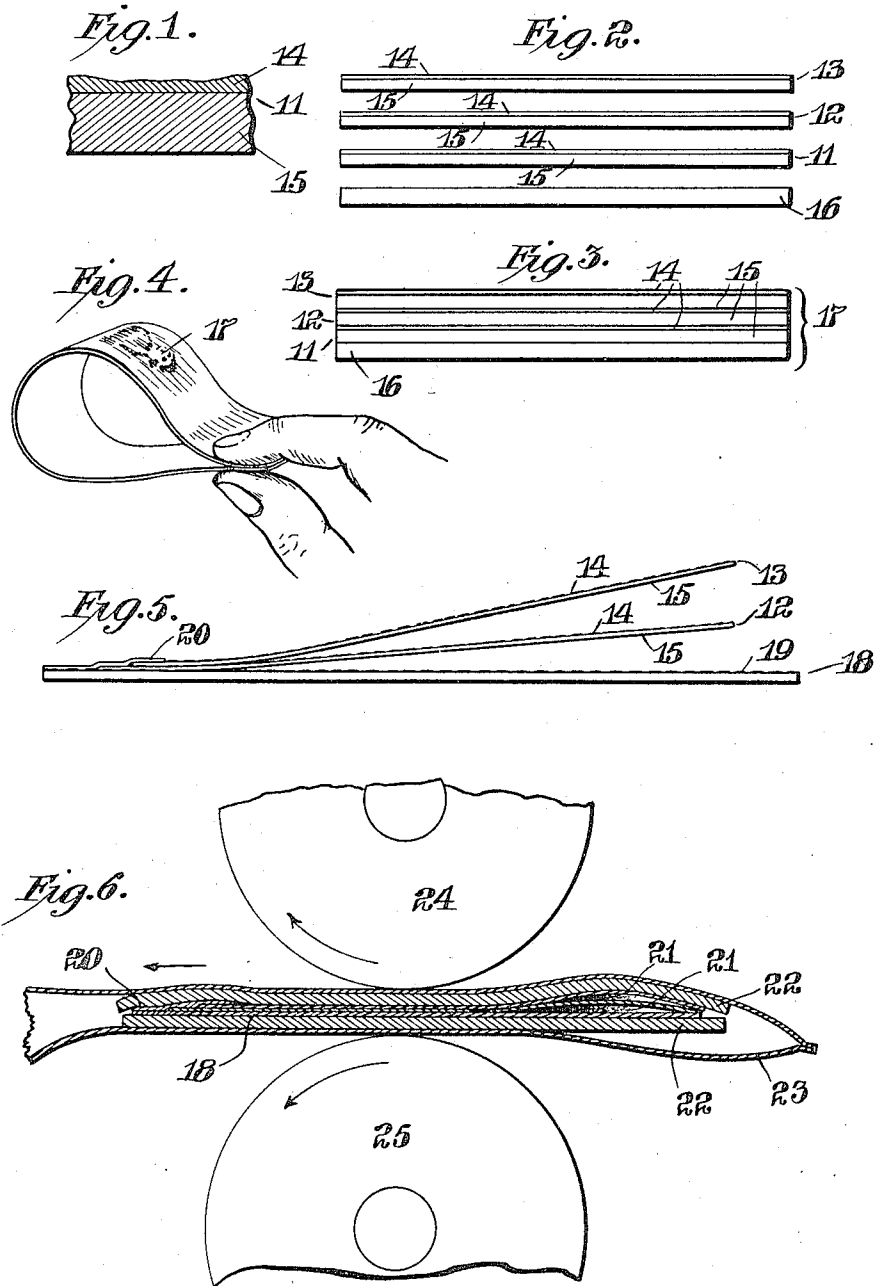


F. E. IVES.
 COLOR PHOTOGRAPHY.
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1,145,143.

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UNITED STATES PATENT OFFICE.

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COLOR PHOTOGRAPHY.

1,145,143.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, FREDERIC EUGENE IVES, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Color Photography, of which the following is a specification, reference being had therein to the accompanying drawing.

This improvement relates to color photography and more particularly to the production of a multi-color print on the general plan which is illustrated in my prior application Serial No. 713,343, filed August 5, 1912, patented December 29, 1914, No. 1,122,935, of which this application is a division, wherein a plurality of individual color prints are first produced each consisting of a celluloid back or support for an image-containing colloid coating and all of which, the colloids with their celluloid backings, are secured together in superposition and in registry so as to give the combined color effect of the individual components.

Different modes have been heretofore tried for securing together the components which are to produce a color print. For the purposes of transparencies mere clamping between glass plates, or cementing by Canada balsam has been tried with fairly satisfactory results; but heretofore, so far as is known, no successful securing method has been devised which would be adaptable not only for transparencies but for multi-color prints upon paper or other reflecting or flexible base.

