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PHOTOGRAPHIC DEVELOPER AND SUBSTANCES ADDED IN PREPARING THE SAME

Max Nassau, Berlin-Wilmersdorf, Germany, assignor to the firm: Chemische Fabrik Grunau, Landshoff & Meyer Akt. Ges., Berlin-Grunau, Germany, a company of Germany

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My present invention relates to photographic developers and substances added in preparing the same. More particularly it relates to developers yielding images which are less hard, better compensated, relatively softer and, at the same time, of finer grain than those produced by the customary photographic developers.

Modern photography has, to a very considerable extent, adopted the use of photographic material of small dimensions, such as miniature films. As a result, enlargements of successful exposures are frequently being made. In enlarging photographs, particularly those of miniature size, a well compensated, soft negative of fine grain constitutes a marked advantage. Hence, a special field of application of the developers according to the present invention is the development of photographs of small dimensions, such as are obtained, for example, with the miniature cameras.

It is an object of the present invention to provide developers which cause the developing process of the exposed photographic material to be restrained, delayed, and equalized. As a result of this restraining, delaying, and equalizing action there are produced negatives with a much flatter gradation curve and a considerably finer silver grain than those obtained by means of the customary developers.

Another object is to provide substances which are to be added to photographic developers. Any photographic developer can thus be transformed into the developers according to the invention which produce soft negatives of fine grain. The additional ingredient may be added directly to the developing solutions, or it may be embedded in the photographic material as a separate layer. In that case the developers according to the invention will not be formed until the customary developing solutions act on the photographic material.

The photographic developers according to the present invention which produce well compensated negatives of fine grain contain protein decomposition products of medium to higher molecular weight. It is known that proteins are built up of amino-acids and that each protein molecule consists of a very large number of individual amino-acids, mostly considerably more than 100. Under drastic conditions the degradation of proteins proceeds as far as the amino-acids themselves, while degradation under mild conditions results in the formation of polypeptides, i. e. protein decomposition products which consist of a larger number of amino-acids. By protein decomposition products of medium to higher molecular weight which form part of the developers according to the present invention I mean, in the first place, polypeptides containing at least five or more amino-acids per molecule. These polypeptides can be obtained not only by degradation of proteins but also synthetically. However, the simplest method of producing the substances which according to the invention are used as additional ingredients of photographic developers, consists in degrading natural proteins. In lieu of a uniform polypeptide there are thus obtained mixtures of various polypeptides which differ by the number of amino-acids contained therein. Lysalbinic acid, a protein decomposition product of medium molecular weight which is obtained by alkaline disintegration of leather waste, is believed to consist mainly of a mixture of various polypeptides containing five to ten amino-acids per molecule.

The production of protein decomposition products of medium to higher molecular weight can be effected by reacting proteins with acids, alkalis, or enzymes.

It has been stated that an addition of protein decomposition products causes the customary developing baths to produce well compensated negatives of fine grain. Hitherto, well compensated negatives of fine grain which are desirable, for example, in miniature photography, could only be produced by using special developers, while the present invention enables an ordinary hydroquinone methylamidophenol sulfate developer to produce soft images of fine grain.

It is known to add gelatin, a natural protein of very high molecular weight, to developing solutions. However, this addition to developing baths merely results in a relatively slight improvement regarding the production of soft negatives of fine grain. The addition to developing solutions of protein decomposition products of medium to higher molecular weight according to the invention has a much stronger effect as regards the production of soft negatives of fine grain.

It has been found that with equal amounts of the substances which are added to the developing solutions the effect increases with the degree of degradation of the protein decomposition products. Protein decomposition products of medium molecular weight restrain the development more strongly and, hence, are more effective in producing soft negatives of fine grain than are protein decomposition products of higher molecular weight.

The amount of the substances to be added can be varied according to the degree of the desired effect. The developing solution ready for use preferably contains 1–15% of protein decomposition products. The higher the amount of protein decomposition products present in the developing solution, the stronger will be the effect obtained. However, it has to be taken into account that an increasing degree of degradation also produces an increase of efficiency.

The invention is illustrated by the following data:

Three photographs of the same object taken while using the same photographic material and giving equal length of exposure, were developed for two minutes at 18° C. in the same manner, i. e., by employing hydroquinone methylaminophenol sulfate, a so-called rapid developer (cf. Joseph Maria Eder, Rezepte und Tablellen fuer Photographie und Reproduktionstechnik, 10th and 11th edition, Halle, 1921, p. 20).

The first exposure was developed in a developing solution without any additional ingredients.

The second exposure was developed in a developing bath which contained 10% of gelatose, a protein decomposition product of higher molecular weight obtained by heating gelatin with water in an autoclave.

The third exposure was developed in a developing solution which contained 10% of sodium lysalbinate, a protein decomposition product of medium molecular weight which is obtained by alkaline disintegration of leather waste.

The first negative was hard and of relatively coarse grain, while the third was very soft and of extremely fine grain. The second negative, regarding both softness and fine-grain, ranked between the first and the third. This proves that the effect of the protein decomposition products regarding the production of soft negatives of fine grain considerably increases with increasing degree of degradation.

The developers according to the invention can be used not only for developing negatives but also for the development of positives, i. e., for the production of lantern slides and transparencies, positive films, contact prints and enlargements on photographic paper.

What I claim is:

1. A photographic developer containing developing agents, and 1–15% of protein decomposition products of medium to higher molecular weight substantially within the range of the molecular weights of lysalbinic acid and gelatose, the molecules of said protein decomposition products being built up of at least 5 amino-acids.

2. A photographic developer containing hydroquinone methylaminophenol sulfate, and 1–15% of protein decomposition products of medium to higher molecular weight substantially within the range of the molecular weights of lysalbinic acid and gelatose, the molecules of said protein decomposition products being built up of at least 5 amino-acids.

3. A photographic developer containing hydroquinone methylaminophenol sulfate, and 1–15% of sodium lysalbinate.

4. A photographic developer containing hydroquinone methylaminophenol sulfate, and 1–15% of gelatose.

MAX NASSAU.