Jan. 19, 1943. W. C. TOLAND ET AL 2,309,027

PHOTOGRAPHIC PLATE PROCESS

Filed Nov. 12, 1941

Fig. 1.

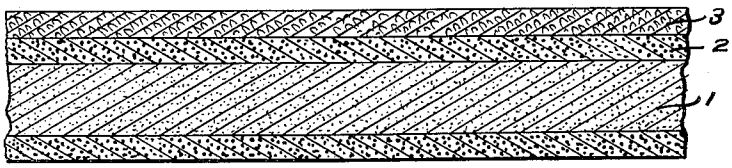


Fig. 2.

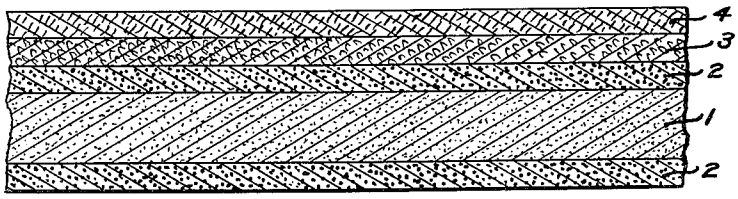


Fig. 3.

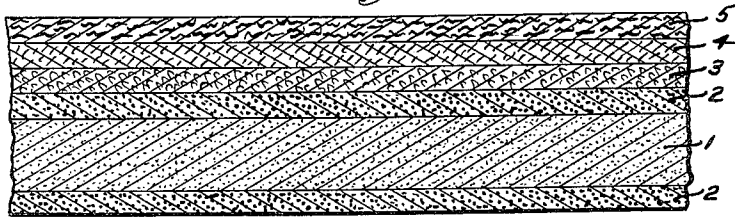


Fig. 4.

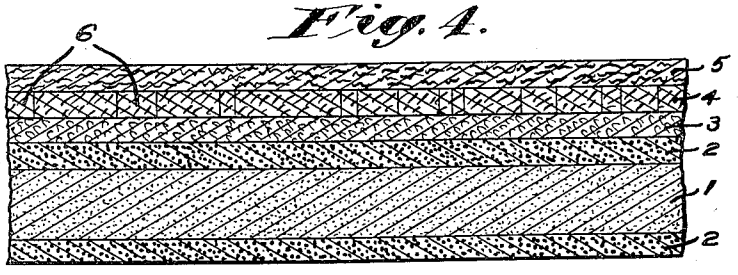
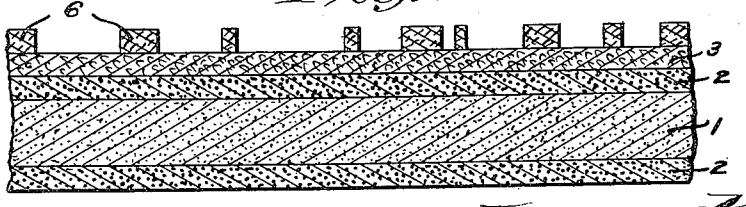


Fig. 5.



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UNITED STATES PATENT OFFICE

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PLANOGRAPHIC PLATE PROCESS

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Application November 12, 1941, Serial No. 418,682

7 Claims. (Cl. 95—5.4)

This invention relates to methods of making planographic printing plates and more especially to methods of making colloidal printing plates, and is a continuation in part of our copending application, Ser. No. 372,727, filed January 2, 1941.

An object of the invention is to improve methods of making planographic printing plates and to devise improved procedures for applying, exposing and developing light-sensitive materials, with a view to eliminating the use of whirling plates; to effecting savings in light-sensitive materials, to avoiding the use of running water in washing plates and thereby making possible the use of paper plates and other types of plates in place of metal plates; to extending the period of sensitivity of light-sensitive mixtures of the chromic salt type; and generally to simplifying and cheapening the preparation of planographic printing plates.

The nature of the invention and its objects will be more fully understood from the following description of the drawing and discussion relating thereto.

In the accompanying drawing:

Fig. 1 is an enlarged fragmentary cross sectional view illustrating a step in the method of making a planographic printing plate in accordance with the invention;

Fig. 2 is an enlarged fragmentary cross sectional view illustrating another step in the method referred to;

Fig. 3 is an enlarged fragmentary cross sectional view illustrating a further step in the method noted;

Fig. 4 is an enlarged fragmentary cross sectional view illustrating still another step in the method; and

Fig. 5 is a cross sectional view illustrating a final step in the preparation of the plate.

