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HECTOGRAPH PROCESS AND SOLVENT

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This invention relates to a novel solvent composition for use in hectograph, and related processes, and to a hectograph process utilizing such solvent.

In the hectograph process, also called the spirit duplicating system, the image is formed in reverse on a master by transfer from a carbon-type sheet, coated with a composition containing a high proportion of a water and spirit soluble dye, such as crystal violet, Victoria green, Victoria blue and the like. The image transfers from the master to copy sheets, the surfaces of which have been wetted with an alcohol or alcohol and water combination, upon contact, as between a compression cylinder and a printing plate mounted in a rotary duplicating machine. The highly volatile solvents permit the production of a larger number of copies and provides for more rapid drying of the copy sheet to reduce setoff and smear. In the spirit duplicating systems, the dyestuff is preferably contained in a coating, such as in a carbon sheet for transfer in mirror image onto the printing master by the application of force, or the like. However, various modifications of the process are known; for instance, that disclosed in Klimkowski U. S. Patent No. 2,634,677, wherein a master sheet is provided having one dyestuff component—e. g., a stabilized diazo dye intermediate, or a coupler, and the dyestuff image is formed on the master from a carbon sheet by means of pressure, as by typing, which transfers to the master the other dyestuff component—e. g., a coupling component or diazoamine, and the dye image is formed on the master by coupling thereon. Final copies are then made by contacting the master with a copy sheet, which has been moistened with a solvent for the dyestuff, so that a portion of the dye transfers to the copy sheet and gives final copy thereon.

In such hectograph systems, the solvents normally employed for moistening the copy sheet have been the lower alcohols, methanol and ethanol; or mixtures thereof, with small amounts of water. Various other solvents, particularly glycol-type solvents, such as ethylene glycol, propylene glycol, Cellosolve (ethylene glycol monoethyl ether), methyl Cellosolve (ethylene glycol monomethyl ether), Carbitol (diethylene glycol monoethyl ether), methyl Carbitol (diethylene glycol monomethyl ether), and the like, have been used, since they are somewhat better solvents for the dyestuffs than ethanol. They are, however, less volatile, and such glycol-type solvents, particularly, ethylene glycol, and the lower alkyl (methyl and ethyl) ethers of ethylene glycol and diethylene glycol, are normally used in less amounts than the ethanol or methanol in the solvent, since if they are used in too great an amount, due to their low volatility, the copy sheet is still apt to be slightly moist, when it emerges from the duplicating machine, with the result that the dye transferred thereto may smear, or otherwise transfer. In addition, various volatile solvents, particularly acetone, are frequently included in the hectograph transfer liquid, in order to hasten drying. In order to reduce the inflammability of the alcohol base of the hectograph transfer liquid, volatile chlorinated solvents, such as methylene chloride, are frequently included in the formulation of hectograph transfer liquids and function with the dual purpose, both to reduce flammability; and due to their volatility, hasten drying. Such chlorinated solvents are relatively poor solvents for the dyestuffs, and, as a result, relatively weak copies are frequently obtained when they are included in the transfer liquid.

I have now found that, by incorporating a small amount of butyrolactone, in prior art hectograph transfer solvents, the inflammability of the prior art solvents, which consist largely of methanol, or ethanol, is appreciably reduced, and, at the same time, improved copies are obtained. Improvement of the copies is particularly outstanding when the butyrolactone is added to a solvent containing a chlorinated hydrocarbon.

The amount of butyrolactone, which I have found to be useful in hectograph transfer solvents is about 10% butyrolactone, by weight, based on the total solvent; and the preferred amount of butyrolactone is in the range of 7 to 15%, by weight, of the total solvent, as within these ranges substantially improved copies are obtained, the copies being much denser at the start, of the run, and the total run being about the same as when any given transfer fluid is used, which does not contain butyrolactone. Somewhat higher amounts of butyrolactone, up to 20%, by weight, of the total solvent can be used if extremely dense copies are desired at the start of the run. However, when the amount of butyrolactone increases above 15%, it appears that too much dye transfers at the start of the run, so that the total number of clear copies which can be obtained is somewhat reduced.

The other components of the solvent of the present invention are those commonly employed in the art, the material being ethanol, or methanol, which may contain permissible additions of ethylene glycol-type solvents, and permissible additions of volatile chlorinated hydrocarbon solvents, and/or other volatile solvents, such as acetone, to expedite drying; and/or volatile chlorinated solvents to reduce the flammability of the solvent.

