

UNITED STATES PATENT OFFICE.

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PRINTING AND DEVELOPING PHOTOGRAPHS ON SILVER-CHLORID PAPER.

No. 918,847.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HERBERT JOHN MALLABAR, a subject of the King of Great Britain, and residing in Liverpool, in the county of Lancaster, in the Kingdom of England, photographic chemist, have invented certain new and useful Improvements in Printing and Developing Photographs on Silver-Chlorid Paper.

10 This invention has for its object a new or improved process for printing and developing silver chlorid paper whereby much greater speed of operation is obtained, the cost is very much lower than in the gold process, 15 and the results are more brilliant and show greater detail.

The invention consists mainly in using cyanids or sulfocyanids in the developer. In practice I propose to form the chemicals into 20 tablets; one tablet to contain 4 grains of pyrogalllic acid with or without inactive material, and the other to contain one-thirtieth of a grain of bichromate of potash, one-fourth of a grain of sulfocyanid of potassium (KCNS) 25 and one grain of citric acid with or without inactive material such as sugar of milk the function of this material being to increase the bulk. These two pellets or tablets are dissolved in about five ounces of water. I do 30 not however bind myself to these exact details. Taking the various chemicals separately, in place of pyrogalllic acid I may use about the same weight of metol. If metol be used it gives a blacker tone, and increases 35 the speed of development. One and a half grains of metol and three grains of hydroquinone give a tone midway between pure metol and pure pyrogalllic acid. There are other reducing agents similar to these which can 40 be used in substitution of them, but not with such good effect. The bichromate of potash is used to increase the speed of development, and other alkaline bichromates can replace the bichromate of potash, but 45 there is no advantage in using any of these over the potash salt, which is at the same time the cheapest, the most easily obtainable, the purest and the most satisfactory for my purpose. In place of anhydrous sulfocyanid of potassium, an alkaline iodid, sulfocyanid of sodium or even of ammonium 50 could be used, but the ammonia salt discolors quicker and it cannot be made in the tablet form. Alkaline cyanids can also be used 55 to a certain extent, but from my experiments

I find that none of these salts are equal in value to the anhydrous sulfocyanid of potassium, and further sulfocyanid of potassium is non-poisonous whereas cyanids are very 60 poisonous. I say anhydrous, as although the hydrated salt will work equally well, the anhydrous salt can be made into tablets, and is not so deliquescent, whereas the hydrated salts are very deliquescent, and therefore it is difficult to keep them in pellets of exact 65 weight and quantity. The quantity of sulfocyanid too can be considerably varied, thus where a considerable amount extra is added, and the printing is carried deeper in the first instance, I obtain a fine Bartolozzi red tone. 70 The citric acid I use is specially pure and free from sulfuric acid and lime and is deprived of its water of crystallization, one grain of it equals 1.120 grains of ordinary citric acid crystals. It is used to make the developer 75 work more evenly and to remove the bichromate stain. It can also be substituted in whole or in part by tartaric and other vegetable acids of a like nature, but from my experiments I have found that citric acid is 80 decidedly the best.

I will now give an illustration of the carrying out of my invention. Sensitized paper is placed behind the negative in the usual manner, and exposed to actinic light. When it 85 is printed to about one-third of the depth necessary for the usual method of gold toning, it is placed at once into the developing bath without previous washing, this developing bath being composed of about five 90 ounces of water to each pair of tablets. When sufficiently developed the print is placed in a fixing solution of hyposulfite of soda, say two ounces to one pint of water. When in this 95 fixing bath, the print turns first to a yellowish color, but when the fixing is complete say in from ten to fifteen minutes, it is found that the print has arrived at the requisite color. It is then washed as usual and dried. This process I have found by experiment will 100 develop about one hundred cabinet prints for one penny of chemicals, according to the prices now ruling in Great Britain, and each print only takes about a minute and a half to develop, while the result is superior to anything I can obtain from any other process. 105 As far as my experiments have gone to, these prints are more permanent than the ordinary gold toned prints.

I have found in practice that iodid of po- 110

tassium, and in fact other alkaline iodids will work substantially as well as the sulfo-cyanids, and I wish it to be understood that I wish to claim these also as the equivalent of the sulfo-cyanids.

I declare that what I claim is:—

1. The process of printing and developing silver chlorid paper, which consists in printing to about one-third the depth required by the ordinary gold process, immersing the paper in a mixture of a reducing agent, such as described, a bichromate, sulfocyanid of potassium, citric acid and water, and then fixing, substantially as described.

2. The step in the process of printing and developing ordinary sensitive paper, which consists in immersing the exposed paper in a mixture of a reducing agent, such as described, with a bichromate, anhydrous sulfocyanid of potassium, citric acid, and water, substantially as and in the proportions described.

3. The process of printing and developing silver chlorid paper, which consists in first printing, then immersing the print in a reducing agent containing a sulfo-cyanid, and then fixing.

4. The process of printing and developing ordinary sensitized paper which consists in forming two sets of tablets as follows; tablet A, 240 parts by weight of a reducing agent,

as described, and tablet B, two parts by weight of a mineral alkali bi-chromate, sixty parts by weight of citric acid, and 15 parts by weight of a sulfocyanid of potassium, making a bath of an equal number of tablets of each of these sets with the requisite amount of water to form the developer, and developing therein.

5. The process of developing photographic images in silver sensitive papers by adding an alkaline sulfo-cyanid to the developer.

6. The process of developing photographic images in silver sensitive papers, which consists in adding to the developer a chemical that shall instantly seize on the nascent silver and convert it to an insoluble, non-adhesive, crystalline salt.

7. The process of printing and developing ordinary silver sensitized paper, which consists in first printing, then immersing the print in an acid reducing agent, containing one of the well known re-agents which precipitates silver in an acid solution in the form of a crystalline, non-adhesive salt.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

HERBERT JOHN MALLABAR.

Witnesses:—

WILLIAM P. THOMPSON,

WILLIAM HENRY BEESTON.