In an earlier patent, No. 2,230,981, issued Feb. 4, 1941, we have disclosed a novel planographic printing surface and a method of preparation therefor. The printing surface consists of a water-receptive coating obtained from an aqueous suspension of colloidal material which functions as a substitute for the grained metal surfaces of lithographic printing plates.

In accordance with the invention, we provide a method of making plates in which the water-receptive coating of the above noted patent is applied over some suitable base and dried.

A water-soluble coating of a light-sensitive salt and a colloid, of the type which may be hardened to a water-insoluble state upon exposure to actinic light, is laid over the water- receptive coating. The light-sensitive material is allowed to dry and then covered with a layer of greasy developing material which is translucent with respect to actinic light.

Photographic exposure of the light-sensitive material is carried out through the greasy developing layer and the resulting hardened colloid portions are immediately rendered grease-receptive from being in contact with the overlying greasy developing material.

The portions of the light-sensitive material which are not hardened by photographic exposure adhere only lightly to the underlying water-receptive coating and are readily washed away by lightly rubbing over the surface of the plate with a pad or applicator soaked with a mixture of water and gum arabic. This uncovers areas in the water-receptive coating which are adapted to absorb water and constitute the non-printing portions of the plate while the hardened grease-receptive colloid portions constitute the printing portions.

We have found that a coating, such as one of a vinyl compound and in particular polyvinyl alcohol, as set forth in the above-identified patent, presents a surface upon which a smooth coating of light-sensitive material of uniform thickness may be applied by the use of a brush or pad, without resorting to the use of a whirling plate.

In addition, we have found that the light-sensitive coating when covered with the greasy developing material noted, may be held sensitive for extended periods of time and then exposed to actinic light passed through the developing ink.

Still further we have found that the light-sensitive coating adheres very lightly to the polyvinyl alcohol coating and unexposed portions of the coating may be readily removed by a pad containing water and gum arabic, passed over the surface of the plate, thus avoiding the use of large amounts of water and especially running water to wash out and develop the plate.

Referring more in detail to the drawing, Fig. 1 illustrates one suitable lithographic printing base consisting of a paper element 1, which may for example be a tough, kraft paper containing a binder such as polyvinyl alcohol or other sizing agent intimately incorporated throughout the fibers thereof.

The polyvinyl alcohol, as it occurs in the paper, is of a slightly water-receptive character, and in addition to acting as a sizing for holding the fibers together, functions as a plasticizing agent and a moisture-retentive agent for maintaining

small amounts of moisture in the paper, such as are normally required to be maintained in paper to prevent brittleness.

The paper 1 is provided with waterproofing or water-repellent layers 2, which lightly impregnate and substantially waterproof the paper 1, so that it resists stretching and shrinking.

The water-repellent material preferably consists of an aqueous suspension of a urea formaldehyde resin glue, which upon being coated on a suitable surface and allowed to dry, will set to a water-insoluble state. Examples of waterproofing agents of this general character are water dispersions of urea formaldehyde condensation products, sometimes referred to as urea formaldehyde resin glues as "Plaskon" and "Casco," suspensions of "Bakelite," and others.

Papers such as parchment, kraft and others, with or without a sizing agent, may also be used for the paper element 1, and other types of lithographic printing bases, as metal, resin and others, may be resorted to.

The paper 1, carrying the water-repellent layers 2, is covered at one side with a coating 3 obtained from an aqueous suspension of a water-receptive printing material such as polyvinyl alcohol, as illustrated in Fig. 1 of the drawing. The coating 3 is strongly bonded to one of the coatings 2. This may for example be effected by applying the coating 3 to the urea formaldehyde resin while the latter is in a partially dried state and then allowing both materials to dry together.

It should be understood that the printing coating 3, after it has become thoroughly dried, retains its moisture-receptive character, and is highly adapted to function as the water-receptive non-printing portions of a lithographic printing plate.

