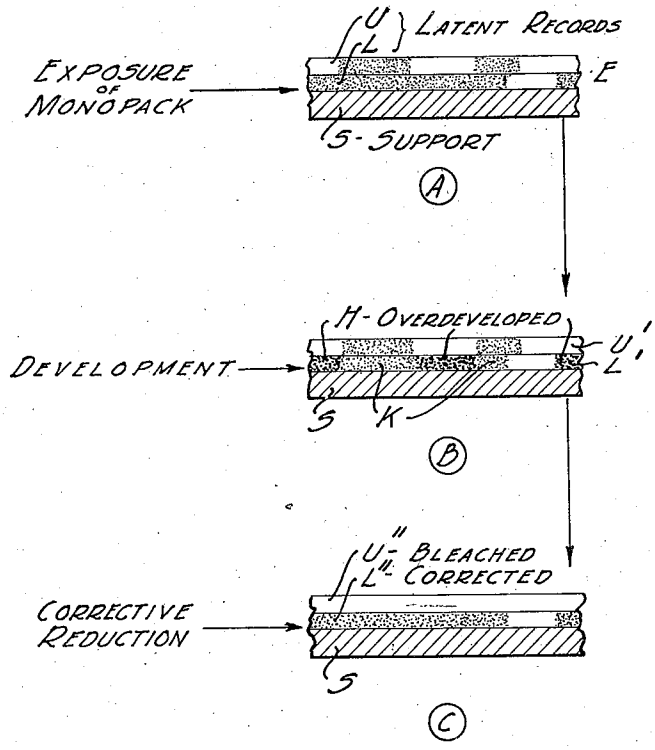
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MONOPACK PROCESS

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MONOPACK PROCESS

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In certain branches of the photographic art, especially in color photography, emulsions are sometimes used which bear different photographic records in distinct layers or strata thereof. Films or plates of this type are usually termed monopacks, and various methods have been proposed to separate the records that are superposed in these monopacks. For example, a master positive can be made from the superposed records, for example two color separation negatives made according to the methods disclosed in the inventor's Reissue Patent No. 18,680, entitled "Color photography", dated December 6, 1932. Subsequently, the outer image can be chemically eliminated as described and claimed in the inventor's copending application Serial No. 477,873, filed August 26, 1930. The master positive and the remaining lower negative record can then be superposed in register, and a so-called duplicate negative printed therefrom. This duplicate negative represents the photographic equivalent of the removed outer negative and can be used together with the remaining original negative like any other pair of color separation negatives. It will be apparent to any one skilled in the art that this method can also be employed with emulsions containing more than two records.

No matter whether the separation of the superposed monopack records is accomplished according to the afore-mentioned, or other heretofore proposed methods, the resulting set of separated records is imperfect due to the fact that it is practically impossible to give to the inner and outer record layers (that is, the strata adjacent to, and removed from the common support, respectively) equivalent treatments subsequent to exposure, so that the final records do not correspond to an equal degree to the exposures which they received. The difficulty of imparting equal treatment to the layers is due to the influence which the outer record exerts upon the diffusion properties of the agents used for developing the latent silver halide records, which properties include all penetration and distribution characteristics within the emulsion. Quite frequently, portions of an inner record which lie directly beneath heavily exposed parts of the upper record receive less development than portions underneath lightly exposed portions of the outer stratum, so that in effect a positive image corresponding to the outer record is impressed upon the inner record. It is possible somewhat to mitigate this effect by making the development as complete as possible, but it is very difficult and often impossible to eliminate it completely. It is the main object of the present invention to rectify the above-described influence of an outer record of a monopack upon an inner record thereof. Another object is the elimination of an outer record by a chemical process in a quick, inexpensive and reliable manner by rectifying, at the same time, the detrimental influence of the outer upon the inner record, exerted during the preceding development process.

These, and other objects of the invention will be apparent from the following description illustrating the genus of the invention by describing a concrete embodiment thereof. The description refers to a drawing which represents a flow diagram with schematical film cross sections illustrating the steps of the process.

It has been found that the above-described undesirable influence of the outer record upon the lower emulsion stratum, during development, can be neutralized by a controlled reduction of both records with an agent which diffuses into the emulsion in a similar manner as the developing agent, but acts chemically in the opposite sense, and therefore undoes the undesirable effect of the developer. In other words, the emulsion is treated with an agent which reduces the photographic density of the portions of the lower record which, during development, have not been influenced by the other record, and which are in most cases purposely overdeveloped, to an intensity which approximates that of the other portions of that record, that is, those portions whose development was retarded by the outer record. The term "reducing" is in this connection not employed in its chemical sense, but in its photographical meaning, which implies the diminution of the metallic silver contents of a photographic record. Preferably this treatment is connected with a chemical elimination of the upper record, using an agent which first bleaches the outer record and then begins to reduce or bleach the inner record in the same manner, whereby the effect of the outer record upon the inner record has the same extension but the opposite algebraic sign as compared with the effect of the developer. The reduction of the inner record is more effective in parts where the developer has not been retarded by a heavily exposed part of the upper record, that is, at the lighter densities of the upper record, where both developer and reducer can diffuse more readily. In order to obtain this effect in the best possible manner, the diffusion relationships during reduction should operate physically

in the same manner as during development, whereas chemically, the record reducing effect should be arithmetically opposite the preceding record producing effect of the developer. The better these conditions are fulfilled, the more perfect is the corrected inner record.

