Feb. 23, 1943. W. C. TOLAND ET AL 2,311,889

LITHOGRAPHIC PLATE

Filed Nov. 19, 1941

Fig. 1.

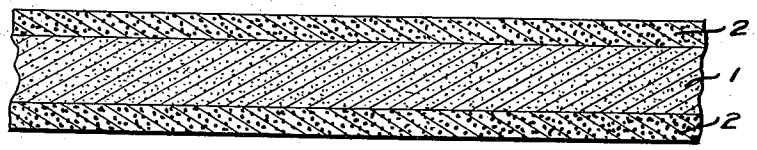


Fig. 2.

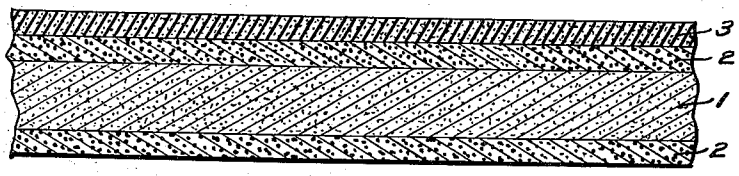
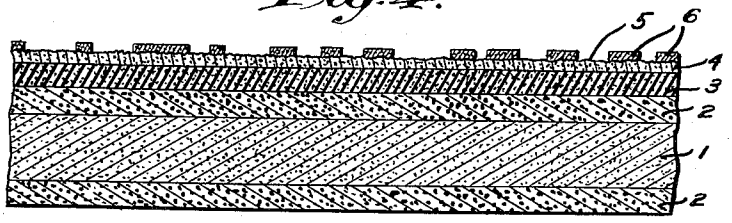


Fig. 3.



Fig. 4.



Inventors

William Craig Toland

Ellis Bassist

Munroe H. Hamilton

By

Attorney

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LITHOGRAPHIC PLATE

William Craig Toland and Ellis Bassist, Brookline, Mass., assignors to William Craig Toland, trustee

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7 Claims. (Cl. 41—41.5)

This invention relates to lithographic printing plates and to methods of making lithographic printing plates, and more especially to paper printing plates.

A chief object of the invention is to improve lithographic printing plates and methods of preparation therefor, and to devise improved lithographic plates of the type in which mixtures of clay and a bonding material are coated on a paper base, with a view to providing a surface which is either grained or may be roughened to furnish a grain generally corresponding to the grained surface of lithographic stone. Another object of the invention is to provide means for preventing scumming in lithographic plates formed from coating mixtures of finely divided materials. Still another object is to combine a lithographic coating mixture with a paper base which is sufficiently impervious to the action of water to substantially resist stretching and shrinking. The invention also aims to provide a flexible, light, cheap and durable printing plate.

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 a fragmentary cross sectional view illustrating a paper base element of the invention;

Fig. 2 is a fragmentary cross sectional view illustrating a step in a method of treating a base element such as that shown in Fig. 1 to form a lithographic printing plate.

Fig. 3 is a fragmentary cross sectional view illustrating another step in the method of making the printing plate of the invention; and

Fig. 4 is a fragmentary cross sectional view illustrating still another step in the method noted.

In making a lithographic printing plate, it has been proposed to provide on a suitable base a coated material which either presents a grained surface or may be treated to provide a grained surface. The grained surface referred to is of a character closely resembling that of lithographic stone, and is adapted to constitute the non-printing portions of a lithographic plate. The coated material is prepared by mixing together water, a finely divided material such as clay, and a binder. The grained or roughened surface of this coated material will attract and hold moisture and thus repel greasy ink in the well-known manner.

It is further desirable to combine coating mixtures with a cheap, flexible paper base element. In order to make a satisfactory paper plate the paper must first be rendered resistant to moisture by treatment with a water-repellent substance, over which the coated material is thereafter applied. It has been found that, after a greasy printing image is formed on the coated material, there is a tendency for greasy ink to penetrate through the coated material at some points, and to become attached to the water-repellent substance on the paper, which results in scumming or failure of the plate to completely reject greasy ink in the non-printing areas. Scumming may also develop in other ways.

In accordance with the invention, we have provided means for overcoming scumming in plates formed of coated mixtures of finely divided materials. Such means comprise a water-receptive grease-repellent thin layer or coating disposed between the water-repellent substance on the paper base and the coated mixture of clay and a binder or other mixture used. Preferably, the grease-repellent layer is formed of a water-receptive colloid which maintains small amounts of moisture, and thus will sharply repel small amounts of greasy developing ink which might pass through the coating of the lithographic mixture and become attached to the underlying water-repellent substance on the paper.

Referring more in detail to the drawing, Figs. 1–4 inclusive illustrate a method of preparing a lithographic printing plate in which a paper element 1, which may for example comprise a tough kraft paper, is impregnated with a sizing such as polyvinyl alcohol or other water-receptive colloid, intimately incorporated in the fibers thereof. The sizing, as it occurs in the paper, is of a slightly water-receptive character, and in addition to acting as a binder 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. Papers such as parchment, fiberboard and others, either with or without a binder, may also be used for the paper element 1.

To render the paper element resistant to water and of non-stretch character, it is coated with a waterproofing or water-repellent substance 2 at either side thereof. The water-repellent substance lightly impregnates and substantially waterproofs the paper 1 so that it will have the character noted. The water-repellent material preferably consists of an aqueous suspension of a urea formaldehyde resin which, upon being

coated on a suitable surface, first sets to a partially dried water-receptive state and then to a fully dried water-insoluble and water-repellent state.

