May 12, 1964 H. R. DALTON 3,132,584

PLANOGRAPHIC MASTER-FORMING BLANK AND METHOD OF MANUFACTURE THEREOF

Filed July 26, 1954

Fig. 1.

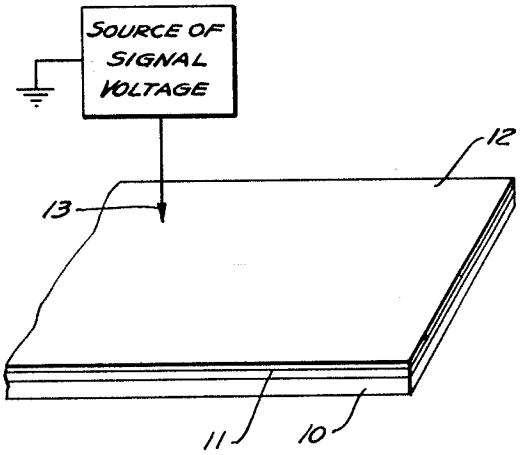


Fig. 2.

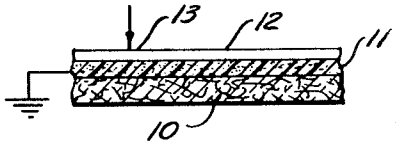


Fig. 4.

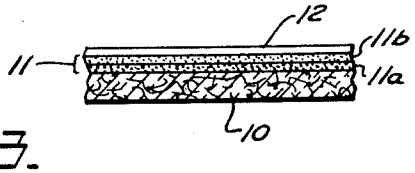


Fig. 3.

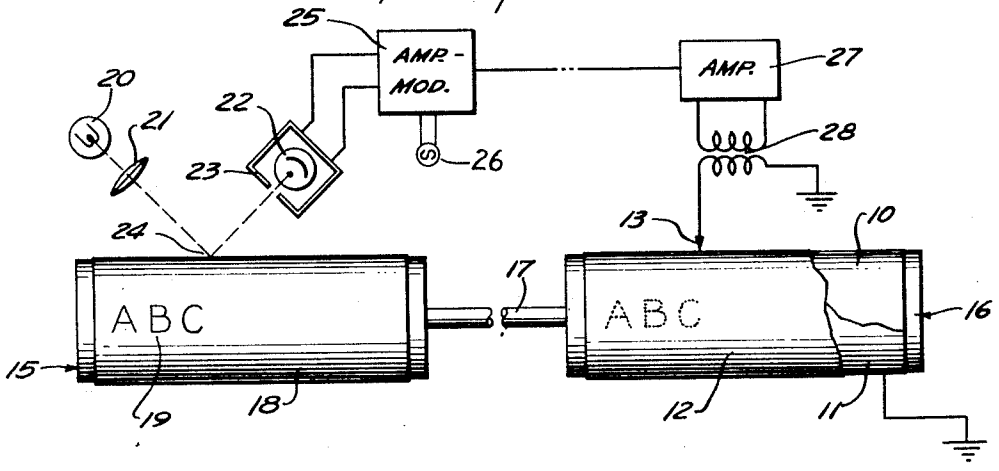
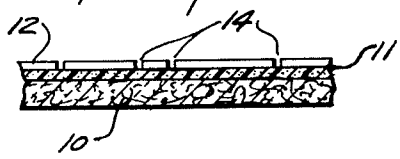


Fig. 5.



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3,132,584

PLANOGRAPHIC MASTER-FORMING BLANK AND METHOD OF MANUFACTURE THEREOF

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16 Claims. (Cl. 101—149.2)

This invention relates to planographic or offset printing blanks and methods of manufacture thereof. It is in the nature of an improvement on the blank and on the planographic master plate disclosed in application Serial No. 248,509, filed September 27, 1951.

