This invention relates to a duplicating sheet and to colored coating compositions therefor. It relates more particularly to duplicating sheets of the so-called "single-copy" carbon paper type; that is, duplicating sheets which are used only once and then discarded; and to coating compositions for the preparation thereof.

Duplicating sheets of the type under consideration usually consist of a sheet of paper coated on one side with a colored film which is adapted to be transferred to a receiving sheet by the application of pressure to the surface of the duplicating sheet, as by a stylus, typewriter, etc.

Primary requirements of duplicating sheets, especially of the "single-copy" carbon paper type, are that both the coated surface of the duplicating sheet and copy inscriptions transferred to a receiving sheet possess good resistance to smudging, soiling, offset and color run during ordinary handling and use. These properties, which, of course, are highly desirable in all types of duplicating paper, are critically important in duplicating papers used to transfer inscriptions to cards which are to be processed by certain modern automatic machines which function responsive to information retrieved from the cards, such as, automatic scanning and sorting machines, and punch-card machines. Cards of this type may, for example, contain a copy inscription from a sales slip representing credit purchases at a gasoline filling station in which part of the inscribed copy is obtained from a "credit card" stamping plate. Such copies should have inscriptions of good color and should be free of color smudges and smears, which interfere with the proper functioning of such machinery. Cards containing copy inscriptions obtained by means of ordinary duplicating papers heretofore available have proved highly unsatisfactory, because color runs and offsets of wax and color on such cards have interfered with the operation of the machines.

It has been proposed in U.S. Patent 2,299,694 to overcome this difficulty by providing a duplicating sheet consisting of a base sheet coated with a pressure-transparent coating formed of a solid plastic hydrophobic gum in a continuous phase having dispersed therein discrete colored droplets consisting of a suspension of carbon black in a polyhydric alcohol or a solution of Malachite Green dye in glycerin. On the other hand, Malachite Green is a water-soluble dye, the characters obtained with it on a copy sheet are subject to smearing, offsetting and running when handled in moist weather or with damp hands.

We have discovered that improved duplicating sheets of the above type and coating compositions for the production thereof can be obtained by employing, as the colored liquid dispersed as droplets (the discontinuous phase) in a plastic solid hydrophobic material (as continuous phase), a solution of one or more of a particular class of water-insoluble colorants in one or more of a particular class of hydrophilic oxygen-containing organic liquids which are solvents for said colorants. Thus, we have discovered that such solutions can be readily dispersed into the hydrophobic material to form coating compositions which, when applied as a film to a base sheet material by the usual procedures (e.g., hot-melt coating or solvent coating), result in duplicating sheets having a number of desirable properties; they do not smudge or cause discoloration when handled in a humid atmosphere or with damp fingers, and when used in copying by the application of pressure of a stylus, typewriter key or raised plate to the duplicating sheet, the film of coating is ruptured and the droplets of colored solution are released and are absorbed by the receiving sheet, leaving markings of the colorant on the receiving sheet. Since the colorant is insoluble in water the markings do not smudge, smear, run, or offset when handled in a moist atmosphere or with damp hands or even when subjected to water, as in the rain; and, in view of the high degree of solubility of the colorants in the hydrophilic solvents, the markings are of good color strength, legibility and definition. Since, unlike ordinary carbon paper, the continuous phase of the coating is not itself the color carrying vehicle, relatively harder plastic solid hydrophobic materials can be employed as the continuous phase of the coating; so that greater smudge resistance is obtained and only innocuous amounts of wax or other hydrophobic material are transferred to the receiving sheet.

The colorants employed in accordance with the present invention are water-insoluble salts of organic bases (and especially organic dyestuff bases) with organic dyestuff sulfonic acids, and especially those in which at least one of the base and acid components is of the triphenylmethyl class. Those which contain a triphenylmethyl dye as at least one component of the molecule are preferred because of their high color value.

The colorants can be prepared by heating a mixture of an aqueous solution of the organic base with an aqueous solution of the dyestuff sulfonic acid. The resulting sulfonate salt of the organic base, being insoluble in water, precipitates out and is isolated, dried and ground.

Suitable organic bases include basic dyestuffs of the triphenylmethyl, xanthene, azo and azomethine classes; and organic amines (including amidines) containing more than 10 carbon atoms in the molecule, such as dialkylamines, trialkylamines and diarylalkylamines, especially of the benzene series, like diphenyl-, diotyl- and dixylylguidanides), which are without color value but which impart the requisite solubility characteristics to the molecule.

