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PRINTING INK

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This invention relates to printing ink. It has for its objects:

First, to produce a new and improved ink.

Second, to produce such an ink in which a binder insoluble in water and a solvent therefor miscible in water are employed so that offset may be prevented by subjecting a printed film of the ink to the action of steam to form a thin hard film of the binder over the printed film.

Third, to provide such an ink which has such tolerance to water that high press room humidities will not separate the binder from the solvent on the press where the ink is spread out in a thin film.

Fourth, to provide such an ink whose water tolerance is such that even though the printed film is treated with steam in the press room to eliminate offset, the resultant high press room humidity will not separate the binder from its solvent on the press.

Fifth, to provide such an ink whose water tolerance is such that when a printed film of the ink is treated with steam the film of binder formed over the printed film is of such thickness that the solvents of the unaffected portion of the printed film will not re-dissolve the binder of the thin hard film before the ink has an opportunity to dry by penetration.

Other objects and advantages pertaining to details will appear from the description to follow. The invention is defined in the claims.

Our new and improved ink comprises a varnish comprising 50 to 60% by weight of diethylene glycol and 40 to 50% by weight of a resin comprising a natural rosin modified with an alpha beta unsaturated organic polybasic acid such as maleic acid or fumaric acid by a diene reaction as described in Patent 2,063,542, issued December 8, 1936, to Carleton Ellis, for Diene resin.

The resin employed has a softening point such that when steam is applied to a printed film of the ink for a short time to eliminate offset, the resin will not soften. The softening point is above the temperature of ordinary steam.

The resin is soluble in diethylene glycol and is insoluble in water, although it is soluble in a mixture of diethylene glycol and a limited quantity of water although insoluble in diethylene glycol and an unlimited quantity of water.

We have obtained very satisfactory results with such a resin sold by the American Cyanamid & Chemical Corporation under the trade name "Teglac 127." This material has a high acid number, to-wit, about 300. This product has a melting or softening point above the temperature of ordinary steam, namely 130° C.

We have found that the acid number may vary and that even if the acid number runs down to 200 very satisfactory results are obtained. We have found that the water tolerance varies with the acid number, being greater for the higher acid numbers.

With the varnish, we employ a pigment which is insoluble in the diethylene glycol and in water. If from 15 to 20% of the weight of the varnish of carbon black is employed, a very satisfactory black ink is obtained. If 60% of the weight of the varnish of chrome yellow is employed, a satisfactory yellow ink is obtained. Other pigments may be used to obtain other colors and the amounts will vary in accordance with the color desired.

In use a film of the ink is printed on a sheet of paper. Immediately thereafter it is subjected to the action of dry steam which causes a film of the resin to form on the exposed portions of the printed film to prevent offset. The steam employed must have a sufficiently low water content that it will not have any deleterious effect upon the sheet of paper or the like.

The steam may be applied either by a heated drum with a padded surface to which steam is applied and over which the printed paper is passed with the printed film in contact with the padding or by means of a heated blanket which is moistened to provide water for the production of steam and adjacent which the printed paper or the like passes.

The use of these devices in the press room increases press room humidity and may run the relative humidity up to 80% or higher. Our ink is not deleteriously affected on the press by such humidities and there is no tendency for the binder to separate out on the press, even though the ink is spread in very thin films on the press. When the steam is applied to the film, however, the resin at the surface is separated out so as to form a thin film which permits the printed paper to be stacked or re-wound.

It is possible to vary the resin as above set forth and it is possible to make use of other solvents than diethylene glycol. Other liquid poly glycols such as triethylene glycol, propylene glycol and dipropylene glycol may be employed. All of these solvents are miscible with water and are capable of taking the resin into solution. The resin is such that when the ink is treated to the action of steam it forms a thin

hard film over the surface of the printed film of ink.

Ink made in accordance with our invention has sufficient water tolerance to permit the steam applied as above set forth to penetrate the printed film. Because of this, the thin hard film formed on the surface of the printed film to prevent offset has sufficient thickness to resist the action of the solvent in the resin of the film to prevent softening of the ink until the ink can dry by penetration.

