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# METHOD AND MEANS OF MAKING PLANOGRAPHIC PRINTING PLATES

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The invention relates to planographic printing plates made by the photographic transfer method.

More specifically this invention is concerned with plate treating materials and methods of using the same.

Planographic printing involves the preparation of a master plate having hydrophilic (water-receptive and hence ink-repellent) non-printing portions, which may be called "background," and hydrophobic (water-repellent and ink-receptive) printing portions in the form of an image to be reproduced. The plate is moistened with an aqueous fountain fluid which wets the background while being repelled by the image, and the plate is then inked with printing ink which coats the ink-receptive image areas but is repelled by the wet background. The ink is then transferred from the image to a copy sheet, usually by an offset blanket, to form an impression of the image thereon.

There are different types of planographic printing plates. Older types consist usually of a water-soluble, light-sensitive coating on a support. Some of these coatings consist of albumen sensitized with bichromate, others contain diazo compounds. The support may be a metal plate or parchment, or it may be made of other material and provided with one surface made water-receptive and image-retaining. Such supports could be specially treated paper, cardboard, aluminum foil laminated on paper, superficially saponified cellulose acetate foil, or any other plastic material.

The coating is exposed to light through a suitable stencil or negative to insolubilize the exposed portion. The unexposed portion of the coating is washed away leaving a hydrophobic image surrounded by a hydrophilic background.

Application of printing ink as in a lithographic press, then renders the image visible. Chemical compositions may be used before applying the printing inks to make a sharper distinction between the hydrophobic character of the image and the hydrophilic character of the background. These chemical compositions include developers, plate conditioners, etches, counter etches, pre-etches, desensitizers, correctors, anti-scumming agents, fixers and hardeners.

A similar but more diluted solution, usually referred to as a fountain solution, is employed in the fountain of the printing press for keeping a balance between the ink-receptive image and the water-receptive background.

More modern planographic printing plates are made in accordance with the photographic transfer process. Here, an exposed negative, after going through a transfer solution (a photographic developer containing a solvent for silver halide) is brought into contact with a transfer printing plate (consisting of a support coated with silver nuclei, or nuclei of any other metal).

While it is possible to obtain copies of transfer printing plates with a metallic surface, the known principles fail to produce a hydrophobic image on non-metallic surfaces, for instance on a superficially saponified cellulose acetate layer.

Known plate conditioners have various shortcomings. After such conditioners are applied, the plate must be dried, this being done with a fan or blower or in an oven.



Some plate conditioners contain pigments and dyes which stain the hands of the operator and special cleaners are required to remove the stains.

Some plate conditioners contain chromium salts which may cause chromium poisoning, others contain strong etching acids like trichloro-acetic acid, or poisonous ferric-cyanides.

Other plate conditioners and fountain solutions include colloid thickeners such as gum arabic, gum tragacanth, sodium alginate and soluble starch, which are subject to spoilage by the growth of molds, bacteria and the like. Preservatives, such as formaldehyde, phenols and salicylates are sometimes used to prevent spoilage but they tend to interfere with the printing process. When they are omitted, inconvenience, waste and expense result from the need of frequently refreshing the solution.

One object of this invention is to provide a plate conditioner and fountain solution applicable to the development of non-metallic plates made in accordance with the photographic transfer process.

Another object of this invention is to provide a plate conditioner and fountain solution which produces a printing plate immediately ready for printing.

Still another object is to provide a plate conditioner and fountain solution capable of producing a visible image of improved wear-resistance.

A further object is to provide a fountain solution which is not subject to attack by molds and bacteria and therefore requires no preservatives.

Still another object of this invention is to provide a process capable of producing a printing plate from an original in a relatively short time, namely approximately two to four minutes. In this system only one or two treatments follow the transfer process. This should be contrasted with such prior art as German Patent No. 1,011,280, which describes eight successive operations after the transfer process to prepare a superficially saponified cellulose actetate plate for printing.

A further object of the invention is to provide a clean, non-staining plate conditioner.

Another object of the invention is the provision of a plate conditioner free from chromium (the cause of chromium poisoning), etching acids (like trichloro-acetic acid) and poisonous ferricyanides.

Still another object is the provision of a plate conditioner capable of functioning as a fountain solution upon the addition of water.

Other objects and advantages of the invention will appear from the following description.

The present invention is based upon the following discoveries:

(1) Organic acids, especially aromatic organic acids and preferably polycarboxy aromatic acids, fortify and accelerate the ink receptivity of a silver image.

(2) Oxidation of silver with copper salts, preferably in the presence of complexing agents, improves the ink receptibility.

(3) Differences in character of different bases for transfer printing plates and the use of suitable media in plate conditioners for these plates.