Suitable dyestuff sulfonic acids include triphenylmethane, azo, xanthene, azomethine, anthraquinone, di- oxazine, phthalocyanine and other dyes which contain at least 1, and preferably more than 1, sulfonic acid group, or groups which react as sulfonic acid groups (i.e. sodium sulfonate groups or sulfonate groups internally linked by an ionic bond to a quaternary nitrogen atom in a dyestuff molecule).

Colorants of this type are illustrated by the following, in which the number of moles of basic component is equivalent to the number of sulfonic acid groups present in the dyestuff sulfonic acid. The C.I. designations refer to Colour Index numbers given in Colour Index, Second Edition (1956).

Dixylylguidanide salt of Wool Violet 4BN (C.I. 42640)
Dixylylguidanide salt of Brilliant Wool Blue FFR Extra C.I. 42735)
Ditolylguidanide salt of Fast Wool Blue R (C.I. 13390)
Salt of Rhodamine 6GDN (C.I. 45160) with Chromolan Yellow N (C.I. 19045)
Dixylylguidanide salt of Sirius Light Blue FFRL (prepared as described in BIOS Final Report No. 760, pp. 77-8)
Dixylylguidanide salt of Brilliant Acid Blue 6BN (C.I. 42660)
Salt of Crystal Violet (C.I. 4255S) with Alphazurine FG (C.I. 42090)
The hydrophilic oxygen-containing organic liquids employed in accordance with the present invention are liquids which, besides being hydrophilic and oxygen-containing, have good solvency for the colorants (they dissolve at least 3% and preferably at least 5% by weight of the selected colorant) and are immiscible with the normally solid plastic hydrophobic material employed as a continuous phase of the duplicating sheet coating. Particularly suitable hydrophilic oxygen-containing liquids are characterized by the following properties:

They are liquid at ordinary atmospheric temperatures, preferably at temperatures at least as low as 10° C. and especially as low as -30° C.

They have a high boiling point, preferably above 150° C.

They have a low vapor pressure, preferably below 0.1 mm. of mercury at 25° C.

They have a high flash point, preferably above 100° C.

They have a molecular weight above 60.

They contain more than 10% by weight of oxygen in the molecule.

The following are illustrative of hydrophilic oxygen-containing organic liquids suitable for use in accordance with the present invention:

Glycols, such as ethylene glycol, propylene glycol, hexylene glycol, octylene glycol, etc.

Other polyhydric alcohols, such as butanediol-1,3; pentanediol-1,5; glycerol; etc.

Polyalkylene glycols and their corresponding thioethers, such as, diethyleneglycol, triethyleneglycol, higher polyethylene glycols, dipropylene glycol, tripropylene glycol, higher polypropylene glycols, triiodoethyleneglycol, etc.

Glycol ethers, such as, alkyl ethers of the above; e.g., monoethyl ether of diethylene glycol ("Carbitol") or of triethylene glycol, dimethyl ether of tetraethylene glycol, etc.

Hydroxyalkyl amines, such as, ethanolamine.

Organic carbonates, such as, ethylene carbonate and propylene carbonate.

Ketones, such as, cyclohexanone.

Those of the above hydrophilic oxygen-containing liquids, or mixtures thereof, which have the formula

\[ R'OH\]

wherein

R' represents a member of the group consisting of H and C2-C4 alkyl groups,

R is an alkylene group containing from 2 to 10 carbon atoms, inclusive,

n is an integer from 1 to 12, inclusive, and

the total number of carbon atoms is from 2 to 24, inclusive,

and especially those C5-C24 compounds in which R in the above formula represents a C5-C10 alkylyne group, are preferred for use as solvents for the water-insoluble colorants. Those of the latter class of solvents in which R' in the above formula represents hydrogen, and especially mixtures of polyethylene glycols having an average molecular weight of about 4000 may be dispersed in a toluene solution of a suitable resin (such as one of those referred to above); the resulting dispersion may be spray-dried, during which the toluene evaporates and the residual material is obtained in the form of microspherical beads containing droplets of colored solution encapsulated in a shell of resin; and the beads may then be dispersed into a suitable continuous film-forming hydrophobic material by mechanical mixing.

