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POTASSIUM IODIDE COMPOSITION OF MATTER FOR PHOTOGRAPHIC PROCESSES.

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To all whom it may concern:

Be it known that I, ROBERT JOHN, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a certain new and useful Potassium Iodide Composition of Matter for Photographic Processes, of which the following is a specification.

My invention relates to a potassium iodide composition of matter for photographic processes and has for its object the production of a photographic record of lights and shades in which the gradation between the recorded lights and shades may be controlled.

A further object of my invention is to produce a series of pictures taken under different lighting and other conditions in which the evenness of gradation in each picture shall be approximately the same. If desired, "hard" pictures can be made "soft" and "soft" pictures can be made "hard."

A further object of my invention is to obtain, in one embodiment thereof, a printing surface which is mounted on a suitable carrier and which represents photographic lights and shades in such a manner that copies may be made therefrom by a dye or ink transfer contact process.

For the purposes of illustration, my invention will be described in connection with the formation of a printing surface obtained by exposing to the action of light modified by the lights and shades of a completed negative which it is desired to reproduce, a sensitized emulsion mounted on a transparent carrier through which it preferably is exposed, which then is treated to form a hardened printing surface.

It is considered desirable in producing a printing surface to expose the sensitized emulsion through its transparent carrier rather than on its outside surface in order that the printing surface may be as close as possible to the carrier. If the emulsion is exposed on its outside surface, it is necessary to strip the emulsion from its carrier in order to remove the unhardened portions which will lie adjacent the carrier. Stripping the emulsion is a delicate operation which can be performed only by those skilled in the art and is likely to injure the image.

When an emulsion is exposed through its transparent carrier, however, certain difficulties are encountered in the formation of the printing surface. In the first place, the treating solution must penetrate the entire emulsion in order to reach the light affected portions adjacent the transparent carrier. This usually is accomplished by the use of an excess of alkali, such, for example, as sodium carbonate, which opens the pores of the emulsion and carries the solution through. The objection to this is that the excess of alkali has a tendency to affect the image unfavorably, destroy the delicate intermediate shades, and make it too contrasting. In the second place, an ordinary sensitized emulsion usually is in excess of one-thousandth of an inch in thickness, while the preferable printing surface adjacent the carrier should be very thin, substantially one ten-thousandth of an inch or less. As this ordinary thick emulsion will be penetrated deeply by the light to which it is exposed, particularly that portion of the light coming through clear spaces or light shadows in the negative which is being reproduced, the resultant printing surface after treatment will give a relatively too thick printing surface in those portions. This undesirable thickness is increased by the use of an alkali as referred to above. It is very difficult, therefore, to get the darker portions of the negative recorded properly without having the lighter portions of the negative registered too heavy and deep.

One manner of overcoming the above difficulties has been to incorporate in the emulsion a light-restraining agent such as tartrazine or a chrome yellow pigment which has the property of absorbing or slowing down the action of the printing rays sufficiently to enable the dark portions of the negative which is being reproduced to be registered on the sensitized particles in the emulsion adjacent the carrier, before the printing rays coming through light portions of the negative have penetrated the emulsion so deeply as to form a printing surface which is too thick in the portions corresponding to said light portions of the negative, after the printing surface has been treated and the portions of emulsion unaffected by light removal. The use of these light-restraining agents, however, has disadvantages, among which may be mentioned their deterring effect on the sensi-

tized emulsion so that a longer time of exposure is required. Although this additional time of exposure is not a serious handicap in plate photography, it is important in motion picture photography where the speed of running the large number of individual pictures upon a motion picture film through the printer is a material factor.

In order to overcome these disadvantages, I have discovered that excellent results may be obtained by the use of a developer solution containing potassium iodide, which within certain limits seems to have the property of holding the lighter tones and at the same time keeping the shadows and heavier tones down to a desirable level, so that the image is confined closely to the base and has the characteristics desirable for a contact transfer printing surface. A softness of result also is obtained without the too contrasting effects which are undesirable.

A sample formula for a developing solution containing potassium iodide is as follows:

A.

Pyrogallic acid	10 grs.
Water to	1 oz.

B.

Sodium carbonate	270 grs.
Potassium iodide	50 grs.
Water to	5 ozs.

