April 17, 1973 H. F. GIPE 3,728,123

PLATE FOR DRY PLANOGRAPHY

Original Filed Nov. 14, 1969

FIG. 1

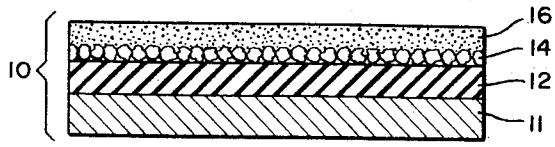
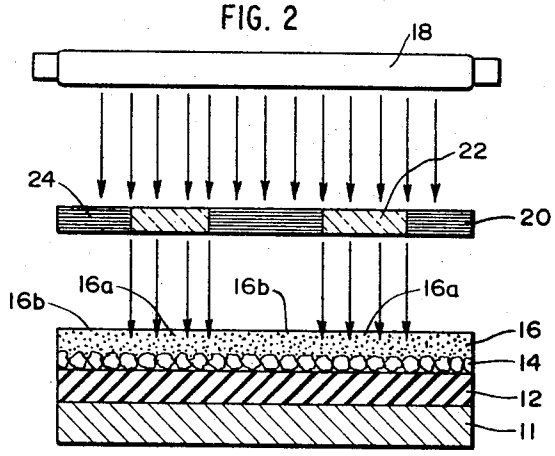


FIG. 2



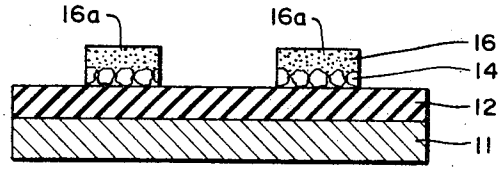


FIG. 3

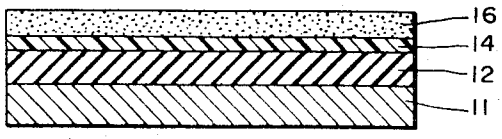


FIG. 4

INVENTOR
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United States Patent Office 3,728,123
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3,728,123

PLATE FOR DRY PLANOGRAPHY

Harry Frank Gipe, Baltimore, Md., assignor to Scott Paper Company, Philadelphia, Pa.

Original application Nov. 14, 1969, Ser. No. 876,688, now Patent No. 3,632,375, dated Jan. 4, 1972. Divided and this application May 20, 1971, Ser. No. 145,224
Int. Cl. G03c *1/52, 1/64, 1/66*
U.S. Cl. 96—75 3 Claims

ABSTRACT OF THE DISCLOSURE

A negative acting presensitized plate for use in dry planography, said plate comprised of a flexible substrate having coated thereon a layer of silicone rubber which when cured will not accept printing ink, a layer of polymeric anchoring material overlying and adhered to the silicone rubber layer and a layer of photoresponsive image forming material coated over said anchoring material with the anchoring material serving to bond the photoresponsive image forming material to the silicone layer.

RELATED APPLICATION

This application is a division of U.S. patent application, Ser. No. 876,688, filed Nov. 14, 1969, now U.S. Pat. 3,632,375.

BACKGROUND OF THE INVENTION

This invention relates to that form of dry planography in which there is used a planographic plate having background or non-imaged surface areas consisting of elastic silicone rubber that, although not moistened by water or other liquid, will not accept printing ink from a rotating inking roller passed thereover. In particular, it relates to a new method of making a presensitized planographic printing plate for use in dry planography and to the new presensitized plate.

New planographic plates have been developed which do not require the use of a fountain solution to prevent the non-imaged areas from picking up ink (toning). See French Pat. No. 1,475,466, British specification No. 1,146,768, published Mar. 26, 1969, and Belgian Pat. No. 709,037. These patents disclose a new presensitized planographic printing plate for use in a dry planographic process. Not only do the new planographic plates not require the application of a fountain solution to prevent the non-imaged background area from picking up ink during the printing operation but the application of a fountain solution is not desirable. The background or non-imaged area of the plates is a cured elastic silicone rubber that does not remove the printing ink from the surface of an inking roller as the inking roller passes across the face of the plate.

