Patented Jan. 12, 1932 1,840,529

UNITED STATES PATENT OFFICE

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METHOD OF TREATING PHOTO-SENSITIVE BODIES

No Drawing. Application filed February 5, 1929, Serial No. 337,738, and in Germany February 14, 1928.

The present invention relates, broadly stated, to the production of photographic films and plates and is more particularly concerned with an improved and simplified copying and developing method.

The usual procedure in producing films and the like consists in first making a negative in any well known manner and in then copying this negative on a suitable transparent film, provided with a photosensitized layer.

This layer may be a silver-free colloid, sensitized by chromic acid salts to produce hardening of the layer when exposed to light. During the copying under the negative, the light rays striking the colloid layer will cause a hardening of the concerned sections to a certain depth. The quality of the film or plate depends largely on the uniformity of the hardened sections or on the completeness of hardening. To explain this a little more in detail, it is essential that the hardening is uniform throughout the entire section and complete as to its thickness.

As has been said above, the copying under the negative produces partially hardened sections under ordinary conditions of exposure. Now, the further treatment of the films or plates may be performed in various ways, but it always produces difficulties on account of the incompleteness of the hardening. For example, dyes may be used for coloring the non-hardened parts. The coloring liquid is absorbed by the non-hardened parts, and, since the adjoining hardened sections are only hardened to a certain depth, the coloring liquid may, similarly to the first case, enter underneath the hardened parts and produce dimmed pictures. On the other hand, if mordants are used for coloring the hardened sections, the results will be undefined colors, because the hardened section is incomplete as to thickness of the colloid layers. Therefore the colors will be poor and fading.

Complete and uniform hardening of the concerned sections may be accomplished by long exposure or by storing in a moist atmosphere. However these possibilities harbour serious difficulties in view of the expense incident to their realization, e. g., the element of time introduced in both cases makes either case exceedingly costly. Furthermore the application of the above mentioned storage treatment in a moist atmosphere presents appreciable difficulties in case of long films which can not be conveniently kept for any length of time.

The chief object of the present invention is to produce a quality film or plate and to overcome, in a novel way, the handicaps of methods applied at present, as indicated above. The invention will be explained in detail in the following description and will be particularly defined in the appended claims.

Up to the moment of copying the negative upon the photosensitized layer, the present method is exactly like the well-known process, which has been intimated previously. While other methods have attempted to produce uniformity and completeness in the hardening of the sections struck by the light by the costly and time-consuming procedure of long exposure and storing in a moist atmosphere, I have succeeded in producing uniformity and completeness of hardening quickly and inexpensively. After the first exposure, which produces hardened and unhardened sections on the film or plate, the unhardened sections are subjected to a treatment so as to prevent the possibility of changing their consistency under the subsequent influence of light rays. This may be done in various ways and is preferably effected by simple moistening in a moist atmosphere, by applying moisture by means of rollers, by spraying or washing, or in any other suitable manner. The film or plate may then be directly exposed to the action of light rays for a short period of time.

The principles underlying the method disclosed above are as follows. Moistening, generally speaking, affects the sensitivity to light of the colloid layer. Since the non-hardened parts absorb moisture quickly, it is evident that the sensitivity of these parts will be greatly affected, while the hardened parts will remain relatively unaltered because of comparatively little absorption of moisture. Now, by re-exposing the colloid layer at this

time to the direct action of light rays, the previously hardened parts having retained sensitivity, will again benefit by the exposure. Uniformity of hardening is thereby effected and completeness as to depth will be reached because the section, which at the time of the first exposure was only partially hardened, will now be hardened completely.

Referring to the difficulties experienced with previous methods, and particularly to the coloring of the films, as intimated previously, it will be remembered that the coloring liquid might have entered underneath the partially hardened sections and thereby caused dim and faded pictures. The question is apparent, whether the moistening liquid too will enter underneath the partially hardened sections and produce reduction of light-sensitivity. If this condition should occur, there would be no advantage of the method explained over the known methods. It must be borne in mind, that the moisture, in order to reach the unhardened parts underneath the hardened parts, must penetrate the entire non-hardening adjoining sections and then enter the latter through tiny passages. Thorough investigations have revealed that no moisture enters in practice; therefore the question is merely of theoretrical interest.

Another way of treating the plate prior to the second exposure consists in washing off the unhardened parts. This may be performed in any well known manner, preferably in applying hot water to the film or plate, and thereby removing the unhardened parts.

It may be mentioned that during the washing off of the unhardened parts the hardened parts are lixiviated by the applied water, losing their sensitization. They must therefore be re-sensitized before the plate is again exposed to light.

