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METHOD OF ETCHING AND DAMPENING PLANOGRAPHIC PRINTING PLATES AND REPELLENT SOLUTION THEREFOR

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This invention relates to an etching and dampening or so-called repellent solution for use upon planographic printing plates. The uses and functions or purposes of such solutions are well-known in the art and are disclosed, for example, in United States Patents Nos. 1,977,646 and 2,003,268, to which reference may be had for a disclosure of the general composition and purposes of such solutions. In general it may be said, however, that such solutions are of two types, namely, those which are applied directly to the plates as etching solutions at the start of a printing operation to render the non-printing areas of the plate repellent to greasy or fatty acid-containing printing inks and those which are employed for the same purpose as so-called fountain repellent solutions upon rotary offset duplicating machines. In the latter instance the repellent fountain solution in addition to serving as a dampening or repellent solution, per se, keeps the plate moist and prevents it from scumming up when the machine is stopped temporarily during the printing of long editions.

It is customary to include in such planographic etching and dampening or so-called repellent fountain solutions a hygroscopic agent which has commonly been glycerine. This hygroscopic agent has been, in general, satisfactory for its intended purpose and especially when the solution is used upon or in conjunction with metal planographic printing plates and as a so-called fountain repellent solution for use upon rotary offset planographic printing or duplicating presses employing such metal plates. It has also been common practice to employ gum arabic in such solutions to increase the moisture-retaining or hydrophilic characteristics of the plates.

However, I have found that certain of the water-soluble glycols including diethylene glycol, ethylene glycol and propylene glycol may be used advantageously as hygroscopic agents in etching and dampening or fountain repellent solutions of the present invention and when so used have certain advantages over glycerine. Among these are that such glycerols are more volatile than glycerine so that when planographic printing plates moistened therewith are removed from the machine they dry rapidly. However, the volatility of such glycols is not such as to cause excessive evaporation when used as the hygroscopic agent in a repellent fountain solution for a rotary offset duplicating machine.

Moreover, when such glycol hygroscopic agents are used in repellent solutions in conjunction with planographic printing plates which after use are stored and onto which additional reproducible matter is added before reuse, it has been found that better results are realized than those attained when glycerine is used as the hygroscopic agent in the repellent solution. This is believed to be due to the fact that since glycerine is not as volatile as the glycols, it tends to remain on the surface of the plate thereby rendering the same objectionably hydrophilic and this may interfere with retention on the surface of the added reproducible matter but this is avoided when the glycols referred to herein are used as hygroscopic agents in etching and dampening or fountain repellent solutions.

However, when diethylene glycol or one of the other glycols referred to above, is employed as the hygroscopic agent in such etching and dampening or repellent fountain solutions it has a tendency to cause the blankets used in the rotary offset lithographic duplicating presses with which such planographic printing plates and fountain repellent solutions therefor are used to become objectionably tacky after a relatively small number of copies or a short edition has been run off from the rotary offset duplicating machines or press with which such planographic printing plates and blankets are used. This is objectionable in that it tends to cause the paper sheets, which are run through the press to receive the image from the master plate to adhere to the blanket.

However, I have found that if a limited quantity of a water-soluble aldehyde, preferably formaldehyde, is employed in such an etching and dampening or repellent fountain solution in conjunction with diethylene glycol or one of the other glycols referred to above, the objectionable tendency of diethylene glycol, and of the other glycols referred to herein, to cause the blankets to become tacky is eliminated and a highly satisfactory etching and dampening and repellent fountain solution for use with planographic printing plates is thus afforded.

A typical example of a suitable formula which may be followed in preparing the new composition especially for use as an etching solution, when diluted as described hereinafter, for direct application to planographic printing plates at the start of a printing operation is shown in the

following example in which all parts indicated are by weight:

Example 1

	Parts by weight
Monoammonium acid phosphate $(NH_4)H_2(PO_4)$ (dry salt)	4.50
Ammonium nitrate $(NH_4)(NO_3)$ (dry salt)	0.75
Nickelous nitrate (hexahydrate) (dry salt)	2.25
Formaldehyde (HCHO) (37% solution U. S. P.)	1.00
Diethylene glycol	20.00
Water (distilled) (balance)	71.50
	100.00

A typical example of a suitable formula which may be followed in preparing the new composition especially for use as a fountain repellent solution, when diluted as described hereinafter, is shown in the following example in which all parts indicated are by weight:

Example 2

	Parts by weight
Monoammonium acid phosphate $(NH_4)H_2(PO_4)$ (dry salt)	2.0
Ammonium nitrate $(NH_4)(NO_3)$ (dry salt	0.4
Nickelous nitrate (hexahydrate) (dry salt)	1.0
Formaldehyde (HCHO) (37% solution U. S. P.)	1.0
Diethylene glycol	35.0
Water (distilled) (balance)	60.6
	100.0

In place of diethylene glycol specified in the foregoing examples equivalent quantities of ethylene glycol or propylene glycol, or mixtures of such water-miscible glycols, may be employed.

If desired, the ammonium nitrate may be eliminated entirely from the solutions prepared according to the foregoing examples without detracting from the value or utility of the solutions since the use of this substance is known to be optional as may be seen by reference to the patents referred to above.