It is a particular object hereof to afford a securing method and securing material adapted to the securing together of the components which are to constitute a multi-color photographic print upon paper or the like.

Other objects will appear in the hereinafter following description of one embodiment of the present improvements.

Broadly speaking, the securing means and process hereof might be employed outside of the realm of color photography and broadly I wish to cover the present improvement in such particular aspect; but in a peculiar sense, owing to the peculiar conditions, difficulties and obstacles in the art of color photography particularly with respect to affording multi-color photographs on paper, the present improvement is spe-

cially adapted and directed to the art of color photography, and I desire to cover the same as an improvement in that art.

As will be hereinafter seen, the present improvement deals particularly with the permanent securing together of two elements or components, one of which is composed of transparent celluloid or its equivalent (such as collodion) or possesses a surface thereof, while the opposing component or element may consist of or be surfaced with various substances such, for example, as gelatin or other colloid or equivalent. Such is the problem presented in building up a multi-color photograph under my aforesaid prior application; the under side of one of the monochrome components consisting of celluloid, and the upper side of the next below component consisting of a thin layer of colloid or gelatin. According to the present invention such two components are permanently secured together for the purposes referred to by means of an adhesive material or cement which is of a certain character, having the property of slightly but not destructively attacking or dissolving the celluloid surface so as to soften it to a suitably small degree thereby enabling the cement to thoroughly and intimately adhere to and take hold of the material of the celluloid; the cement also having the property of adhering to without destruction of or injury to the opposing colloid surface; so that the two components become firmly, permanently and noninjuriously secured together. In the case of a multi-color print, as in color photography, the final print is thus enabled to be built up in permanently secured form without destroying either the coloring or tone of the image carried by the colloid, while at the same time maintaining in full degree the transparency of all of the components, as is necessary for a successful final result. As examples of cementing or adhesive materials having the property mentioned, namely, of slightly, that is sufficiently but not destructively, attacking the surface of a celluloid surface being cemented, I mention the material preferred by me which is amyl-acetate collodion. This it is understood is in the form of a colorless liquid. Also I preferably incorporate therewith a large amount of camphor. Ordinarily amyl-acetate may be employed, and this in first attacking the celluloid gener-

ates amyl-acetate collodion. In any case; the employment of camphor favors the preservation of the integrity of the celluloid film. To insure that there shall be no excessive softening of the celluloid under the attacking influence of the cementing material, precautions may be taken to provide only an extremely small quantity or extremely thin film of cementing material; for example, heavy roller pressure may be promptly employed after the application of the cement to expel all but a small though sufficient quantity to insure a firm connection. It is believed that the small amount of amyl-acetate and camphor which remains will to a slight extent become diffused into the substance of the celluloid film without substantially dissolving it and without disintegrating it but leaving it firmly attached to the opposing colloid surface in a permanent yet flexible manner.

As some mode of properly applying the cementing material between the flexible transparent surfaces to be attached together is an important part of the present improvement, I will describe by the aid of drawings the preferred complete operation of attaching together into a substantially single, unitary, multi-color photograph, a plurality of monochrome components presenting the condition of celluloid surface to be permanently and flexibly attached without injury to a colloid surface.

In the accompanying drawing forming a part hereof Figure 1 shows a partial section of one of the monochrome positives made according to my aforesaid prior application, the same consisting of a celluloid base carrying a colored colloid relief. There may be a complete set of such positives, produced from a corresponding set of color-selection negatives, each produced by exposing the sensitized colloid layer through its celluloid back behind one of the negatives, afterward developing to remove the unaffected colloid to give relief, and afterward staining to the proper depth of the proper color before finally bodily superposing and securing together in registry the several transparent positives with their carriers and with a suitable reflecting base beneath. Fig. 2 shows three of the positives, color side uppermost, with a paper back, the four being unattached but in proper relative position. Fig. 3 shows the same components as in Fig. 2, but permanently cemented together. Fig. 4 shows the same photograph of Fig. 3, but without exaggeration, and illustrating the flexibility and opacity which is attainable. Fig. 5 illustrates the temporary attachment at one edge of three positives, the underneath one consisting of a cyanotype on paper. Fig. 6 illustrates the spreading of cement between the faces of the positives. The positives 11, 12 and 13, each consist

of a stained gelatin monochrome 14 at the face and a transparent celluloid base or carrier 15 at the rear. The face 14 may consist of a dyed gelatin relief as before explained. The arrangement indicated in Fig. 2 presents the condition of a celluloid back of one positive opposed to the colloid face of another. Behind all three of the positives is an opaque or paper back 16 (in Figs. 2 and 3); but when a cyanotype or other paper positive 18 is employed for the back, as in Figs. 5 and 6, having its picture side 19 uppermost, there will be a smaller number of transparent positives and no separate paper back 16.

