

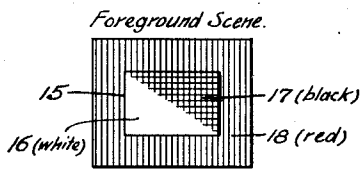
June 6, 1933.

W. V. D. KELLEY

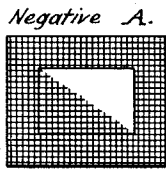
1,912,582

COMPOSITE PHOTOGRAPHY

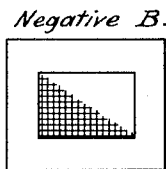
Filed Oct. 20, 1930



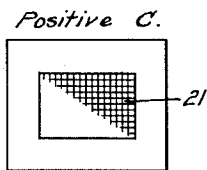
*Fig. 1.*



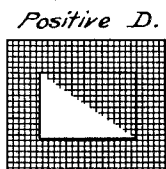
*Fig. 2.*



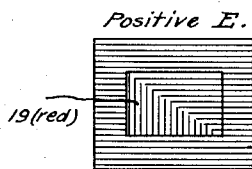
*Fig. 3.*



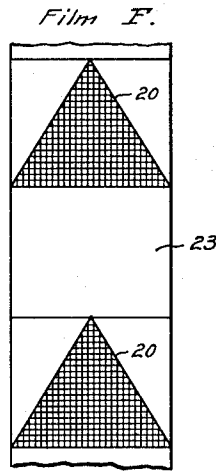
*Fig. 4.*



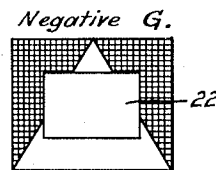
*Fig. 5.*



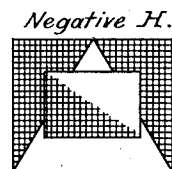
*Fig. 6.*



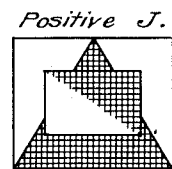
*Fig. 7.*



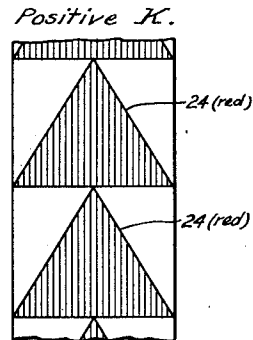
*Fig. 8.*



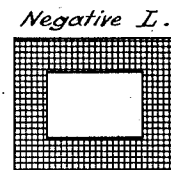
*Fig. 9.*



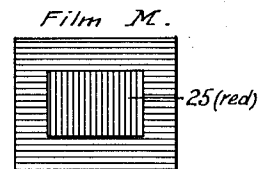
*Fig. 10.*



*Fig. 11.*



*Fig. 12.*



*Fig. 13.*

*Inventor;*  
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*Attorney.*

# UNITED STATES PATENT OFFICE

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## COMPOSITE PHOTOGRAPHY

Application filed October 20, 1930. Serial No. 489,947.

In this specification, and the accompanying drawing, I shall describe and show a preferred form of my invention, and specifically mention certain of its more important objects. I do not limit myself to the forms disclosed, since various changes and adaptations may be made therein without departing from the essence of my invention as hereinafter claimed, and objects and advantages, other than those specifically mentioned, are included within its scope.

My invention relates to composite photography, which term as usually employed signifies the art of combining two or more photographs into one. By means of this art it is possible to produce many types of unusual pictures, such as putting an action scene that is photographed in Hollywood into a background scene photographed in Paris or New York. It also permits of making action pictures without hazard to the performers, as in the case of fire scenes or snow slides.

The general objects of my invention include overcoming many of the difficulties and objectionable features involved in the practice of the hitherto known methods of composite photography. Among these difficulties may be mentioned; the necessity for preparing the background shot first; the inconvenience and impracticability of making negatives in daylight where color backgrounds are to be used; and the great expense that frequently is involved in holding actors in idleness while the background shot is being prepared.

More specifically stated, the principal objects of my invention include; first, to provide a process of composite photography that requires no hand working of the photographic material; second, to eliminate any necessity for special cameras in such a process; third, to make it easily possible to use the same foreground scene over again, in case the first background scene proves to be unsatisfactory, and in this way to avoid such expenses as having to re-call actors; and, fourth, to improve the general practice of making composite photographs. Other objects and advantages of my invention will become apparent to those skilled in the art to which it re-

lates, upon a study of the following specification.

