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BLUE PRINTING

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The present invention relates to the art of image reproduction through the action of light on iron salts, and has particular reference to an improved process by which image reproduction in blue printing, blue line printing and the like is facilitated.

The art of blue printing is based on the reducing action of light upon chemical compounds such as ferric salts, and the final image is formed directly from the reduction product. Of necessity, then, the density of the image is dependent upon the amount of reduction product present.

A primary object of my invention is to provide a blue printing or similar process which will produce reproductions more permanent to light and washing than processes known heretofore.

Another object is to improve the brilliance of reproductions obtained from light-sensitive paper prepared from iron salts.

A further object is to provide an improved process for utilizing light-sensitive paper of the character described which has been over or under exposed.

A still further object is to improve the fastness of color of an image formed upon paper coated with iron salts, when the same is treated with water, that is, to prevent "bleeding" of the print.

These and other objects will become apparent from the following description. The invention will be described with particular reference to blue printing, and it is to be understood that this description is for purposes of illustration and explanation.

Blue print paper is customarily prepared by coating a suitable type of paper with a ferric salt, such as ferric ammonium citrate or oxalate, which will be reduced by the action of light to the ferrous state. With the ferric salt is admixed a second compound which combines with the reduced iron compound to form a highly colored image. It is customary to employ potassium ferricyanide for this purpose.

A diagram, the reproduction of which is desired, is transposed over the coated paper, and then exposed to the action of actinic light for a period of time sufficient to insure reduction of the ferric ammonium citrate.

Upon washing the exposed paper with water, the ferrous salt combines with the potassium ferricyanide to form Turnbull's blue, and the unexposed and unreduced ferric ammonium citrate is dissolved out of the paper.

In some cases, it is desirable to dissolve the potassium ferricyanide in the wash liquid rather than to coat the paper with the same.

After being washed with water, the exposed paper is ordinarily washed in a bath of an oxidizing agent such as potassium dichromate, again washed with water, and dried.

In accordance with my invention, before being washed with water, the exposed paper is subjected to a bath containing a neutral or alkaline solution of a ferrocyanide reducing agent capable of intensifying the image. While it is preferred to employ potassium ferrocyanide, other compounds, such as ammonium ferrocyanide, sodium ferrocyanide, and calcium ferrocyanide, may also be used.

I have found that considerably more desirable results are obtained when the solution is alkaline, for example, having a pH of 8 or more. Sodium carbonate or other alkaline compound may be employed to impart the desired alkalinity.

With the potassium ferrocyanide bath is combined a stronger reducing agent or inhibitor such as sodium hyposulfite, sodium sulfite, or potassium meta bisulfite. The amount of inhibitor will depend upon the length of time between the intensifying bath and the oxidizing bath to which the paper is later subjected.

Subsequent to the intensifying bath, the paper is subjected to a water bath and an oxidizing bath as described heretofore with reference to the prior art.

To illustrate my invention the following specific example is given.

A photo sensitive base is prepared by coating paper, cloth or some similar carrier with a 16 percent solution of ferric ammonium citrate, a 16 percent solution of potassium

ferricyanide, and a 5 percent solution of oxalic acid.

The paper prepared in this manner is exposed beneath the desired diagram to light.

After exposure the paper is subjected to an intensifying solution composed of an 18 percent solution of potassium ferrocyanide to which is added 1 percent sodium carbonate and approximately 3 percent sodium sulfite.

The intensified paper is then washed with water, and immersed in a 7 per cent solution of potassium dichromate.

Following the oxidizing bath, the paper is again washed with water, and dried.

As evidenced upon operation of my improved process, the washing with potassium ferrocyanide increases the permanence of the color obtained, and, equally important, eliminates what is known in the art as "bleeding".

Various applications and variations of my invention will occur to one skilled in the art, and such modifications are intended to be included in the appended claims. For example, the expression paper, as used in the claims, is intended to cover the various mediums, such as paper, cloth, and the like, upon which the light-sensitive iron compounds are placed.

I claim:

1. A process of printing, which comprises providing a photo-sensitized sheet of paper prepared with a light-reducible ferric salt and a ferricyanide compound, exposing said paper to the action of light modified by a design, and intensifying the exposed paper by treatment with an alkaline solution of potassium ferrocyanide.

2. A process of printing, which comprises providing a photo-sensitized sheet of paper prepared with a light-reducible ferric salt and a ferricyanide compound, transposing thereover an opaque diagram, exposing said paper to the action of light, and intensifying the exposed paper by treatment with an alkaline solution of potassium ferrocyanide and a reducing agent which will inhibit oxidation of ferrous compounds.

3. In the process of blue printing, the step which comprises subjecting exposed blue print paper photochemically prepared with a light-sensitive ferric compound and a ferricyanide compound to treatment with an alkaline solution of potassium ferrocyanide.

4. In the process of printing images upon paper photo-sensitized with a light-sensitive ferric compound and potassium ferricyanide, the step of subjecting the exposed paper to the action of an alkaline solution containing potassium ferrocyanide and sodium sulfite.

5. In the process of printing images upon paper photo-sensitized with a light-sensitive ferric compound and a ferricyanide compound, the steps of treating the exposed paper with an alkaline solution containing potassium ferrocyanide and then subjecting the paper to treatment with an oxidizing agent capable of developing an image thereon.

6. In the process of printing images upon paper photo-sensitized with a light-sensitive ferric compound, an organic acid, and a ferricyanide compound, the step of treating the exposed paper with an alkaline solution containing potassium ferrocyanide and a compound from the group comprising sodium sulfite, sodium hyposulfite, and sodium meta bisulfite.

7. A process of printing, which comprises providing a sheet of paper photo-sensitized by a light-reducible ferric compound, and a ferricyanide compound, transposing thereover an opaque diagram, exposing the paper to light, subjecting the exposed paper to the action of an alkaline solution of a ferrocyanide compound capable of intensifying the color of the exposed portion of said paper and a reducing agent capable of inhibiting the oxidation of ferrous compounds, washing said paper with water, and then treating the washed paper with an oxidizing agent capable of developing the exposed portions of said paper.

8. A process of printing, which comprises providing a sheet of paper coated with a light-sensitive ferric compound, an organic acid, and potassium ferricyanide, transposing thereover a diagram, exposing the paper to light, treating the exposed paper with an alkaline solution of potassium ferrocyanide and sodium sulfite, and then treating said paper with a solution of postassium dichromate.

9. A process of blueprinting, which comprises exposing paper photosensitized with a light-sensitive ferric salt and a ferricyanide compound to light modified by a design, treating the exposed paper with an alkaline solution containing a ferrocyanide compound, and then treating said paper with a solution of postassium dichromate.

In testimony whereof I have hereunto subscribed my name.

ROBERT E. KWECH.