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PHOTOGRAPHIC SENSITIZER AND DEVELOPER

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The present invention relates to photographic sensitizing and developing solutions, and particularly to solutions which produce a definite black print of outstanding quality, with lines of sharp contrast and uninterrupted continuity on paper of any color, without affecting the original color of the paper. The invention further relates to a process for the copying of plans in black and white known in the printing industry as "black line printing" and which involves the use of both sensitizer and developer.

The objects of the invention are (1) to eliminate the discoloration which commonly occurs when exposed and developed diazo prints are exposed to the action of actinic light; (2) to eliminate the deterioration of the sensitized paper when stored indefinitely; (3) to produce lines on paper which cannot be altered except through such drastic action as to be detectable at once; (4) to provide the users with sensitizing and developing solutions which have no detrimental effect on machinery used in reproducing processes; (5) to produce black line prints of outstanding quality which surpass in quality those now on the market.

Many requirements of various kinds are placed upon photographic diazo prints, such as good keeping quality of the photographic printing paper, stability of the finished prints, copies with sharp outlines, good contrast, and clean grounds that do not yellow. Although it is known that amino diazo compounds alone, or in mixture with azo components are suitable for the production of light sensitive layers, it has not been possible to obtain good positive prints of dark sharp shades of good stability such as made possible by the process of this invention.

I have found that by my process I obtain black prints on white paper with uninterrupted lines of sharp contrast, and that no discoloration of the white paper takes place subsequent to the copying process. In addition, papers treated with my sensitizers can be safely stored indefinitely without deterioration. Papers sensitized with my sensitizers can be processed on all conventional machines used in the black and white print process, yielding direct positive copies in original (contact) size of line drawings, printed and typewritten matter, or continuous tone prints. Ingredients used in the sensitizers and developers of my process will not have any detrimental effect whatsoever on machinery used in the reproducing processes.

The following examples serve to illustrate this invention:

(1) Sensitizer:

Tartaric acid.....grams... 800
Para-diazodiphenylamine sulfate.....do... 270
Water cc... 25,000

Developer:

Oxalic acid.....grams... 245
Sodium carbonate.....do... 510
Phenol do... 518
Phloroglucinol do... 15
Water cc... 10,000

Add any desired deodorant.

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Application of the sensitizer on all kinds and grades of base paper is done in a conventional manner, and at conventional temperatures. The required exposure time may be regulated by increasing or decreasing the quantity of p-diazodiphenylamine sulfate as desired. The result is a definite black print on full white paper, with lines of sharp contrast and uninterrupted continuity. It is impossible to change these reproduced lines without the change being quite obvious.

When used on most current types of diazo paper the developer solution above will produce black lines. This is in contrast to currently available developers which produce lines merely approximating black, or which work satisfactorily only on the specific papers for which they have been planned. On the other hand, only my above developer will produce black lines on paper sensitized with my above sensitizer. Some present processes which do produce black lines have the disadvantage of subsequent discoloration, in contrast to mine, which has no such disadvantage.

(2) Sensitizer:

Tartaric acid.....gm... 800
Para diazodiphenylamine sulfate.....gm... 270
Phloroglucinol gm... 15
Water cc... 25,000

Developer:

Oxalic acid.....gm... 245
Sodium carbonate.....gm... 510
Phenol gm... 518
Water cc... 10,000

Add any desired deodorant.

In cases where the developer is expected to be exposed to lengthy oxidation through storing, such oxidation can be avoided by transferring the phloroglucinol where it is present in the developer to the sensitizer as above, not only in the above formula, but also in all the other formulae herein set forth. Copies made in this manner have the same desirable qualities as when made in Example 1.

(3) Sensitizer:

Phloroglucinol gm... 8.5
Tartaric acid.....gm... 267.5
p-Diazodiphenylamine sulfate.....gm... 8
p-Diazodimethylaniline zinc chloride
.....gm... 68
Water cc... 7250

Developer:

Sodium carbonate exsiccate.....gm... 450
Oxalic acid.....gm... 150
Water cc... 6000

This developer is in the form of effervescent pills. In hot water it dissolved quickly to form a solution which remains colorless, and does not decompose, not even after lengthy storage.

