

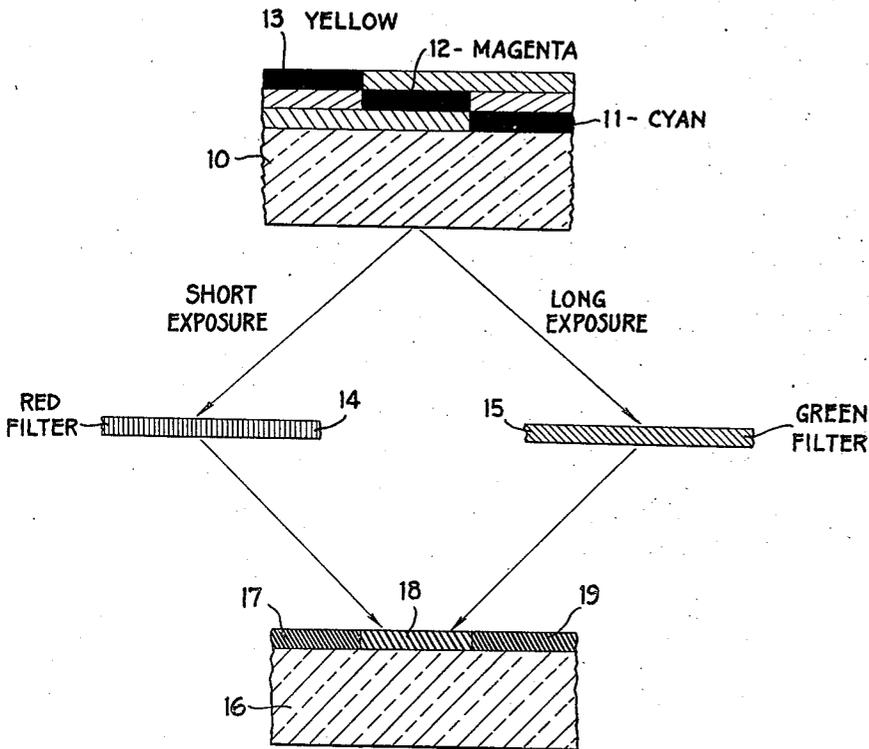
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PHOTOGRAPHIC MASKING USING THE CLAYDEN EFFECT

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PHOTOGRAPHIC MASKING USING THE CLAYDEN EFFECT

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This invention relates to photography and particularly to a method of producing masked photographic images.

For the color correction of photographic or photo-mechanical color reproductions or for improving the rendering of fine detail, a masking method is often used. This consists of the combination of a negative and a positive in register with each other. Whichever of these images has the lower contrast is known as the mask. For example, a low contrast red filter positive mask may be combined with a green filter negative to produce a corrected green filter negative. It is generally necessary to make a separate low contrast masking image either negative or positive, depending upon whether a positive or negative image is to be masked and this of course requires additional steps and additional photographic material. In Seymour U. S. Patent 2,169,009, granted August 8, 1939, the final positive relief images are used as masks but in other processes a separate masking image must be made.

It is therefore an object of the present invention to provide a simplified method of masking. A further object is to provide a method which avoids the necessity of making a separate masking image for use with each image to be corrected. Other objects will appear from the following description of my invention.

These objects are accomplished by exposing a silver halide layer under an image, to a high intensity light source for a short period of time, and exposing the layer under a different image for a longer period of time to a low intensity light source. The high intensity light desensitizes the layer so that a reduction in density is obtained in the portions so exposed.

In the accompanying drawing, the single figure is a diagram of the method of making corrected color separation images according to my invention.

The present invention makes use of the Clayden effect, which is a photographic effect discovered by Clayden in 1899 in connection with photographic exposures to lightning flashes. The feature which characterizes the Clayden effect is the initial exposure to high intensity light which desensitizes the emulsion so that subsequent exposure to low intensity light produces less effect than if the pre-exposure had not been given.

