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METHOD OF PICTORIAL CONTROL AND MATERIAL FOR USE THEREIN

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This invention relates to the art of pictorial control, as the expression is employed in the art of photographing reproduction, and pertains particularly to an advantageous method of practicing pictorial control and to certain advantageous materials for use therein.

"Pictorial control" as known to photographers, consists in modifying all or a portion of a photographic register or image to obtain a resultant register which is more pleasing to the eye than the cold representation of the photographic subject obtained by the camera lens and the photographic emulsion. For example, in portraiture, the camera lens will pick up slight defects which the eye itself would not be critical of, and these defects are observable in a photographic print principally due to the lack of animation in the print. Further, certain high lights and shadows might be picked up by the camera lens which would entirely alter the appearance of the subject, and which, if removed, would materially improve the value of the portrait as a camera study. Photographers have, heretofore, by working on the photographic negative in what is known as an etching process, removed portions of the silver deposit by abrading the emulsion surface with a suitable implement to obtain a removal of highlights and have reinforced certain parts of the silver image by means of a retouching pencil to obtain a removal of shadows. This procedure is quite feasible where a relatively large negative is obtained of the photographic subject, but when a miniature negative is employed, the re-touching operation is quite difficultly carried out by virtue of the fact that the detail in the negative is so small as to require the procedure to be carried out under a microscope or the like. It has been found more convenient to obtain the desired pictorial control in an enlargement made from such a miniature negative, and aqueous solutions of iodine and potassium iodide have been employed as an oxidizing agent to effect a chemical conversion of a portion of the silver image by production of silver iodide which would later be fixed out in a normal strength of photographic hypo (sodium thiosulphate) solution. This procedure made possible, in treating such an enlargement, the removal of shadows, and the aforementioned

highlights can be removed by application of a re-touching pencil to the desired portions.

For many subjects a color other than that of the cold neutral black of the ordinary developing papers is desirable, and when the color is selected principally with reference to the nature of the subject, considerable is added to the artistic effect, and in this connection pictorial control includes the bleaching of any desired portion of a photographic reproduction, to convert the metallic silver deposit into an insoluble silver salt, after which the reproduction may be immersed in a suitable redeveloping bath to develop a modified tone at the bleached portions. As far as is known, no suitable process has been heretofore disclosed which enables a bleaching operation to be carried out in a single operation, where the bleaching of but a portion of the photographic reproduction is desired. The general practice has been, heretofore, that of immersing the reproduction in a bleaching bath whereby all portions thereof are uniformly acted upon by the bleaching reagent, or in applying the bleaching reagent to the desired portions of the reproduction over small areas at a time, overlapping one application of reagent with a subsequent application in an attempt to secure a uniform conversion of the silver deposit.

In the use of aqueous solutions in the above procedures, the photographic print was customarily soaked in a very weak solution of hypo and an aqueous iodine solution was applied, as a very strong solution, to the part of the picture where the silver deposit was too heavy. Three problems are present in the practice of this particular method which make it substantially impossible to obtain smooth and uniform results. First, the iodine solution gathers in drops on the emulsion surface and produces a spotted effect due to the ununiform oxidation of the silver deposit. Second, due to the rapid diffusion of the underlying hypo solution, present in the print, into the iodine and because the surface tension of the iodine caused it to stand on the surface of the print in irregular depths, the iodizing action of the iodine solution on the silver deposit would stop quicker at the edge portions and at thin portions of the iodine application than at the remaining portions, which further produced a mottling or spotting effect instead of an even removal of the silver deposit. Third, the iodine solution would have a

tendency to run or creep beyond the application area in an irregular manner, thus making the removal of small areas of silver difficult. In addition to the above causes of non-uniform results in an etching procedure, it has been found that the removal of the silver deposit is best obtained in only a single application of the iodine reagent, in view of the fact that after an application of an aqueous iodine solution a not inconsiderable amount of sodium iodide is formed as a reaction product, which acts both as an accelerator in a subsequent application and as a gelatine swelling agent, so that if a second application of aqueous iodine reagent is made to a particular portion of the negative a highly localized action is obtained which invariably causes an irregular outline to result. It is thus considered necessary, with the use of aqueous iodine etching reagents, to so gauge a single application that the desired etching is obtained without requiring a second application, and it will be appreciated that such a procedure requires tremendous experience on the part of the operator in view of the fact that substantially every type of photographic emulsion requires a different treatment and time of application.