In this manner the unfavorable effect of development is eliminated, together with the removal of the outer image. Sometimes, it is advantageous to employ the reducer also for correcting the excessive density of the inner record, (which is often a consequence of the forced development generally used in such processes), by carrying the reducing action somewhat further as necessary for correcting the development effect.

In carrying out this invention, any photographic reducer having the above described physical and chemical properties can be used, but ferricyanide or persulfate reducers have been found to be particularly suitable, and an embodiment utilizing such a reducer will now be described.

The exposed monopack, as shown at A of the flow sheet, comprises a support S, an upper latent record U, and a lower latent record L in different strata of the emulsion E, these latent images being substantially undistorted records of respective color aspects of the object field, which is indicated by uniform shading of the exposed portions (high lights) of the two strata. After development, the silver records are distorted, as indicated at B, where the portions K of lower record L' are shown as of lower density than the remainder H of record L', due to the shielding action of those portions of the upper record which overlap with K, thereby somewhat delaying diffusion of the developer through U into L. It is evident that K is in effect a positive impression of record U upon record L.

After development and the customary subsequent treatment which may include fixation, the film is placed in a bath of an approximately 15% solution of potassium ferri-cyanide (or a weak solution of Farmer's reducer, about 3% to 4%), where it remains until the upper record has disappeared entirely, and the lower record is corrected by elimination of the impression thereon of a positive of the upper record, which takes, in normal cases, approximately 5 to 10 seconds, whereupon the film is given a very short rinse in water of about room temperature which has the purpose of removing the ferri-cyanide from the film surface, and finally bathe the film in a 40% solution of sodium thiosulfate. The film has then a structure as indicated at C, the outer record being eliminated from upper emulsion stratum M and the inner record N being of correct density, without any impression of the outer record.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

It is claimed:

1. The method of separating superposed photographic records on the same side of a film which comprises developing the latent records, and subsequently bleaching the outer record and correcting the detrimental effect of the outer record upon the inner record during development, by treatment with a photographic reducer whose diffusion characteristics are similar to those of the developer.

2. The method of treating monopack films which comprises developing the superposed latent records of said film, bathing the film in an agent having a diffusion substantially equal to that of the developer and affecting photographic records in a sense algebraically opposite to the action of the developer, and interrupting the action of said agent upon elimination of the effect of an outer record of said film upon an inner record thereof, during development.

3. The method of separating the superposed photographic records of a monopack film which comprises development of the latent records thereof, whereby the outer record is impressed upon the inner record, subsequent treatment of said film in a solution of potassium ferri-cyanide until the complete outer record and the impression of the outer record upon the inner record are substantially eliminated, an immediately following short rinse in water, and subsequent fixation.

4. The method of separating the superposed photographic records of a monopack film which comprises development of the latent records thereof, whereby the outer record is impressed upon the inner record, subsequent treatment of said film in Farmer's reducer until the complete outer record and the impression of the outer record upon the inner record are substantially eliminated, an immediately following short rinse in water, and subsequent fixation.

5. The method of compensation for the influence during development of a certain record of a film upon a separate and substantially coextensive second record of the same film which comprises the step of photographically reducing said second record with an agent having diffusion characteristics substantially similar to those of the developer.

6. The method of compensating for the influence of an outer record of a monopack film upon an inner record of the film during development, which comprises the step of controlled photographic reduction of said inner record with an agent having a diffusion substantially equal to that of the developer.

7. The method of compensating for the influence during development of a certain record of a film upon a separate and substantially coextensive second record underneath thereof on the same film, which comprises development of both latent records, and subsequent treatment with an agent which physically penetrates the film in a manner similar to that of the developer, but whose effect upon the density of a photographic record is substantially opposite to that of the developer.

8. The method of separating the photographic records of a monopack film which comprises developing the superposed latent records, making a master positive of the superposed negatives, treating the film with a photographic reducer having diffusion properties similar to those of the developer until the outer record is bleached and the effect of the outer record upon the inner record during development is eliminated, and making a duplicate negative of said bleached record by copying said master positive and said inner record in superposed registered position.

9. The method of separating superposed photographic records on the same side of a film which comprises developing both records, and subsequently photographically reducing the lower record under control of the upper record, to a degree substantially eliminating the effect of the upper record upon development of the lower record.

10. The method of separating superposed photographic records on the same side of a film which comprises substantially overdeveloping both records, and subsequently photographically reducing the lower record under control of the upper record, to a degree substantially eliminating the effect of the upper record upon development of the lower record.

11. The method of separating superposed photographic records on the same side of a film which comprises developing the latent records until they are substantially overdeveloped, the lower record receiving a reduced amount of development underneath the upper record commensurate to the retardation of the developer by said upper record, and photographically reducing said records with an agent being retarded substantially like said developer until said upper record is substantially bleached and said lower record is brought to a density approximately conforming to its latent state by said reducing action as controlled by the retardation effected by said upper record similar to the retardation of the developer.

CAMBRIDGE TRUST COMPANY,
Executor of the Last Will and Testament of Leonard T. Troland, Deceased.

By A. MEAD WHEELER,
Its Asst. Secy.