According to my invention a silver halide photographic layer is exposed to a very intense image which will be called the masking image, for a very short time. This exposure may be made

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in the camera using a colored filter so that a color separation image is obtained or it may be made in a printer using a color separation image on a photographic film or plate. The silver halide layer is then again exposed in register for a longer period of time to a second low intensity image, which will be called the main image, of the same subject at the same magnification. The silver halide layer is then developed, preferably in a high contrast developer, to obtain a corrected color separation image of the main image.

In my process, the masking image and the main image may be considered to be positive with respect to each other, although the effect of the masking image is negative, since its action is reversed by means of the Clayden effect. The value of the method depends upon the fact that it permits the use of images which are positive with respect to each other. By "positive with respect to each other" I mean that the masking image and the main image are both positive or are both negatives. Generally, in masking processes, as stated above, the masking image is negative with respect to the main image, that is, a positive masking image is used to mask a negative main image or vice versa, and this is the reason that the positives or negatives already available are unsuitable for masks.

The masking of desensitizing exposures used in my method must be of high intensity and short duration. The desensitizing exposure should be less than 0.001 second, preferably less than 0.0002 second. An exposure of this order is obtained with the Kodatron speed lamp, studio type, which produces a light intensity of about 12,000 lumens and has a flash time of approximately 0.0001 second. Owing to the extreme variation in exposures required to produce the Clayden effect with different emulsions, it is not possible to give the light intensity in exposure terms. However, the desensitizing exposure should be not less than four times and not more than 1000 times the Clayden threshold value. The Clayden threshold value is the least exposure required to cause a visible decrease in the density produced by a subsequent normal (low intensity) exposure.

My process will be described in greater details by reference to the following example for the preparation of a corrected color separation image.

In the drawings, a color transparency is shown consisting of a transparent base having thereon superposed layers containing cyan, magenta and yellow images 11, 12 and 13, respectively,

To make a color corrected green filter negative, a photographic film 16 such as Kodak Tri-X panchromatic sheet film is first exposed through the transparency with a red filter 14 and a high intensity light of short duration such as that from the Kodatron speed lamp. This is the masking exposure and partially desensitizes portions 17 and 18 of the emulsion layer of film 16 but has no effect on portion 19 which is produced by the cyan image 11. An exposure is then made through a green filter 15 with a low intensity light such as 1 meter-candle of light for 10 seconds. After development in a non-solvent (low sulfite) developer such as 1 part of Kodak D-72 developer diluted with 3 parts of water, portion 18 has a low density because it was desensitized by the first exposure and protected by the magenta layer 12 from the second exposure. Portion 19 develops to a medium density since it is partially protected by the green absorption of the cyan dye. If it had not received the desensitizing exposure, portion 17 would have developed to a higher density than portion 19. However, the effect of the desensitizing exposure is to reduce the density of portion 17 until it is approximately equal to that of portion 19, thus compensating for the undesired absorption of the cyan dye.

A color corrected blue filter negative may similarly be given a short high intensity exposure through the green filter followed by a low intensity exposure through the blue filter.

My method can also be used in the preparation of unsharp masks for preserving detail in line work as described in my prior application, Ser. No. 438,633, filed April 11, 1942, now Patent No. 2,420,636, of May 13, 1947. According to this method the camera is thrown slightly out of focus and a short desensitizing exposure is made with the Kodatron lamp. This out-of-focus image is the masking image. The camera is then focused accurately, care being taken not to change the size of the image, and the main exposure is made. The local desensitizing action of the first exposure prevents the fine details from being overexposed and yet permits the rest of the subject to be given full exposure.

In my masking method, the contrast of the mask image depends upon the type of film, that is, the method by which the emulsion is made, the developer, and the duration and intensity of the two exposures.

As stated above, by "high intensity" light, I mean light giving an exposure of not less than four times nor more than 1000 times the Clayden effect threshold value (as defined above) of the emulsion at that particular exposure time which is used. By "low intensity" light, I mean light which is of such low intensity that it does not produce a Clayden effect (i. e. has no desensitizing action) however prolonged the exposure may be. The high intensity light is used for a period not exceeding 0.001 second and the low intensity light is used for a time longer than 0.0001 second.