In addition to the above disadvantages in the use of aqueous iodine solutions in pictorial control, it was found that only a small amount of work could be done on a print at a given time due to the swelling of the gelatine in the emulsion due to the action of the formed sodium iodide and, further, considerable difficulty was offered by the uncontrollable change in the hypo content of the emulsion during repeated applications of the iodine solution to a particular area in the print.

One of the particular objects of the present invention is to provide a method of pictorial control which provides for easy and accurate removal of any desired portion of a silver image, under conditions of precise control of the size of the area under treatment, and of the reduction of the intensity of the silver image over the desired area.

A further object of the invention is to provide a method of pictorial control which does not cause a serious swelling of the gelatine and which may be practiced for relatively long periods of time on any particular area or which may be interrupted at any time and continued at a later time without damage or deterioration of the photographic surface or image.

A further object of the invention is to provide a method of pictorial control employing a plurality of successive applications of an oxidizing agent, in which each application of such agent is comparable to another application, whereby the effect of one or more applications can be anticipated and the desired bleaching of the silver deposit obtained without danger of over-bleaching of any particular area.

A further object of the invention is to provide a method of pictorial control which may be practiced in the removal of large areas of silver deposit or in the uniform reduction of the intensity of large areas of silver deposit under controlled conditions.

A further object of the invention is to provide certain reagents for use in the present method of pictorial control, in which the action or effectiveness of each agent is fixed and predictable.

A further object of the invention is to provide a silver oxidizing agent in a non-aqueous base or medium, whereby the application of such agent

to the photographic surface may be adequately controlled and the depth of penetration thereof governed to the desired degree. Other objects of the invention will be subsequently brought out in the following description, or will be apparent therefrom.

The method of the present invention may be divided into two phases or techniques, dependent upon the character of the control operation desired. These two techniques may be separately considered as an "etching technique" and a "bleaching technique". The essential difference between the etching and bleaching techniques is that in the etching technique the metallic silver deposit is chemically acted upon in the production of a soluble silver salt which is continuously brought into solution within the emulsion layer as rapidly as it is formed, while in the bleaching technique the metallic silver is converted to a silver salt which is allowed to remain in place, after which the print may be re-developed to obtain a modified tone, or fixed out with hypo in the event that it is desired to preserve the bleach.

In carrying out the etching technique, a suitable control medium is applied to the print or negative over the entire area to be worked upon to obtain a partial hydration of the gelatine by providing a small amount of moisture without causing excessive swelling or softening. This control medium is preferably one having a pronounced neutralizing action on free iodine and a solvent action on silver iodide, and in addition, provides some neutralizing action to limit the extent of penetration and diffusion of the iodine reagent. Furthermore, this control medium is preferably one having a low vapor tension so that the dampened print will remain in the desired moistened condition for a relatively long period. After the application of the control medium, a non-aqueous solution of iodine may be applied by means of a brush or a tuft of cotton directly to the portions of the image to be wholly or partly removed, allowed to stand for a short period, for example, from one-quarter second to one minute, and the control medium is then applied to the treated area to stop the action of the non-aqueous iodine solution and dissolve the formed silver iodide. The non-aqueous iodine solution may be added in any desired number of separate steps, whereby a slight reduction in the intensity of the silver image is obtained at each step, but the reduction will reach a maximum after a limited number of such applications, or, if the operator is sufficiently experienced with the manner in which the iodine solution acts upon the particular type of surface with which he is engaged, the desired removal of the silver deposit may be obtained in a single application. After the desired removal of the various portions of silver image is obtained, the print may be then fixed with an acid-hypo bath, washed, and dried in the usual manner.

When the bleaching technique is practiced, the non-aqueous iodine solution may be distributed evenly over the area to be bleached, being applied directly to a thoroughly dry print or negative. The distribution of the iodine solution over the photographic surface may be accomplished by spreading the same with a tuft of cotton. Due to the absence of water, the iodine solution will have no bleaching effect upon the silver deposit at this step of the operation, and it will be appreciated that the reagent may be applied as carefully as desired and as slowly as desired, so that only

