# UNITED STATES PATENT OFFICE

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## IMPROVEMENT IN PHOTO-CHEMICAL PRINTING.

Specification forming part of Letters Patent No. **213,484**, dated March 18, 1879; application filed January 22, 1879.

*To all whom it may concern:*

Be it known that I, WILLIAM WILLIS, Jr., of Bromley, Kent, England, have invented an Improved Process of Photo-Chemical Printing, which process is fully set forth in the following specification.

This invention is based upon the process described in the specification of my former Letters Patent, dated February 8, A. D. 1876, which process consists in the production on suitable surfaces, such as paper, wood, silk, prepared canvas, and others, of photographic pictures in platinum, iridium, and other metals, by the application of solutions of potassic, ammonic, or other suitable oxalate, to such surfaces after they have been exposed to light or insolated under a negative or other suitable object, and which surfaces have been coated previous to such insolation with ferric and other salts, one of which is a salt of the metal in which the picture is to be produced.

But although good results are produced by the process above set forth, I have discovered means whereby I not only obtain greatly superior results in photo-chemical printing, but am enabled to effect such printing in a more simple, economical, and expeditious manner than heretofore, and these improved means form the subject of my present invention.

My invention consists in the addition of a salt of platinum, or of iridium, or of mercury to the solution of potassic, ammonic, or other oxalate used, as described in the said former specification.

According to the said invention I proceed as follows—that is to say, I coat paper with an aqueous solution, which I term the "coating solution," each fluid ounce of which contains fifteen grains potassic chloro-platinite, or double chloride of potassium and platinum, seventy grains ferric oxalate, or oxalate of iron, (with enough oxalic acid to render this ferric oxalate freely soluble,) and two grains of plumbic chloride, or chloride of lead. I then dry the paper, and expose it to light under or behind the negative or other object from which the picture or image is to be produced on the so-prepared paper. On removing the paper from this negative or other object an image or picture is usually faintly visible. I then float the said paper, face downward, on or immerse it in a hot aqueous solution, which I term the "developing solution," each fluid ounce of which contains one hundred and twenty grains potassic oxalate, or oxalate of potash, and seven grains potassic chloro-platinite, or double chloride of potassium and platinum. This solution quickly deepens in color or blackens the picture or image produced on the coated paper by the action of light. I then wash the paper in a weak solution of some acid, (preferably oxalic acid,) and finish by washing it in plain water.

For coating or treating the paper or other surface previous to its insolation or exposure to light, I may use other salts of platinum or salts of other metals than those above named, such as salts of gold, of iridium, or of palladium, or mixtures of these with other salts; but it is essential in all cases that ferric oxalate form one of the ingredients or constituents of the coating or coatings applied to the said surfaces.

The following are examples of the manner in which I vary the composition of the coating solution or solutions:

First. I sometimes substitute fifteen grains of iridium chloride for the potassic chloro-platinite used, as above specified. All other operations the same.

Second. In some instances I proceed as in the first-described method, but substitute for the two grains plumbic chloride four grains mercuric chloride, the treatment being otherwise conducted as in the first-described method.

Third. In other cases I omit the plumbic chloride in the coating compound or solution.

Instead of effecting the coating of the paper or other surface with the aforesaid salts by using the same all in one solution, I may, in some instances, find it desirable to apply such salts in different and successive solutions, and dry the paper, if necessary, between the successive coatings.

I wish it understood that I do not intend to confine myself to the use of aqueous solutions of the chemicals hereinbefore referred to, as the salts may be dissolved and used with any suitable solvent.

Neither do I restrict myself to the exact proportions of the chemicals used in the above-described process, as above stated, as these

proportions may be varied within certain limits, according to the results desired to be obtained, or other conditions.

In the final treatment of the paper or other material I do not confine myself to the use of acids, but may employ a solution of any other suitable substance capable of dissolving out the salts or chemicals which may be left in the paper.

Nor do I confine myself to the use of the potassic chloro-platinite as an addition to the solution of potassic oxalate which I apply to the insolated surfaces, but may use other salts of platinum, or salts of iridium or mercury, such as platinic chloride, potassic chloroplatinate, or sodic, ammonic, or baric chloroplatinite, iridic chloride, or mercuric chloride, and others; but although these and other salts of the above-named metals, (namely, platinum, iridium, and mercury,) when added to or mixed with the potassic oxalate, will produce good results, I prefer to employ the potassic chloro-platinite for the purpose of my invention, as above set forth.

I claim as my invention—

1. The process herein described of producing photographic pictures by coating the surface of paper, wood, or other material with a compound consisting of the double chloride of potassium and platinum and oxalate of iron, exposing the material thus prepared under a negative, and developing and toning the image by means of a solution of oxalate of potash and the double chloride of potassium and platinum, substantially as specified.

2. A sensitive coating for the production of photographic pictures, consisting of the double chloride of potassium and platinum, or other similar salt, and oxalate of iron dissolved in oxalic acid, substantially as specified.

3. A developing and toning compound for photographic pictures produced upon the sensitive compound herein mentioned, consisting of oxalate of potash and the double chloride of potassium and platinum, substantially as specified.

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