One of the plates described in French Pat. No. 1,475,466 is a presensitized plate having a layer of photopolymerizable water soluble diazonium salt beneath the layer of silicone rubber. When that plate is exposed to light through a positive transparency, the diazo compound in the exposed background area is photopolymerized and insolubilized while the diazonium salt in the unexposed image area remains water soluble. Following exposure, the surface of the plate is treated with aqueous developing liquid which penetrates the silicone layer, dissolves the water soluble diazo compound in the image area thereby allowing the overlying silicone rubber to come away exposing the oleophilic surface of the presensitized plate in the imaged area. The exposed surface of the presensitized plate will then accept ink from the inking rollers while the silicone rubber background areas will not remove ink from the rollers and thus remains ink free. The resulting plate is capable of printing thousands of copies. This plate

requires considerable care and effort to develop due to the need to remove silicone in the image areas. When the silicone layer is thin enough to be removed easily it may not "run" as cleanly as desirable when used with low tack inks. When the silicone layers, however, are too thick, they are very difficult to remove in the image areas.

A presensitized plate also can be prepared by rubbing a powdered water soluble diazonium salt into the cured silicone rubber surface of a plate comprised of a support and a layer of silicone rubber. Upon exposure of the plate prepared in this manner to a negative transparency, the light insolubilizes the diazonium compound in the imaged area, but the diazo in the unexposed area remains soluble and is readily removed by washing with aqueous developer. The resulting plate is capable under best conditions of printing only a few hundred copies.

In view of the large market for relatively inexpensive short-run plates, it is very desirable to be able to produce a silicone rubber plate that is imageable through a negative, and which is capable of printing from 1000 to 5000 copies without losing image fidelity. Such a plate would, as can readily be seen, display a significantly longer press life than the plate produced by rubbing powdered diazo into the surface of the silicone. Prior to the present invention, the production of relatively inexpensive short run plates has been very difficult because photoresponsive diazo sensitizers do not readily adhere to the surface of the silicone rubber layer. Aqueous solutions of sensitizers do not even wet the silicone rubber, much less adhere to it, and rubbing powdered diazo into the surface of the silicone rubber has not turned out to be very practical. The present invention provides a more practical method for firmly attaching the sensitizer layer to the silicone rubber. Furthermore, the plates of the present invention have a significantly longer press life and good image fidelity.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 represents a sectional view of the new planographic plate showing the base, silicone rubber layer, finely divided particles of polymeric anchoring material and overlayer of photoresponsive image forming material.

FIG. 2 represents a sectional view depicting the exposure of the new planographic plate.

FIG. 3 represents a sectional view illustrating an exposed and developed plate of the present invention.

FIG. 4 represents a sectional view of the new planographic plate showing the base, film of polymeric anchoring material and overlayer of photoresponsive image forming material.

DESCRIPTION OF THE INVENTION

It has now been discovered that an improved presensitized negative-acting dry planographic plate comprised of a base coated with non-ink-receptive silicone rubber and a layer of photoresponsive image producing material overlying the silicone can be produced by interposing a layer of polymeric anchoring material between the photoresponsive image producing material and the silicone rubber layer. The polymeric anchoring material is applied to the surface of the silicone while the silicone is uncured and still adhesive thereby providing an adhesive bond between the silicone and the polymeric bonding material. The photoresponsive image forming material is then coated over the anchoring material. The silicone layer with the polymeric layer in contact therewith is usually cured prior to the application of the photoresponsive material. The plate thus prepared is ready to be exposed or imaged.

The new planographic plate of the present invention and the method of producing said plate are more easily understood by reference to FIGS. 1–4. FIG. 1 represents a cut away view of the new planographic plate comprised

of a flexible substrate **11** having coated on at least one surface thereof a layer **12** of silicone rubber. The surface of the silicone rubber layer is coated with a layer **14** of water softenable polymeric anchoring material. The water softenable polymeric material comprising layer **14** serves as an anchor for the layer **16** of photoresponsive image forming material thereby forming a bond between the image forming material and the silicone rubber layer. In FIG. 1 the layer **14** of anchoring material is depicted as finely divided particles. In FIG. 4 the polymeric anchoring material is shown as a film of polymeric material.