the particular areas to be bleached are coated. In the event that certain areas are inadvertently covered with the iodine agent where no bleach is desired, a neutralizing solution may be applied to such portions to vitiate the iodine agent and deprive it of its bleaching power. The areas covered by the non-aqueous iodine solution are very easily discernible due to the brown color of the iodine solution, and the effect of the neutralizing solution may be discerned by the removal of this brown color over the areas to which the neutralizer is applied. The neutralizing solution is also preferably only slightly aqueous so that there will be no tendency for water from this solution to permeate the gelatine beyond the edges of the area to which this solution is applied and thus cause an undesired bleaching at these portions of the photographic image. When the desired areas of the photographic image have been covered with the iodine solution to the desired extent, the photographic print or negative may then be immersed in a water bath whereupon the diffusion of the water into the emulsion will enable the iodine to react with the silver deposit in the production of silver iodide and the removal of metallic silver. The print may be allowed to remain in the water bath until the desired bleach is completed, whereupon it may be removed to a photographic fixing solution, washed, and dried, or may be placed in a warm tone developer, or the like, to produce a different tone or color, and then handled in the customary manner for finishing.

Instead of immersing the photographic reproduction in a water bath to obtain the desired activation of the non-aqueous iodine solution, the reproduction may be exposed to a steaming operation, whereby the necessary quantity of moisture may be absorbed by the emulsion and the reaction between the iodine and the metallic silver made possible, and this procedure is advantageously employed where it is desired to carry out the bleaching operation in a series of two or more steps, in view of the fact that after the steaming operation the reproduction will be in substantially dry condition so that a second application of the non-aqueous iodine solution may be made to the desired portions thereof without waiting a relatively long period for the same to dry. It has been noted that when the activation of the iodine is obtained through the use of steam, certain slight discolorations of the print will occasionally be found, which are very possibly due to the formation of certain calcium salts, but these discolorations may be easily removed by subsequent treatment with a potassium metabisulphite solution.

The control medium above described in connection with the etching technique, is a partly aqueous solution of an agent capable of neutralizing the iodine present in the non-aqueous solution and an agent capable of causing solution or removal of the silver iodide formed by reaction between the iodine agent and the metallic silver deposit. This medium also contains an agent which restricts the absorption of water by the gelatine, and thus limits the extent of swelling of the gelatine. This latter agent is preferably one which has a lower vapor pressure than water so that it will not evaporate from the emulsion at such a rate that the proportion of water remaining in the emulsion is increased. The amount of water present in this solution controls the degree of softening of the gelatine of the emulsion, which in turn controls the speed of reaction of the iodine agent on the silver deposit. Other materials or solvents are incorporated in the control medium

for the purpose of modifying its surface tension so that the subsequently applied non-aqueous iodine solution will neither puddle nor spread unevenly and, further, provide for easy access of the iodine neutralizing agent to the iodine through the non-aqueous medium carrying the iodine in solution. In other words, the control medium, while it must be at least somewhat aqueous in order to suitably prepare the emulsion for the action of the non-aqueous iodine solution, must also be capable of promptly reacting with the non-aqueous iodine solution in a neutralizing action.

The constituents of this control medium may be divided into the following general classes:

- (a) A material having a neutralizing action on elemental iodine ----- Hypo; thiourea
- (b) A material having a solvent action on silver iodide ----- Hypo; thiourea
- (c) A water soluble liquid material having the property of controlling the swelling action of water on gelatine and a vapor pressure lower than water ----- Carbitol
- (d) A material which facilitates the transfer of iodine from non-aqueous to aqueous solution phase ----- Hexalin
- (e) Alcoholic solvents ----- Isopropyl and butyl alcohols, glycols.

I have determined that a solution of the above materials in certain preferred proportions, provides a very satisfactory control medium having the above-described important properties. A typical example of the formula of a control medium of the above type is as follows:

Hypo (sodium thiosulphate) -----	grains..	125
Thiourea -----	do.....	75
Boric acid -----	do.....	15
Water -----	fl. oz..	4 45
Isopropyl alcohol -----	do.....	2
Carbitol (diethylene glycol mono-ethyl ether) -----	do.....	3
Hexalin (hexahydrophenol) -----	do.....	1
Diethylene glycol -----	do.....	2 50
Glycerine -----	do.....	1
Normal butyl alcohol -----	do.....	1

In the above formula, the boric acid functions to prevent precipitation of calcium iodide when the non-aqueous iodine solution is applied. The hexalin serves a rather peculiar function in that it facilitates the transfer of iodine from its non-aqueous dissolved condition in the subsequently applied iodine solution into the partially softened emulsion and materially assists in obtaining uniform etching results.