Use one part of A to 5 parts of B. Within certain limits sodium sulphite may be used with potassium iodide, the exact amounts of which will be determined by the particular work in hand. A sample formula for a developing solution containing potassium iodide and sodium sulphite is as follows:

Water	8.5 oz.
Pyrogallic acid	11 grs.
Metol	9 grs.
Potassium bromide	4 grs.
Sodium carbonate	200 grs.
Sodium sulphite	40 to 60 grs.
Potassium iodide	20 to 90 grs.

Metol is monomethylparamidophenolsulphate.

It is customary in photographic work and particularly in motion picture work to control the evenness of finished prints by varying the amount of light exposure in different stages of the photographic process. This is particularly desirable in motion picture work in order to give an even lighting effect to the completed film where the parts have been taken under varying lighting conditions. In addition to this evenness of lighting effect, I have found it possible to control the evenness of the pictures with relation to the difference between light and dark portions, so that some pictures will not be more contrasting than other pictures but that all will have substantially the same degree of softness or evenness of gradation. A thousand foot reel of ordinary motion pictures, for example, ordinarily consists of many different scenes taken under varying light conditions. In making prints from the negative of such a picture, the unevenness in lighting can be reduced by varying the time of exposure during the printing operation. In addition to reducing this unevenness in lighting, I have found its possible to reduce the unevenness of gradation between light and dark portions, so that the completed motion picture will have a uniformity of appearance most pleasing to the eye. To accomplish this result I first develop those portions of a picture in which the degree of gradation between lights and shades is at a minimum in a developer solution containing a minimum amount of potassium iodide. When this portion of the film has been developed, more potassium iodide is added and a portion of the film developed in which the degree of gradation between lights and shades is greater than in the first portion developed. More potassium iodide is added as portions of the film having greater degrees of gradation are reached until the entire film is finished. This will result in a completed film in which not only is there evenness of lighting but evenness of gradation between the light and dark portions of the film. In making still pictures the different negatives can be developed in the same manner.

Potassium iodide appears to have the property of reducing the heavy shades of an exposed emulsion without destroying the light shades so that a less contrasting or more soft picture is obtained, particularly in the production of a printing surface suitable for a dye or ink contact transfer process. If, on the other hand, an amount of sodium sulphite sufficient to reduce heavy shades was used, it would destroy the light shades. It is this property of potassium iodide of reducing the heavy shades without destroying the light shades which makes it possible to obtain a uniform product as well as a desirable surface for contact transfer printing.

Many modifications of my invention will be apparent to those skilled in the art without departing therefrom or from the scope of the invention, my invention not being limited to the embodiments thereof chosen for purposes of illustration but consisting of a potassium iodide composition of matter, whereby the image is retained close to the carrier and any series of pictures may be produced having the same degree of gradation between light and dark portions thereof.

What I claim is:

1. A developing and hardening composition containing a hardening substance and an agent adapted partially to neutralize said

hardening substance comprising potassium iodid, in such an effective amount as to permit only a selective area of hardening.

2. A developing and hardening composition containing pyrogallic acid, and potassium iodid in such an effective amount as to permit only a selective area of hardening.

3. A developing and hardening composition containing pyrogallic acid as a hardening substance and a mixture adapted partially to neutralize said hardening substance comprising potassium iodid and sodium carbonate, the latter being present in sufficient quantity with respect to the iodid, to prevent complete neutralization of the hardening effect of the pyrogallic acid so as to permit only a selective area of hardening.

4. A developing and hardening composition comprising an iodid salt present in insufficient quantity to completely neutralize the hardening effect of the composition, whereby only a selective area of hardening will result.

5. A developing and hardening composition for photographic processes comprising the following:

Pyrogallic acid	10 grs.
Sodium carbonate	1,350 grs.
Potassium iodid	250 grs.
Water	26 ozs.

6. A developing and hardening composition for photographic processes comprising water, pyrogallic acid, metol, potassium bromide, sodium carbonate, and potassium iodid.

7. A developing and hardening composition for photographic processes comprising water, pyrogallic acid, metol, potassium bromide, sodium carbonate, potassium iodid, and sodium sulphite.

In testimony that I claim the foregoing, I have hereunto set my hand this 30th day of September, 1919.

ROBERT JOHN.