

UNITED STATES PATENT OFFICE.

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PROCESS OF PHOTOGRAPHIC PRINTING.

SPECIFICATION forming part of Letters Patent No. 345,753, dated July 20, 1886.

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To all whom it may concern:

Be it known that I, REDFIELD B. WEST, of Guilford, in the county of New Haven and State of Connecticut, have invented a new Improvement in Photographic Printing; and I do hereby declare the following to be a full, clear, and exact description of the same.

This invention relates to an improvement in photographic printing, and is an improvement on the invention for which Letters Patent of the United States No. 273,206 were granted to me February 27, 1883; and it consists in the processes as hereinafter described, and particularly recited in the claims.

1. *To sensitize the paper.*—To produce the best results the paper is first coated upon both sides with a starch solution, which forms the subject of an application for patent filed on even date herewith. The sensitizing-solution is prepared from the following formula: Potassium bichromate, eight parts; mercuric chloride, four parts; aluminum sulphate, one part. For convenience these may be in powder. For the bath take pure water, according to the size of the bath, and to each ounce of water add fifty grains of the above-mentioned compound and thoroughly dissolve the same in the water. The paper is immersed in the bath, so as to wet both sides, not to exceed one minute. Care should be taken to protect the paper during and after the sensitization from chemically active light, as it is more sensitive than paper prepared under the usual process for photographic printing. The paper is dried, may be by artificial heat, but coal-gas or kindred vapors should be avoided as injurious to the surface, and the paper thus sensitized should be used the same day to produce the best results, but it may be kept several days in a dark, cool, damp place. The one part of aluminum sulphate may be omitted, if less contrast is desired, without materially affecting the result. I therefore do not wish to be understood as limiting this part of my invention to the use of aluminum sulphate.

2. *Printing.*—The glass negative for printing with paper thus sensitized should be thinner than that used for silver-printing, in order to prevent too deep shadows and "bronzing" during the development. If, however, it is necessary to use a thicker negative, roughen the varnish over its most transparent

parts with retouching-powder. The printing should be carefully watched during its progress, and should be carried only so far as to make visible all that it is desired to show in the finished print. When a sufficient number of prints have accumulated, they must be washed for twenty or thirty minutes in clear water and then developed.

3. *Developing.*—The compound from which the developing-bath is made is from the following formula: gallic acid, fifteen parts; pyrogallol, one part; ferrous sulphate, fifteen parts; sodium hyposulphite, (dried,) one hundred parts; aluminum and ammonium sulphate, (dried,) fifteen parts; potassium bitartrate, twelve parts. These should be kept in stock dried. Each of the ingredients required dried is obtained so by fusing the commercial article and maintaining it in that condition until the water of crystallization is driven off. This process of drying is necessary to prevent decomposition of the compound. If possible, the ingredients should be in a fine granulated condition rather than in powder. The proportions called for above are weighed out after the materials have been dried. When mixed, they should be immediately packed in tight dry bottles. The compound will then keep indefinitely.

To prepare the developing-bath it should be made the same day that it is required for use. Add ten grains of the dried composition to each ounce of water.

The test of the good working quality of the ingredients may be made as follows: After the solution has stood for twenty minutes it should not indicate an inky appearance or any trace of it, but, on the contrary, should remain colorless for at least twenty-four hours. The print should be developed in from five to ten minutes, but prolonged immersion should not reduce the intensity of the print. If it is so reduced, an excess of acid is indicated. If the development of a cabinet print in two fluid ounces of bath should produce an inky appearance of the bath or trace of it, it would indicate an excess of alkali in the bath, which should be corrected. Two fluid ounces of the bath is an ample allowance for each cabinet print to be developed. Several prints may be developed in succession, if the bath is allowed to repose some minutes between the de-

velopment of each print. During the developing operation the bath should be rocked, but in no case should the bath be crowded.

The method of developing is as follows:

5 After the prints have been washed for twenty or thirty minutes, they are placed in the developing-bath until their color changes from yellow or light brown to violet black. The development is completed when, on holding
10 the print up to the light, no brown tint is seen in the shadows. When it has arrived at this condition, a prolonged immersion in the developer will produce no change either in the shadows or high lights. If, however, the print
15 has become bronzed by prolonged exposure, it will not perfectly develop. To prevent this bronzing, which occurs from a thick negative, the clearer portions should be deadened either by an application to the back or by
20 roughening the varnish with retouching-powder.

4. *Bleaching*.—After the print has been taken from the developing-bath it should be thoroughly rinsed in pure water; but the whites
25 will not be sufficiently pure without more or less bleaching. For this purpose a bath from the following formula is prepared: bromine, one ounce; bromide of potassium, two ounces; water, ten ounces. This should be kept from
30 the light. When it is required to bleach the whites of prints, add enough of the bleaching solution to water to color light yellow or amber. Then immerse the prints until sufficiently whitened. If the shadows are too dark, add a
35 little acetic acid to the bath. A deep bath will produce better results than a shallow one. As soon as the prints are bleached, they may be at once mounted if the color is satisfactory; if not, they may be transferred to the toning-
40 bath.

5. *Toning*.—I employ the following formula for the preparation of the compound for the toning-bath, and which may be kept in stock: potassium nitrite, four parts; lead nitrate, one
45 part. The potassium nitrite may be prepared from potassium nitrate or saltpeter by melting in a crucible and keeping at a red heat for two hours. For the toning-bath, for each ounce of water add five grains of the toning
50 compound. The prints are immersed in this bath after bleaching. When acetic acid has been added to the bleaching-bath, it is better to wash the prints before toning. This toning, it will be observed, is the reverse of silver
55 toning. If a cold gray and black are desired, a trace of mercuric chloride added to the bath

will produce that result. A larger proportion of the mercuric chloride will produce a greenish black.

While I have obtained the best results from 60 the proportions of the ingredients of the several baths, as I have described, these proportions may be varied to some extent without materially changing the result. I do not therefore wish to be limited to the precise propor- 65 tions which I have described.

I am aware that a bath for the treatment of paper for photographic purposes has been made from a combination of many ingredients, among which are bichloride of mercury 70 and bichromate of potash; but in such combination of other ingredients with the bichloride of mercury and the bichromate of potash the result due to the bath composed of bichloride of mercury and bichromate of potash only, and 75 in the proportions which I have described, cannot be attained. The essential feature of this part of my invention resides in a bath composed of potassium bichromate and mercuric chloride in certain proportions, as de- 80 scribed.

I claim—

1. The herein-described improvement in the process for photographic printing, consisting in subjecting the paper to be printed upon to 85 a bath composed of potassium bichromate and mercuric chloride, in the proportions and substantially as described.

2. The herein-described improvement in photographic printing, consisting in subject- 90 ing the print to a bath composed of gallic acid, pyrogallol, ferrous sulphate, sodium, hyposulphite, aluminum and ammonium sulphate, and potassium bitartrate, in the proportions and substantially as described. 95

3. The herein-described improvement in photographic printing, consisting in subjecting the print after development to a bath composed of bromine, bromide of potassium, and water, in the proportions and substantially as 100 described.

4. The herein-described improvement in the process of photographic printing, consisting in subjecting the prints after bleaching to a bath composed of potassium nitrite and lead nitrate, 105 in the proportions and substantially as described.

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Witnesses:

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