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E. H. FARMER

PROCESS OF PRODUCING COLORED PHOTOGRAPHIC PRINTS

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Fig. 1.

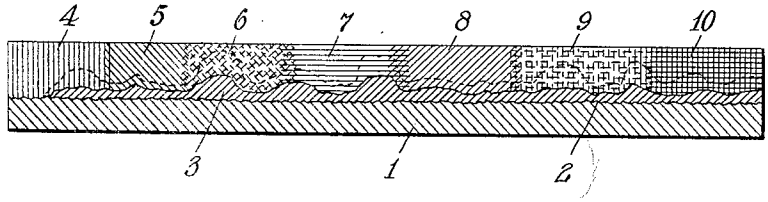
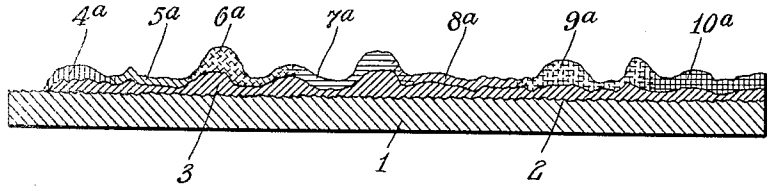


Fig. 2.



Inventor
Ernest H. Farmer
By his Attorneys
Howson Brewood Whitaker

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ERNEST HOWARD FARMER, OF LONDON, ENGLAND.

PROCESS OF PRODUCING COLORED-PHOTOGRAPHIC PRINTS.

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My invention consists in the novel features hereinafter described, reference being had to the accompanying drawing, which illustrates, schematically, the manner in which my invention is carried into effect, and said invention is fully disclosed in the following description and claims.

The object of my invention is to provide a simple and practical process for the production of colored photographic prints, capable of being carried out by anyone of ordinary intelligence, and without artistic training, in which the pigments, in association with a suitable vehicle, are roughly applied to a surface bearing a photographic image, the pigments being rendered permanent under the control of the photographic image, and in proportion to the density thereof, preferably by the application of material which will react upon the vehicle in the presence of a photographic image, and in accordance with the density thereof, to harden the vehicle and fix the colors, the excess of vehicle and pigments being dissolved off and removed from the print, and the degree to which the photographic under-print is visible being capable of variation by bleaching to a greater or less extent, if desired. In other words, the colors, in association with a suitable vehicle, which is preferably of a gelatinous character, are applied to different portions of the print under the control of the operator, and the photographic image appropriates, in various parts thereof, and makes permanent thereof, portions of the pigments in accordance with the variations of density of the photographic image, with the result that the photographic image controls not only the outlines of the colors, but the delicate gradations and shadings thereof, in accordance with the variations of density, and with the result that the prints resemble fine water color paintings, to a greater or less extent, depending somewhat upon the degree in which the photographic image itself is obscured by the colors or bleached out by a subsequent bleaching process, if this is desired.

In the drawing, in which I have attempted to show, schematically, or diagrammatically, the operation of my process, and the print produced thereby,

Fig. 1 is a sectional view, greatly exaggerated, representing a photographic image, upon a suitable supporting medium, as paper, and showing the pigments and vehicle applied thereto, in excess of the requirements of the photographic image, the dotted lines indicating the portions of the vehicle which are hardened in subsequent treatment of the prints in proportion to the varying densities of different portions of the photographic image.

Fig. 2 is a similar view showing the resulting print after the excess of color and unhardened vehicle are dissolved off of the print.

In carrying my invention into effect, I first prepare a photographic image upon a suitable surface, as paper, celluloid or other material. I prefer to employ as the support for the image, a material suitable for brush work, as, for example, drawing paper, as this not only facilitates the application of the pigments, but such paper has a rough surface which in itself gives character and quality to the finished print. Such a paper or other surface may be conveniently sensitized with a thin coating of gelatine (a very small quantity of gelatine being employed), with bromide or chloride of silver, for example, which is printed in the usual manner under a negative, the exposure being preferably timed to produce a weak print which is then developed in any usual or preferred manner as, for example, by the use of metol-hydrokinone developer, or any other suitable developer. The surface of the print after development, will contain in the darker portions, metallic silver in a finely divided condition, and in different densities, according to the character of the photographic image. In the preparation of the sensitized surface or paper, care should be taken to avoid the use of oxidizing agents, or any material likely to combine with or effect the reducing power of the silver set free by the developer. After the print is prepared, and preferably while it is still damp, I apply or paint onto its surface, with water color pigments, mixed with a gelatinous vehicle, preferably an aqueous solution containing a small percentage of glue or gelatine and charging each portion of the print with an excess of the pigment and vehicle. A convenient method of preparing the painting colors, is to take a four per cent solution of gelatine which has been rendered partially insoluble, by the

addition of a few drops of a four per cent chromalum (or other hardening re-agent), to each ounce of the gelatine solution. The correct quantity of chromalum is to be determined by the particular sample of gelatine, on account of the variations which invariably occur in gelatines generally. The pigments or colors are preferably added to the gelatine vehicle at the time of use, and are preferably specially ground in gum-arabic and glycerine, but some of the water colors sold as ordinary artists' colors, may be employed for the purpose.

