This invention relates to a new composition to be used as a fountain solution in a lithographic printing press and to an improved method of lithographic printing.

Rotary lithographic printing conventionally employs a smooth surfaced printing plate on which the image areas have been made water-repellent and oil-retaining while the non-image areas have been made water-wettable. In operation of a conventional rotary lithographic printing press, the plate cylinder as it rotates is in rolling engagement with a fountain solution roller which carries "fountain solution." This fountain solution is water, which contains manganese salts and cobalt nitrates as phosphoric acid and desensitizing gum. This "fountain solution wets the non-image areas thoroughly, but is repelled by the hydrophobic image areas. As the plate cylinder rotates further, a greasy or oily hydrophobic ink is then immediately applied to its surface and adheres to the hydrophobic image areas. As the plate cylinder rotates still further, the ink image is transferred either directly to the stock being printed, or as in offset printing, to a rubber blanket from which it is then retransferred to the stock being printed.

It will be noted from the foregoing very brief description that fountain liquid and ink are being continuously, though separately, supplied to the rotating printing plate. It will also be noted that while the fountain solution is always supplied to an essentially ink-free sector of the plate cylinder, the ink is always applied to a sector which has just been wetted with fountain solution. Even though the ink and the fountain solution are immiscible, a certain amount of fountain solution is invariably transferred from the plate to the ink form rollers. Some of the fountain solution so transferred to the ink roller will in turn be transferred back up the ink-delivering roller train up towards the ink fountain.

In many lithographic printing operations it has become a practice to add to the fountain solution small amounts of water soluble salts which are driers for the inks. These salts are regularly transferred together with the fountain solution which, as described above, is carried into the inking system. The salts become emulsified in the ink. This method which results in the regular addition of small amounts of drier to the ink has been found to be advantageous over adding drier directly to the ink. In the latter situation, the drier which is added in one larger addition, tends to cause undesirable drying or skinning of the ink while it is still in its reservoir or on the rollers.

While these conventional water soluble driers which include manganese salts and cobalt nitrates are quite effective in conventional fountain solutions, they produce undesirable results when used in the recently developed fountain solutions which contain lower alcanols, usually at least 15% by volume of such alcanols. These alcanols are most preferably either ethanol or isopropanol.

In the presence of such alcanols, the addition of the conventional water soluble drier salts results in a precipitate in the fountain solution. This precipitate is believed to be the phosphate salt of the drier metal and only seems to form in the alcohol medium. The precipitate interferes with the printing operation by depositing on the plate. The precipitate particles are ink receptive and result in ink deposits, randomly scattered on the plate.

In addition, the drier salt concentration is markedly lowered. We have discovered that when cobalt nitrate is the drier used in the fountain solution in place of the abovementioned salts, no such undesirable precipitation takes place. For best results, we have found that the cobalt nitrate is preferably used in combination with a small amount of acetic acid. Conventionally, fountain solution has a pH of from 4 to 5. The acetic acid acts to maintain the pH of the fountain solution at the same level after the cobalt nitrate is added. The acetic acid may be left out if the pH is maintained at the above level by other utilizable means such as using a greater concentration of phosphoric acid in the fountain solution.

The cobalt nitrate is preferably used in the proportion of from 7 to 58 g. per gallon of fountain solution and the acetic acid preferably is used in the proportion of from .01 to 22.4 g./gallon.

As previously set forth, the fountain solution contains the conventional small amount of phosphoric acid preferably from 1 to 5% by volume of for example 1% phosphoric acid as well as the conventional small amount of desensitizing gum. The hydrophobic desensitizing gum is most generally gum arabic or carboxymethyl cellulose but other standard gums such as gum tragacanth and hydroxyethyl cellulose are also used.

The fountain solution of this invention has been found to be very effective in the most extensively used of the alcoholic fountain systems which contain from 15% to 30% of the lower alcanols. However, the fountain solution may also be used in systems which require greater concentrations of alcanol, e.g., that of U.S. Patent 3,653,178 (Greubel) which uses a fountain solution containing 52 to 70% ethanol.

The following examples will serve to illustrate the practice of this invention:

Example 1

A fountain solution of the following composition is made:

<table>
<thead>
<tr>
<th>Component</th>
<th>Volume cc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>700</td>
</tr>
<tr>
<td>Isopropanol</td>
<td>300</td>
</tr>
<tr>
<td>1% phosphoric acid</td>
<td>20</td>
</tr>
<tr>
<td>1% gum arabic</td>
<td>20</td>
</tr>
<tr>
<td>Solution of 10 parts by weight of acetic acid and 25 parts by weight of cobalt nitrate</td>
<td>15.6</td>
</tr>
</tbody>
</table>

The resulting mixture when used on a conventional sheet or web fed lithographic press, operates effectively in all respects including rapid drying of the printed ink. No evidence of precipitation is in evidence in the fountain system.

Example 2

Example 1 is repeated using the same ingredients, proportions and conditions except that 800 parts of water are used and 200 parts of ethanol are used in place of the isopropanol. The results are substantially the same as in Example 1.

The fountain solutions may of course contain any of the conventional additives used in fountain solutions such as corrosion inhibitors including ammonium bichromate or zinc nitrates.

Unless otherwise specified, all proportions set forth in the specification and claims are by weight.

While there have been described what is at present considered to be the preferred embodiments of this invention, it will be obvious to those skilled in the art that various changes and modifications may be made, therefore, aimed to cover all such changes and modi-
What is claimed is:

1. A lithographic fountain solution comprising a minor amount of phosphoric acid, a minor amount of desensitizing gum, acetic acid and cobalt nitrate dissolved in water and a lower alkanol selected from the group consisting of ethanol and isopropanol, from 7 to 58 g. of cobalt nitrate and from .01 to 22.4 g. of acetic acid being present for each gallon of fountain solution.

2. A method of lithographic printing comprising applying to a lithographic plate a fountain solution comprising a minor amount of phosphoric acid, water, at least 15% of the volume of the fountain solution of an alkanol selected from the group consisting of ethanol and isopropanol, and from 7 to 58 g. of cobalt nitrate and from .01 to 22.4 g. of acetic acid per gallon of fountain solution, subsequently applying to said plate a hydrophobic ink and then printing upon a substrate with said plate.

References Cited

UNITED STATES PATENTS

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OTHER REFERENCES


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