(4) The presence of the herein described and claimed composition on the plate during printing improves and perfects the quality of the copies.

Certain organic acids fortify and accelerate the ink receptivity of transfer printing plates. Many acids can be used, but a carboxyl group works better than a sulfon group, and the more carboxyl groups in the molecule the stronger the action. Examples are:

Benzoic acid
Ortho, iso and terephthalic acid

Pyromellitic acid (benzene tertacarboxylic acid)
Phthalaldehyde acid
Salicylic acid
Gallic acid
Benzene sulfonic acid
Benzene poly sulfonic acids
Furoic acid
Naphthalene sulfonic acid
Naphthalene poly sulfonic acids
Naphthalene acetic acid
Naphthol sulfonic acid
Naphthol polysulfonic acids

In using a mild oxidation with a copper salt, preferably in presence of a silver complexing agent like potassium thiocyanate or allyl thio carbamide, together with organic acids, only one plate conditioner is necessary to prepare a plate for the press.

In applying the copper oxidation and the acids to a surface which is already strongly hydrophilic the usual hydrophilic anti-scumming agents are omitted as unnecessary and undesirable, as they would only slow down the preparation of a plate. Here the action can be accelerated by the addition of alcohol for the following three reasons: First, the plate conditioner can contain more acid, as the solubility of the acids is in general much greater in dilute alcohol (about 50%) than in water. Second, the plate dries more rapidly. Third, the alcohol solution penetrates more quickly into the surface than an aqueous solution.

The following plate conditioner compositions are given as specific examples illustrative of the invention and they are not to be considered restrictive or limitative of its scope:

*Example 1*

A.

| | |
|---|---|
| Water, ml. | 600 |
| Ethanol, ml. | 400 |
| Copper sulfate 5 aq., g. | 9 |
| Potassium citrate, g. | 50 |
| Sodium acetate 3 aq., g. | 100 |
| Phthalaldehyde acid, g. | 80 |

B.

| | |
|---|---|
| Water, ml. | 130 |
| Potassium thiocyanate, g. | 10 |

Mix A and B before using.

*Example 2*

| | |
|---|---|
| Water, ml. | 600 |
| Ethanol, ml. | 600 |
| Cupric nitrate 3 aq., g. | 20 |
| Potassium citrate, g. | 44 |
| Sodium acetate anh., g. | 100 |
| Allyl thio carbamide, g. | 15 |
| Phthalic acid, g. | 76 |

*Example 3*

| | |
|---|---|
| Water, ml. | 550 |
| Ethanol, ml. | 600 |
| Cupric nitrate 3 aq., g. | 20 |
| Potassium citrate, g. | 44 |
| Sodium acetate 3 aq., g. | 154 |
| Potassium thiocyanate, g. | 15 |
| Pyromellitic acid, g. | 20 |

According to the photographic transfer method, a printing plate can be made, for instance, by bringing its surface into contact with an exposed negative paper, while paper and plate are going through a transfer solution, and separating them when a sufficiently strong image is transferred from paper to plate.



The present invention may be applied in different ways in producing copies from a transfer method printing plate.

The first is to swab the plate for about two minutes with the herein described plate conditioner and then to mount the plate on the press without further preparation. The second process is to swab the plate with said plate conditioner and then swab it with an adequate rub-on-ink. If the operator so wishes, he may clean the plate by removing the excess ink with water or with the fountain solution hereinafter described.

Even the first process, swabbing the plate with a plate conditioner, may be omitted if one wishes to limit hand operations to a minimum. If the foregoing plate conditioner compositions are present on the plate in the form of a fountain solution, highly perfected copies result. To act as a fountain solution 1 part plate conditioner may be diluted with 4 parts of water. The fountain solution in the press will compel the image to take ink. With the less concentrated fountain solution however, it requires more time to produce a completely hydrophobic image than with the plate conditioner applied directly to the plate.

We claim:

1. A fountain solution suitable for use with printing plates prepared by the photographic transfer method, comprising a plate conditioner of the character herein described, diluted in the proportion of approximately one part plate conditioner to four parts of water, said plate conditioner comprising an aromatic organic acid, a copper salt and a silver complexing agent in an aqueous alcohol medium, said aromatic organic acid being selected from the group consisting of phthaldehyde acid, phthalic acid and pyromellitic acid.

2. A fountain solution suitable for use with printing plates prepared by the photographic transfer method, comprising a plate conditioner of the character herein described, diluted in the proportion of approximately one part plate conditioner to four parts of water, said plate conditioner comprising an aromatic organic acid selected from the group consisting of phthaldehyde acid, phthalic acid and pyromellitic acid, a copper salt and a silver complexing agent in an aqueous alcohol medium, said silver complexing agent being selected from the group consisting of potassium thiocyanate and allyl thiocarbamide.


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