In order to fully illustrate the present invention, the following specific examples are given:

Example 1

A solvent was prepared, having by weight the following composition:

80 parts methanol, 10 parts Cellosolve, 10 parts butyrolactone. This composition was employed as the solvent in a commercial hectograph machine, and it was found that much denser copies were obtained with it at the start of the run, and density and sharpness maintained up to 70 copies and, essentially, the same total number of clear copies were obtained as when a solvent consisting of 89 parts methanol and 11 parts Cellosolve was used. Similar results were obtained when a solvent containing ethanol, in place of methanol, in the above formulation was used.

Example 2

A solvent was prepared having by weight the following composition:

10 parts acetone, 45 parts methylene chloride, 35 parts ethanol, 10 parts butyrolactone. This composition was employed as a transfer posting liquid, and gave excellent copies, which were much denser than those obtained using a commercial transfer liquid having the following compositions:

10 parts acetone, 55 parts ethylene chloride and 35 parts ethanol.

It will be understood that the foregoing examples are illustrative only of the composition of the present inven-

tion, and that it has been found that butyrolactone is a useful additive to a wide variety of commercially available hectograph transfer solvents, of undisclosed specific composition, but containing substantial mounts of ethanol, or methanol, and containing, as additives, such products as ethylene glycol-type solvents, or acetone, and/or volatile chlorinated hydrocarbon solvents. Broadly, therefore, the present invention is directed to a hectograph transfer solvent having an alcohol base containing preferably from 7 to 15%, and, permissibly, up to 20%, by weight, of butyrolactone.

I claim:

1. In a hectograph process wherein copies are produced by pressing a master sheet having a dyestuff image thereon against a copy sheet, at least one of said sheets being moistened with a solvent for the dyestuff on said master sheet whereby a portion of the dyestuff transfers to the copy sheet and the image on said master sheet is reproduced on the copy sheet; the improvement which comprises employing as said solvent a hectograph solvent composition having a lower alkanol base and containing butyrolactone as an essential ingredient in an amount equal to 7 to 20% of the total weight of said solvent.

2. In a hectograph process wherein copies are produced by pressing a master sheet having a dyestuff image thereon against a copy sheet, at least one of said sheets being moistened with a solvent for the dyestuff on said master sheet whereby a portion of the dyestuff transfers to the copy sheet and the image on said master sheet is reproduced on the copy sheet; the improvement which comprises employing as said solvent a hectograph solvent composition having a lower alkanol base and containing butyrolactone as an essential ingredient in an amount equal to 7 to 15% of the total weight of said solvent.

3. In a hectograph process wherein copies are produced by pressing a master sheet having a dyestuff image thereon against a copy sheet, at least one of said sheets being moistened with a solvent for the dyestuff on said master

sheet whereby a portion of the dyestuff transfers to the copy sheet and the image on said master sheet is reproduced on the copy sheet; the improvement which comprises employing as said solvent a hectograph solvent composition having a lower alkanol base and containing butyrolactone as an essential ingredient in an amount equal to about 10% of the total weight of said solvent.

4. In a hectograph process wherein copies are produced by pressing a master sheet having a dyestuff image thereon against a copy sheet, at least one of said sheets being moistened with a solvent for the dyestuff on said master sheet and the image on said master sheet is reproduced on the copy sheet; the improvement which comprises employing as said solvent a hectograph solvent composition having as a base a mixture of a lower alkanol and a volatile chlorinated hydrocarbon and containing butyrolactone as an essential ingredient in an amount equal to 7 to 20% of the total weight of the solvent.

5. A solvent for use in the hectograph process consisting essentially of a mixture of a lower alkanol, a glycol solvent selected from the group consisting of ethylene and propylene glycol and lower alkyl ethers thereof and butyrolactone, said butyrolactone comprising from 7 to 20% by weight of the total solvent, and the lower alkanol comprising more than 50% of the remainder of said solvent.

6. A non-flammable solvent for use in the hectograph process consisting essentially of a mixture of a lower alkanol, a glycol solvent selected from the group consisting of ethylene and propylene glycol and lower alkyl ethers thereof, and a volatile chlorinated hydrocarbon and butyrolactone, said butyrolactone comprising from 7 to 20% by weight of the total solvent.

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