There is disclosed in said application a planographic master printing blank comprised, in general, of a backing member whose surface has been treated to render it hydrophilic and water-insoluble while at the same time being ink-repellent for the inks usually employed in planographic or offset printing, and the like. Over that hydrophilic surface was strippably applied a layer or film of a conductive plastic, for example polyvinyl resin, which contains powdered carbon and a water-repellent ingredient such as a wax. When the blank is subjected to electric discharge from a pointed electrode, such as a signal-energized stylus, the plastic film alone is perforated at the extremely minute regions directly beneath the point of the stylus, and as a result there is transferred to the hydrophilic-surfaced backing member, a deposited record which is both water-repellent and ink-receptive. The said plastic film is applied in such a thickness, for example of the order of about 1½ to 3 mils, and is of sufficient strength and pliability so that it can be readily peeled from the backing member. This left a master plate which could be used in any well known planographic or offset printing machine.

While the blank of the said application has great utility, I have found that it is possible to make blanks without the necessity of employing a strippable film.

Accordingly, one of the principal objects of this invention is to provide a novel planographic or offset blank which can be converted into a printing master by stylus-applied electric discharges, and this master can then be used directly as such in any well known planographic or offset printing machine without the necessity of stripping a film and without the necessity of resorting to fixing or developing procedures, as are necessary with conventional photographic offset printing blanks.

Another principal object is to provide an improved planographic master printing form of paper or similar fibrous material.

A further object is to provide a novel method of making planographic or offset master printing forms.

In the drawing:

FIG. 1 is a perspective view of part of a planographic blank according to the invention. Merely for clarity, the thickness of the blank and its coatings is greatly increased in FIG. 1.

FIG. 2 is a cross sectional view, in magnified form, of part of the blank of FIG. 1.

FIG. 3 is a schematic showing of a system or organization of apparatus for producing the finished planographic master form in conformity with an original subject matter.

FIG. 4 is a cross sectional view, similar to FIG. 2, of a modification of the blank.

FIG. 5 is a magnified view of the blank of FIGS. 1 and 2, and wherein the perforations are produced by the system of FIG. 3.

Referring to FIG. 1, the blank comprises a backing member **10** of any suitable material to whose surface there is applied an electrically conducting layer **11**. This

layer may be of uniform electric conductivity through its thickness or it may be of graded conductivity through its thickness. For example, the backing member **10** may be of any well known smooth wet-strength paper, preferably one which has been made water-resistant in any well known manner as by the use of a suitable binding resin, and the surface of which has been coated with the desired thickness of the conductive layer **11**. This layer **11** in accordance with the preferred form of the invention consists of a film-forming resin wherein powdered electrically conductive carbon is incorporated and preferably uniformly dispersed throughout its thickness. The sheet or layer **11** may be formed either in a single pass or in a plurality of successive passes, which, of course, when dried, form a single continuous film or sheet of electrically conductive material. If layer **11** is formed in a succession of passes, the succeeding passes may be of different electric conductivity. Thus, as shown in FIG. 4, the layer **11** may consist of two successive passes **11***a* and **11***b*. The pass **11***a* may be formed from a mixture of a film-forming resin in liquid or semi liquid form throughout which is uniformly dispersed powdered electrically conductive carbon of predetermined amount so as to impart to the pass **11***a*, when dried, a relatively high electric conductivity considered through its thickness. The next pass **11***b* may also be formed of a liquid or semi liquid suspension of a film-forming resin containing electrically conductive powdered carbon but of a nature such that the pass **11***b*, when dried, has a considerably lower electric conductivity than pass **11***a*. While the ratio of the conductivities of the two passes **11***a* and **11***b* is not critical, preferably the pass **11***a* should have a conductivity which is the same or greater than the conductivity of pass **11***b*. In the particular embodiment of FIG. 4, the pass **11***a* may be referred to as the base coat and the pass **11***b* may be referred to as the intermediate coat. For a detailed description of typical formulations for the coating **11** and for the coatings **11***a*, **11***b*, reference may be had to U.S. patents Nos. 2,555,321 and 2,664,044. As pointed out in said application Serial No. 248,509, the plastic which forms the layer **11** may be any well known film-forming resin or plastic such for example as the following: vinyl ester polymers, or reaction products of polyvinyl alcohol and aldehydes, cellulose esters, ethers or the like; i.e., any one of the well known film-forming resins or elastomers such as vinyl chloride polymers, vinylidene chloride polymers, vinyl chloride-vinyl acetate copolymers, polyvinyl butyral polymers, styrene polymers, cellulose nitrate, cellulose acetate, ethyl cellulose, etc.