In producing the new planographic plate, a layer of silicone gum is applied to the flexible substrate by known coating apparatus such as a reverse roll coater, blade coater, Mayer bar, knife, etc. Before the silicone gum has cured and while the silicone is still tacky and adhesive, a layer of polymeric anchoring material is applied to the surface of the silicone layer. However, when the silicone gum contains a solvent it is preferred that at least a substantial portion of the solvent be evaporated before a polymeric anchoring material is applied to the silicone layer. Removal of the solvent increases adhesion between the polymeric material and the silicone and prevents the solvent from damaging the material. The solvent is evaporated if necessary by heating the silicone briefly by such convenient means as infrared, heated air, etc. Care must be taken, however, not to cure the silicone at this time, prior to the application of the polymeric anchoring material; therefore, the evaporation of solvents should be carried out quickly. If the silicone gum becomes cured before being brought into contact with the polymeric material, the polymeric material will not adhere to the silicone. The layer of polymeric anchoring material can be applied as a plurality of finely divided polymer particles or as a thin film as illustrated in FIGS. 1 and 4. The finely divided particles of polymer can be applied to the adhesive silicone surface by any convenient means; however, at least a portion of the surface of substantially all particles should be in adherent contact with the silicone gum. Representative method of applying the finely divided particles including dusting or entraining the particles in a flowing gas and impelling the particles against the surface of the uncured silicone so that at least a portion of the particle surface is in adherent contact with the silicone layer. Any excess particles of polymeric material not in adhesive contact with the silicone layer are removed by air blast, vacuuming, light brushing or other suitable technique.

The thin polymeric films are applied to silicone gum by known film laying techniques. In a preferred embodiment the thin films of polymeric anchoring material are supported by an easy release carrier and applied to the uncured silicone gum. The easy release carrier is then stripped away leaving the film of polymeric anchoring material adherred to the silicone gum.

After the silicone gum and the polymeric anchoring material are in adhesive contact, the silicone gum layer is usually allowed to cure. The manner in which the silicone gum is cured will depend upon the particular silicone gum being employed. Many of the silicone gums will cure at room temperature with the passage of time and exposure to moisture; in such cases active curing procedures such as heating are not required. However, heat often can be utilized to enhance curing or is used to cure those silicone gums which do not cure at room temperatures. When heat is used to cure the silicone layer or to enhance curing, care should be taken to maintain the temperature below the temperature at which the polymeric film is damaged by heat. The curing step of the method of the present invention encompasses those cases where the silicone gum is merely allowed to cure under ambient conditions such as at room temperature as well as those cases where active curing step such as heating are employed.

Following the application of the polymeric anchoring material to the silicone gum the anchoring material is coated with a layer of photoresponsive image forming material which will for the sake of convenience be hereinafter referred to as the photosensitizer. The photosensitizer is applied to the polymeric anchoring particles or film as an aqueous solution by standard coating techniques such as reverse roll coated, Mayer bar, blade, spray and the like and any excess photosensitizer can be removed by air knife. The photosensitizer coating is thereafter dried to remove the aqueous solvent and to leave the photosensitizer as a residue covering the anchoring particles or film and in adherent contact therewith. The sensitizer layer will have to be dried in a manner so as not to activate the photosensitizer and at temperatures which will not have a deleterious effect on the sensitizer. Means of so drying sensitizers such as by forced air, heated or unheated, and under non-activating conditions, are well known to those skilled in the production of lithographic plates.

In a preferred procedure, the silicone gum is cured prior to the application of the photosensitizer. The dried plate comprised of substrate **11**, silicone layer **12**, polymeric anchoring layer **14** and photoresponsive image forming layer **16** is ready to be exposed.

