

UNITED STATES PATENT OFFICE.

THOMAS C. ROCHE, OF BROOKLYN, ASSIGNOR TO E. & H. T. ANTHONY & CO
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PHOTOGRAPHIC PAPER.

SPECIFICATION forming part of Letters Patent No. 241,070, dated May 3, 1881

Application filed February 8, 1881. (No specimens.)

To all whom it may concern:

Be it known that I, THOMAS C. ROCHE, of the city of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Photography, of which the following is a specification.

One of the comparatively modern improvements in the art of negative photographic printing consists in the successful use of gelatine sensitized by a bromide of silver applied as a coating to the glass plate for receiving the negative photographic impression, a sensitized gelatine solution having been discovered and produced which, when thus employed in negative printing, is possessed of such extreme sensitiveness as to enable a satisfactory photographic impression to be secured very quickly, and even by a feeble artificial light; but so far as I am aware the use of this gelatine solution has been hitherto confined to negative printing, and has not, until my present invention, been successfully, if at all, employed in positive printing. It is possible that a gelatine solution may have been laid upon paper; but if so the paper has been employed only as a "tissue" on which to form a pellicle intended to be removed and used as a negative. I have succeeded in combining a gelatine solution sensitized with a neutral bromide of silver with photographic paper, whereon positive photographs may be successfully taken under a "negative" almost instantaneously, and even by the light of a common oil-lamp.

I will proceed to describe my method of thus combining sensitized gelatine with paper.

The solution I prepare is as follows: I put together in a proper vessel—a glass bottle preferred—of good gelatine, (preferably French gelatine,) say, one hundred and fifty grains, bromide of ammonia sixty grains, and water five ounces. When the gelatine has softened I put the bottle in a water-bath and raise the temperature sufficiently to dissolve the gelatine—say to 90° or 100° Fahrenheit. In another bottle I dissolve, say, one hundred grains of nitrate of silver in five ounces of water, and then in a room in which there is only non-actinic light I mix the contents of the two bottles together by adding the silver solution gradually to the other, a little at a time, shaking well the

latter at each addition. I then put the bottle now containing the united solutions into a covered light-excluding vessel containing water, the temperature of which is raised and kept up to between 80° and 110° Fahrenheit for two or three days, occasionally shaking the bottle, so as to keep the contents thoroughly mixed. Each day's cooking makes the solution more sensitive. I can, by raising the temperature to the boiling point and maintaining it for a short time—say one to two hours—accomplish nearly the same result; but I prefer the effect the cooking more slowly produces. After the solution has been thus cooked I pour it into a suitable dish—preferably glass or porcelain—and permit it to cool and set. I then divide it up into small pieces and put it into a suitable holder for washing—a coarse canvas bag or an earthen vessel with perforations in the bottom. I then allow cold water to run onto it for a few hours, occasionally stirring up the mass to wash out all soluble matter, such as nitrate of ammonia and excess of bromide, if any remain. I then dissolve the gelatine thus prepared by heat and add to it about an equal quantity, by fluid weight, of water, thus forming a solution that contains no free nitrate of silver, and that is much thinner than is suitable for use on plates for negative printing. It is essential in negative printing that the solution should be sufficiently concentrated to form a comparatively thick and opaque film on the plate. When thus concentrated it will not answer to apply to paper for positive printing. In the latter it is essential that the sensitized gelatine shall be applied in an exceedingly thin film, and that it, in some measure, penetrate and become incorporated with the organic matter of the paper.

The solution being thus prepared, it is ready for use on paper; but now it is necessary to have regard to the condition of the paper to which it is to be applied. Paper suitable for tissues—that is, paper the pores or interstices of which have been filled with some preparation that prevents the gelatine solution from penetrating the surface of the paper and causes it to serve the purpose of a simple tablet or plate on which a removable pellicle is formed—will not answer. It must be common

unprepared or unfilled photographic paper as it comes from the manufacturer. If it is entirely unsized and merely calendered, all the better. I take paper such as I have described, and apply the solution either by flowing it over the paper, by floating the paper on the solution, or in any other suitable manner. The paper is then hung up and allowed to dry, when it is ready for use.

All the operations must, of course, be carried on in a room from which all actinic light is excluded.

Paper thus prepared, having on it no free nitrate of silver, will keep an indefinite time without deterioration, and may be used in a dry state. It is exceedingly sensitive, being susceptible of receiving a sufficient photographic impression for good and satisfactory pictures almost instantaneously, and by the light of even a common oil-lamp.

In the absence of free nitrate of silver the photographic impression on the paper is invisible until developed by a suitable developer. The ferrous oxalate is such a developer, it acting to bring out the image fully.

I am aware that a solution substantially such as I have described has been made and used in negative printing on plates and tissues, except that it has always been made and used in a concentrated state, so as to form a pellicle upon the plate or tissue, and not to penetrate or become combined with the organic matter of the paper. As is obvious, it is highly desirable to be able to use this highly-sensitized gelatine solution for positive printing on paper; but I am not aware that any successful

method of so doing has ever been known or practiced in this country or published or patented anywhere before my present invention.

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

1. The method herein described of combining sensitized gelatine with paper for positive photographic printing, consisting in first softening the gelatine in water and adding the bromide of ammonia or an equivalent bromide, using about the proportions named; then dissolving the gelatine by heat and adding gradually nitrate of silver dissolved in water in about the proportions named; then continuing the heat at about 80° or 100° Fahrenheit for two or three days; then, after allowing it to cool and set, cutting it into fragments and washing out the soluble matter; then melting it by heat and adding about its weight of water; then applying it to unfilled photographic paper, into which it penetrates, and with the organic matter of which it combines; lastly, drying it in any suitable manner, all as and for the purpose described.

2. As a new article of manufacture, unfilled and unglazed photographic paper for positive printing, with the face of which is combined a sensitive substance consisting, essentially, of gelatine and a bromide of silver, substantially as specified.

Witness my hand this 5th day of February, A. D. 1881.

THOMAS C. ROCHE.

In presence of—

ALLEN G. W. VERMILYA,
HENRY EICHLING.