It will be understood that the operator can select the colors to be used on different portions of the print, and that different portions of the print are painted over with different colors. The painting, however, does not require expert training, as the pigmented vehicle may be put on roughly over the different portions of the print, and may even overlap at their marginal portions, without injury to the print. I prefer to keep the print in a condition sufficiently warm to maintain the pigmented vehicle a fluid, while it is painted on, and when it is desired to avoid getting any color on any particular area of the print, such area or areas, may be painted over with the plain gelatine solution or vehicle, without color, after which the colors from the adjacent colored portions may overlap the plain gelatine coated portions without danger of coloring the same. While I prefer to paint the prints immediately after development and a sufficient washing to remove the developer and before fixing, it is to be understood that the pigmented vehicle may be applied after the fixing of the prints, and a few minutes washing to remove the fixing solution (hyposulphite of soda), and further that, should it be desired to keep or store the prints before they are painted, this may also be done, but in such case the developed prints must be fixed and dried for storage, and later bleached with a weak solution of ferricyanide of potash and bromide of potash, and re-developed before the pigmented vehicle is applied.

After the prints are painted with the pigmented vehicle, which is conveniently applied by a brush or brushes, the print is treated with what I term a tanning agent, or solution, to develop the color, or in other words, to enable the photographic image to select portions of the applied colors, in accordance with the masses of the photographic image, and in proportion to the variations in density of the image. For this purpose I prefer to employ a solution which will re-act in the presence of the silver image, so as to set free a substance which tans or hardens the gelatine vehicle where the deposited silver of the image is present, and in proportion to its density upon the paper or other supporting surface. A suitable solution which I have employed for this purpose is the following:—

Potassium bromide	1.0 grain
Potassium bichromate	0.5 grain
Potassium ferricyanide	0.25 grain
Acetic acid (glacial)	10 minims
Alcohol (methylated)	3 ounces
Water	5 ounces

The prints are preferably immersed in this solution, with the result that in the portions of the print in which the image is represented by the deposited silver, chromic oxide is set free, and reacting upon the gelatine vehicle, tans or hardens it in accordance with the outline of the silver deposit and in proportion to the density thereof, at different portions, thus enabling the photographic image itself to select and harden, and apply unto itself, portions of the excess pigmented vehicle which has been applied to it exactly in accordance with the outline and density of the silver deposit. The quantity of all the colors is determined by the period during which reaction of the tanning agent or solution is permitted to act, the relative degrees and shadings of the several colors being determined by the varying densities of the variations of the silver deposited constituting the photographic image.

In some instances, instead of fixing the color by immersing the prints in a bath of the solution above described, a few drops of a stronger solution of the same materials may be added to the gelatine vehicle and pigments carried thereby before they are painted onto the print, but I prefer to proceed as before stated.

When the color has been developed to the desired degree of intensity, the remaining portions of the pigmented gelatine not selected and hardened by the reaction with the silver deposit upon the paper, and forming the photographic image, is dissolved off and removed. This may be accomplished by washing the developed colored print in warm water, leaving only the photographic image and the hardened portions of the pigmented gelatine on the supporting surface.

The print is then finally fixed by immersing it in a ten percent solution of hyposulphite of soda.

In developing the colors, the silver under-print may remain, or if it is desired, the silver under-print may be bleached, especially in the delicate or lighter tones, or bleached and removed altogether, as desired, leaving only the colors upon the surface. This bleaching action may be effected by the ordinary means, as ferricyanide of potassium and bromide of potassium, and the degree of bleaching may be regulated by the length of time the print remains immersed in the bath and the strength of the bleaching bath.

If desired, the bleaching action may take place after the colored print has been washed to remove the soluble pigmented vehicle, in which case the bleaching action will be fully visible, and may be carried to the exact extent desired. It will also be understood that the color developing or tanning agent or solution may be varied somewhat to suit differently prepared papers.

In carrying out my invention, the use of insoluble surface papers, which are necessary in processes in which the adhesion of transfer film is a feature, is not necessary, and such papers will not ordinarily be employed. On the contrary, all of the natural surface papers employed for drawing and painting are available and will retain their natural surfaces and contribute to the pleasing effect of the colored prints which in effect are similar to fine offset prints. By painting different parts of the prints with the pigmented gelatinous vehicle, containing different quantities of the same color of pigment, the vehicle containing larger proportions of the pigment being painted over the dark portions of the print, and the vehicle containing lesser quantities of the pigment being painted over the lighter or weaker portions of the print, the finished prints will reproduce the full range of gradation of colors, including the most delicate and lightest tints of the same.

