Aug. 7, 1934. G. HEYMER 1,968,944

THREE-COLOR PHOTOGRAPHY

Filed May 2, 1932

Fig. 1

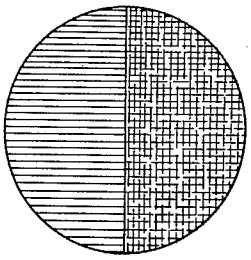


Fig. 2

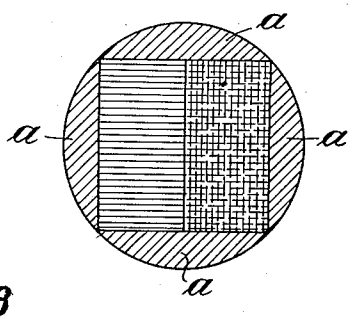


Fig. 3

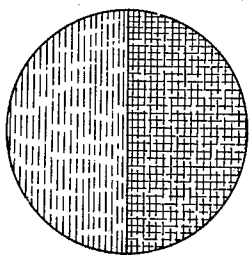


Fig. 4

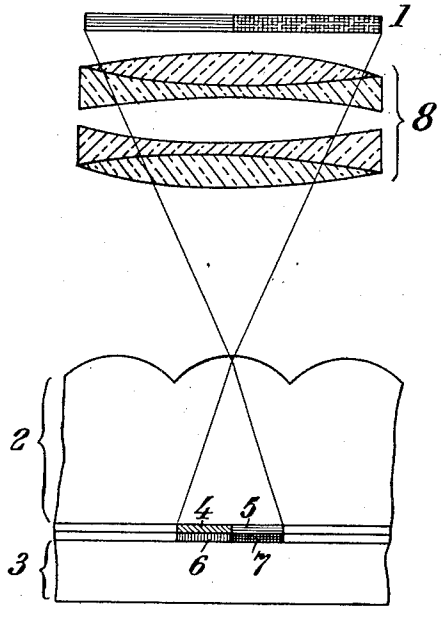
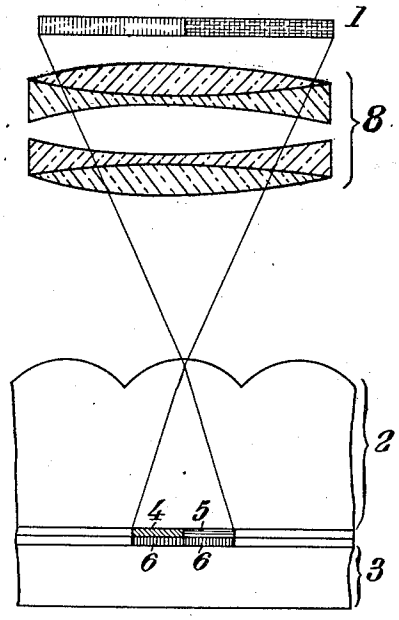


Fig. 5



Inventor:
Gerd Heymer,

By Attorney
Philip S. Hopkins.

Patented Aug. 7, 1934 1,968,944

UNITED STATES PATENT OFFICE

1,968,944

THREE-COLOR PHOTOGRAPHY

Gerd Heymer, Dessau-Ziebigk, Germany, assignor to Agfa Ansco Corporation, Binghamton, N. Y., a corporation of New York

Application May 2, 1932, Serial No. 608,829
In Germany May 2, 1931

4 Claims. (Cl. 95—2)

My present invention relates to color photography and more particularly to three-color photography.

One of its objects is to provide an improved process of manufacturing color photographs according to the three-color process. Further objects will be seen from the detailed specification following hereafter.

All of the three-color processes have certain drawbacks. In applying the tri-pack process, the second and third pictures, especially the third lack satisfactory sharpness. When three part pictures are taken simultaneously behind corresponding filters by means of three objectives arranged side by side or one above the other, these part pictures show local parallaxes. When a single objective is used the course of rays being split into three different pencils by means of prisms or mirrors, there occurs a considerable loss of light. The same is true in the case of all processes employing screen films particularly the Berthon process, because it involves a three-color filter each area of which absorbs two of the three component colors of the spectrum. If, for avoiding this disadvantage, the process is restricted to the reproduction of only two colors, the colors of the pictures obtained are essentially different from those of the object to be photographed.

The object of this invention is a process which profits by all the technical advantages offered by the two-color process without giving up the third color. The process consists in exposing behind one objective two light-sensitive layers one arranged behind the other with a yellow or red filter layer arranged between them as usual in bi-pack practice, the layer next the objective being associated with a lenticular screen according to the known Berthon process, and a two-color filter being in front of, or in, or behind the objective. Each area of the color filter is capable of absorbing at least one of the three component spectral colors that is to say one area of this filter is permeable for about two of the three component spectral colors and the other area is permeable for about one or two of the three component colors of the spectrum. The third component color which is in any case absorbed by the last-named filter area corresponds with one of the two component colors to which the first named area is permeable. Such filters are, for instance, a filter composed of a blue area and a yellow area, the yellow area being permeable to green and red and the blue area to blue; or a filter having a purple area and a yellow area, the yellow area being permeable to green and red, and the purple area being permeable to blue and red, but absorbing green.