The coating compositions may be applied in the molten or solution form to the base sheet material in various ways, as is known; for example, by drawdown blades, or by conventional coating machinery of the direct or indirect roll type, or by printing by direct or offset gravure. Hot melt coatings may be cooled, suitably by air chilling or by passing over chilled rollers. If the coatings as applied contain a volatile solvent, the latter, of course, is removed by evaporation. The weight of coating applied may range from 1 to 6 lbs. (preferably about 3 lbs.) per 500 sheets of 20" x 30" paper.

The invention will be illustrated by the following specific examples, but it is to be understood that it is not limited to the details thereof and that changes may be made without departing from the scope of the invention.

The temperatures are in degrees centigrade and the parts and percentages are by weight, unless designated as parts by volume. Where parts are by volume, the amount be applied by hot-melt coating method; and/or which are soluble in volatile hydrophobic solvents (especially hydrocarbons, such as, toluene, coal tar naphtha, or various low boiling solvent-grade petrochemicals), so that they may be applied by solvent-coating methods with subsequent removal of the solvent by evaporation; and mixtures thereof. Thus, they include waxes and resins and mixtures thereof.

The following are illustrative of suitable waxes: montan wax, carnauba wax, carnaucy wax, esparto wax, ceresin, ozokerite, beeswax, sugar cane wax, paraffin wax, microcrystalline or petrolatum wax, and waxy amides of long-chain fatty acids.

The following are illustrative of suitable resins: polyethylene, polyisobutylene, other polymerized hydrocarbon resins such as may be obtained by treatment of unsaturated hydrocarbon distillates with Friedel-Crafts catalysts, and hydrocarbon-soluble alcohol-insoluble natural resins (such as, gum dammar).

Plasticizing agents, such as, light or heavy mineral oil, petrolatum, lard oil, or dioctyl phthalate may be incorporated with the waxes and/or resins if desired. The coating compositions are prepared by dispersing a solution of the water-insoluble colorant or mixture of such colorants, in the hydrophilic oxygen-containing organic liquid, or mixture of such liquids (preferably a solution containing a high concentration of colorant on the hydrophobic material in liquid form (in molten form or in solution form). Dispersing is preferably effected by mixing the said components in efficient, high-speed mechanical dispersion equipment, such as a "Kady Mill" or "Waring Blender." Chemical emulsifying agents may be used if desired but are generally not necessary. The amount of color solution may range from 20% to 80% of the weight of the total formulation (exclusive of volatile solvent, where used), depending, among other things, on the color strength of the solution. Mixing is continued until the desired degree of dispersion is obtained. The size of the dispersed droplets may range from 0.1 to 70 micros. Average sizes of droplets in the range 0.5 to 20 micros, and more particularly in the range 1 to 5 micros, are preferred.

Coating compositions of exceptionally high quality may be made by encapsulating the colored solution in a resin (e.g. gum dammar) to form bead-like capsules which are then dispersed in the continuous phase of hydrophobic material. For example, a solution of a colorant in a suitable solvent (such as a mixture of polyethylene glycols having an average molecular weight of about 4000, which may be dispersed in a toluene solution of a suitable resin (such as one of those referred to above); the resulting dispersion may be spray-dried, during which the toluene evaporates and the residual material is obtained in the form of microspherical beads containing droplets of colored solution encapsulated in a shell of resin; and the beads may then be dispersed into a suitable continuous film-forming hydrophobic material by mechanical mixing.

The coating compositions may be applied in the molten or solution form to the base sheet material in various ways, as is known; for example, by drawdown blades, or by conventional coating machinery of the direct or indirect roll type, or by printing by direct or offset gravure. Hot melt coatings may be cooled, suitably by air chilling or by passing over chilled rollers. If the coatings as applied contain a volatile solvent, the latter, of course, is removed by evaporation. The weight of coating applied may range from 1 to 6 lbs. (preferably about 3 lbs.) per 500 sheets of 20" x 30" paper.

The invention will be illustrated by the following specific examples, but it is to be understood that it is not limited to the details thereof and that changes may be made without departing from the scope of the invention. The temperatures are in degrees centigrade and the parts and percentages are by weight, unless designated as parts by volume. Where parts are by volume, the amount
EXAMPLE 1

This example describes the preparation of a duplicating paper consisting of a film of a montan wax composition coated on a paper base. The wax composition consists of a dispersion of discrete minute droplets of colored monoethyurethane of diethylene glycol ("Carbitol") as discontinuous phase in montan wax as the continuous phase. The "Carbitol" is colored by having dissolved therein a blue organic colorant which is a water-insoluble salt of 3 mols of Crystal Violet Base (Solvent Violet 9—C.I. 42555B) with 1 mol of Alphazurine FG (Acid Blue 9—C.I. 42090).

