

UNITED STATES PATENT OFFICE.

J. W. OSBORNE, OF MELBOURNE, AUSTRALIA, ASSIGNOR TO SAMUEL THOMPSON HOOPER, OF CHARLESTOWN, MASSACHUSETTS.

IMPROVEMENT IN PHOTOLITHOGRAPHY.

Specification forming part of Letters Patent No. 32,668, dated June 25, 1861.

To all whom it may concern:

Be it known that I, JOHN WALTER OSBORNE, of the city of Melbourne, in the county of Bourke, in the Colony of Victoria, in the Dominions of Her Britannic Majesty, have invented a new and Improved Mode of Preparing Photolithographic Transfers; and I do hereby declare that the following is a full and exact description thereof.

The nature of my invention consists in the use of a coating of albumen upon paper—subjected, as hereinafter described, to coagulation—as a basis for the production of photolithographic transfers, and in the use of gelatine in intimate connection with the said albumen for the formation of a surface of organic matter upon the paper of a nature fitted to receive the photographic picture, and at the same time to behave toward the lithographic retransfer-ink in a manner calculated to produce the best description of photolithographic transfers.

To enable others skilled in the art of photolithography to make use of my invention, I will proceed to describe how the process may be performed.

Take a sheet of plain positive photographic paper, dampen it, and when it has become quite flat cover it with the following solution: water, eight ounces; albumen, two ounces; gelatine, eight hundred grains, and bichromate of potash four hundred and forty grains. The gelatine, with the finely-powdered bichromate, may be soaked in the whole quantity of water for three or four hours in the dark, and may then be melted by immersing the flask containing it in hot water, taking care not to raise the heat higher than necessary. When the temperature of the melted contents of the flask has fallen to about 110° Fahrenheit the albumen may be added and very well mixed, and the whole allowed to repose for a time. The albumen for this purpose should have been whipped to a froth and the required quantity measured off after subsidence. It should also be obtained from fresh eggs. To apply this solution to the surface of the paper, the following or any more convenient method may be adopted:

Lay the paper, face down, on a board, near one end of which is adjusted a trough containing the mixture before mentioned cooled to the

temperature of 85° Fahrenheit. The side of the trough nearest the paper should be rounded over to prevent undue friction. The trough should be provided with a movable piece of wood passing longitudinally through it, with a rounded edge under which the paper is drawn, which piece of wood should be so adjusted as just to press the under surface of the paper into the bichromate mixture as the paper is drawn under the rounded edge of the same upward from the trough.

The bichromate solution or mixture hereinbefore described may be varied as to quantities, or by the substitution or addition of other ingredients—such as gum, sugar, chromic acid, or any other chromate or bichromate or any of the salts of uranium or other chemicals of similar properties—so far as such can be used without impairing the advantages arising from a preponderance of albumen or interfering with the characteristic property possessed by gelatine of swelling in cold water.

The photographic transfer-paper, the manufacture of which has been described, may also with equally good results be prepared by coating the plain paper with two solutions, the first to consist of one part albumen, with from one to two parts water, which, after the paper has dried, is to be followed by another consisting of water, eight ounces; gelatine, six hundred and forty grains; bichromate of potash, three hundred and fifty-two grains. In whichever way the photolithographic transfer-paper is made, it should be dried in a perfectly dark and warm room and then passed through a lithographic press upon a copper plate in order to glaze and flatten it. A negative of the object to be photolithographed is now to be taken and the sheet of paper prepared as above to be exposed under it in a photographic pressure-frame used for making positives in sunlight from one half minute to six minutes, or more, if necessary. This photographic positive print is next to be inked in by passing it through a lithographic press with its face toward a lithographic stone or plate, said stone or plate having been first evenly rolled in with lithographic retransfer-ink. When the paper is pulled off the stone the greasy ink should be found to be of such a thickness as to disclose the positive print dimly through it.