FIG. 2 graphically depicts the exposure of a new dry planographic plate wherein the photosensitizer is an initially water soluble diazo sensitizer. The photosensitizer layer **16** is exposed to a source of actinic radiation from actinic light source **18** through a negative transparency **20**. The actinic radiation passes through the transparent image areas **22** causing photoactivation of the corresponding areas **16***a* of the photosensitizer layer **16** thereby rendering areas **16***a* insoluble and firmly bonded to the immediately underlying areas of the anchor layer **14**. The opaque background areas **24** of the negative shield the underlying portions of layer **16** from the light source. Consequently, these areas are not exposed and the photosensitizer layer in these areas remains soluble. The activation and resultant insolubilization of the photosensitizer in the exposed or image areas for reasons not fully understood increases not only the adhesion between the photosensitizer and water swellable polymer but also seems to strengthen the bonding between the particles of water swellable polymer and the silicone rubber. This effect is referred to as tanning. The unexposed, still soluble background areas are then removed by standard development procedures. For example, the surface of the plate is treated with a developer solution such as water or a water-lower alkanol mixture that removes the unexposed soluble portions of layer **16** and the underlying areas of layer **14** leaving the insolubilized image areas **16***a* firmly attached to the surface of the silicone layer **12** by means of the anchoring material **14**.

FIG. 3 shows a developed plate where the insolubilized image portions **16***a* of the photosensitizer layer **16** are ink receptive and retain printing ink whereas the exposed areas of silicone layer **12** are not ink receptive and do not pick up ink during the subsequent printing process. Furthermore, no fountain solution is required to keep the exposed silicone background areas from picking up ink.

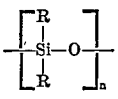
In the present invention, the flexible substrate **11** can be substantially any flexible material having sufficient dimensional stability to withstand the stresses encountered during the lithographic process. Representative substrate materials include metal sheet such as aluminum or paper, plastic, foil coated plastic or paper and the like.

Silicone rubbers suitable for use in the present invention are well known. Essentially, they are elastomers of high molecular weight about 400,000 to 800,000 formed by slightly cross-linking linear diorganosiloxanes (preferably dimethylsiloxane) and stopped by acyloxy, hydroxyl or oxime radicals. The cross-linking is usually the result of action by metal carboxylates, and heat, if necessary, or moisture. These silicone rubbers are commonly referred to as "silicone elastomers" and are formed by the cure of further polymerization of "silicone gums."

Silicone elastomers, formed by further polymerizing the gums, can be characterized generally as the very sparsely

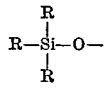
cross-linked (cured) dimethyl polysiloxane of high molecular weight. The sparsity of cross-linking is indicated by R/Si ratios very close to 2, generally above 1.95, or even above 1.99, and generally below 2.1 or even below 2.01, there usually being 200–500 dimethyl units between cross-link sites. In contrast, the much more densely cross-linked silicone resins which are considered commercially useful fall in the range of R/Si ratios of 1.2–1.5.

Representative silicone gums include the diorganopolysiloxanes having the central repeating linear

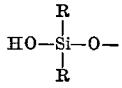


unit, where n may be as small or as large as 20,000 or more, and where the R moieties in the chain may be the same, but need not be, each individual R being a monovalent alkyl or aryl group, halogenated alkyl or aryl group or cyano alkyl group, with not more than a few percent of total R being vinyl, phenyl, or halogenated vinyl or phenyl, the major proportion of R usually being methyl groups.

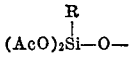
While an internal R may become a cross-linking site, depending somewhat on the curing mechanism, cross-linking more frequently involves the end groups which may be



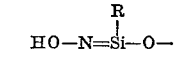
or



or



or



where "R" has the same meaning as above, and where Ac is a saturated aliphatic monoacyl radical.