**Part A.—Preparation of Colorant**

A hot (about 80°) solution of 240 parts of Alphazurine FG (100% strength basis=3 mols) in about 1500 parts of water is added dropwise to a well stirred hot (80°) solution of Crystal Violet (371 parts=1 mol) in about 2000 parts of water and stirred is continued for an additional hour at 80°. The resulting mixture is allowed to stand, and the product, which separates out as a tarry mass, is permitted to settle. The upper layer of water is syphoned off. The remaining tarry product is purified by adding hot water, stirring the resulting mixture, and then allowing it to cool and settle. After syphoning off the upper aqueous layer, the product is dried under vacuum at 40° to 45°. A dry friable solid is obtained which is then ground to a powder in a "Mikro-Pulverizer."

The resulting product is a blue colorant which is substantially insoluble in cold water, but very soluble in oxygenated organic solvents, as evidenced by the following Table I, showing in round numbers the solubility in representative solvents of this class at room temperature.

<table>
<thead>
<tr>
<th>Solvent</th>
<th>Solubility, percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Carbitol&quot;</td>
<td>40</td>
</tr>
<tr>
<td>Propylene glycol</td>
<td>40</td>
</tr>
<tr>
<td>Hexylene glycol</td>
<td>35</td>
</tr>
<tr>
<td>Octylene glycol</td>
<td>35</td>
</tr>
</tbody>
</table>

**Part B.—Preparation of Coated Duplicating Sheet**

A coating composition is prepared by agitating a mixture of the following ingredients at 90° in a high speed mixer of the "Waring Blender" type:

<table>
<thead>
<tr>
<th>Parts</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Carbitol&quot;</td>
<td>75</td>
</tr>
<tr>
<td>Montan wax (16B grade)</td>
<td>200</td>
</tr>
<tr>
<td>Blue colorant prepared in Part A</td>
<td>15</td>
</tr>
</tbody>
</table>

During this operation the colorant dissolves in the "Carbitol" and the resulting colored "Carbitol" solution is dispersed as minute droplets, constituting the discontinuous phase, an emulsion of the colored solution in the molten wax as continuous phase. Upon cooling to room temperature, the resulting dispersion sets to a plastic solid. The dispersion is then coated on paper by means of a drawdown plate or other suitable coating means. The weight of the coating is equivalent to 3 pounds per 500 sheets of 20" x 30" paper.

The coated paper is characterized by stability to handling and the excellence of the copy matter obtained by its use. Thus, the coated paper has a high degree of resistance to smudging, soiling, and offsetting and bleeding of color during normal handling and use. Copy inscriptions transferred to a receiving sheet by means of this coated paper are characterized by good definition and legibility, and by a high degree of freedom from smudging and from smearing of the color and/or wax. As a result, copy inscriptions obtained by the use of the coated paper are well adapted for use in connection with automatic data processing machines, such as, punchcard machines and other types of automatic business machines.

EXAMPLE 2

This example describes the preparation of a duplicating paper consisting of a film of a carnauba wax composition coated on a paper base. The wax composition consists of a dispersion of discrete minute droplets of colored monostearyl ether of diethylene glycol ("Carbitol") as discontinuous phase in carnauba wax as the continuous phase. The "Carbitol" is colored by having dissolved therein a black organic colorant which is a water-insoluble salt of 2 mols of Crystal Violet Base (Solvent Violet 9—C.I. 42555B) and 1 mol of the base of the orange azomethine dye stuffing the following formula (see Example 6 of U.S. Patent 2,140,248):

![Formula Image]

with 1 mol of Light Green SF Yellowish (Acid Green 5—C.I. 42095).

**Part A.—Preparation of Colorant**

A hot (about 80°) solution of 198 parts (100% strength basis=1 mol) of Light Green SF Yellowish in 420 parts of water is added dropwise to a well stirred hot (80°) solution of 205 parts (100% strength basis=2 mols) of Crystal Violet and 106 parts (100% strength basis=1 mol) of the orange azomethine dye stuffing having the above formula in 1000 parts of water and stirring is continued for an additional hour at 80°. The resulting slurry is allowed to cool. The product precipitates out as a tar. Supernatent water is decanted off, and the product is reslurred in 2000 parts of hot (80°) water. Upon cooling without agitation, the colorant separates out as a tar, which is isolated and dried under vacuum at 40° to 45°, and ground to a powder in a "Mikro-Pulverizer."

