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D. A. NEWMAN

3,274,928

PLANOGRAPHIC PRINTING PLATE

Filed Dec. 13, 1965

Fig. 1

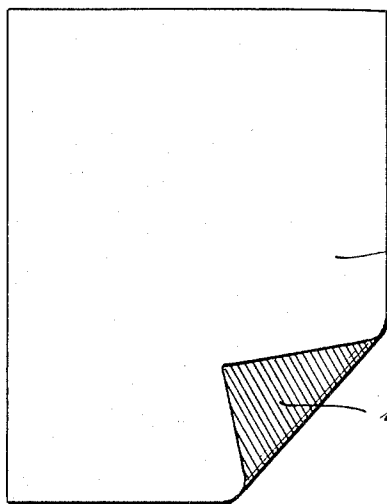
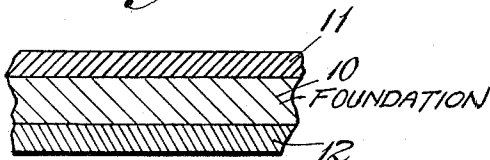


Fig. 2



11 PLANOGRAPHIC COATING

12 OLEOPHILIC TRANSFER COATING

Fig. 3

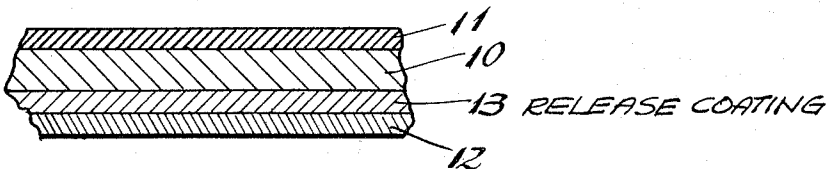
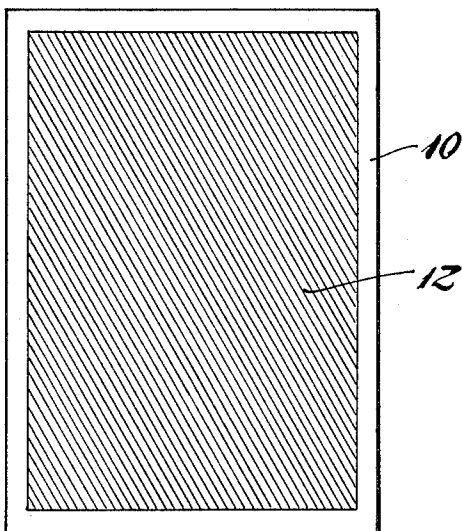


Fig. 4



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3,274,928

PLANOGRAPHIC PRINTING PLATE

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10 Claims. (Cl. 101-149.2)

This application is a continuation-in-part of copending application Serial No. 212,406, filed July 25, 1962, and now abandoned.

This invention relates to planographic printing plates having on the back surface thereof a dry, clean, rub-resistant pressure-sensitive transfer coating, and to the method of preparing the same, and more particularly to such plates wherein the transfer layer comprises oleous transfer material suitable for the placing of oleophilic or ink-receptive images on the hydrophilic surface of a planographic printing plate.

Although an inked planographic plate may be used to produce upwards of a thousand copies, most duplication requirement are far below this number at any given time, although additional copies are often required in the future. Since the inked plate cannot be stored for future use due to the presence thereon of the extremely spreadable oleous printing ink, it is necessary to produce and store additional printed copies during the single use of the plate or to image new planographic plates in the future as needed.

It is of course burdensome to retype planographic plates, particularly when the matter to be copied is lengthy. There are also problems encountered in the retyping, such as the failure of the new plate to correspond exactly with the subject matter of the original plate due to a typing error or to a loss of the original subject matter. Problems also result from the failure of the new plate to correspond exactly in quality of copy production to the original plate due to a difference in the planographic surface coating or in the oleophilic material used to image the plate.

It is an object of the present invention to prepare planographic printing plates which may be superposed in groups and simultaneously imaged in a single operation without the necessity of using additional oleophilic transfer ribbons or sheets.

It is another object of this invention to prepare plates of the aforementioned type which are completely clean to the touch and which may be stored in contact with one another under varying conditions without any inadvertent staining of the planographic printing surfaces.

