UNITED STATES PATENT OFFICE.

ABEL BOULARAN DIT DEVAL, OF PARIS, FRANCE.

PROCESS FOR IMPROVING PHOTOGRAPHIC NEGATIVES.

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To all whom it may concern:

Be it known that I, ABEL BOULARAN DIT DEVAL, a citizen of the Republic of France, and resident at Paris 66 Rue Pierre Charron, France, have invented a new and useful Process for Improving Photographic Negatives, which process is fully set forth in the following specification.

In the photographic as well as in the cinematographic industry it frequently happens that the negatives obtained cannot be used even after intensifying, owing to the defective conditions in which they were taken, such as insufficient light, insufficient exposure, etc. Certain negatives however have a great value, and it is sometimes very important to be able to convert a useless negative into a good one. By the expression "negative" is meant here an ordinary photographic negative, as well as a cinematographic film.

First of all, a positive is produced on glass from the bad negative by the ordinary photographic processes, with or without enlargement. When the positive print, necessarily a bad one, is dry, it is intensified by the ordinary processes, more particularly by the following:

The positive print is dipped in a bath of mercuric chlorid with a slight addition of sulfuric acid. The proportions can vary, but the following can be used:—1000 c. c., water, 20 gms. mercuric chlorid, 10 drops sulfuric acid.

The positive is left to become completely white. When it is white, it is washed in running water for about an hour and, without drying, it is dipped into a very diluted aqueous solution of ammonia. This solution can be constituted for instance as follows:—1000 c. c. water, 100 c. c. of commercial ammonia preferably of 16° strength.

The positive is left to become as completely black as possible, and is slightly washed.

After drying the print thus intensified, its front face (the gelatin side) is coated with a layer of bichromated gelatin as thin as possible. The bichromated gelatin used must be very strongly colored by the addition of some unalterable coloring matter, for instance China ink. The proportions can vary. By way of example, the following may be given:—

50 c. c. water, 10 gms. gelatin, 0.7 gms. potassium bichromate, 10 gms. China ink.

The print is left to dry in the dark, protected from dust. After drying, the back (the support side) is exposed to light. The time of exposure varies with the intensity of the source of light used. In the sun, the exposure is completed in half an hour, while in the shade it takes about two hours. The operator alone can of course judge of the necessary duration of the exposure.

The plate is then developed in hot water or by means of other known reagents.

The original positive gelatino-bromid image is then caused to disappear by dipping the plate into a suitable bath, for instance into a bath formed of an aqueous solution containing potassium ferricyanid and sodium thiosulfate. As an example, the following proportions may be mentioned:—

2000 c. c. water, 50 gms. potassium ferricyanid, 50 gms. sodium thiosulfate.

The immersion of the plate in the bath is continued until the positive image completely disappears. As the positive image fades, there will be seen to appear gradually the negative image previously obtained by the exposure of the layer of bichromated gelatin through the positive image. The plate is not withdrawn from the bath until the negative image appears in all its details. In this way an absolutely perfect negative is obtained, which is free from any imperfections of the negative originally used and it can be used for obtaining excellent positive counter-types by the usual photographic processes. It must be however pointed out that the negative obtained represents the original negative reversed. In order to obtain it reversed again, it is sufficient to treat it with known means, namely by hardening the gelatin by means of formaldehyde and by turning over the film. The latter operation is unnecessary in the case of negatives or films intended for obtaining positive prints to be used for projection, for in such a case the positive print is turned over at the moment of projection.

In the process described, it is obvious that if the initial negative is not available, a bad positive print can be used for obtaining an excellent negative which can be printed by purely photographic processes, or by processes based on photography.

The negatives obtained by the process described, have no grain. In fact, colored bichromated gelatin has not any grain in itself. The grain in an image on gelatino-bro-

mid exists in the dark portions and decreases until final disappearance in the pure whites. When the image is reversed, the grain of the gelatino-bromid will be in the whites of the new image where it will be invisible, and the dark portions or shadows of the new image, resulting from the lights in the old one, will have no grain.

The process applied directly to a negative of any kind, renders it possible to convert it into an excellent positive. This direct transformation of a negative into a positive has not, in practice, the same importance as the obtaining of a negative, but may be useful in certain cases.

Claims:

1. The herein-described process of improving photographic negatives, which consists in intensifying the negative; printing a silver positive therefrom on a transparent support; coating the front face of the positive with a thin layer of colored bichromated gelatin; drying the coated print in the dark; exposing the positive to light at its support side; developing the negative thereby produced on the bichromated gelatin layer; immersing the print in a bath to cause the intensified silver image to disappear; and washing and drying the negative.

2. The herein-described process of improving photographic negatives, which consists in intensifying the negative; printing a silver positive therefrom on a transparent support; coating the front face of the positive with a thin layer of colored bichromated gelatin; drying the coated print in the dark; exposing the positive to light at its support side; developing the negative thereby produced on the bichromated gelatin layer; immersing the print in an aqueous solution containing potassium ferricyanid and sodium thiosulfate to cause the intensified silver image to disappear; and washing and drying the negative.

3. The herein-described process of improving photographic negatives, which consists in printing a silver positive on a transparent support; intensifying it by application of mercuric chlorid followed by a solution of ammonia; coating the front face of the positive with a thin layer of colored bichromated gelatin; drying the print in the dark; exposing the positive to light at its support side; developing the negative thereby produced on the bichromated gelatin layer in hot water; immersing the print in an aqueous solution containing potassium ferricyanid and sodium thiosulfate to cause the intensified silver image to disappear; washing and drying the negative; hardening the gelatin with formaldehyde; and reversing the film.

4. The herein-described process of improving photographic negatives, which consists in intensifying the photographic, silver image-bearing body; coating the front face thereof with a thin layer of colored bichromated gelatin; drying it in the dark; exposing its back to the action of light; developing the image thereby produced on the bichromated gelatin layer; immersing the said body in a bath to cause the intensified silver image to disappear; and thereafter washing and drying said body.

5. The herein-described process of improving photographic negatives, which consists in intensifying the photographic, silver image-bearing body; coating the front face thereof with a thin layer of colored bichromated gelatin; drying it in the dark; exposing its back to the action of light; developing the image thereby produced on the bichromated gelatin layer; immersing the said body in an aqueous solution containing potassium ferricyanid and sodium thiosulfate to cause the intensified silver image to disappear; and thereafter washing and drying said body.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

ABEL BOULARAN DIT DEVAL.

Witnesses:

CHAS. P. PERSSLY,

JULES ROUSSET.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."