The product is a black colorant which is insoluble in cold water but is very soluble in oxygenated organic solvents such as those set out in Table I, above.

**Part B.—Preparation of Coated Duplicating Sheet**

A coating composition is prepared by agitating a mixture of the following ingredients at 90° in a high speed mixer of the "Waring Blender" type:

<table>
<thead>
<tr>
<th>Parts</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Carbitol&quot;</td>
<td>75</td>
</tr>
<tr>
<td>Carnauba wax</td>
<td>200</td>
</tr>
<tr>
<td>Black colorant prepared in Part A</td>
<td>15</td>
</tr>
</tbody>
</table>

During this operation the colorant dissolves in the "Carbitol" and the resulting colored solution is dispersed as minute droplets, constituting the discontinuous phase, an emulsion of the colored solution in the molten wax as continuous phase. Upon cooling to room temperature, the resulting dispersion sets to a plastic solid. The dispersion is coated on paper, excess being removed by a doctor bar at 120°, to give a coating weight of 3 pounds per 500 sheet 20" x 30" ream.

The coated paper is characterized by exceptional resistance to smudging or soiling during normal handling and use. Copy inscriptions transferred to a receiving sheet by means of this coated paper are characterized by a strong black color, good definition, good legibility, and exceptional resistance to smudging and to running of the color in the presence of moisture.

**EXAMPLE 3**

This example describes the preparation of a duplicating paper consisting of a film of a gum dammar composition...
coated on a paper base. The gum dammar composition consists of a dispersion of discrete minute droplets of colored polyethylene glycol as discontinuous phase in gum dammar as continuous phase. It is prepared by dispersing a polyethylene glycol solution of the colorant into a toluene solution of gum dammar, coating the resulting dispersion on a paper base sheet, and then evaporating the toluene from the coated surface. The colorant is a bluish red water-insoluble salt of 2 mols of Rhodamine B base (Solvent Red 49—C.I. 45170) with 1 mol of Crocein Scarlet SS (Acid Red 73—C.I. 27290).

Part A—Preparation of Colorant

A bluish red solid is prepared by precipitation, in the manner described in Examples 1 and 2, Parts A above, from hot aqueous solutions of 2 mols of Rhodamine B (Basic Violet 10—C.I. 45170) and 1 mol of Crocein Scarlet SS, respectively. The colorant is insoluble in water, but very soluble in oxygen-containing organic solvents. Thus, it has a solubility of about 50% in "Carbitol" and in propylene glycol.

Part B—Preparation of Coated Duplicating Sheet

A colored polyethylene glycol solution is prepared by dissolving 6 parts of the colorant obtained in Part A of this example in 24 parts of Polyethylene Glycol 400 having an average molecular weight range of 380-420 (a product of Carbide and Carbon Chemical Co.).

A gum dammar solution is prepared by dissolving 40 parts of gum dammar in 60 parts of toluene.

The colored polyethylene glycol solution is dispersed into the gum dammar solution by agitating them together in a high speed mixer ("Waring Blender"), the resulting emulsion is coated on a paper base sheet, and the toluene is removed from the coating by evaporation.

The resulting coated sheet is resistant to smudging, and gives well defined, bluish red copy inscriptions which are fast to light and to water.

It will be evident that the invention is not limited to the details of the foregoing illustrative examples and that changes can be made without departing from the scope of the invention.

Thus, instead of the wax and gum employed in the above specific examples, any of the other plastic solid hydrophobic materials referred to above may be employed as continuous phase and may be applied to the base sheet by the hot melt or solvent coating procedures.

Instead of the hydrophilic oxygen-containing organic liquids employed in the above examples, others of the said class of solvents for the colorants may be substituted for the glycol ether and polyethylene glycol employed in the above examples.

Similarly, the water-insoluble organic base salts of organic dyestuff sulfonic acids employed in the specific examples may be replaced by other water-insoluble salts of organic bases with organic dyestuff sulfonic acids.

Since changes may be made in the duplicating sheets and compositions for preparing them without departing from the scope of the invention, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense, except as limited by the claims.