My objects are attained in the manner described below, and as illustrated in the accompanying diagrammatic drawing, in which:—

Figure 1 represents a foreground or action scene, in front of a plain background that is uniformly colored red;

Figure 2 is a negative photograph of the above, taken on a panchromatic emulsion;

Figure 3 is a negative of this same scene, taken on an emulsion that is blind to red;

Figure 4 is a positive print from the negative of Fig. 2;

Figure 5 is a positive print from the negative of Fig. 3;

Figure 6 represents the positive film shown in Fig. 5, after it has been bleached and color-treated, so that the exposed portions have been dyed blue and the unexposed portions dyed red;

Figure 7 is a positive film of a background scene, into which the foreground scene of Fig. 1 is to be inserted, the background scene being printed on alternate frames with clear unexposed frames therebetween;

Figure 8 illustrates, diagrammatically, the first step in producing the desired composite negative of the foreground scene in front of the background scene;

Figure 9 illustrates the final completed composite negative;

Figure 10 shows the final composite positive, printed from the negative of Fig. 9;

Figure 11 illustrates an alternative method of preparing the positive background film for the purpose of the process, so as to avoid the necessity for using the double length film shown in Fig. 7;

Figure 12 illustrates a step in another alternative process that is specific to my invention, whereby a different type of negative of the foreground scene may be made to take the place of the film illustrated in Fig. 2; and

Figure 13 is the film shown in Fig. 12 after it has been bleached and color-treated, in such a way that the exposed portions are dyed blue and the unexposed portions dyed red.

Similar reference numerals refer to similar parts throughout the several views. Various

areas of the figures have been surface-shaded to indicate color values.

In the practice of my invention it is to be noted, first, that if a director desires to produce an action scene as if it was photographed before a background at a distant location, it is not necessary to send the actors to such location, nor even to prepare the background scene in advance. A camera is set up, the actors are summoned, and exposures of the action are made in front of a suitable screen. The resulting negatives may then be put away until the final background scene is ready, or until it is convenient to combine the two scenes into a composite picture. This may be done at any time thereafter.

The first step in my improved process therefore consists in making a pair of negatives of the action or foreground scene, in front of a plain uniformly colored screen. In these two negatives the foreground is identically the same in each, but the background of one of the negatives is clear and in the other it is exposed or black. A preferred way of accomplishing this result is to expose the negatives superimposed, the action being taken in front of a plain red screen, to which one of the negative emulsions is sensitive, and to which the other emulsion is blind. By utilizing the well known film pack idea employed by Du Hauron, Bastini, and others, this step may be readily accomplished.

In practice the action or foreground scene usually will embrace various colors, as well as whites and blacks. When such a scene is photographed, the result will be a distribution of whites, blacks, and black and white color-values, ranging from white to dense black. For the sake of simplicity we may properly consider in this discussion, only the extremes of the actinic values of the scene; it being obvious and well understood that a process of this kind, that is adapted for correctly representing the extremes, will also correctly represent the intermediate actinic values of the subjects photographed.

Let us assume that the foreground scene is represented diagrammatically by the subdivided rectangle 15 of Fig. 1, of which the area 16 is white and the area 17 is black. This scene is photographed on the two superimposed emulsions described, in front of a plain screen 18 that is uniformly colored red. This foreground scene and its background screen, are set up for photographing as indicated diagrammatically in Fig. 1, the surface shadings in the figure indicating the respective color-values mentioned.

After development, the panchromatic negative emulsion that was exposed to the above scene, will appear as in Fig. 2, and I will call this "Negative A". The blind to red negative emulsion, after development, will appear as in Fig. 3, and I will call this "Negative B". Negatives A and B are then printed, in

superimposed registering positions, on a double sided film, i. e., a film having a transparent base and an emulsion on each side. The results of these printings will appear as in Figs. 4 and 5, and I will call these prints "Positive C" and "Positive D" respectively.

The next step in my process is to bleach and color Positive D, as in the manner described in my U. S. Patent 1,830,468, issued November 3, 1931. By this treatment the parts of the emulsion that were exposed become bleached and hardened, and they are then given a blue color; and the unexposed portions are left soft and then colored with a red dye that does not attach itself to the hard blue-dyed portions. The result of this treatment is as indicated in Fig. 6, and I will call this "Positive E". In this figure the red dyed area is indicated at 19, and the remainder of the film is colored blue.

It is to be understood that the bleaching and coloring treatment just described is allowed to affect only Positive D, so as to transform it into Positive E. Positive C, which is in registering position on the other side of the double coated film, is left unbleached and uncolored. This double sided film, with Positives C and E thereon in opposed registering positions, furnishes the means for putting the foreground scene it represents into a final background scene, for the production of the desired composite result.