Likewise, in place of the formaldehyde specified in the foregoing examples equivalent quantities of other water-soluble aldehydes may be employed with similar good results. However, formaldehyde is the preferred aldehyde since it is relatively inexpensive and readily and completely water-soluble and is free from any tendency to form any objectionable precipitate or colloidal suspension in the solution. Moreover, the new solution containing the relative quantity or percentage of formaldehyde specified in the foregoing examples inhibits mold growth but, at the same time, is non-toxic and substantially odorless while having a desired pH value of about 4.0.

Thus, equivalent quantities of other water-soluble aldehydes may be employed in Example 2 in place of the relative quantity of the formaldehyde solution having the strength therein specified, as follows:

	Percent by weight
Para-formaldehyde	0.4
Acetaldehyde	0.37 to 4.0
Benzaldehyde	0.3
Furfuraldehyde	0.4
Glyoxal: Ethanedial or oxalaldehyde 30 percent solution	0.133

In preparing the new solution, according to the foregoing examples, it is preferred to mix the formaldehyde directly with the monoammonium phosphate, ammonium nitrate, and nickelous nitrate, as the dry salts of these three substances. The water is then added, with stirring, so as to dissolve the mixture thus prepared. The diethylene glycol, or other water-miscible glycol is then added slowly with continuous stirring. The mixture is then allowed to stand for a few hours, as over night, after which it should be filtered, whereupon it may be put into suitable glass bottles or like containers and distributed for use.

It is preferred, however, that the solution be allowed to stand for about a week before it is used and that when used as a fountain repellent solution it should be diluted with water in the ratio of about 1 part of the solution, prepared as above, to about 7 parts of water, by volume.

I have also found that in place of the glycols hereinbefore referred to I may also employ as a hygroscopic agent in such etching and dampening or so-called repellent solutions certain water-soluble invert sugars such, for example, as that which is known commercially as "Gluma."

It will thus be seen from the foregoing description that the present invention affords a novel and efficient etching and dampening and so-called repellent fountain solution for use upon or in conjunction with planographic printing plates and rotary offset printing or duplicating presses employing such planographic printing plates. It will also thus be seen that the new solution prepared according to the present invention accomplishes its intended objects and has the desirable advantages and characteristics including those hereinbefore pointed out and others which are inherent in the invention.

I claim:

1. A composition for etching and dampening planographic printing plates comprising an aqueous solution of an acid phosphate, nickel nitrate, a water-miscible glycol, and a water-soluble aldehyde.

2. A composition for etching and dampening planographic printing plates comprising an aqueous solution of an acid phosphate, nickel nitrate, a water-miscible glycol, and formaldehyde.

3. A composition for etching and dampening planographic printing plates comprising an aqueous solution of ammonium acid phosphate, nickel nitrate, diethylene glycol, and a water-soluble aldehyde.

4. A composition for etching and dampening planographic printing plates comprising an aqueous solution of monoammonium acid phosphate, ammonium nitrate, nickelous nitrate, diethylene glycol, and formaldehyde.

5. A composition for etching and dampening planographic printing plates comprising an aqueous solution of an acid phosphate, a water-miscible glycol, and a water-soluble aldehyde.

6. A composition for etching and dampening planographic printing plates comprising an aqueous solution of ammonium acid phosphate, nickel nitrate, ethylene glycol, and a water-soluble aldehyde.

7. A composition for etching and dampening planographic printing plates comprising an aqueous solution of ammonium acid phosphate, nickel nitrate, propylene glycol, and a water-soluble aldehyde.

8. The improvement in the art of printing from planographic printing plates which comprises the step of treating the non-printing areas of the

plates with an aqueous solution of an acid phosphate, nickel nitrate, a water-soluble glycol and a water-soluble aldehyde.

9. The improvement in the art of printing from planographic printing plates which comprises the step of treating the non-printing areas of the plates with an aqueous solution of an acid phosphate, nickel nitrate, a water-miscible glycol and formaldehyde.

10. The improvement in the art of printing from planographic printing plates which comprises the step of treating the non-printing areas of the plates with an aqueous solution of an acid phosphate, a water-miscible glycol, and a water-soluble aldehyde.

11. The improvement in the art of printing from planographic printing plates which comprises the step of treating the non-printing areas of the plates with an aqueous solution of ammonium acid phosphate, nickel nitrate, diethylene glycol and a water-soluble aldehyde.

12. The improvement in the art of printing from planographic printing plates which comprises the step of treating the non-printing areas of the plates with an aqueous solution of monoammonium acid phosphate, ammonium nitrate, nickelous nitrate, diethylene glycol and formaldehyde.

13. The improvement in the art of printing from planographic printing plates which comprises the step of treating the non-printing areas of the plates with an aqueous solution of ammonium acid phosphate, nickel nitrate, ethylene glycol and a water-soluble aldehyde.

14. The improvement in the art of printing from planographic printing plates which comprises the step of treating the non-printing areas of the plates with an aqueous solution of ammonium acid phosphate, nickel nitrate, propylene glycol and a water-soluble aldehyde.

15. A composition for etching and dampening planographic printing plates comprising an aqueous solution of a water-miscible glycol and a water-soluble aldehyde, said solution having a pH of approximately 4.

16. A composition for etching and dampening planographic printing plates comprising an aqueous solution of a water-miscible glycol, a water-soluble aldehyde, and an acid phosphate, said solution having a pH of approximately 4.

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