Fig. 5 shows the components in the process of assemblage, Fig. 3 shows them assembled, and Fig. 4 shows in more nearly proper proportions the final finished color photograph 17 indicating its opacity, flexibility and unitary character. A practical and my preferred mode of finally cementing together the positives into such a unitary photograph, after all the steps of registration and color adjustment have been completed, is as follows, referring particularly to Figs. 5 and 6: The three completed monochrome prints or positives having been superposed and adjusted into registry, may first be fastened along one edge. This may be done by cutting them to overlap, as shown in Fig. 5, and applying an adhesive strip 20 pasted over the several edges. While thus temporarily fastened, if desired the registration and color adjustment may be again inspected. The several prints may now be opened out like the leaves of a book, as seen in Fig. 5, and a small though sufficient quantity of transparent cement introduced into the bottom of the V-shaped grooves thus produced. Such cement will preferably be an amyl-acetate cement or its equivalent, as previously specified. The prints are then closed together again and preferably laid between sheets of soft absorbent blotting paper 22, 22, and the whole may then be placed in an ordinary paper bag 23. Pressure will then be applied and cause the cement to spread from the fastened edges so as to cover the entire area with a very thin film of the cementing material, which as before stated is capable of affecting the celluloid surface so as to insure adhesion while at the same time adhering to the opposed colloid surface, and without impairing or destruction of either component or of the transparency of the whole. Rather than apply pressure merely by hand or by a squeegee roll, I prefer to run the combined prints, blotters and bag between a pair of compression rolls. Elastic or rubber rollers 24, 25 are shown, these being supposed to be under high pressure. Upon turning the rolls, the assembled prints will be drawn through and forcibly pressed together, as

indicated in Fig. 6, this action serving to force the cement 21 forwardly, at the same time spreading it uniformly and entirely over the adjoining surfaces of the prints.

5 Any surface cement will be expressed from between the prints and absorbed by the blotters so that the cemented prints may be safely removed without risk of the excessive cement becoming applied to the outside surface.

10 By the improvements just described, what would ordinarily be a troublesome and messy process of fastening the prints together is enabled to be accomplished with celerity, cleanliness and precision, and without the exercise of any special skill.

15 I have thus described a novel means and mode of cementing photographic components into a unitary whole or multi-color photograph, the same embodying the principles and attaining the advantages hereinbefore referred to, and other advantages will be apparent to those skilled in the art. Since various matters of detail and other features might be modified without departing from the principles, I do not intend to restrict the present improvements to be disclosed features and details excepting to the extent set forth in the appended claims.

30 What is claimed is:

1. In the art of color photography the method of making a multi-color print consisting in making a plurality of monochromes of different colors at least one of which has a transparent celluloid base, and combining them into a unitary color photograph by applying between the transparent celluloid base of one monochrome and the next monochrome a cement, containing amyl-acetate collodion, capable of slightly softening or dissolving the celluloid surface.

2. In the art of color photography the method of making a multi-color print consisting in making a plurality of monochromes of different colors at least one of which has a transparent celluloid base and at least one of which has a colored colloid surface, and combining them into a unitary color photograph by applying between the transparent celluloid base of one monochrome and the colored colloid surface of the next monochrome a cement, capable of slightly softening or dissolving the celluloid surface without impairing the color or transparency of either monochrome.

3. The method of making a composite

photographic print from a plurality of transparent photographic monochromes at least one of which has a transparent celluloid base, said method consisting in superposing the several monochromes with a layer, between each monochrome celluloid side and the face of the adjacent monochrome, of a cement capable of slightly softening or dissolving the celluloid surface.

4. A composite photograph comprising a plurality of photographs at least one of which has a transparent celluloid base, superposed and cemented together by a cement, capable of slightly softening or dissolving the celluloid surface.

5. A multi-color picture comprising a plurality of different colored monochrome positives at least one of which has a transparent celluloid base, all superposed and cemented together by a cement containing amyl-acetate collodion, capable of slightly softening or dissolving the celluloid surface.

6. As an improvement in the production of a colored composite photographic picture comprising a basic print and one or more superposed, dyed, transparent, colloid relief prints, the mode herein described of securing said prints together, said mode consisting in introducing between the prints a supply of transparent cementing material comprising amyl-acetate collodion and camphor.

7. As an improvement in the production of a colored composite photographic picture comprising a basic print and one or more superposed, dyed, transparent, colloid relief prints, the mode herein described of securing said prints together, said mode consisting in first securing the prints at one edge, introducing between the prints at such secured edge a supply of transparent cementing material comprising amy-acetate collodion, closing the prints upon one another, placing them between sheets of absorbent material, and passing the latter, and the prints between them, between a pair of compression rolls in such direction that the connected edges of the prints will first enter between the rolls.

In testimony whereof, I have affixed my signature in presence of two witnesses.

FREDERIC EUGENE IVES.

Witnesses:

W. C. JOHNS,
A. M. WOOD.