By "immediately exposing" the emulsion to low intensity light after the Clayden effect exposure, I mean that there is no intermediate treatment, such as development, between the exposures. The second exposure need not be immediate with respect to time.

It will be understood that the modifications and examples described herein are illustrative only and that my invention is to be taken as limited only by the scope of the appended claims.

I claim:

1. The method of photographic masking, which comprises exposing a silver halide emulsion layer to an image of a subject for a period not exceeding 0.001 second, with a high intensity light beam producing an exposure of from 4 to 1000 times the Clayden threshold value of the emulsion, and thereby desensitizing the exposed portions of the layer, then exposing said layer to a second image of the same subject with a low intensity light source having no desensitizing action, for a longer time than 0.001 second to produce a developable image, and developing the emulsion with a silver halide developing agent.

2. The method of photographic masking which comprises exposing a silver halide emulsion layer to a color separation image of a subject for a period not exceeding 0.001 second, with a high intensity light beam producing an exposure of from 4 to 1000 times the Clayden threshold value of the emulsion, and thereby desensitizing the exposed portions of the layer, then immediately exposing said layer to a different color separation image of said subject, with a low intensity light source having no desensitizing action for a longer time than 0.001 second to produce a developable image and developing the emulsion with a silver halide developing agent.

3. The method of photographic masking which comprises exposing a silver halide emulsion layer to a red filter separation image of a subject for a period not exceeding 0.001 second, with a high intensity light beam producing an exposure of from 4 to 1000 times the Clayden threshold value of the emulsion and thereby desensitizing the exposed portions of the layer, then immediately exposing said layer to a green filter separation image of said subject, with a low intensity light source having no desensitizing action for a longer time than 0.001 second to produce a developable image, and developing the emulsion with a silver halide developing agent.

4. The method of photographic masking which comprises exposing a silver halide emulsion layer to a color separation image of a subject for a period of approximately 0.0001 second, with a high intensity light beam producing an exposure of from 4 to 1000 times the Clayden threshold value of the emulsion, and thereby desensitizing the exposed portions of the layer, then immediately exposing said layer to a different color separation image of said subject with a low intensity light source having no desensitizing action for a longer time than 0.001 second to produce a developable image and developing the emulsion with a silver halide developing agent.

5. The method of photographic masking which comprises exposing a silver halide emulsion layer to an image of a subject and slightly out of focus with said image for a period of time not exceeding 0.001 second with a high intensity light beam of from 4 to 1000 times the Clayden threshold value of the emulsion, and thereby desensitizing the exposed portions of the layer, then exposing said layer to said image and in focus with said image at the same magnification as in the former exposure, with a low intensity light source having no desensitizing action for a longer time than 0.001 second to produce a developable image and developing the emulsion with a silver halide developing agent.

6. The method of photographic masking, which comprises exposing a silver halide emulsion layer to an image of a subject and slightly out of focus with said image for a period of time of approxi-

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mately 0.0001 second, with a high intensity light beam of from 4 to 1000 times the Clayden threshold value of the emulsion, and thereby desensitizing the exposed portions of the layer, then exposing said layer to said image and in focus with said image at the same magnification as in the former exposure, with a low intensity light source having no desensitizing action for a longer time than 0.001 second to produce a developable image, and developing the emulsion with a silver halide developing agent.

7. The method of photographic masking, which comprises exposing a silver halide emulsion layer to a green filter separation image of a subject for a period not exceeding 0.001 second, with a high intensity light beam of from 4 to 1000 times the Clayden threshold value of the emulsion, and

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thereby desensitizing the exposed portions of the layer, then immediately exposing said layer to a blue filter separation image of said subject with a low intensity light source having no desensitizing action for a longer time than 0.001 second to produce a developable image and developing the emulsion with a silver halide developing agent.

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REFERENCES CITED

The following references are of record in the file of this patent:

Mees: "The Theory of the Photographic Process," The Macmillan Co., N. Y., 1942; pages 168, 196, 254, 255, 256, 257 and 260. (Copy in Division 7.)