UNITED STATES PATENT OFFICE.

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PROCESS FOR THE PRODUCTION OF PHOTOGRAPHIC PRINTS.

1,120,429. Specification of Letters Patent. Patented Dec. 8, 1914.

No Drawing. Original application filed September 22, 1913, Serial No. 791,021. Divided and this application filed June 2, 1914. Serial No. 842,388.

To all whom it may concern:

Be it known that I, WILLIAM WILLIS, a subject of the King of England, residing at Brasted Chart, in Kent, England, have invented certain new and useful Improvements in Processes for the Production of Photographic Prints, of which the following is a specification.

This invention consists in improvements in or relating to the production of photographic prints by the use of a paper coated with a sensitive coating of the nature described in my co-pending patent application Serial No. 791021, filed September 22, 1913.

The specification above referred to relates to the production of a photographic printing paper in which the coating or surface sensitive to light contains salts of iron, silver and platinum.

The process of making photographic prints according to the present invention is based on the discovery I have made that the reduction of silver chlorid by a solution of ferrous oxalate in potassium oxalate is greatly facilitated, increased in rapidity and made more complete, by placing in contact with this silver salt a small quantity of potassium chloro-platinite before the reducing agent (ferrous oxalate) is applied to the silver salt. And I have found that the only salts of platinum of value in thus aiding in the reduction of silver chlorid by ferrous oxalate are salts of chlorin and platinum that is to say chloro-platinites or chloro-platinates, salts which are also described as platino-chlorids or platini-chlorids. And I also find platinic chlorid to be of value. The salts of platinum just named are themselves reducible by a solution of ferrous oxalate and when one of these salts is used as above described to aid in the reduction of silver chlorid it will be reduced together with the silver salt and both platinum and silver will be liberated. This effect of platinum salts in aiding the reduction of silver chlorid can be easily shown by a purely chemical method but perhaps more readily by a practical trial on paper in the manner following: If the paper is first of all coated with silver chlorid and then with ferric oxalate, then exposed to light under a negative and then developed on potassium oxalate it yields only a poor image, but if in addition to the silver chlorid and ferric oxalate the coating is made to contain a small quantity of potassium chloro-platinite, then on exposure and development a stronger image of blackish color will be obtained; and it has been proved that the intensity of this image is due mostly to the increased reduction of the silver salt and only slightly to the reduction of the small quantity of platinum salt used in this experiment.

In a preferred method of manufacture of the printing paper the paper is coated with silver chlorid which may be applied or attached to the surface as an emulsion in gelatin or other suitable medium, or formed on the surface by the well-known process of double decomposition. The coated surface is then again coated with a solution of ferric oxalate in which is dissolved some potassium chloro-platinite (K_2PtCl_4). The coated paper is finally well dried in any suitable way and is then ready for use.

The process for making prints from a paper treated in the manner described above is as follows:—The sensitized paper is first of all exposed to light behind a negative or other suitable screen and then immersed in a developing solution made by dissolving 453 grams of potassium oxalate in 18.12 grams of water. In about one minute development is usually completed. The developed print is then removed to a clearing bath made thus—potassium bisulfate 85 grams, potassium oxalate 14.2 grams, water 2840 grams. In this bath the paper should remain from ten to fifteen minutes and then it is well washed in several changes of water. Finally the print is "fixed" in a "hypo" solution made by dissolving 28.4 grams of sodium "hyposulfite" in 284 grams of water. The print is finally washed in several changes of water.

Other methods and salts may be used for developing and clearing or "fixing" the prints, but the method described is an excellent one.

The production of an image on the paper by exposure to light under a negative and subsequent development in potassium oxalate solution is effected in the following manner:—The action of light through the negative forms on the sensitive coating of the paper a faint image consisting mainly of ferrous oxalate. This exposed paper is now immersed in a solution of potassium

oxalate which quickly commences to dissolve the ferrous oxalate forming the image, but this solution of ferrous salt in potassium oxalate is a strongly reducing agent. Now salts of silver and platinum are in contact with the ferrous image on the paper and as this ferrous image is dissolved by the application of potassium oxalate, the resulting solution of ferrous salt reduces these salts of silver and platinum "*in situ*" forming or yielding an image composed of silver and platinum more or less in the metallic state and coinciding with the position of the original image of ferrous oxalate. This final image composed of silver and platinum is of a black tone agreeable to the eye and does not require toning. The unaltered salts are then dissolved out from the paper in any suitable way.

According to a modification of a process of making photographic prints according to this invention a paper may be employed in which the platinum salts may be wholly or in part contained in the developing solution, that is to say, a paper may be employed in which the coating of chloro-platinite or chloro-platinate may be omitted or reduced to a minimum. The paper is exposed in the usual manner and is thereafter treated with a solution of the chloro-platinite or chloro-platinate in admixture with the developing solution.

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

1. The herein described process of making photographic prints which consists in exposing to light behind a negative a paper coated with a haloid salt of silver and with ferric oxalate and developing the exposed paper in potassium oxalate in the presence of a salt of platinum and chlorin.

2. The herein described process of making photographic prints which consists in exposing to light behind a negative a paper coated with silver chlorid and with ferric oxalate and developing the exposed paper in potassium oxalate in the presence of potassium chloro-platinite.

3. The herein described process of making photographic prints which consists in exposing to light behind a negative a paper coated with silver chlorid and with ferric oxalate, developing the exposed paper in potassium oxalate in the presence of potassium chloro-platinite and dissolving out the unaltered salts.

4. The herein described process of making photographic prints which consists in exposing to light behind a negative a paper coated with a haloid salt of silver, a salt of platinum and chlorin and ferric oxalate and developing the exposed paper in potassium oxalate.

5. The herein described process of making photographic prints which consists of exposing to light behind a negative a paper coated with silver chlorid, potassium chloro-platinite and ferric oxalate developing the exposed paper in potassium oxalate and dissolving out the unaltered salts.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM WILLIS.

Witnesses:
W. H. SMITH,
E. A. SALT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."