Other objects and advantages are attained as is obvious from the following disclosure and drawings in which:

FIGURE 1 is a front elevational view of a planographic plate according to this invention.

FIG. 2 is a diagrammatic cross-section, to an enlarged scale, of a planographic printing plate according to this invention.

FIG. 3 is a view of a plate corresponding to that of FIG. 2 with the addition of a release coating between the plate foundation and the oleophilic transfer layer, according to one embodiment of the present invention.

FIG. 4 is a rear elevation view of a planographic printing plate according to one embodiment of the present invention.

The objects of the present invention are accomplished by preparing planographic printing plates having on the front surface thereof a planographic surface coating 11 and having on the rear or opposite surface a pressure-transferable oleophilic coating 12 which is based upon a binder material from the group consisting of cellulose

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plastics and synthetic thermoplastic resins and mixtures thereof and is so constituted as to be dry, clean to the touch and to resist rubbing off, as illustrated by FIG. 1 of the drawings.

Plates of this type may be superposed in varying numbers, depending upon the number of duplicate plates it is desired to image, so that the transferable layer of each plate is in contact with the printing surface of the next. Under the effects of imaging pressure, as by typing on the printing surface of the top plate, each of the superposed plates is simultaneously identically imaged on its printing surface with the oleophilic transfer material from the rear surface of the plate in contact therewith. The duplicate plates may then be stored for future use or may be sent to different locations for the production of printed copies.

The most critical element of the plates of the present invention is the transfer layer which must be one which is very frangible so as to transfer solid masses of the oleophilic layer to the plate under normal imaging pressure and which must have a surface which is dry, exceptionally clean to the touch and which is resistant to rubbing off or migrating to the printing surface of the plate in contact therewith when the plates are handled or stacked in superposed relationship during storage and shipment.

In line with these requirements, it has been found that the transfer layer must be based upon resinous or cellulosic film-forming or plastic binder materials or mixtures thereof, and that such transfer layers must be applied in the cold, as opposed to conventional hot melt methods, using volatile solvents or dispersion media.

The preferred transfer layers are frangible coatings containing cellulose binder material and applied with volatile organic solvents at room temperature. The following examples illustrate suitable compositions for forming the oleophilic transfer layers.

Example 1

Ingredients:	Parts by weight
Cellulose binder materials—Ethyl cellulose	5.0
Oleophilic ingredient—Mineral oil	13.0
Pigment (if desired)—Milor blue	10.0
Volatile organic solvent—Methyl alcohol	50.0
Water	5.0

The above ingredients are uniformly mixed to a smooth consistency and applied as the transfer layer 12 to the back surface of a planographic printing plate foundation 10 having on the front surface a hydrophilic printing coating 11 based upon carboxymethyl cellulose according to the teachings of my U.S. Patent No. 2,655,864, as illustrated by FIG. 2 of the drawing.

Other cellulosic binder materials may be substituted for the ethyl cellulose of the above example and synthetic resinous binders may be added thereto, the only requirements being that they are used together with oily additives to render them oleophilic and that they provide frangible transfer layers. Suitable solvents must be substituted depending upon the solvency of the particular cellulose plastic and/or resin used. Among the other suitable cellulose derivative film-formers are hydroxyethyl cellulose, methyl cellulose, carboxymethyl cellulose, and the like. Among the suitable synthetic thermoplastic resinous binder materials are polystyrene and styrene copolymers of butadiene, acrylonitrile or the like, polyvinyl chloride, and polyvinyl acetate and copolymers thereof, polyvinylidene chloride, isobutylene polymers, acrylic resins, and the like.