The sensitizer of this example has an additional advantage, in that it may also be developed with ammonia vapor where that is desirable.

(4) Sensitizer: Same as in Ex. 1.

Developer: Same as in Ex. 1 except that phloroglucinol is replaced with resorcinol.

Prints developed developed with this solution have red-orange colored lines instead of black ones. The depth and shade of the color can be regulated by increasing or decreasing the amount of resorcinol.

(5) Sensitizer:

Tartaric acid.....	gm..	800
p-Diazodiphenylamine sulfate.....	gm..	270
Water	cc.	25,000

Developer:

Oxalic acid.....	gm..	243
Sodium carbonate.....	gm..	510
Phenol	gm..	280
Phloroglucinol	gm..	37.5
Water	cc.	10,000

Add any desired deodorant.

The prints obtained by use of the solutions in each of these examples are outstanding in quality and surpass others now in the market, showing the following advantages:

1. Papers treated with the sensitizers can be safely stored indefinitely without deterioration.

2. Copies of sharper contrast-definite black or orange and white.

3. Easy produceability.

4. No subsequent discoloration either of paper or of lines, of reproduced drawing, text, or whatsoever.

5. Reproduced lines cannot be altered except through drastic interference, obvious at once.

6. Ingredients used in sensitizer and in developer will not have any detrimental effect on any parts of the machinery commonly used in reproducing processes.

While this invention has been shown and described in detail, it is obvious that this invention is not to be considered as being limited to the exact form disclosed, and that changes in detail may be made therein within the scope of what is claimed, without departing from the spirit of this invention.

Having thus set forth and disclosed the nature of this invention, what is claimed is:

1. In a method of preparing positive diazo prints the steps of sensitizing the paper with an aqueous solution consisting of 800 gm. of tartaric acid, 270 gm. of p-diazodiphenylamine sulfate, and, after exposure to a light image, subsequently developing with an aqueous solution consisting of

Oxalic acid.....	Gm.	245
Sodium carbonate.....		510
Phenol		518
Phloroglucinol		15

2. In a method of preparing positive diazo prints the steps of sensitizing the paper with an aqueous solution consisting of

consisting of	Gm.
Tartaric acid.....	800
p-Diazodiphenylamine sulfate.....	270
Phloroglucinol	15

and, after exposure to a light image, subsequently developing with an aqueous solution consisting of

	Gm.
Oxalic acid.....	245
Sodium carbonate.....	510
Phenol	518

3. In a method of preparing positive diazo prints the

steps of sensitizing the paper with an aqueous solution consisting of

	Gm.
Phloroglucinol	8.5
Tartaric acid.....	267.5
p-Diazodiphenylamine sulfate.....	8.0
p-Diazodimethylaniline zinc chloride.....	68

and, after exposure to a light image, subsequently developing with an aqueous solution consisting of

	Gm.
Sodium carbonate exsiccate-----	450
Oxalic acid-----	150

4. In a method of preparing positive diazo prints the steps of sensitizing the paper with an aqueous solution consisting of

	Gm.
Tartaric acid-----	800
p-Diazodiphenylamine sulfate-----	270

and, after exposure to a light image, subsequently developing with an aqueous solution consisting of

Oxalic acid.....	Gm.	245
Sodium carbonate	510	
Phenol	518	
Resorcinol	15	

5. A universal developing solution for the production of black line prints consisting of

	Gm.
Oxalic acid.....	245
Sodium carbonate.....	510
Phenol	518
Phloroglucinol	15

6. In a method of preparing positive diazo prints the steps of sensitizing the paper with an aqueous solution comprising tartaric acid and a diazo compound, the proportion of tartaric acid to total diazo compound being substantially three to one by weight, and in the presence of a member of the group consisting of phloroglucinol and resorcinol, after exposure to a light image, subsequently developing the sensitized paper with an aqueous solution comprising oxalic acid and sodium carbonate, the amount of carbonate being two to three times the amount of acid by weight.

7. A developing solution for production of orange line prints consisting of oxalic acid 245 gm., sodium carbonate 510 gm., phenol 518 gm. and resorcinol 15 gm.

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