The last described method presents the disadvantage that the half-tones are spoiled. On the other hand the complete hardening of the hardened sections is effected with certainty, which is particularly desirable in production of black-white pictures, e. g., such as used in trick-films, silhouette-films.

The second exposure may be made either directly on the colloid layer or from the other side through the carrier, provided that the carrier is transparent. It will be readily apparent that the result will be the same and in accordance with the description in the preceding paragraphs regardless from what side of the photosensitive body the second exposure is effected.

I claim:

1. Method of treating a photo-sensitive body, having a photo-sensitive colloid layer sensitized by a chromic acid salt and characterized by being adapted to harden when exposed to light, consisting in exposing said body under a negative, thereby producing hardened and unhardened sections of said layer, in making said unhardened sections ineffective to the action of light rays and in re-exposing said body to light for a short period.

2. Method of treating a photo-sensitive body, having a photo-sensitive colloid layer sensitized by a chromic acid salt and characterized by being adapted to harden when exposed to light, consisting in moistening said layer after exposure and in re-exposing said body to light for a short period.

3. Method of treating a photo-sensitive body, having a colloid layer photo-sensitized by means of bichromates, consisting in moistening said layer after exposure and in re-exposing said body to light for a short period.

4. Method of treating a photo-sensitive body, having a colloid layer photo-sensitized by means of bichromates, consisting in moistening said layer after exposure and in directly re-exposing said body to light for a short period.

5. Method of treating a photo-sensitive body provided with a photo-sensitive colloid layer sensitized by a chromic acid salt and characterized by being adapted to harden when exposed to light, consisting in moistening said layer after exposure of said body, and in re-exposing said body to light for a short period by subjecting one side of said body to the direct action of light rays.

6. Method of treating a photo-sensitive body provided on one side with a photo-sensitive colloid layer sensitized by a chromic acid salt and characterized by being adapted to harden when exposed to light, consisting in moistening said layer after exposure of said body, and in re-exposing said body to light for a short period by subjecting the other side of said body to the direct action of light rays.

7. Method of producing photographic pictures, consisting in taking a photo-sensitive body provided with a photo-sensitive colloid layer sensitized by a chromic acid salt and characterized by being adapted to harden when exposed to light, in exposing said body under a negative and thereby partially hardening those parts of the colloid layer struck by the light rays, in reducing the photo-sensitivity of the non-hardened parts of said layer, by moistening said layer, and in thereafter subjecting said body to the action of light rays for a short period.

8. Method of producing photographic pictures, consisting in taking a photo-sensitive body, provided on one side with a photo-sensitive colloid layer sensitized by a chromic acid salt and characterized by being adapted to harden when exposed to light, in exposing said layer under a negative, and thereby hardening to a certain depth those sections of the colloid layer struck by the ligh rays, in re-

ducing the photo-sensitivity of the non-hardened sections adjoining the partially hardened sections by moistening said layer, and in thereafter re-exposing said body for a short period by subjecting the other side to the direct action of light rays, whereby the hardening of the partially hardened sections is completed.

9. Method of producing photographic pictures, consisting in taking a photo-sensitive body, provided with a photo-sensitive colloid layer sensitized by a chromic acid salt and characterized by being adapted to harden when exposed to light, in exposing said layer and thereby partially hardening those parts thereof struck by the light rays, in moistening said layer, and in then re-exposing said body directly to the light, and thereby completely hardening said partially hardened parts.

10. The method of treating a photo-sensitive body having a photo-sensitive colloid layer sensitized by a chromic acid salt and characterized by being adapted to harden when exposed to light, comprising the steps of exposing said body under a negative, thereby producing hardened and unhardened sections of said layer, of destroying the photo-sensitivity of the parts of said body corresponding to the unhardened sections, and of thereafter subjecting said body to the action of light rays for a short period.

11. The method of producing photographic pictures, comprising the steps of exposing under a negative a photo-sensitive body provided with a colloid layer sensitized by a chromic acid salt and characterized by being adapted to harden where exposed to light, thereby producing hardening and partial hardening of those portions of the colloid layer exposed to light rays, of removing the non-hardened portions, and of thereafter subjecting said body to the action of light rays for a short period.

12. The method of producing photographic pictures, comprising the steps of exposing under a negative a photo-sensitive body provided with a colloid layer sensitized by a chromic acid salt and characterized by being adapted to harden where exposed to light, thereby hardening and partially hardening those portions of the colloid layer exposed to the light rays, of washing off the non-hardened portions, of resensitizing the remaining hardened portions, and of thereafter subjecting said body to the action of light rays for a short period.

In testimony whereof I affix my signature.

CARL ROEHRICH.