We claim:

1. A duplicating sheet in the form of a base sheet and a pressure-rupturable coating on said sheet consisting essentially of a plastic solid hydrophobic material selected from the group consisting of waxes, resins, and mixtures thereof as continuous phase discrete colored droplets dispersed in the discontinuous phase, thereby characterized that said colored droplets consist essentially of a solution of a water-insoluble colorant which is at least one salt of an organic base with an organic dyestuff sulfonic acid in a hydrophilic oxygen containing organic liquid solvent for said salt which is immiscible with said hydrophobic material.

2. A duplicating sheet as defined in claim 1 in which the hydrophilic oxygen-containing organic liquid is liquid at temperatures at least as low as 10° C. and has a boiling point above 150° C., a vapor pressure below 0.1 mm. of mercury at 25° C., a flash point above 100° C., and a molecular weight above 60, and contains more than 10% by weight of oxygen in the molecule.

3. A duplicating sheet as defined in claim 1 in which the hydrophilic oxygen-containing organic liquid is at least one compound of the formula

$$R'O(R_O)_{2-n}H$$

wherein

$R'$ represents a member of the group consisting of H and C$_1$-C$_4$ alkyl groups,
$R$ is an alkylene group containing from 2 to 10 carbon atoms, inclusive,
$n$ is an integer from 1 to 12, inclusive, and the total number of carbon atoms is from 2 to 24 inclusive.

4. A duplicating sheet as defined in claim 3 in which the hydrophilic oxygen-containing organic liquid is an open-chain organic dihydroxy compound having the formula

$$HO(RO)_{2-n}H$$

wherein

$R$ represents C$_2$-C$_5$ alkylene, and
$n$ equals 1 to 12, inclusive.

5. A duplicating sheet as defined in claim 1 in which the water-insoluble colorant is a salt of an organic dye stuff base with an organic dyestuff sulfonic acid, and the hydrophilic oxygen-containing organic liquid is a mixture of polyethylene glycols having an average molecular weight of 200 to 500.

6. A duplicating sheet as defined in claim 6 in which the water-insoluble colorant is a salt of an organic dye stuff base with an organic dyestuff sulfonic acid, at least one of which is of the triphenylmethane class.

7. A duplicating sheet as defined in claim 6 in which the water-insoluble colorant is a salt of a triphenylmethane dyestuff base with an organic dyestuff sulfonic acid.

8. A coating composition for the production of a duplicating sheet consisting essentially of a dispersion of discrete colored droplets as discontinuous phase in a plastic normally solid hydrophobic material selected from the group consisting of waxes, resins and mixtures thereof as continuous phase, thereby characterized that said colored droplets consist essentially of a solution of a water-insoluble colorant which is at least one salt of an organic base with an organic dyestuff sulfonic acid in a hydrophilic oxygen-containing organic liquid solvent for said salt which is immiscible with said hydrophobic material.

9. A coating composition as defined in claim 9 in which the hydrophilic oxygen-containing organic liquid is liquid at temperatures at least as low as 10° C. and has a boiling point above 150° C., a vapor pressure below 0.1 mm. of mercury at 25° C., a flash point above 100° C., and a molecular weight above 60, and contains more than 10% by weight of oxygen in the molecule.

10. A coating composition as defined in claim 9 in which the hydrophilic oxygen-containing organic liquid is liquid at temperatures at least as low as 10° C. and has a boiling point above 150° C., a vapor pressure below 0.1 mm. of mercury at 25° C., a flash point above 100° C., and a molecular weight above 60, and contains more than 10% by weight of oxygen in the molecule.
which the water-insoluble colorant is a salt of an organic dyestuff base with an organic dyestuff sulfonic acid, at least one of which is of the triphenylmethane class.

12. A coating composition as defined in claim 10 in which the water-insoluble colorant is a salt of a triphenylmethane dyestuff base with an organic dyestuff sulfonic acid.

13. A coating composition as defined in claim 10 in which the normally solid hydrophobic material is a wax melting below 150° C.

14. A coating composition for the production of a duplicating sheet consisting essentially of an emulsion of discrete colored droplets dispersed as discontinuous phase in a solution in a hydrocarbon solvent of a normally solid plastic material selected from the group consisting of waxes, resins and mixtures thereof, as continuous phase, thereby characterized that said colored droplets consist essentially of a solution of a water-insoluble colorant which is at least one salt of an organic base with an organic dyestuff sulfonic acid in a hydrophilic oxygen-containing organic liquid solvent for said salt which is immiscible with said hydrophobic material.

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<th>Inventor(s)</th>
<th>Date</th>
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