In the accompanying drawing I have endeavored to illustrate, schematically or diagrammatically, the operation of my improved process in the production of my improved colored prints. In Fig. 1, for example, 1, represents the image support or paper, preferably having a roughened surface, indicated at 2, which is sensitized, exposed to light, and developed, as before described, the portions of the silver image of different densities being indicated at 3. 4, 5, 6, 7, 8, 9 and 10, represent portions of the vehicle pigmented with different colors as selected by the operator in any desired number and any desired range of shades of different color, such portions of the drawing, Fig. 1, being in this instance shaded so as to represent red, green, orange, blue, brown, yellow, and black, but of course the particular colors and shades of particular colors will vary with each image, in accordance with its characteristics. The proportions of the several parts illustrated in the drawing and necessarily greatly exaggerated in an endeavor to convey the idea graphically, and it will be understood that the pigmented vehicle is applied in excess of the requirements of the photographic image, as before set forth. The dotted line in Fig. 1 represents, schematically, the portions of the several and differently colored pigmented vehicles which are hardened by the so-called tanning agent, as previously described, Fig. 1, representing the print before the excess of pigmented vehicle is dissolved, off of the print.

In Fig. 2 I have represented the image support, or paper, 1, having its roughened surface, 2, carrying the photographic image, and deposited silver, represented at 3, and showing the adhering hardened portions of the pigmented vehicle in the different colors shown in Fig. 1, from which the surplus unhardened pigmented vehicle has been separated by washing and dissolving it, in the manner described, leaving the finished prints in colors, which hardened portions of the pigmented vehicle are presented at 4^a, 5^a, 6^a, 7^a, 8^a, 9^a and 10^a, and correspond with the dotted lines shown in Fig. 1.

In the foregoing specification, and in the following claims I have used the term "gelatinous" as meaning a substance which contains gelatine, or analogous material, having the chemical characteristics of gelatine.

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

1. The herein described process of producing photographic colored prints, which consists in preparing a photographic underprint upon a suitable support, painting different portions of the photographic image with an excess of different colored pigments combined with a vehicle containing gelatinous material, and subjecting said pigmented vehicle to the action of a tanning agent capable of reacting upon the vehicle in the presence of the photographic image, to harden the gelatinous vehicle and fix the pigments in proportion to the density of the photographic image, and dissolving away the unhardened vehicle and the pigment carried thereby.

2. The herein described process of producing photographic colored prints, which consists in preparing a photographic underprint upon a suitable support, consisting of a deposit of silver in finely divided condition and varying in density in different portions thereof, applying different colors to a gelatinous vehicle, to different portions of the surface of the photographic image, treating the pigmented vehicle with a material capable of reacting upon the silver of the image to produce a tanning agent, and hardening the vehicle containing the colors, in proportion to the density of the silver deposit of the image, and dissolving off the unhardened portions of the vehicle and pigments carried thereby.

3. The herein described process of producing photographic colored prints, which consists in preparing a photographic image in different degrees of density at different portions thereof upon a suitable supporting surface, applying different colored pigments to different portions of the photographic image, in association with a vehicle, effecting the hardening of the vehicle in proportion to the variations of density of the

photographic image, to fix the pigments thereon, and dissolving off the excess vehicle and pigments.

4. The herein described process of producing photographic colored prints, which consists in preparing a photographic image in deposited silver upon a suitable surface, applying different colored pigments to different portions of the photographic image in association with a gelatinous vehicle, and subjecting the pigmented vehicle to the action of a tanning material containing chromic salt, adapted to react in the presence of the silver of the image, to set free a chrome tanning agent and harden the gelatinous vehicle, in proportion to the variations in density of the photographic image, to fix pigments thereon, and dissolving off the unhardened excess vehicle and pigments.

5. The herein described process of producing photographic colored prints, which consists in preparing a photographic image in deposited silver upon a suitable surface, applying different colored pigments to different portions of the photographic image in association with a gelatinous vehicle, treating the print with a solution containing potassium bromide, potassium bichromate, potassium ferricyanide, and acetic acid, to set free in reaction with the silver of the image, a chrome tanning agent and harden portions of the pigmented vehicle upon the silver image, in proportion to the variation of density thereof, to fix the pigments, dissolving off the excess unhardened vehicle and pigments, and fixing the print with hyposulphite of soda.

6. The herein described photographic colored print, comprising a supporting surface and a vehicle carrying pigments of different colors, and hardened upon a photographic image and said support in accordance with the details and variations in density thereof.

7. The herein described photographic colored print, comprising a supporting surface, a photographic image thereon, and a gelatinous vehicle carrying different pigments of different color applied to different portions of the photographic image, and hardened thereon in accordance with the details of and variations in density of the photographic image.

8. The herein described photographic colored print, comprising a supporting surface, a photographic image in deposited silver thereon, a gelatinous vehicle carrying pigments of different colors applied to different portions of the photographic image and hardened thereon, in accordance with the details of said image, and in proportion to the variations in the density thereof.

In testimony whereof I affix my signature.

ERNEST HOWARD FARMER.