The next operation is an important part of my invention. Its object is to effect the coagulation of the albumen combined with the sensitive coating. With this in view the inked print should now be placed in a darkened room, swimming on boiling water contained in a tray or dish, the inked side upward, excluding air-bubbles, where it should be left until the water is cold. A distinctive feature of my process is availing myself of the swelling properties of gelatine, which change is brought about in the sensitive coating simultaneously with that of coagulation while the paper is swimming upon the water. The effect of these swelling properties of unaltered gelatine is to cause the altered portions of the gelatine which do not swell to become relatively depressed, whereby the ink upon said depressed parts is protected during the washing-off process, which is done as follows: The print is to be placed, face upward, upon a smooth board and washed off gently with a clean soft sponge dipped in water. When the print is clean enough pin it fast to the board and pour a large quantity of boiling water over it from a kettle or other vessel. Now lay the print, face up, on the boiling water and let it float until the upper surface is dry, which soon takes place if the water is hot, and the print left surrounded with an inky border. When the albuminized surface is dry lift the paper off the water, lay it on blotting-paper, and then finish drying in any convenient manner. This transfer may now be transferred to a lithographic stone in the ordinary way, or to the surface of a zinc plate for zincographic printing, or to a copper plate to be used as a guide for engraving on copper, or to any surface of wood, metal, stone, paper, or cloth, glass, india-rubber, leather, gutta-percha, or composition.

My process or method differs materially from that described in Newton's patent. By Newton's process the photographic picture is thrown upon a lithographic stone or zinc plate prepared for the purpose by direct exposure under a positive or in the camera, and the ink adheres eventually to those parts of said prepared surface where the light has not acted, whereas I do not work upon the stone or zinc direct, but upon a prepared surface upon paper, whereby a positive transfer is made upon which the ink will be found adherent to those places where the light has acted. By Newton's process it will be found difficult, if not impossible, to produce the clearness and sharpness requisite for printing maps, line-engravings, drawings, and manuscripts. Poitevin produces his photolithographs upon the stone direct. In this he differs from me, and also in his method of wetting the exposed surface before inking it, whereas I, on the contrary, ink it while dry. Asser's process differs from mine in the nature of the basis over which the sensitized coating is applied. He uses plain

paper, or paper sized with starch, while in my process the existence of a coating of albumen under the work prevents the greasy ink from spreading into the fiber or pores of the paper, which would injure the clearness of the lines. Asser also washes and wets his exposed transfer before inking it. Colonel James's method, practiced in the British Ordnance Survey Office, also differs from mine, inasmuch as he uses gum in preparing his photographic transfer-paper, whereas I use a compound film of albumen and gelatine, each of these substances playing an important part. The albumen in my process, while it is easily applied to the paper in its uncoagulated state, resists, after that change has been effected in it by the action of the boiling water, every attempt to wash it away. The work, therefore, is found eventually to be upon albumenized paper, which, besides improving its quality, plays a very important part by constituting an underlying adhesive coating which adheres firmly to the lithographic stone or other substance during the operation of transferring in the lithographic press, in consequence whereof the paper cannot slip, which would cause the work to become thickened or doubled. The compound film of albumen and gelatine upon which I work enables me also to derive great advantages from the manner in which those parts of it unacted upon by light swell up when floating the inked print upon the boiling water, this change in the exposed and inked surface causing the work to become considerably depressed, whereby the ink upon it is protected from the rubbing action of the sponge and the maximum amount of firmness and clearness is the result. In this respect my process differs materially from Colonel James's and all others.

From the foregoing references it will be seen that I do not claim to be the original inventor of photolithography.

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

1. The preparation and use, in making photolithographic transfers, of a paper prepared by applying, in conjunction with the sensitizing substances, or preceding their applications, a coating of albumen to the surface of the paper and coagulating the albumen so applied by heat in the manner and for the purposes hereinbefore described.

2. The use and application of gelatine, in conjunction with albumen, for the formation of the coating of organic matter applied to the surface of photolithographic transfer-paper, which gelatine, by its swelling properties, when acted upon by moisture, as I have explained, enables me to obtain the results hereinbefore described.

J. W. OSBORNE.

Witnesses:

JOHN VAN DARLINGTON,
HUGH MCGRAW.