The non-aqueous iodine solution preferably contains, in addition to iodine and non-aqueous solvents therefor, certain modifying agents such as a resinous material, for example, rosin or balsam, for modifying the consistency and coagulating properties of the solution, soluble iodides for increasing the solubility and activity of the iodine, certain alcohols to assist in the solution of the iodine and for obtaining a balance with respect to the miscibility of the solution with water, and a non-aqueous agent having some penetrating power on gelatine.

The constituents of this reagent may be divided into the following general classes:

- (a) A silver-oxidizing agent..... Iodine
- (b) Accelerating agents for the iodine..... Oil soluble inorganic iodides
- (c) Consistency (viscosity) modifying agents..... Rosin and castor oil
- (d) Oleaginous iodine solvent..... Rape seed oil
- (e) Non-gelatin-swelling agents, having a partial solution effect on iodine and iodides and serving to assist the conversion of the iodine and iodides from non-aqueous to aqueous solution phase..... Alcohols and hexalin
- (f) Solvent material having the same properties as the alcohols, but in addition having a penetrating action on partially hydrated gelatine..... Diethylene glycol
- (g) A solvent material having the property of regulating the solubility of iodine and the iodides with respect to the non-aqueous and aqueous solution phases..... A liquid hydrocarbon (kerosene)

A typical formula for the non-aqueous iodine solution may be as follows:

Rosin (or balsam).....	grains.....	80
Iodine.....	pound.....	1
Calcium iodide.....	grains.....	400
Potassium iodide.....	do.....	100
Normal butyl alcohol.....	fl. oz.....	10
Fusel oil (amyl alcohol).....	do.....	5
Castor oil.....	do.....	2
Kerosene.....	do.....	14
Rape seed oil.....	do.....	20
Diethylene glycol.....	do.....	2
Hexalin.....	do.....	7

In the above formula the rosin and castor oil act to modify the consistency of the solution; the butyl alcohol, fusel oil, kerosene, rape seed oil, and hexalin act jointly to effect solution of the iodine, the kerosene acting particularly in assisting the distribution of the iodine between the non-aqueous iodine solution and the dampened emulsion, serving principally to assist the diffusion of such iodine from its non-aqueous phase into aqueous phase, and thereby materially controlling the speed of reaction of the iodine solution on the emulsion; the calcium and potassium iodides act to increase the solubility and activity of the iodine (calcium iodide being used principally by reason of its greater solubility in oils than potassium iodide and its lower gelatine softening action); and the diethylene glycol is employed principally as the limited softening agent for the gelatine. The kerosene appears to act to limit the solubility of the iodine and iodides, so that the non-aqueous iodine reagent contains iodine in a concentration approximately equal to the saturation solubility of iodine, so that the iodine is just on the verge of precipitation from solution, whereby the transfer of iodine from non-aqueous phase to aqueous phase is facilitated where it may react with the

silver deposit when brought in contact with the dampened emulsion. The kerosene thus serves to maintain the speed of reaction of the iodine upon the silver deposit, and even when such reagent is diluted as is subsequently described, this reaction rate is maintained substantially constant, and the extent of reaction is diminished.

In the above connection, it will be appreciated that other hydrocarbon oils or petroleum distillates may be substituted for the kerosene, the particular property of the hydrocarbon for the purposes at hand being that of having a low solubility in water and a relatively low solvent action on elemental iodine.

Under some circumstances I prefer to dilute the non-aqueous iodine solution with a suitable modifying solvent whereby the activity thereof will decrease with its penetration into the emulsion. This thinner may be employed in substantially any ratio to the iodine solution and serves to decrease the total action of the iodine solution in direct ratio to the dilution employed, without materially modifying the reaction rate of the iodine solution. A typical formula for the thinning medium is as follows:

	Fl. oz.
Hexalin.....	18
Carbitol.....	2
Kerosene.....	5 30

In the above formula the hexalin functions as a solvent for all of the constituents of the non-aqueous iodine solution so that an adequate dilution or thinning is possible and the carbitol serves principally to restrain the swelling of the gelatine. The kerosene serves to preserve the distribution balance of the dissolved iodine and iodides so that the reaction rate of the solution is not materially modified upon dilution.