The next step in the process is to make a positive of the final background scene on a double length film, the picture frames being alternated with clear frames between. This is shown diagrammatically in Fig. 7, wherein the objects in the final background are indicated at 20, and I will call this result "Film F". This film is made in such a manner as to be suitable for making a "dupe" negative therefrom. It is left unbleached and uncolored.

With the above films prepared as described, they may be combined to secure a composite result, so that the action scene will appear in front of the background scene, in the manner now to be described.

For the production of the final composite picture negative, a panchromatic emulsion is used. Each frame of this is first printed through a blue color-filter, and through Positives C, E, and a picture frame of Film F, superimposed in registering positions. The blue light will freely pass through the blue colored portions of Positive E, but it will be completely blocked by the red colored portion 19 thereof. It will also be blocked by black area 21 of Positive C. After such printing, the frames of the emulsion would appear as in Fig. 8 if they were developed, but they are not developed at this time. I will, however, refer to this result as "Negative G". It will be noted that this first exposure leaves a rectangle 22, which corresponds in outline

to the foreground of Fig. 1, completely unexposed.

The next step in the process consists in advancing Film F one frame, while leaving Positives C and E, and the panchromatic emulsion behind them, in the same position they were before. The same frame of the emulsion is then printed through a red color-filter, through Positives C, E superimposed, and through a clear frame 23 of Film F. The red light will freely pass the red colored portion 19 of Positive E, but will be completely blocked by the blue colored portions thereof. The panchromatic emulsion may now be developed, and it will appear as in Fig. 9 which I will call "Negative H".

Negative H is the final composite negative result sought. When printed it will give the positive composite picture indicated in Fig. 10, wherein the foreground scene of Fig. 1 is combined with the background scene of Fig. 7; without any effects of fringing, double printing, or phantoms, I will call this final result "Positive J".

It will be readily seen by those conversant with this art, that my improved process of composite photography is susceptible of many variations of detail in the various steps involved, without departing from the scope of the invention. Certain of these variations will now be described.

Instead of preparing background Film F with picture frames alternating with clear frames, we may make use of a positive background film prepared as indicated in Fig. 11, without skip frames. The figures 24 of this background scene are colored red, by any of the well known means for doing this. I will call this film "Positive K". Although the use of this film, in place of Film F, avoids the necessity for a double length film, and does not require that it shall be advanced one frame between the successive printings of Negative H, it does require coloring. Otherwise it is used in the same way as Film F. The panchromatic negative emulsion is printed first by blue light through Positives C, E, and K, producing the exposure result of Negative G; and then the emulsion is again printed by red light without moving the films, producing the result of Negative H.

In all of the steps of my process the complementary colors may be used in a reverse sense to that described. That is, blues may be used in place of reds, if reds are used in place of blues. Also the screen 18 of Fig. 1 may be of any plain actinic color; provided that the emulsion of Negative B is blind to that color, and that the emulsion of Negative A is sensitive to it.

A further variation of my process is to use a plain white screen in place of that shown at 18 in Fig. 1, illuminating the foreground only with red light that does not fall upon the screen, and illuminating the screen

itself only with white or blue light. There are well known ways of accomplishing this. In such a case the panchromatic negative will be the same as Negative A; and the ortho negative, that is blind to red, will appear after development as in Fig. 12. I will call this "Negative L". The latter is bleached and color-treated by such processes as those mentioned, so as to produce the colored film shown in Fig. 13, which I have designated "Film M". In this film the area 25 is red, and the rest is blue. For exposing the final composite negative in this case Positives C and M are superposed in registering positions over either Positive Film F or Positive K, and the panchromatic emulsion is exposed first through a blue color-filter and then through a red color-filter. The results of these respective exposures will be the same as indicated in Negative G and Negative H, just as in the former procedure described.

In the use of my process many other variations will occur to those familiar with the art involved, and many possibilities for controlling and modifying the final results will suggest themselves. Among such controls may be mentioned the use of emulsions of selected rapidity, emulsions of selected color sensitivity, exposure timing, and the employment of color screens of graded color-values. Thus, if care and skill are used, the process is capable of producing very perfect results.

In the foregoing description it has been shown how the extremes of actinic values in the action and background scenes are perfectly taken care of. The intermediate actinic values will take care of themselves as already stated. Thus when half-tones in the emulsions are subjected to bleaching and dye-coloring in the process, varying proportions of the red and blue dyes will attach to these parts in accordance with the density of exposure. To attempt a detailed explanation of the effects of intermediate actinic values in the subjects photographed would entail a very lengthy and complicated description. This appears to be entirely unnecessary in view of the common knowledge of experienced persons that such effects are proportional to the actinic values involved. Thus if the extremes of actinic values are properly cared for, as in the manner described, the intermediate actinic values will take care of themselves.