The layer 3 may in some cases be formed from other aqueous suspensions of colloidal materials such as those of gelatin, glue, gum arabic, albumin and water-absorbent resin materials. In addition, the polyvinyl alcohol suspension may include hardening agents such as iron chloride, ammonium bichromate, and fillers such as clay and other finely divided materials.

Over the coating 3 of polyvinyl alcohol is applied a film 4 of a light-sensitive material. The light-sensitive material may for example consist of a suspension of albumin and ammonium bichromate in water. This type of light-sensitive material is hardened by actinic light and thereafter readily rendered grease-receptive.

A smooth film of light-sensitive material of uniform thickness is obtained by repeatedly passing over the surface of the coating 3, an applicator such as a brush or a pad containing the light-sensitive material soaked or absorbed therein. The polyvinyl alcohol is characterized by a surface which is highly receptive to the light-sensitive suspension, and which has a great affinity for it so that a smooth uniform film may be applied in the manner noted without the appearance of streaks or irregularities, and without resorting to the use of a whirling plate.

The film 4 thus applied is allowed to dry and then covered with a layer 5 of a greasy developing material which is translucent with respect to actinic light. A preferred example of such a developing material is one composed of a greasy substance such as linseed oil and a blue pigment which readily passes actinic light. Other suitable developing materials which are translucent with respect to actinic light may be employed.

The developing material is allowed to dry to a point at which it will not offset and thereafter a photographic negative member is located over the developing material. The plate is then exposed to actinic light which exposes the light-sensitive coating underneath the developing ink in those areas corresponding to the translucent portions of the photographic negative, to form printing portions 6.

Thereafter the unexposed portions of the light-sensitive coating 4 are removed by treatment with small amounts of gum arabic and water or other aqueous solvent. Preferably this is carried out by passing a sponge or pad, carrying the mixture of gum arabic, over the surface of the exposed plate. The polyvinyl alcohol layer 3, while being receptive toward the unexposed light-sensitive material, nevertheless retains it very lightly and thus permits removal of unexposed portions by the use of a pad or sponge. This eliminates the necessity of subjecting the plate to the action of running water for a relatively long period of time.

An important feature of the invention is the step of applying light-sensitive material, such as bichromated albumin, to a lithographic printing base by means of a pad or brush repeatedly passed across the surface of the plate. It is pointed out that in conventional types of lithographic printing plates, such as grained metal, application of light-sensitive material in this way is impractical for the reason that streaking or non-uniformity results, and a properly developed image cannot be obtained.

The underlying surface of polyvinyl alcohol has a pronounced affinity for the aqueous suspension of light-sensitive colloid, which affinity is not present in a metal plate. This allows the light-sensitive material to be brushed quickly on the polyvinyl alcohol and to set into a smooth uniform film, which is entirely satisfactory for the formation of a printing image. Similar affinity is exhibited by other resins such as vinyl compounds and others.

By such an operation, several advantages are obtained. The use of expensive equipment, such as a whirling plate, is avoided, and likewise the labor required to adjust and secure the printing plate in a whirling plate is eliminated, with substantial saving in time. The use of a whirling plate results in relatively large amounts of the light-sensitive material being thrown out away from the plate and lost. Such loss of light-sensitive material is completely eliminated by the brushing-on procedure of the invention.

Another important feature is the procedure of applying over the light-sensitive film 4 a layer of a greasy developing material, which is translucent with respect to actinic light, before exposure of the light-sensitive material. Application of the developing material can be more quickly and cheaply carried out at this point and saves handling of the plate after exposing operations have been completed. In addition, the developing material acts as a protective medium for holding the sensitivity of the light-sensitive coating, and thus extends its light-sensitive life for a period of several days or longer.

Still another important feature of the invention is the step of removing, by the use of a pad or sponge, unhardened light-sensitive material to develop the film 4 after it has been exposed to photographic light. It is pointed out that conventional methods of developing plates of this character require washing under running water

for a period of 10 or 15 minutes. Immersion in water causes difficulty in using materials such as paper, resin and the like since these materials tend to stretch or shrink when thus exposed to water, and a distortion of the subjected matter of the plate results. It is pointed out that by not immersing the plate in water, much of the stretching and shrinking difficulty may be avoided and various types of relatively cheap paper or resin sheets employed to make plates of some types. The gum arabic has a slightly tacky character, which tends to lift the softened greasy developing material and unexposed light-sensitive material away from the plate. The water vehicle softens the materials first. Other vehicles and tacky materials may be resorted to.