The neutralizing medium referred to in connection with the bleaching technique above described, may comprise a partly aqueous or non-aqueous solution of a reagent adapted to completely vitiate the oxidizing power of the iodine. As above stated, the water content of this solution should be relatively small, so as to prevent undesired bleaching adjacent the edges of the area to which this solution is applied. Also, the solvent or solvents employed therein should have a sufficiently low vapor pressure to substantially prevent or minimize evaporation therefrom during application. Excessive evaporation of solvent would not only alter the consistency and concentration of the solution, but might cause sufficient cooling to result in condensation of water in contact therewith, which would be objectionable. A typical formula for this neutralizing medium is as follows:

Fusel oil.....	fl. oz.....	1 60
Hexalin.....	do.....	1
Thiourea.....	grains.....	50
Tri-ethanolamine.....	drams.....	2
Butyl alcohol.....	do.....	2
Water (this may be omitted, if desired).....	do.....	2 65

In the above formula, the tri-ethanolamine acts to increase the rate of absorption of the neutralizing medium into the gelatine and assists in the solution of the thiourea and water, if water be employed. The thiourea is employed to completely neutralize the oxidizing effect of the iodine and it will be appreciated that other equivalent reagents may be substituted therefor.

One of the important features of the present invention is that of providing a non-aqueous, so-

lution, substantially immiscible or only slightly miscible with water, and containing a reagent having oxidizing properties with respect to the silver deposit in the emulsion, which is substantially incapable of reacting with the silver deposit in the absence of water, and employing this solution in a pictorial control technique in the presence of an aqueous medium which permits a reaction between the oxidizing agent and the silver to take place, under conditions such that a careful government of the degree of reaction may be obtained. In the present description the expression "silver deposit" will be understood to designate either metallic silver or silver sulfide, in view of the fact that the present method and reagents are equally applicable to use on these two types of silver deposit. To my knowledge, in all previous attempts to obtain photographic reduction for pictorial control through the agency of a material which is chemically capable of reacting with silver deposit, the material has been employed in aqueous solution, in which case the material started its action upon the silver immediately upon being placed in contact therewith, and the only control possible was by applying the reagent in small amounts, over small areas and then quickly fixing or washing the print. In general the chemical reaction necessarily progressed until the reagent was consumed by its reaction, or until the print or negative was immersed in a fixing or washing solution, or otherwise treated with a reagent having a neutralizing action on the active reagent, and thus a tremendous amount of experience or practice was necessary to obtain favorable results. This objection not only applied to etching technique wherein relatively small areas were operated upon at a particular instant, but also applied in a bleaching technique where relatively large areas are ordinarily subjected to treatment, in that the active agent started reaction with the silver deposit immediately after its application, and went the full depth of the emulsion practically instantaneously, whereby no control of the reaction was possible other than by a control of the quantity applied over a given area, and when a relatively large area had to be covered, the areas first covered would be subjected to somewhat greater or at least somewhat advanced treatment before the latter areas were properly covered, and very ununiform results were obtained. The present process, as applied to etching technique, permits one to operate on any particular isolated area in a series of successive applications of the reagent, which applications are alternated with applications of a control medium which definitely preserves the absorbent characteristics of the gelatine and removes the excess oxidizing reagent between applications thereof so that each application is in effect a fresh application unmodified by previous applications. In the bleaching technique as provided by the present method, the entire dry surface of the print or negative may be covered with the then inactive oxidizing agent, and the actual bleaching reaction caused to take place when the entire area to be bleached has been covered to the desired extent.

It will be comprehended that the present invention is not limited to the practice of pictorial control on negatives alone, nor on prints alone, as the technique outlined is equally applicable to treatment of both types of emulsions. Furthermore, though I find a wide application of my invention to the treatment of enlargements

from the so-called "miniature" negatives, i. e., negatives made with small cameras, the invention is also applicable to the practice of pictorial control directly to any photographic print or negative, or to motion picture negatives or positives.

I claim:

1. In the art of photographic pictorial control, the method of treating a silver deposit in a gelatine emulsion, which comprises: separately applying to such an emulsion a non-aqueous iodine solution containing an oleaginous iodine solvent, and an aqueous medium for controlling the hydration of the gelatine in such emulsion, and subsequently subjecting said emulsion to a photographic "fixing" treatment.

2. The method set forth in claim 1, said aqueous medium being applied to said emulsion prior to the application of said non-aqueous solution.

3. In the art of photographic pictorial control, the method of treating a silver deposit in a gelatine emulsion, which comprises: separately applying to such an emulsion a non-aqueous iodine solution containing an oleaginous iodine solvent, and an at least partially aqueous medium said non-aqueous iodine solution being substantially incapable of reaction with said silver deposit in the absence of water, and said at least partially aqueous medium serving to at least partially hydrate the gelatine of said emulsion whereby said iodine chemically reacts with said silver deposit in the formation of a silver salt.