The polymerizable silicone gums preferably are compounded with a catalyst to promote cure. The catalysts employed in the silicone rubber compositions include the organic carboxylic acid salts of tin, zinc and other multivalent metals and are well known in the art. Available commercial silicone gum compounds generally provide, after curing, satisfactory silicone rubber layers which adhere to the substrate and provide good mechanical properties which minimize problems of wear, both in physical handling and under the abrasive conditions on the press. In addition to the catalyst, other materials are often compounded with the silicone gums, for example, fillers such as the silica fillers can be employed, to improve mechanical properties of the cured silicone rubber. It is not vitally necessary that the elastomer be filled. For example, silicone gum SE–76 (General Electric Company) reported to have an average molecular weight of 400,000–500,000, is an example of an unfilled silicone gum which, after curing to an elastomer, provides a satisfactory adhesive surface. Other silicone gums which upon curing provide good silicone rubber layers include General Electric's RTV–108, RTV 60 potting compound, RTV–118, S.S.–414, S.E.–30, S.E.–52, S.E.–76 and G.E. Clear Seal and Dow Corning's Syloff 23, Syloff 236, Silastic 432. The teachings of my co-pending application, U.S. Ser. No. 706,286, filed Fem. 18, 1968, concerning usable silicone compositions are incorporated herein by reference.

The photosensitizers useful in the present invention are those light sensitive materials exhibiting a higher degree of solubility in aqueous media prior to being exposed to actinic radiation than after being exposed. Suitable photosensitizer materials, upon being activated by actinic radiation, react with or otherwise become firmly bonded (tanning) to the polymeric anchoring materials and appear to increase not only the adhesion between the photosensitizer and anchoring layer but also the adhesion between the anchoring layer and the silicone layer. The photopolymerizable initially water-soluble diazo compounds represent a class of photosensitive materials that are suitable in the present invention. Of particular use for the purposes of the present invention are the formaldehyde condensation products of double salts of zinc and para-diazodiphenylamine. Other representative diazonium salts are disclosed in U.S. Pat. No. 2,649,373. The diazo sensitizer is generally dissolved in an inert liquid carrier, such as water or a water-lower alkanol mixture. Other solvents can be employed such as methyl Cellosolve, methyl isobutyl ketone, methyl ethyl ketone, acetone or ethyl acetate. The sensitizer solution or suspension is then coated on the anchoring layer by conventional means such as air knife, Mayer bar or reverse roll coater. The sensitizer coating is then dried at room temperature or at elevated temperatures that do not have any deleterious effect on the sensitizer. In general, the diazo sensitizers withstand temperatures up to about 70° C. for a few hours.

The layer of polymeric anchoring can be either finely divided particles of polymeric material or can be a continuous film of polymeric material. The term "polymeric material" as employed in the present specification and claims referes to natural or synthetic polymers that are soluble in or softenable by water and which are tannable by or react with the photosensitizer to produce a strong substantially insoluble bond between the photosensitizer and anchoring material so as to prevent the activated insolubilized photosensitizer from being removed during the developing procedure and to provide a durable image which will withstand the relatively large and frequent stresses created by rapidly splitting the ink films formed during the printing process. Examples of water softenable polymeric materials include gelatin, polyacrylamide, polyvinyl pyrrolidone and copolymers of poly(methylvinyl ether) and maleic anhydride such as "Gantrez" sold by General Aniline and Film Corporation.

Polymers which are normally water-soluble but which are tanned to an insoluble condition by diazos under the action of light are also satisfactory. Representative water soluble films include polyacrylamides, polyvinyl pyrrolidone, polyvinyl alcohol and alkyl cellulose ethers such as methyl cellulose, hydroxyethyl cellulose and carboxymethylhydroxyethyl cellulose.

When finely divided particles of polymer are employed, the size of the particles is not critical provided that the particles are not so large that they produce an uneven surface, i.e., large than 44 microns. Conventionally, a majority of the particles pass through a 325 mesh screen. Particles larger than 44 microns tend to produce an uneven surface and while such an uneven surface will still serve as a base for the photoresponsive image forming material, the image is not smooth and, therefore, does not accept ink uniformly and does not print evenly.