Having thus fully described my invention, I claim:

1. Composite photography comprising: photographing a foreground scene in front of a plain screen by a method adapted to produce a pair of positive films that are identical except as to variations in exposure due to color-selection, one of the films showing the foreground scene and such portions of the screen only as are not blocked off by said scene, and the other film showing the fore-

ground scene only; coloring the exposed portions of the first said film one color, and the unexposed portions a complementary color; and exposing a panchromatic film through said colored and uncolored positives in superimposed registering positions, successively to light of said respective colors; the last said exposures being made through a film carrying a positive background picture, in a manner to prevent double printing of said background through the foreground scene.

2. Composite photography comprising; photographing a foreground scene in front of a plain screen by a color-selection method, to produce a pair of positive films that are identical except as to variations in exposure, one of the films showing the foreground scene and such portions of the screen only as are not silhouetted by said scene, and the other film showing the foreground scene only; coloring the exposed portions of the first said film one color, and the unexposed portions a complementary color; and exposing a panchromatic film through said colored and uncolored positives in superimposed registering positions, successively to light of said respective colors; one only of the last said exposures being made through a background picture.

3. Composite photography comprising; photographing a foreground scene in front of a plain screen by a color-selection method, to produce a pair of positive films that are identical except as to variations in exposure, one of the films showing the foreground scene and such portions of the screen only as are not silhouetted by said scene, and the other film showing the foreground scene only; coloring the exposed portions of the first said film one color, and the unexposed portions a complementary color; and exposing a panchromatic film through said colored and uncolored positives in superimposed registering positions, successively to light of said respective colors; the last said exposures being made through a film carrying a background picture in alternate frames spaced by clear frames, and the last said film being shifted by the extent of one frame between said successive exposures.

4. Composite photography comprising; photographing a foreground scene in front of a plain screen by a color-selection method, to produce a pair of positive films, one of the films showing such portions of the foreground scene as are of the same color as the screen and such portions of the screen only as are not silhouetted by differently colored portions of the foreground, and the other film showing only such portions of the foreground as are of different color from the screen; coloring the exposed portions of the first said film one color, and the unexposed portions a complementary color; and exposing a panchromatic film through said colored and uncolored positives in superimposed registering positions, successively to light of said respective colors; one only of the last said exposures being made through a positive background picture.

5. Composite photography comprising; photographing a foreground scene in front of a plain screen, to produce a pair of positive films that are identical except as to variations in exposure, one of the films showing the foreground scene and such portions of the screen only as are not silhouetted by said scene, and the other film showing the foreground scene only; coloring the exposed portions of the first said film one color, and the unexposed portions a complementary color; and exposing a panchromatic film through said colored and uncolored positives in superimposed registering positions, successively to light of said respective colors; the last said exposures being made through a positive background picture, in which the exposed portions are colored the same as the unexposed portions of the first said colored positive.

6. Composite photography comprising; photographing a foreground scene in front of a plain colored screen upon a pair of films, one of which is panchromatic, and the other being blind to the color of the screen, to produce a pair of negatives that are identical except as to variation in exposure resulting from their color-selection characteristics; producing a positive print from each of said negatives; bleaching the exposed portions of the print from the orthochromatic negative, and coloring its exposed and unexposed portions complementary colors; and exposing a panchromatic film through said colored and uncolored positives in superimposed registering positions, successively to light of said respective colors; one only of the last said exposures being made through a positive background picture.

7. Composite photography comprising; photographing by a color-selection method, a foreground scene that is illuminated by light of one color and in front of a plain screen that is illuminated by light of a complementary color, to produce a pair of positive films that are identical except as to variations in exposure resulting from the use of the color-selection method, one of the films showing the foreground scene and such portions of the screen only as are not silhouetted by said scene, and the other film showing the foreground scene only; coloring the exposed portions of the first said film one color, and the unexposed portions a complementary color; and exposing a panchromatic film through said colored and uncolored positives in superimposed registering positions, successively to light of said respective colors; one only of the last said exposures being made through a positive background picture.

8. Composite photography comprising; photographing a foreground scene in front of a plain screen by a color-selection method, to produce a pair of positive films, one of the films showing such portions of the foreground scene as are of the same color as the screen and such portions of the screen only as are not silhouetted by differently colored portions of the foreground, and the other film showing only such portions of the foreground as are of different color from the screen; coloring the exposed portions of the first said film one color, and the unexposed portions a complementary color; and exposing a panchromatic film through said colored and uncolored positives in superimposed registering positions, successively to light of said respective colors; one only of the last said exposures being made through a positive background picture.

WILLIAM V. D. KELLEY.