4. The method set forth in claim 3, said at least partially aqueous medium being applied to said emulsion prior to the application of said non-aqueous iodine solution.

5. In the art of photographic pictorial control, the method which comprises: applying a partially aqueous solution to a photographic emulsion containing gelatine and a silver deposit to obtain a partial hydration of said gelatine; applying a non-aqueous solution of iodine containing an oleaginous iodine solvent to said partially hydrated emulsion to cause oxidation of said silver to a salt of silver, and then removing said silver salt from said emulsion.

6. In the art of photographic pictorial control, the method which comprises: applying a non-aqueous iodine solution containing an oleaginous iodine solvent to the surface of a substantially dry photographic emulsion containing gelatine and a silver deposit; applying an aqueous medium to said emulsion to effect an at least partial hydration of the gelatine in said emulsion to cause a reaction between said iodine and said silver deposit in the production of a silver salt; and subsequently treating said register in a finishing operation involving the chemical fixation of said silver salt.

7. The method set forth in claim 6, said aqueous medium comprising water vapor applied to said emulsion by a steaming operation.

8. A photographic pictorial control solution for use on a photographic surface provided with an emulsion comprising gelatine and a metallic deposit of silver or the like, which comprises: water; a water-soluble reducing reagent adapted to react with elemental iodine in the formation of a compound chemically inert with respect to metallic silver; and a non-aqueous alcoholic liquid having a vapor pressure lower than that of water and having the property of restricting the absorption of water by the gelatine in said emulsion.

9. A photographic pictorial control solution for use on a photographic surface provided with an

emulsion comprising gelatine and a metallic deposit of silver or the like, which comprises: water; a water-soluble reducing reagent adapted to react with elemental iodine in the formation of a compound chemically inert with respect to metallic silver; and a water-soluble ether having a vapor pressure lower than that of water and the property of restricting the absorption of water by gelatine, said ether being present in an amount sufficient to prevent an appreciable softening of the gelatine in said emulsion by the water present in said solution.

10. A solution for use in photographic pictorial control, which comprises: water, sodium thiosulphate, thiourea, an alcoholic solvent, and a water soluble ether having the property of restricting the absorption of water by gelatine.

11. A solution for use in photographic pictorial control, which comprises:

20	Sodium thiosulphate	grains	125
	Thiourea	do	75
	Boric acid	do	15
	Water	fl. oz.	4
25	Isopropyl alcohol	do	2
	Carbitol	do	3
	Hexalin (hexahydrophenol)	do	1
	Diethylene glycol	do	2
	Glycerine	do	1
30	Normal butyl alcohol	do	1

12. A solution for use in photographic pictorial control which comprises: a non-aqueous solution of iodine in a plurality of solvents, at least one of said solvents comprising an oleaginous liquid, and another of said solvents comprising an alcoholic liquid at least partially miscible with water.

13. A solution for use in photographic pictorial control, which comprises: iodine, a non-aqueous oleaginous solvent for iodine, a water-miscible non-aqueous alcoholic solvent for iodine, and a

second alcoholic liquid agent having the property of penetrating partially hydrated gelatine.

14. A solution for use in photographic pictorial control, which comprises: iodine, a non-aqueous oleaginous solvent for iodine, a water-miscible non-aqueous alcoholic iodine solvent, an oil-soluble inorganic iodide, a soluble resin, and a second alcoholic liquid agent having the property of penetrating partially hydrated gelatine.

15. A solution for use in photographic pictorial control, which comprises:

	Resinous material	grains	80
	Iodine	pound	1
	Calcium iodide	grains	400
	Potassium iodide	do	100
	Normal butyl alcohol	fl. oz.	10
	Fusel oil (amyl alcohol)	do	5
	Castor oil	do	2
	Kerosene	do	14
	Rape seed oil	do	20
	Diethylene glycol	do	2
	Hexalin	do	7

16. A solution for use in photographic pictorial control, which comprises: a water-soluble reducing reagent adapted to react with elemental iodine in the formation of a compound chemically inactive with respect to metallic silver; an alcoholic solvent for said reducing agent; and an alcoholic liquid having mutual solvent properties with respect to water, iodine, and oleaginous materials.

17. A solution for use in photographic pictorial control, which comprises:

	Fusel oil	fl. oz.	1
	Hexalin	do	1
	Thiourea	grains	50
	Tri-ethanolamine	drams	2
	Butyl alcohol	do	2

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