Under some conditions, access to running water may not be available, and therefore the sponging treatment of the present invention removes this limitation, and allows development of a plate to be carried out anywhere. The step of removing light-sensitive material with a pad is also much faster than the older washing procedure since the plate may be cleaned in three to four minutes.

The step of removing unhardened light-sensitive material from a photographically exposed plate by treatment with gum arabic and water applied from a pad may be carried out independently of the method of applying the greasy developing material, as for example in a method of photographically exposing the light-sensitive coating and then applying the greasy developing material. Also other types of developing material than those translucent with respect to actinic light may be removed in the manner noted. The gum arabic and water may be applied to the plate surface in various other ways and the use of a pad carrying other solvent material as sugar solutions, etc., may be resorted to.

It will be seen that we have disclosed cheap, simple, fast, and efficient methods of coating, exposing, developing and cleaning planographic printing plates, and have indicated procedures for obtaining substantial savings. The equipment and material required for making a planographic plate have been simplified, and the period of light-sensitivity of bichromated albumin coatings has been extended.

While we have shown a preferred embodiment of our invention, it should be understood that various changes and modifications may be resorted to, in keeping with the spirit of the invention as outlined in the appended claims.

We claim:

1. That improvement in methods of making planographic printing plates which comprises applying on a base which includes a surface layer of a vinyl compound, a smooth uniform coating of a light-sensitive emulsion of the type which is hardened to a water-insoluble state upon exposure to actinic light, covering the light-sensitive coating with a developing ink which is translucent with respect to actinic light, exposing the light-sensitive coating by actinic light passed through a photographic negative, and then removing the unexposed portions of the light-sensitive coating and the developing ink located on these portions by lightly rubbing the surface of the plate with an applicator carrying gum arabic and water absorbed therein.

2. In a method of making planographic printing plates the steps which comprise preparing a plate with a grease-receptive image formed in a layer of light-sensitive material, which is covered by a greasy developing ink translucent with respect to actinic light, and then removing unexposed portions of the coating and developing material by repeatedly passing an applicator containing gum arabic and water over the surface of the plate.

3. That improvement in methods of making planographic printing plates which comprises photographically exposing a light-sensitive coating supported on a lithographic printing base, applying a greasy developing material to the coating to render the exposed portions of the coating grease-receptive and then removing unexposed portions of the coating by treatment with gum arabic and water applied solely from an applicator passed over the plate surface.

4. In a method of making planographic printing plates the step which comprises treating a photographically exposed coating, while covered with greasy developing material, with a mixture of gum arabic and water applied from an applicator.

5. That improvement in methods of making planographic printing plates which comprises applying on a lithographic base having a surface layer of polyvinyl alcohol, a smooth uniform coating of a light-sensitive emulsion, covering the coating with a layer of a greasy developing material which is translucent with respect to actinic light, exposing the plate to actinic light passed through a photographic negative in contact with the greasy developing material, and then removing the unexposed portions of the light-sensitive emulsion and adjacent greasy developing material by treatment with a mixture of water and gum arabic.

6. That improvement in methods of making planographic printing plates which comprises applying on a lithographic base having a surface layer of polyvinyl alcohol, a smooth uniform coating of a light-sensitive emulsion, covering the coating with a layer of a greasy developing material which is translucent with respect to actinic light, exposing the plate to actinic light passed through a photographic negative in contact with the greasy developing material, and then removing the unexposed portions of the light-sensitive emulsion and greasy developing material by treatment with a mixture of water and gum arabic applied solely from an applicator repeatedly passed over the surface of the plate.

7. That improvement in methods of making planographic printing plates which comprises applying on a lithographic base having a surface layer of polyvinyl alcohol, a smooth uniform coating of a light-sensitive emulsion, covering the coating with a layer of a greasy developing material which is translucent with respect to actinic light, exposing the plate to actinic light passed through a photographic negative in contact with the greasy developing material, and then removing the exposed portions of the light-sensitive emulsion and greasy developing material by lightly rubbing with an applicator containing a mixture of water and gum arabic.

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ELLIS BASSIST.