot the following ingredients: glue, one pound; glycerine, one ounce; water, thirty-two ounces; albumen, three ounces; bichromate of ammonia, one ounce. Dissolve the ingredients by warming over a fire and stirring well. When all is dissolved, strain through flannel cloth into a clean pot and add one pound of powdered resin, stirring the same briskly, and flow or pour out the same upon a smooth level surface of glass or metal previously prepared by coating the surface with a thin film of oil or wax dissolved in ether, to prevent the composition from ad-

hering, place the composition in a strong cool draft to dry, which will require from twenty-four to sixty hours, according to the temperature and condition of the atmosphere. The composition should be shielded from the contact of actinic light during every stage of the process, except when exposed under the photographic negative; as upon its sensitiveness to actinic light depends the production of the relief. When the composition is dry, before it becomes too brittle separate it from the support and it is ready to expose to the action of actinic light under the negative. Cut off a piece of the required size and place the negative in contact with that side or face of the composition which was in contact with the support upon which it was dried. Place in an ordinary photographic printing-frame and expose to the light (sunlight preferred) for the necessary length of time, and remove the composition from contact with the negative, protect from the light and it is ready for the next operation.

For use on the printing-press, the finished block should be of the standard or required height of type. This we can obtain by casting our layers of composition of the required thickness in the first place, or by casting the composition in any thickness and afterward increasing to the desired height of type by cementing the sensitive plate to a block-plate applicable to the purpose. We have used a thin layer of composition which we increase to the height of type by cementing the sensitive sheet to a back of wood, previously prepared by boiling in a solution of glue-water until it is thoroughly saturated and then drying and seasoning the same. We procure a piece of the desired size and make smooth by scraping or planing, then prepare a solution of glue and bichromate of ammonia, and coat the face of the support and the back of the sensitive sheet and place the two surfaces in contact. Place under pressure, and when thoroughly set it is ready for the next step in the process.

We mention here that the action of the light that passed through the transparent parts of the negative was to render the parts of the composition affected insoluble in the original solvent, hot water, while these parts protected by the opaque parts of the negative remain

soluble in the original solvent, hot water. To develop the plate, place the block, face up, over a tank or suitable place and direct a stream of boiling water passing through a nozzle perpendicularly against the face of the block with great force. The boiling water softens the unprinted or soluble parts of the composition, and the pressure and friction of the stream displaces those parts and carries them away, leaving the printed parts of the design standing in relief. When displaced to a sufficient depth, flow with alcohol to remove the surplus water, and let stand in a draft for a short time. It is then ready for the final process of hardening, so as to stand the pressure and wear of printing on the printing-press.

To harden and convert the relief-block into a composition as durable and resembling a metal plate, the following mode is employed: Prepare solutions as follows, in about the following proportion: No. 1, saturated solution of bichromate of ammonia; No. 2, nitrate of silver, fifteen grains to one ounce of water; No. 3, saturate solution of sulphate of iron; No. 4, solution of ammonium hydrosulphite. Treat the block to a bath of solution No. 1 for a few minutes until it has absorbed a quantity, then blot off the surplus with blotting-paper and dip into solution No. 2, nitrate of silver. The chromate already soaked into the composition will combine with the silver. The composition absorbs the silver, forming chromate of silver, and leaving an excess of silver to be acted upon and reduced to the metallic state by the absorption of the solution of sulphate of iron, leaving an excess of iron solution, then by treating to a bath of solution of ammonia hydrosulphide. The action is to oxidize and harden the entire mass and bind all the ingredients together. Blot off with blotting-paper the excess of solution, and give a final bath of solution of nitrate of silver to give a smooth rich finish to the whole. Place the block in a strong draft of air, and in a short time it will become as hard and tough as a metal plate, and sufficiently hard and durable for all purposes of printing on the type-printing press, and capable of receiving a high polish by a buffer. Allowance should

be made for the block to be a little greater in height than the types, so that it can be planed down from the back to the required height of type.

The process consists of the operation in the several steps as follows: First, the procuring a suitable negative for the design; second, the preparation of the sensitive composition; third, the printing by actinic light through the negative on the sensitive plate or sheet; fourth, the cementing of the printed composition to a suitable support of wood, metal, stone, or other material, for the purpose of increasing the thickness to the height of type; fifth, the treatment or displacing of the soluble or unprinted parts of the design with boiling water applied through a nozzle, with the aid of mechanical devices to give the desired pressure and percussive force; sixth, the hardening of the composition by treatment with chemicals by allowing the composite to absorb successively the substances named for the purpose of rendering the composition hard and durable; seventh, the surface in relief produced by our improvement is adapted to being printed from directly, without any cast or mold being taken, thereby insuring great perfection in the plate, and the composition employed is as durable and makes as perfect impressions as the best box-wood, if not better.

We claim as our invention—

1. The sensitive plate composed of gelatine, albumen, glycerine, resin, and bichromate of ammonia, substantially as set forth.

2. The method herein specified of hardening relief gelatine plates, consisting in treating such gelatine plates successively to baths of solutions of bichromate of ammonia, nitrate of silver, sulphate of iron, and ammonium hydrosulphite, substantially as set forth.

Signed by us this 14th day of March, A. D. 1883.

PROCTOR R. SHUGG.
GEO. BOYLE.

Witnesses:

GEO. T. PINCKNEY,
WILLIAM G. MOTT.