In both the embodiments of FIG. 1 and FIG. 4, the conductive plastic layer **11** has applied thereto by any well known process a top coating **12** of hydrophilic, water insoluble but ink-repellent material. For example, the coating **12** may be formed from a mixture containing casein and a hardening agent such as formaldehyde, or carboxy methyl cellulose and a hardening agent such as an aluminum salt, etc. It may also include a whitish pigment, such as zinc sulfide, with a small amount of a preservative and a small amount of a plasticizer. When the coating **12** is dried by heat, the formaldehyde or aluminum salt reacts with the casein or cellulose to harden it. The manner of preparing such coatings and the proportioning of the parts is well known in the lithographic coating art. A typical example of such prior art is that given in U.S. Patents No. 2,132,443, and No. 2,156,100.

Instead of casein, water-insoluble glue, starch, methyl cellulose, carboxy methyl cellulose, or polyvinyl-methyl-ether-maleic anhydride copolymer, can be used. If it is found that the coating **12** has, after drying, any slight

porosity, a wash coat formed for example of a dilute water solution of a cellulosic sizing agent, such as "Cellosize" or carboxy methyl cellulose, can be applied. The latter wash coating does not require any special drying heat as it dries almost immediately.

In view of the fact that the coating **12** has a much higher electrical resistance than the coating **11**, I have found that it is possible to convert the above described blank directly into a planographic printing master by subjecting the surface **12** of the blank to the action of a needle-pointed electrically charged stylus, indicated in the drawing by the numeral **13**. Since the hydrophilic and ink-repellent coating **12** is of very high resistance, as compared with coating **11**, the electric discharge from the stylus **13** results in a minute perforation of only the coating **12**, which perforation is confined to the minute region directly beneath the point of the stylus, and no perforation whatever takes place in the backing **10**. As a result, at the elemental regions where the coating **12** is perforated, the carbon containing layer **11** is exposed. These minute exposed regions of layer **11** are ink-receptive, but water-repellent. Since the remaining unperforated portions of surface **12** retain their hydrophilic and ink-repellent properties, it is possible to use the finished recorded blank directly as a master in any well known lithographic or planographic printing machine.

I have found that the coating **12** can be made of such thickness that in those regions acted upon by the electrically energized stylus **13**, the ink from the inking surface of the planographic machine is readily taken up only by the exposed carbon in registry with the minute perforations in coating **12**, as indicated by the numeral **14** in FIG. 5. In other words, in the final recorded blank, as inked by the usual inking roller of the planographic machine, the ink is substantially flush with or only slightly above the surface of coating **12**, whereas when the carbon is deposited on a hydrophilic surface, as in said application Serial 248,509, the ink is received by a slight "mound" of carbon, although this mound has an extremely minute height above the hydrophilic surface. In any event, it has been found that in a recorded plate such as that described hereinabove, it is possible to use the plate directly in a planographic printing machine without any further treatment such as stripping, photographic exposing, developing, or fixing, as is true of the ordinary planographic or offset printing masters.