To ensure adherence of the photoresponsive material to the anchoring particles or film it has been found necessary in most cases to employ a tannable binder along with the photoresponsive image forming material. The binder is tanned by the photosensitizer during the photoactivation of the sensitizer and the tanned adhesive increases the bonding strength between the photoactivated sensitizer and the anchoring materials. Representative binders include water soluble binders such as gelatin or polyacrylamide or aqueous emulsions of binders such as polyvinyl acetate. In addition to causing the photoresponsive material to adhere more strongly to the anchoring particles,

the binder also fills the voids between adjacent particles giving the plate a smooth and more level top surface; hence making the image area of the developed plate smooth, thereby minimizing variations in the ink density of prints made therefrom. When the polymeric anchoring material is in the form of a film as opposed to a layer of discrete particles, adequate bonding between the sensitizer and anchoring material is obtained without the use of a tannable adhesive.

When employing a polymeric film, good results are obtained when the film has a thickness of from 0.01 to 0.2 mil and preferably from 0.01 to 0.1 mil. Films materially thicker than 0.2 mil are undesirable in that the thickness of the film makes it difficult to develop the plate following exposure; greater scrubbing is required to remove the polymeric anchoring material in the non-image or background areas. Furthermore, thicker films are more difficult to "tan" all the way through than the thinner films, thereby, in those cases where they do not "tan" through resulting in a weaker bonding between the silicone, polymeric layer and sensitizer in the image areas. This is undesirable because the stresses encountered during the printing process make it necessary that the image areas be bonded to the base and silicone layer as strongly as possible.

SPECIFIC EMBODIMENTS

Example 1

A sheet of 5 mils, anodized aluminum was coated by means of a #10 Mayer bar with a layer of Dow Corning Corporation's silicone rubber adhesive "Silastic RTV–732." Within one minute, the still wet uncured surface was dusted with 325 mesh polyacrylamide powder (American Cyanamid Company's PAM 200) and excess powder was blown off the surface of the silicone. The sheet was then allowed to cure at room temperature for 24 hours. Then the surface was coated by means of a #10 Mayer bar with layer of composition made as follows, all parts being parts by weight:

100 parts of a polyvinyl acetate emulsion of 55% solids was diluted with 100 parts of water and to this was added 2.6 parts of a formaldehyde condensable of the double chloride of zinc and paradiazo diphenylamine dissolved in a mixture of 130 parts of water and 65 parts of isopropanol.

The sensitized plate was air dried and then exposed for one minute through a negative transparency to a 35 ampere carbon arc at a distance of 26 inches. Thereafter, the exposed plate washed with water and rubber lightly with a pledget of cotton wet with water to remove both the sensitizer and the polyacrylamide particles from the unexposed areas. The plate, after being dried, was then run on a Multilith No. 1250 rotary offset duplicator from which the moistening rollers had been removed, so that the background areas were run dry. 2600 copies were printed from the plate.

Example 2

An aluminum sheet was coated with "Silastic RTV–732" dusted with polyacrylamide powder, and cured, all as in Example 1. Thereafter, the surface was coated by means of a #10 Mayer bar with a solution in a 6 to 1 mixture of water and isopropanol of 2.5% of 275 Bloom gelatin and 1% of a formaldehyde condensate of the double chloride of zinc and paradiazo diphenylamine. The coating was dried and the sheet was then exposed for 2 minutes to a 35 ampere carbon arc. The exposed surface was swabbed with warm water, which removed sensitizer and polyacrylamide from the unexposed areas but did not effect the exposed image. Several thousand copies were printed from the dry plate on a Multilith duplicator from which the dampening rollers had been removed.

Example 3

A sheet of clean aluminum was coated by means of a #10 Mayer bar with a layer of General Electric silicone rubber adhesive 108 RTV. While still wet and adhesive, the surface was dusted with 325 mesh dry powdered copolymer of poly(methyl, vinyl ether) and maleic anhydride (Gantrez AN–119 of General Aniline and Film Corporation), and the so-dusted sheet was allowed to cure for 24 hours at room temperature. Thereafter, the surface was coated by means of a #10 Mayer bar with the same sensitizing coating used in Example 1. It was thereafter swabbed with a 2 to 1 water-isopropanol mixture to clean away the unexposed sensitized coating and Gantrez. Several thousand copies were then printed from the dry plate on a Multilith duplicator from which the dampening rollers had been removed.