The terms and expressions which have been herein employed are used as terms of description and not of limitation, and there is no intention, in the use of such terms and expressions, of excluding any equivalents of the features shown and described, or portions thereof, but it is recognized that various modifications are possible within the scope of the invention claimed.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. A non-offsetting printing ink comprising a varnish comprising a liquid poly glycol as a solvent for the resin, and a resin comprising a rosin modified with an acid selected from the group consisting of maleic acid and fumaric acid and having a high acid number, and in sufficient amount to form, when subjected to steam immediately after printing, a thin hard film of resin over the exposed surfaces of the printed film, and pigment insoluble in water and in said poly glycol.

2. A non-offsetting printing ink comprising a varnish comprising a liquid poly glycol as a solvent for the resin and a resin comprising a rosin modified with an alpha beta unsaturated organic polybasic acid and having a high acid number, and in sufficient amount to form, when subjected to steam immediately after printing, a thin hard film of resin over the exposed surfaces of the printed film, and pigment insoluble in water and in said poly glycol.

3. A non-offsetting printing ink comprising a varnish comprising a liquid poly glycol as a solvent for the resin, and a resin comprising a rosin modified with an alpha beta unsaturated organic polybasic acid, and in sufficient amount to form, when subjected to steam immediately after printing, a thin hard film of resin over the exposed surfaces of the printed film, and pigment insoluble in water and in said poly glycol.

4. A non-offsetting printing ink comprising a liquid poly glycol as a solvent for the resin and a resin comprising a rosin modified with an acid selected from the group consisting of maleic acid and fumaric acid and as modified being soluble in said poly glycol and in a mixture of said poly glycol and a limited quantity of water but insoluble in a mixture of said poly glycol and an unlimited quantity of water and capable of forming a thin hard film, and in sufficient amount to form, when subjected to steam immediately after printing, a thin hard film of resin over the exposed surfaces of the printed film, and a pigment insoluble in water and in said poly glycol.

5. A non-offsetting printing ink comprising a liquid poly glycol as a solvent for the resin and a resin comprising a rosin modified with an alpha beta unsaturated organic polybasic acid and as modified being soluble in said poly glycol and in a mixture of said poly glycol and a limited quantity of water but insoluble in a mixture of said poly glycol and an unlimited quantity of water and capable of forming a thin hard film, and in sufficient amount to form, when subjected to steam immediately after printing, a thin hard film of resin over the exposed surfaces of the printed film, and a pigment insoluble in water and in said poly glycol.

6. A non-offsetting printing ink comprising a liquid poly glycol as a solvent for the resin and a resin comprising a rosin modified with an acid selected from the group consisting of maleic acid and fumaric acid and as modified being soluble in said poly glycol and in a mixture of said poly glycol and a limited quantity of water but insoluble in a mixture of said poly glycol and an unlimited quantity of water and capable of forming a thin hard film and having a softening point above the temperature of ordinary steam, and in sufficient amount to form, when subjected to steam immediately after printing, a thin hard film of resin over the exposed surfaces of the printed film, and pigment insoluble in water and in said poly glycol.

7. A non-offsetting printing ink comprising a liquid poly glycol as a solvent for the resin and a resin comprising a rosin modified with an alpha beta unsaturated organic poly basic acid and as modified being soluble in said poly glycol and in a mixture of said poly glycol and a limited quantity of water but insoluble in a mixture of said poly glycol and an unlimited quantity of water and capable of forming a thin hard film, and having a softening point above the temperature of ordinary steam, and in sufficient amount to form, when subjected to steam immediately after printing, a thin hard film of resin over the exposed surfaces of the printed film, and pigment insoluble in water and in said poly glycol.

8. A non-offsetting printing ink comprising a varnish comprising a liquid poly glycol as a solvent for the resin and a resin comprising a rosin modified with an alpha beta unsaturated organic polybasic acid and having a high acid number, and having a softening point above the temperature of ordinary steam, and in sufficient amount to form, when subjected to steam immediately after printing, a thin hard film of resin over the exposed surfaces of the printed film, and pigment insoluble in water and in said poly glycol.

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