Referring to FIG. 3, there is shown in schematic form an organization of apparatus for recording on the planographic blank, so as to convert it to a master ready for direct use in the press. The system comprises a pair of rotatable drums **15**, **16**, which may be mounted on a common shaft **17** and driven from a suitable motor (not shown). If desired, these drums may be separately located and each driven by a respective motor and by suitable well known means the drums may be kept in rotational synchronism. Arranged to be wrapped around the transmitting drum **15** is the sheet **18** containing the subject matter **19** to be recorded on the planographic blank, which latter blank is wrapped around the receiving drum **16** with the backing member **10** in contact with the metal surface of drum **16**, and with the hydrophilic surface **12** exposed to the recording stylus **13**. The subject matter **19** on sheet **18** is scanned in successive elemental areas by any well known electro-optical translating system, represented schematically by the light source **20**, lens **21**, photo-electric cell **22** with its apertured masking housing **23**. The units **20** to **23** can be carried on a suitable lead screw arrangement whereby they are indexed as a unit along the length of the drum **12** in timed relation to the drum rotation. Likewise, the recording stylus **13** may also be carried on the same lead screw. In other words, the scanning light beam **24** traces a scanning path on the sheet **18** in synchronism with the trace of the stylus **13** with respect to surface **12**.

The cell **22**, in the well known manner, produces electric signal voltages which are determined by the lights and shades of the subject matter on sheet **18**. These electric signals may be applied to an amplitude modulator **25** which modulates a suitable carrier wave from the source **26**. This amplified, modulated carrier wave is then received in the receiving amplifier **27**, and by means of a suitable coupling circuit or transformer **28**, the amplified signals are impressed on the stylus **13**.

Because of the electric conductivity of the layer **11**, when the stylus **13** is thus electrically energized, current flows from that stylus through a minute area on the coating **12** of the planographic blank. The electric discharge passing through the coating **12** is accurately confined to the extremely minute region beneath the tip of the stylus, thus modifying the surface **12** so as to change it at the minute recorded region from a hydrophilic, ink-repellent character to a hydrophobic, ink-receptive character. It is found that after being thus acted upon, the film or coating **12** has minute holes or perforations **14** therein where the pulses of current have been applied by stylus **13**. In order to complete the electric circuit through the planographic blank, the edge of the blank may be provided with a grounded sheet-clamping device which makes contact with the conductive layer **11**. When the recording has been completed, the blank can be unwrapped from the drum **16** and used directly in any well known lithographic, planographic, or offset printing machine.

If desired, a suitable water-repellent ingredient, such as a wax, may be mixed with the powdered carbon to increase the water repellency of the exposed carbon without materially affecting its ink receptivity.

What is claimed is:

1. The method of making a blank which is useful for recording electric facsimile signals and also for lithographic printing after such recording thereon, which method comprises applying to a backing member a carbon-containing coating which contains electrically conductive powdered carbon and a film-forming binder and which is water-repellant and ink-receptive, and applying over said carbon-containing coating which includes a powdered pigment and a water insolubilizing ingredient to render it a lithographic coating perforatable in minute localized areas by stylus applied electric discharges, said lithographic coating including an ink-repellent ingredient, a hydrophilic binder, a water insolubilizing ingredient and a powdered pigment, the said lithographic coating being of a thinness sufficient to mask the background color of the carbon-containing coating.

2. The method according to claim 1, in which said conductive coating is applied with a graded conductivity considered through its thickness and with the stratum of lower conductivity located adjacent said lithographic coating.

3. The method according to claim 1, in which said conductive coating is formed by mixing powdered carbon with a film-forming resin and with a water-repellent ingredient.

4. The method of making a lithographic printing master which comprises applying to a water-resistant backing member a carbon-containing layer integrally bonded thereto, which layer includes electrically conductive powdered carbon and a film-forming binder and which is water-repellent and ink-receptive, applying over said carbon containing layer a lithographic coating which is perforatable in minute localized areas by stylus-applied electric discharges, said lithographic coating being hydrophilic, ink-repellent and water-insoluble and of a thinness sufficient to mask the background color of the carbon-containing coating, and perforating said lithographic coating by applying thereto electric discharges in signal-controlled localized areas.

5. A lithographic printing master comprising, in combination, a water-resistant backing member to which is permanently and integrally attached an electrically con-

ductive layer containing electrically conductive powdered carbon and a film-forming binder and which layer is water-repellent and ink-receptive, and a lithographic coating of hydrophilic, ink-repellent and water-insoluble material on said conductive layer, said lithographic coating being of a thinness sufficient to mask the background color of said carbon-containing layer, said lithographic coating having minute perforations corresponding to subject matter to be printed and thereby exposing the corresponding minute ink-receptive areas of said carbon-bearing layer, the unperforated areas of said lithographic coating retaining their hydrophilic ink-repellent and water-insoluble characteristics.