Example 4

A 10 percent aqueous solution of polyvinyl alcohol (Air Reduction's Vinol 125) was applied by means of a #6 Mayer bar to a glossy-finish release-coated paper (Warren's Transkote Patent A) in an amount sufficient to provide a 0.5 gram square meter (dry weight) of coating. A sheet of clean 5 mil aluminum was coated by means of a #28 Mayer bar with an RTV silicone gum (Dow Corning Corporation's XC30586) diluted with an equal weight of xylene. This film, after being dried for 30 seconds to evaporate the xylene, was about 0.5 mil in thickness. Immediately following the 30 second drying period, the polyvinyl alcohol film carried on the release carrier web was rolled into contact with the wet sticky adhesive silicone layer. The resulting sandwich was then cured for 48 hours at room temperature. Following the cure, the sheet of Transkote release carrier web was stripped off, leaving the polyvinyl alcohol film exposed with its reverse side adhered to the silicone. The polyvinyl alcohol surface was then washed over with a sensitizing solution having the following composition in parts by weight:

	Parts
Formaldehyde condensate of the double chloride of zinc and paradiazodiphenylamine	2
Water	65
Isopropanol	33

The sensitizing solution was applied and dried below 70° C. under yellow light. The sensitized sheet was then exposed through a negative transparency to a 35 KVA carbon arc at a distance of 26 inches for 80 seconds. After such exposure, the unexposed areas were removed by a wash of warm water. The plate was then completely dried and mounted on the plate cylinder of a "Multilith" offset duplicator from which the molleton moistening rollers had been removed. Copies were printed from the dry plate using Addressograph-Multigraph ML–36 ink. The run was stopped after 7000 copies had been printed at that time.

I claim:

1. A planographic plate for use in dry planography comprising

a base element,

a layer of silicone rubber adhesively bonded to at least one surface of the base element,

a layer in adherent contact with the silicone rubber, comprised of a plurality of finely divided particles of a water softenable or water soluble polymeric anchoring material which reacts with a diazo photosensitizer upon exposure to light to become substantially insoluble in water, said particles being not larger than 4 microns in size, and

overlying the polymeric anchoring material and in adhesive contact therewith, a layer of photoresponsive image forming material, which is an initially water soluble diazo photosensitizer which becomes

substantially water insoluble following exposure to actinic radiation.

2. The plate of claim 1 wherein the polymeric anchoring material is selected from the group consisting of gelatin, polyacrylamides, polyvinyl pyrrolidone, copolymers of poly (methylvinyl ether) and maleic anhydride, polyvinyl alcohol, and alkyl cellulose ethers.

3. The plate of claim 2 wherein the alkyl cellulose ether is selected from the group consisting of methyl cellulose, hydroxyethyl cellulose and carboxymethylhydroxyethyl cellulose.

References Cited

UNITED STATES PATENTS

2,804,388	8/1957	Marron et al.	96—75 X
3,161,517	12/1964	Doggett	96—75
3,511,178	5/1970	Curtin	96—33 X
3,606,922	9/1971	Doggett	96—33 X

DAVID KLEIN, Primary Examiner

U.S. Cl. X.R.

96—33

0-1050
5/69)

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,728,123 Dated April 17, 1973

Inventor(s) Harry Frank Gipe

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, line 40, "method" should be --methods--;
line 72, "step" should be --steps--.

Column 4, line 5, "coated" should be --coater--.

Column 5, line 70, "potting compound" should be --Potting Compound--
line 74, "Fem. 18," should be --Feb. 18,--.

Column 6,
line 33, "referes" should be --refers--,
line 57, "large" should be --larger--.

Column 7, line 2, "smooth" should be --smoother--;
line 43, "condensable" should be --condensate--;
line 51, "rubber" should be --rubbed--.

Column 8, line 57, after "printed" insert --even though satisfactory copies were still being printed--;

line 71, claim 1, "4" should be --44--.

Signed and sealed this 5th day of March 1974.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents