

UNITED STATES PATENT OFFICE

WALTER C. NELSON, OF ROCHESTER, NEW YORK, ASSIGNOR TO EASTMAN KODAK COMPANY, OF ROCHESTER, NEW YORK, A CORPORATION OF NEW YORK

TONING BATH FOR PHOTOGRAPHIC PRINTS

No Drawing.

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This invention relates to a toning bath for photographic prints. It is more particularly concerned with a certain type of such baths known as "hypo-alum" toning baths.

Toning baths containing hypo and alum and also baths in which gold chloride was combined with these constituents have been known for many years, and have been used with photographic prints of the highest quality. However, all of these baths which have been used heretofore, even those which have been widely recommended, have been attended by numerous disadvantages. It was, for example, impossible to secure any control of the final color or tone which the bath gave except with baths containing gold chloride. The prints were immersed in the solution and the toning necessarily went to completion, which gave a definite tone, but one which could not be varied. This tone moreover was not always reproducible, different batches made up according to the same formula giving slightly different color. For high class work done in quantity this was of course a serious drawback.

Another disadvantage of all of the baths previously used was the fact that during toning a fine white sediment was deposited on the print. It was necessary after the completion of the toning operation to clean off this sediment with a soft cotton swab, and at times the sediment clung so tenaciously that the surface of the print had to be scrubbed quite vigorously. A still further disadvantage found in many of these baths was that they produced so-called "double toning." This is produced when the toning bath attacks the high lights faster than the shadows, with the result that the highlights are finally of a different color than the shadows.

One of the objects of this invention is to obviate the disadvantages just mentioned.

Another object is to secure a much wider range of colors than has heretofore been possible.

A still further object is the preparation of a toning bath of a high degree of stability and one which may be used for a longer time.

I have been able to accomplish these objects by preparing a toning bath similar in many respects to the older "hypo-alum" toning baths, but one in which for the alum I substitute ammonium persulphate. The action of the ammonium persulphate in my toning formula is not perfectly understood, as this substance has never been previously used for this purpose. Its use in photographic reduction is of course well known. It is thought, however, that in this case the persulphate attacks or etches the surface of the silver particles in the image, after which they are then more easily converted to silver sulphide. It is, of course, understood that toning of the kind under consideration consists of a conversion of the silver image to silver sulphide, which is brown. Whatever the explanation of the action may be, I am able to secure a very pleasing variety of tones and colors by means of the method which I will now describe.

In making my toning bath I proceed by preparing first

Solution No. 1

Warm water (about 130° F.)	128	ozs.
Hypo	2	lbs.
Ammonium persulphate	4	ozs.

The hypo is dissolved before adding the ammonium persulphate. The bath is stirred vigorously while adding the ammonium persulphate. If the bath does not turn milky, the temperature is increased until it does.

I next prepare the following solution:

Solution No. 2

Silver nitrate crystals	75	grains
Water	2	ozs.
Sodium chloride (table salt)	75	grains

The silver nitrate must be dissolved completely before adding the sodium chloride and immediately afterward the solution, including the milky white precipitate produced, is added to the first solution (solution No. 1) which should not be warmer than 100° F.

I next prepare

Solution No. 3

Water----- 8 ozs.
 5 Chloride of gold----- 15 grains

Four ounces of solution No. 3 are added to solution No. 1 after adding solution No. 2, the temperature of the solutions being not over 100° F.

10 The completed toning bath made in this way is then allowed to stand for a short time until it has become cold and a sediment is formed. For use, I pour the clear portion of the above bath into a tray standing in a water bath, by means of which I can regulate the temperature so that during toning the bath is between 100° F. and 110° F.

15 In using this bath, average results will require about 15 minutes for toning, though the length of time will vary with the kind of photographic paper used and the color desired. A wide range of colors can be obtained according to the length of time the print is left in the toning bath. Preferably an untuned print should be kept at hand for comparison during toning. After toning is completed the prints are returned to the fixing bath for 5 minutes, after which they are washed in the usual way.

20 The above bath will tone fifty 8 x 10 prints or their equivalent, after which one dram of solution No. 3 is added after each batch of fifty 8 x 10 prints have been toned. By replenishing the gold solution in this way, that is, one dram of stock solution No. 3 for each additional batch of fifty prints, the bath may be used until exhausted. Fresh solution may be added from time to time to keep up the proper quantity of toning bath.

25 This toning bath gives excellent brown tones and prints may be removed from the solution at any time when a satisfactory color is obtained. A large number of prints, each removed after the same duration of time, will all be found to have a uniform color. It will also be found that this bath is extremely simple to use in every way. Prints removed from the toning bath will be found to be free of the objectionable sediment produced by the older hypo alum baths. The reproducibility and ease with which a wide range of colors can be obtained will also appeal to experienced workers.

30 What I claim is:

35 A photographic print toning bath comprising ammonium persulphate, sodium thiosulphate, gold chloride, and a silver halide.

40 Signed at Rochester, New York, this 16th day of July, 1930.

WALTER C. NELSON.