The following example is illustrative of a non-greasy wax-containing transfer composition containing poly-

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styrene resin as the major solid ingredient and applied from aqueous emulsion to form hard, dry transfer layers 12 according to this invention:

Example 2

Ingredients:	Parts by weight
Bakelite BKS114 (polystyrene emulsion) -----	5
Be Square Wax -----	0.82
Beeswax -----	0.55
Raw montan wax -----	0.82
Oleic acid -----	0.6
Triethanolamine -----	0.33
Milori blue pigment -----	1.38
Water -----	5.50

The following example is illustrative of a preferred oleophilic transfer composition based upon a mixture of cellulosic and resinous binder materials applied by means of a mixture of volatile organic solvents; if desired the ethyl cellulose may be omitted and replaced with a corresponding amount of the other resins:

Example 3

Ingredients:	Parts by weight
Polystyrene resin -----	1.3
Ethyl cellulose -----	1.2
Polybutene resin -----	.5
Lanolin -----	1.0
Clay -----	17.0
Graphite -----	2.0
Methyl isobutyl ketone -----	15.0
Toluene -----	62.0

The ingredients of Examples 2 or 3 are mixed to a smooth uniform emulsion, applied to a paper plate 10 having on the reverse side thereof a hydrophilic planographic printing surface 11 based upon polyvinyl alcohol and produced according to U.S. Patent No. 3,055,295. Heat is applied to evaporate the solvent and form a frangible transfer layer 12 suitable for the placing of printing-ink-receptive or oleophilic images on a planographic plate surface.

Several of the above-mentioned plates may be superposed with the transfer layers in contact with the printing layers, and may be handled or stored together without any inadvertent soiling of the printing surfaces. This is critical, of course, since any such soiling would render the plates ink-receptive in the soiled areas and thus useless.

It is advantageous to add a surface active agent or wetting agent such as Tween (polyoxyalkylene ester), Pluronic L62 (polypropylene glycol ether), Aerosol AS (naphthalene sulfonate), or the like to aid in the emulsification of the wax and in the formation of a smoother and more uniform transfer layer when wax is present in the transfer composition.

The water-borne compositions used according to this invention are based primarily upon resinous binder materials which are hard and relatively high melting. In place of the styrene of Example 2, other vinyl resins may be used, preferably those which are readily emulsifiable in water, such as acrylic and methacrylic acid and the esters and amides thereof. As is the case with the cellulose binder of Examples 1 and 3, when the water-borne formulation is based upon a resinous binder material, oleophilic ingredients such as the waxes shown in Example 2 or oils and pasty materials such as lanolin, petrolatum and the like must be added to render the transfer layer oleophilic.

Though preferred, the oleic acid-amine emulsifying agents of Example 2 may be replaced by other conventional emulsifiers such as soaps, polyoxyethylene derivatives and the like.

According to a preferred embodiment of this invention, the frangible transfer layers, such as those defined

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in the foregoing examples, are applied over a release coating 13, shown in FIG. 3 of the drawing, which aids in the transfer of the oleophilic transfer composition to the planographic plate surface. The rear surface of any planographic plate is generally sized and this aids to some extent in preventing the solvent-applied transfer layer from penetrating the foundation and being locked thereto, particularly when the size coating has been hardened. However, it is preferred that the oleophilic layer be constituted so as to be very hard and rub-resistant and that a separate release coating 13 be applied to the plate surface to increase the pressure-transferability of the oleophilic layer. Preferred for this purpose are coatings based upon vinyl, vinylidene, acrylic or methacrylic resins, which are hereinafter referred to as vinyl resins. These coatings are applied by means of a volatile solvent or dispersing medium, and when set are not soluble in the solvent or dispersing liquid used to apply the transfer layer.

In this way the transfer layer 12 is applied to the smooth surface of the resinous binder layer 13 and is readily releasable therefrom under the effects of imaging pressure.

Suitable binder layer compositions include volatile organic solvent solutions of vinyl butyrate, vinyl acetate, vinyl chloride and copolymers thereof with vinyl acetate, vinylidene chloride and copolymers thereof with vinyl acetate, acrylic acid and esters thereof, methacrylic acid and esters thereof, and the like. It is often preferred, particularly when working with water-applied transfer layers, to apply the binder layer as an aqueous dispersion or emulsion. Preferred for this purpose are latices of styrene polymers and acrylic and methacrylic acids, esters and amides.