The color sensitiveness of the photographic emulsion layers is to be so selected that the emulsion of the lenticular screen film is sensitized for two of the three component colors of the spectrum and that of the smooth film for the remaining component, the smooth film being sensitized for one of the two component colors to which at least one of the filter areas is permeable or for that component of the three component spectral colors to which both filter areas are permeable.

When it is desired to record the blue sensation on the lenticular film, a yellow or red filter is placed between the lenticular film and the smooth film as is usual in bi-pack practice. It is also possible, however, to record the blue sensation, in manner also known in bi-pack practice, on the film which is more remote from the objective, that is to say, on the smooth film, by using a lenticular film which is of low sensitivity to blue but is strongly sensitized to red and green and placing a feebly colored yellow filter in front of the lenticular film.

The emulsion layer associated with the lenticular screen which preferably is composed of cylindrical lenses, is sensitized, for instance, for blue and green, and registers behind each of the lenticular elements in juxtaposition a green sensation and a blue sensation of the object. The emulsion layer arranged in the optical axis behind the first-named emulsion layer and associated with an ordinary support is sensitized for the third color (red), and registers the red sensation. The colored part-picture negatives so obtained can be used for the production of positives in any of the known processes. For instance, the two partial color records on the lenticular film can be printed onto ordinary film analogous to the method described in U. S. Patent 1,874,529. If a positive is printed also from the partial color record on the ordinary film, the three positives can be projected as usual in the additive process. It is particularly advantageous to print the three part-picture negatives onto a single lenticular film according to the process of Berthon which places behind each lenticular element three color sensations; the said film can be projected in connection with the use of a three-color filter.

The process will be more clearly understood by reference to the accompanying drawing in which

Figs. 1 to 3 represent respectively two-color filters useful for the process and

Figs. 4 and 5 illustrate diagrammatically the

production of three-color photographs when different two-color filters are used.

The same reference characters designate the same parts.

The filters shown in Figs. 1 and 2 have a blue area and a yellow area with the difference that the parts marked *a* in Fig. 2 are masked. Fig. 3 shows a two-color filter having a purple area and a yellow area. In Fig. 4 the light-rays coming from the object pass through the two-color filter 1 having a blue area and a yellow area, and are projected onto the lenses elements of the lenticular film 2 by means of the objective 8. In the sensitive layer of this film which is sensitized for green (the film is generally sufficiently sensitive to blue owing to its standard sensitiveness), there is produced the green sensation 4 and the blue sensation 5 of the object. Adjacent to the lenticular film 2 there is arranged the smooth film 3 which is separated from the lenticular film by a yellow or red filter layer (not shown). In this smooth film, the light-sensitive layer of which is sensitized for red, there is produced the red sensation 6 coinciding with the green sensation 4. The part 7 of the emulsion of the smooth film is in the present case simply blackened. If there is inserted a two-color filter having a purple and a yellow area as shown in Fig. 5 also that part of the emulsion layer of the smooth film coinciding with part 5 of the lenticular screen film adds to the red sensation, so that instead of obtaining a screened negative as with the arrangement shown in Fig. 4 a uniform negative is obtained.

The process is, in the first place, suited for color cinematography, but, if desired, may be employed in color photography. It is, in short, suited for all processes which aim at the production of three-color sensations while avoiding too great deficiency of sharpness and considerable loss of light.

What I claim is:

1. A process of producing three-color part negatives which comprises arranging behind an objective a lenticular film and a smooth film in contact therewith, the smooth film being arranged remote from the objective and being sensitized for one of the three component spectral colors and said lenticular film being sensitized for the remaining two of the three component colors, providing the objective with a two-color filter each area of which absorbs at least one of the three component spectral colors, the two absorption bands of the two filter areas being adjusted so that they do not appreciably overlap and each area being permeable respectively for at least one of the two component spectral colors for which the lenticular film is sensitized and at least one area being permeable for the third color component for which the smooth film is sensitized and exposing said films.

2. A process of producing three-color part negatives which comprises arranging behind an objective a lenticular film and a smooth film in contact therewith, the smooth film being arranged remote from the objective and being sensitized for one of the three component spectral colors and said lenticular film being sensitized for the remaining two of the component colors, providing the objective with a two color filter each area of which absorbs one different of the three component spectral colors, the two absorption bands of the two filter areas being adjusted so that they do not appreciably overlap and each area being permeable to the same component color to which the smooth film is sensitive, and exposing said films.

3. A process of producing three-color part negatives which comprises arranging behind an objective a lenticular film and a smooth film in contact therewith, the smooth film being arranged remote from the objective and being sensitized for one of the three component spectral colors and said lenticular film being sensitized for the remaining two of the component colors, providing the objective with a two color filter one area of which absorbs one of the three component colors while the other area absorbs two of the three component spectral colors including that for which the smooth film is sensitized, but is permeable to that color component which the first area absorbs, and exposing said films.

4. A process of producing three-color part negatives which comprises arranging behind an objective a lenticular film and a smooth film in contact therewith, the smooth film being arranged remote from the objective and being sensitized for red and said lenticular film being sensitized for blue and green, providing the objective with a two color filter one filter area being dyed yellow and the other being dyed purple, and exposing said films.

GERD HEYMER.