

UNITED STATES PATENT OFFICE.

THOMAS MANLY, OF LONDON, ENGLAND.

PHOTOGRAPHIC PRINTING.

SPECIFICATION forming part of Letters Patent No. 628,012, dated July 4, 1899.

Application filed November 1, 1898. Serial No. 695,232. (No specimens.)

To all whom it may concern:

Be it known that I, THOMAS MANLY, a subject of the Queen of Great Britain, residing at London, England, have invented certain new and useful Improvements in and Connected with Photographic Printing, of which the following is a full, clear, and exact description, and for which I have made application for British patent, No. 10,026, dated May 2, 1898.

My invention has for its object improvements in the production of photographic pictures or images in pigment or in the anilin or other chemical colors.

In carrying my invention into effect I proceed according to the following method—that is to say, I coat in any convenient way paper or other material with an aqueous solution (which I shall hereinafter refer to as the “sensitizing solution”) containing the following ingredients, namely: potassium bichromate, sodium bichromate, or ammonium bichromate, or chromic acid or other similar light sensitive chromic-acid compound, manganous sulfate or chlorid or other manganous salts, and a preservative, such as boric acid and aluminum sulfate or alum, mixed together in suitable proportions. The term “chromic-acid compound” as here used includes chromic acid, chromates, bichromates, and similar substances. In place of the above-mentioned manganese salts copper, cobalt, or nickel sulfates or chlorids may be used, but the resulting image is not so conspicuous as when manganese salts are employed. After the paper or other material thus prepared and rendered sensitive to light has been dried it is exposed to light under a negative or other screen, producing a brown positive image in manganic oxid or manganese dioxid. The printed paper or other material is cleared of all the unchanged salts by washing in water and will be hereinafter referred to as the “print.”

In order to make a picture or image in pigment, I adopt either of the following methods:

First. I take paper coated with pigmented gelatin, commonly called “carbon tissue,” and proceed as follows: I dip the carbon tissue for about one minute and a half in a weak solution of acetic acid and hydroquinone or of acetic acid, hydroquinone, and ferrous sul-

fate, (which I shall hereinafter refer to as the “acetic solution.”) At the expiration of that time I take the washed print and having given it a coating of a two-per-cent. solution of gelatin I plunge it under the surface of the acetic solution and bring it in contact with the gelatin surface of the carbon tissue. I then draw the print (with the carbon tissue clinging thereto) out of the solution and squeeze them together on a flat surface. After surface-drying they are hung up to dry. When thoroughly dry, I place the print, with its adherent carbon tissue, in cold water for about fifteen minutes. It is then ready for development, which is performed by placing it in water at a temperature of 43° centigrade, or thereabout, removing the backing of the carbon tissue, and washing away those parts not rendered insoluble by the action of the manganic oxid, thus giving an image in pigmented gelatin.

Second. Or I coat the washed and dried print with a hot solution of gelatin, in which pigment or other coloring substance is incorporated or dissolved, using, preferably, such a solution as is used in the preparation of carbon tissue, and as soon as the gelatin coating is dry I dip the print thus treated for about one minute in the acetic solution above referred to. Other reducing agents may be used, such as pyrogallol, in certain cases. I now hang the pigmented print up to dry, and when thoroughly dry I develop the image by dissolving in water at a temperature of 43° centigrade, or thereabout, those portions of the gelatin coating which have not been rendered insoluble by the action of the manganic oxid.

In order to produce an image in anilin colors, I dip the washed print in the following solution: anilin hydrochlorid, twenty grams; sulfuric acid, two cubic centimeters; water, three hundred cubic centimeters, which converts the image into a green color. If this green image is treated with a weak solution of ammonia, a purple image is produced, and if chlorid or bromide of copper be added to above-described anilin solution a dark-blue image is the result.

Other substances, such as various phenol derivatives, giving color on oxidation, will produce colored images.

In preparing the sensitizing solution mentioned above I use by preference the following formula. The undermentioned solutions are first prepared separately: A, a saturated aqueous solution of potassium bichromate, to which has been added as much boric acid as it will dissolve at a temperature of 16° centigrade, or thereabout; B, manganous sulfate, twenty-five parts to one hundred parts distilled water; C, manganous chlorid, twenty-five parts to one hundred parts distilled water; D, aluminum sulfate, twenty-five parts to one hundred parts distilled water; E, dextrin or gum arabic, twenty-five parts to one hundred parts distilled water.

To make a solution for sensitizing paper or other material the above-mentioned solutions are mixed in about the following proportions: A, ten parts; B, three parts; C, two parts; D, one part; E, one part.

The following is a formula for the acetic solution already referred to, but so much depends upon the character of the negative and the constitution of commercial carbon tissue that the ingredients may have to be modified in quantity to produce the best results: magnesium sulfate, twenty-five grams; glacial acetic acid, five cubic centimeters; hydroquinone, 2.50 grams; ferrous sulfate, .50 gram; water, one thousand cubic centimeters.

In the case of prints to be subsequently treated with pigmented gelatin in the form of carbon tissue I claim the following advantages over other similar known processes, namely—

First. The image is visible during the progress of printing and when washed is permanent.

Second. The picture being produced on the material where it will permanently remain does not become reversed in the operations, as in the present method of carbon-printing.

Third. No precaution need be taken to guard against the edges of the picture washing up during development.

Fourth. As it is necessary that the chromic-acid salts should be thoroughly washed out of the print before development, the hands of the operator do not come in contact with any deleterious solution.

Fifth. No insoluble gelatin surface is necessary on the material to be sensitized.

In the case of prints to be subsequently treated with anilin and other salts giving color on oxidation I claim the advantage of simplicity of production and novelty.

I wish it to be understood that I do not limit myself to the proportions of the various working formula above stated, but alter them in various ways to suit the desired result.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A solution for photographic purposes, containing a light sensitive chromic-acid compound, and a manganous salt, for the preparation of a light sensitive surface for the production of photographic images in manganic oxid, substantially as herein described.

2. A material having a light sensitive surface containing a light sensitive chromic-acid compound, and a manganous salt, for the production of photographic images in manganic oxid, substantially as described.

3. The process of producing photographic pictures in pigmented gelatin on the image produced by exposure to light of the sensitive material prepared by a solution containing a light sensitive chromic-acid compound and a manganous salt consisting in fixing the printed image by washing all soluble salts out of the material, drying the same, bringing pigmented gelatin in contact with the printed material using a solution containing acetic acid and a reducing agent, drying the pigmented material thus treated and developing the image by dissolving in hot water those parts of the pigmented gelatin which have not been rendered insoluble by the action of the manganic oxid, thus producing a picture in pigmented gelatin, substantially as herein described.

4. A sensitizing solution for use in the manufacture of a photographic-printing material, consisting of about ten parts of a saturated solution of potassium bichromate, to which has been added as much boric acid as it will dissolve at a temperature of 16° centigrade or thereabout; three parts of a twenty-five-per-cent. solution of manganous sulfate; two parts of a twenty-five-per-cent. solution of manganous chlorid; one part of a twenty-five-per-cent. solution of aluminum sulfate; one part of a twenty-five-per-cent. solution of a colloid, substantially as herein set forth.

In testimony whereof I affix my signature in presence of two witnesses.

THOMAS MANLY.

Witnesses:

B. J. B. MILLS,

CLAUDE K. MILLS.