6. An electrosensitive recording blank comprising a backing, an electrically conductive ink-receptive coating on said backing which contains electrically conductive powdered carbon and a film-forming binder, and a lithographic coating on said conductive coating which lithographic coating is hydrophilic, ink-repellent and includes a water insolubilizing agent.

7. An electrosensitive recording blank according to claim 6 in which said ink receptive coating includes a water repellent ingredient.

8. An electrically inscribable lithographic printing plate comprising a wet-strength paper base having an electrically conductive and oleophilic coating adhered thereto, said oleophilic coating containing electrically conductive carbon and a binder as the essential ingredients thereof, and, on the said oleophilic coating, an adherent, water insoluble, hydrophilic coating containing, as the essential ingredients thereof, a hydrophilic colloid, an insolubilizing agent for the said colloid and zinc sulfide as a pigment; the hydrophilic coating being removable by and the oleophilic coating not being removable during the inscribing of the lithographic printing plate by an electric current.

9. A lithographic printing blank, comprising a flexible backing member having an exposed surface coating which contains a pigment filler in a hydrophilic binder to render it water receptive and which coating includes a water insolubilizing agent, and an electrically conductive layer between said backing member and said surface coating being of a thinness merely sufficient to mask the color of the conductive layer which layer consists of an electrically conductive plastic film of a film-forming resin and powdered carbon, said surface coating being of a thinness merely sufficient to mask the color of the conductive layer when removed in localized areas by electric voltages stylus-applied thereto exposing the said conductive layer only at said localized areas which areas are ink-receptive.

10. An electrosensitive recording blank comprising a backing, an electrically conductive water-repellent but ink-receptive film-forming resin coating on said backing, said coating containing powdered carbon in a film-forming resin binder, and a lithographic coating on said conductive coating which lithographic coating includes a filler and hydrophilic binder to make it water-receptive but is water insoluble by inclusion of a separate insolubilizing agent.

11. A blank for making a printing master of the lithographic kind, said blank comprising in combination a backing having an electrically conductive coating containing a film-forming resin and powdered carbon dispersed throughout the resin, which coating is normally water-repellent but ink-receptive, and a hydrophilic lithographic coating containing a hydrophilic binder and an insolubilizing agent therefor together with a powdered pigment uniformly dispersed therein, said lithographic coating being of a thinness which masks the background color of said conductive coating and being of higher resistance than said conductive coating, rendering said lithographic coating removable in localized areas corresponding to localized electric discharge thereat to expose corresponding areas of said conductive coating which are water-repellent and ink-receptive for lithographic printing, while the remaining unremoved areas of said lithographic coating are hydrophilic but water insoluble.

12. A blank according to claim 11 in which said conductive coating is formed of at least two strata of respectively different electric conductivities.

13. A blank according to claim 12 in which the carbon in the stratum next adjacent to the lithographic coating contains a water-repellent ingredient.

14. A blank according to claim 11 in which said lithographic coating contains casein insolubilized with a hardening agent.

15. A blank according to claim 11 in which said lithographic coating contains a binder chosen from the group consisting of casein, water insoluble glue, starch, methyl cellulose, carboxy methyl cellulose, and polyvinyl-methyl-ether-maleic anhydride copolymer.

16. An electrically inscribable lithographic printing plate comprising a paper base having an electrically conductive and ink-receptive coating adhered thereto, said ink-receptive coating containing electrically conductive carbon and a binder as the essential ingredients thereof, and on the said ink-receptive coating, an adherent, water insoluble, hydrophilic coating, containing, as the essential ingredients thereof, a hydrophilic colloid, an insolubilizing agent for the said colloid, and a whitish pigment; the hydrophilic coating being removable by, and the ink-receptive coating not being removable during the inscribing of the lithographic printing plate by an electric current.

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