For improved cleanliness and proof against soiling, it is preferred that the oleophilic transfer layer be free of pigment or dye and contain a semi-solid or pasty oleophilic material such as lanolin, petrolatum, fat or the like, rather than oil. Where color is desirable, for purposes of proof-reading the imaged plate, then pigment or dye may be added to the transfer layer. It is also preferred to include a large amount of filler such as clay, silica, attapulgit, calcium carbonate or other porous fillers to provide transferable layers which are exceptionally dry, clean and rub-resistant. In such cases the filler preferably constitutes the major amount by weight of the dried transfer layer, as shown by Example 3.

According to another embodiment of this invention, the oleophilic transfer layer 12 may be printed onto the reverse side of the planographic plate in such a manner as to provide a clear uncoated margin of the foundation 10 around the same, as illustrated by FIG. 4 of the drawing. This is highly advantageous since the plates are generally coated in the form of a wide web and thereafter cut into the desired sizes, and the cutting operation tends to spread the oleophilic layer 12 across the edges of the plates being cut and even onto the hydrophilic planographic coating 11 around the entire periphery of the plate, thereby giving rise to undesirable background staining on the planographic copies.

When the oleophilic coating is printed on in separate spaced applications by means of printing rollers or the like, then the cutting knives do not make contact with the same and the problem of spreading and background staining is avoided. It should be understood that a release coating may first be applied to the plate as a continuous coating rather than separate spaced applications, since the release coating material is not oleophilic and thus does not interfere with the hydrophilic properties of the plate surface, even if spread onto the edges thereof.

As set forth hereinbefore, the transfer coatings which form an essential part of the present invention are applied at or about room temperature by means of a volatile organic or inorganic solvent or dispersing medium, and contain oleophilic ingredients such as wax and/or oily

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materials which render the entire transfer composition oleophilic and enhance its attraction for and adherence to the hydrophilic printing surface of a planographic plate. The transfer layer may contain suitable coloring materials such as milori blue, alkali blue, carbon black, nigrosine black and the like, but the presence of these materials is mainly as an aid for the inspection of the coating of the transfer sheet and for proofreading the imaged plate.

Variations and modifications may be made within the scope of the claims and portions of the improvements may be used without others.

I claim:

1. A planographic printing plate comprising a foundation, a hydrophilic planographic printing coating on one surface thereof and a volatile liquid-applied pressure-transferable oleophilic layer on the opposite surface thereof, said layer having a dry, clean, rub-resistant surface and being based upon a binder material from the group consisting of cellulosic plastics and synthetic thermoplastic resins and mixtures thereof, and containing oleophilic imaging material for the placing of ink-receptive images on a planographic printing surface under the effects of imaging pressure.

2. A planographic printing plate according to claim 1 in which the volatile liquid of application is water and the binder material comprises a synthetic thermoplastic resin latex.

3. A planographic printing plate according to claim 1 in which the volatile liquid of application is an organic solvent and the binder material comprises a cellulose plastic.

4. A planographic printing plate according to claim 1 in which the volatile liquid of application is an organic solvent and the binder material comprises a synthetic thermoplastic resin.

5. A planographic printing plate according to claim 1 in which the oleophilic layer contains a major amount by weight of filler.

6. A planographic printing plate according to claim 1 in which the planographic printing coating comprises a binder material from the group consisting of carboxymethyl cellulose and polyvinyl alcohol.

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7. The process of producing a planographic printing plate which comprises the steps of:

(a) coating one surface of a suitable foundation with an aqueous planographic composition comprising a hydrophilic binder material;

(b) evaporating the water to form a planographic printing coating;

(c) coating the opposite surface of the foundation with a volatile liquid composition comprising a binder material from the group consisting of cellulose plastics and synthetic thermoplastic resins and mixtures thereof, and oleophilic imaging material; and

(d) evaporating the volatile liquid to produce a dry, clean, rub-resistant pressure-transferable layer for the placing of ink-receptive images on a planographic printing surface under the effects of imaging pressure.

8. The process of claim 7 in which the hydrophilic binder material of the planographic printing coating is from the group consisting of carboxymethyl cellulose and polyvinyl alcohol.

9. The process of claim 7 in which the volatile liquid of application is water and the binder material comprises a synthetic thermoplastic resin latex.

10. The process of claim 7 in which the volatile liquid of application is an organic solvent and the binder material comprises a cellulose plastic.

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