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DUPLICATING PROCESS FOR REPRODUCING COLOR DESIGNS OF HIGH COLOR INTENSITY

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The invention relates to a duplicating process for reproducing color designs of high color intensity and more particularly relates to a method of reproducing color designs of high color intensity and fastness to light on relatively non-absorbent paper such as rag paper, parchment paper and glassine.

When pay roll systems, check writing systems, billing systems, and the like are adapted to duplication machines where all of the copies are obtained from one master, it is often desirable to obtain at least one very bright permanent copy on rag stock or bond paper. In ordinary spirit process duplication this is not possible since papers of low porosity such as rag papers do not moisten evenly nor completely with spirit process solvents and therefore produce very weak, ragged and spotty copies.

This invention provides a method of treating the non-porous copy sheet of the type usually considered unsuitable for spirit process duplication so as to obtain a very bright, sharp and fade resistant copy by ordinary direct process duplication.

Another object is to provide a method for reproducing characters of high color intensity such as a name or address on a portion of a printed bond left blank for that purpose.

The invention also provides a method of obtaining extremely bright copies and copies of ordinary brightness with the same duplicating machine, using the same master copy and same moistening fluid.

My invention also makes it possible to obtain characters on one portion of a sheet in bright colors and characters on other portions of the same sheet in colors of lesser brightness with one contact of the same master against the copy sheet.

Other objects and advantages of the invention will become apparent as the following detailed description progresses.

In accordance with my invention, I coat the sheet of paper on which the characters are to be reproduced with a composition comprising a dye absorbent solid material, preferably a dye fixing material, and a dye solvent having a greater solvent power for a duplicating dye than water. The sheet may be coated over the entire surface or only on those portions of the surface on which the characters or designs of high color intensity are to be reproduced. The coated sheet so produced is then run through any of the well known spirit process duplicating machines whereby the coated sheet is moistened with a volatile dye solvent, preferably of not greater solvent power than the dye solvent on the coated sheet, and then contacted with a master copy having characters or designs formed of a water and alcohol soluble dye. Copies of high color intensity and copies of lesser color intensity may be obtained at will by the same duplicating machine without changing the moistening fluid and without changing the master copy by simply passing coated or uncoated sheets or coated or uncoated portions of sheets through the machine as desired.

Results of the treatment are independent of the type of paper being used, good results being obtained on rag stock, pulp stock, or even such non-porous materials as Cellophane, Celluloid, or metal sheets.

The dye absorbent material may suitably be any solid material such as solid china clay and talc, but in order to obtain desirable fade resistance there should be used dye fixing material such as colloidal clays of which bentonite is a preferred type, aerogels such as silica aerogels, molybdates, tungstates, tannic acid and gallic acid.

Suitable dye solvents for use in a mixture with the dye absorbent or dye fixing material are any of the dye solvents which have greater solvent power than water for duplicating dyes. Preferably they should be less volatile than ethyl alcohol, and for use with the colloidal clay such as bentonite it is desirable that they should be hydrophilic and, advantageously, even hygroscopic. Examples of suitable relatively non-volatile hydrophilic dye solvents are ethylene glycol, propylene glycol, Cellosolve (ethylene glycol mono-ethyl ether), and Carbitol (diethylene glycol mono-ethyl ether), Methyl Carbitol (diethylene glycol methyl ether), 2-methyl-2, 4-pentanediol, and like solvents. Volatile solvents such as ethyl alcohol may be used but this solvent has a tendency to evaporate too readily and also does not have as much solvent power as the glycol type solvents.

The preferred coating composition is a suspension of bentonite in a mixture of Carbitol and water. One suitable formula consists of 50 parts by weight of bentonite, 200 parts by weight of Carbitol, and 200 parts by weight water.

This coating composition may be applied to the copy sheet either from a roller, by means of a doctor knife, from a felt wiper, or in any other convenient manner. Only a very thin surface film is required. The best results are obtained when the sheet is used as soon after the

coating as possible, and this may be accomplished by having a coating attachment on the spirit process duplicator so that the copy sheet is coated and then is immediately moistened with a volatile solvent and contacted with the master copy sheet. For some purposes the moistening step may be omitted, but I have found that its use results in better copies. Also by partially coating a sheet and by using a moistening liquid which has the same or less solvent power than the solvent of the coated portion of the sheet, I can obtain characters of different color intensity on the same sheet.

While there have been shown and described certain embodiments of the invention, it is to be understood that it is capable of many modifications. Changes, therefore, may be made without departing from the spirit and scope of the invention as described in the appended claims, in which it is the intention to claim all novelty inherent in the invention as broadly as possible, in view of the prior art.

I have also discovered that improved results are obtained when the coated sheet is allowed to stand immediately after the coating operation for sufficient time to evaporate a portion of the solvent and fix the dye absorbent material in place. In the claims this is referred to as immobilizing the dye absorbent material.

I claim:

1. The method of reproducing color designs of high color intensity, which method comprises coating a copy sheet with a mixture of a dye-absorbent material and a glycol type dye solvent having a greater solvent power than water, moistening said coated sheet with a volatile dye solvent of not greater solvent power than the solvent of said coated sheet, and contacting said moistened sheet with the surface of a sheet having a design formed thereon of a dye which is soluble in the aforesaid solvents.

2. The method of reproducing color designs of high color intensity and fastness to light, which method comprises coating a copy sheet with a mixture of a dye-fixing material and a dye solvent having greater solvent power than water, moistening said coated sheet with a volatile dye solvent of not greater solvent power than the solvent of said coated sheet, and contacting said moistened sheet with the surface of a sheet having a design formed thereon of a water or alcohol soluble dye.

3. The method of reproducing color designs of high color intensity on a relatively non-absorbent type of paper such as rag paper, parchment paper and glassine, which method comprises coating said paper with a mixture of a dye-absorbent material and a dye solvent having greater solvent power than water, moistening said coated sheet with a volatile dye solvent of not greater solvent power than the solvent of said coated sheet, and contacting said moistened sheet with the surface of a sheet having a design formed thereon of a water or alcohol soluble dye.

4. The method of reproducing color designs of high color intensity on a relatively non-absorbent type of paper such as rag paper, parchment paper and glassine, which method comprises coating said paper with a mixture of a dye-fixing material and a dye solvent having greater solvent power than water, moistening said coated sheet with a volatile dye solvent of not greater solvent power than the solvent of said coated sheet, and contacting said moistened sheet with the surface of a sheet having a design thereon formed of a water or alcohol soluble dye.

5. The method of reproducing color designs of high color intensity and fastness to light on rag paper, which method comprises coating rag paper with a mixture of bentonite and a dye solvent having greater solvent power than water, and contacting said coated sheet with the surface of a sheet having a design thereon formed of a water or alcohol soluble dye.

6. The method of reproducing color designs of high color intensity and fastness to light on rag paper, which comprises coating said rag paper with a suspension of bentonite in water and a hydrophilic dye solvent having greater solvent power than water, and contacting said coated sheet with the surface of a sheet having a design thereon formed of a water or alcohol soluble dye.

7. The method of reproducing color designs of high color intensity and fastness to light on rag paper, which method comprises coating a suspension of bentonite in water and Carbitol, moistening said sheet with a volatile dye solvent comprising ethyl alcohol, and contacting said moistened sheet with the surface of a sheet having a design thereon formed of a water or alcohol soluble dye.

8. The method of reproducing color designs of high color intensity on relatively non-absorbent types of paper such as rag paper, parchment paper and glassine, which method comprises coating a copy sheet with a mixture of a dye absorbent material and a dye solvent having a greater solvent power than water, evaporating a portion of said dye solvent so as to immobilize the dye absorbent material, and contacting said moistened sheet with the surface of a sheet having a design formed of a dye which is soluble in the aforesaid solvent.

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