Examples of a water-repellent material of this general character are water-dispersed urea formaldehyde condensation products, sometimes referred to as urea formaldehyde resin glues, such as "Plaskon" and "Casco." Aqueous suspensions of Bakelite, casein, and other water-repellent materials may also be resorted to.

In applying water-repellent material to the paper element 1, the polyvinyl alcohol binder provided therein serves a further useful purpose in preventing excess impregnation of the paper by the resin such as would cause brittleness. Substantial amounts of the resin are applied in and over the paper, however, sufficient to render the paper capable of withstanding exposure to water such as occurs during development and use of a lithographic plate, without significant stretching or shrinking occurring.

Over a waterproofing substance as "Plaskon," for example, while it is in a partially dried state, is applied a film 3 of a grease-repellent material such as a water-receptive colloid. A preferred example of a colloidal material of this character is a vinyl compound, and especially a polyvinyl alcohol which is capable of absorbing cold water without dissolving in it. Other water-receptive materials may also be utilized, as gelatin and others.

The application of a film of a water-receptive colloid such as polyvinyl alcohol to a layer of Plaskon, while the Plaskon is in a partially dried state, allows the two materials to dry together and thus develop a bond which will withstand the stresses normally encountered by a lithographic printing plate, tending to pull the layers apart. Other means of securing a properly bonded relation between a grease-repellent film and a water-repellent material may be resorted to, as for example the use of a thin paper sheet as described and claimed in a copending application Ser. No. 306,141, filed November 25, 1939, or in other ways.

Thereafter a coating 4 of an aqueous mixture of a finely divided material such as clay and a binder is applied over the film of polyvinyl alcohol. The coated mixture may include finely divided materials such as clays, calcium carbonate, silica, and other substances, held together by a binder such as for example sodium silicate or other substances which either present a roughened surface or lend themselves to being partially dissolved or etched away to form a roughened or grained surface. In Fig. 3 we have diagrammatically illustrated a grained surface by the numeral 5. This surface 5 is adapted to be rendered water-retentive and to constitute the non-printing portions of the plate.

Over the coating 4 are then formed grease-receptive printing portions 6, by some suitable method such as the Albumin Process. Briefly, this process consists in coating bichromated albumin on the coating 4, drying, preparing with actinic light passed through a contact negative, and developing with a greasy ink.

An important aspect of the invention is the combination of a colloidal layer, which either is or may be rendered grease-repellent, interposed between a waterproof paper and a coated mixture of finely divided material. This underlying layer of colloidal material furnishes a means of preventing small amounts of greasy ink from passing through the coated mixture in the non-printing areas of the plate.

Another important feature of the invention is the strongly bonded relation of the layers one to another. The use of a water-receptive colloidal material provides a surface on which the coated mixture of finely divided material may become attached.

Still another important point in the plate described is the bonded relation of the colloidal material 3 to the waterproofing substance 2. As above noted, these two layers are brought together while the waterproofing substance is in a partially dried state and then allowed to dry together. This furnishes a suitable bond between the two dissimilar substances.

If desired, the water-repellent paper containing a protective layer of grease-repellent colloid or other material, in turn covered by a coating of a lithographic printing mixture, may be prepared and sold as a printing plate material or element, to be later processed and formed into a printing plate.

It will be seen that we have provided a cheap, light, flexible printing plate of paper and coating materials adapted to form grease-receptive printing portions, grease-repellent non-printing portions. Means have been included for preventing scumming. The paper has been preserved from brittleness while being waterproofed, and suitable bonded relation between the various coatings and the paper has been provided for.

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

We claim:

1. As an article of manufacture a lithographic printing plate comprising a base, a layer of a polyvinyl alcohol on the base, a coating of lithographic printing material disposed over the layer, said lithographic printing material adapted to be rendered water-receptive to form the non-printing portions of the plate, and grease-receptive portions adapted to constitute the printing portions of the plate.

2. As an article of manufacture a lithographic printing plate element comprising a paper base which is covered with a water-repellent material, a layer of a water-absorptive polyvinyl alcohol on the base, a coating overlying the water-receptive layer, said coating including a finely divided material and a colloid, and said coating adapted to be formed into a grained water-receptive surface.

3. As an article of manufacture a lithographic printing plate element comprising a base, which includes layers of paper and resin combined together to provide a substantially water-resistant element, a layer of a cold-water-insoluble polyvinyl alcohol impregnated in and attached to the base, a coating which includes a finely divided material, and a binder overlying the polyvinyl alcohol coating.

4. As an article of manufacture a lithographic printing plate element comprising a base, which includes layers of paper and resin combined together to provide a substantially water-resistant element, a layer of a polyvinyl alcohol impregnated in and attached to the base, and a coating which includes a finely divided material and a binder overlying the polyvinyl alcohol coating.

5. As an article of manufacture a lithographic printing plate element comprising a base, said

base including a paper impregnated with resin and water-repellent coatings applied over the base, a layer of polyvinyl alcohol applied to one of the water-repellent coatings, a coating of a lithographic printing mixture, said coating adapted to be roughened to constitute the non-printing portions of the plate.

6. As an article of manufacture a lithographic printing plate comprising a paper base, a grease-receptive water-receptive substance applied at either side of the paper base for the purpose of preventing the paper from stretching when subjected to water, a substratum of a colloid overlying the grease-receptive water-repellent substance, an outer coating bonded to the substratum, said coating including a finely divided material and a binder which presents a grained surface, part of said grained surface being rendered water-receptive to constitute non-printing portions of the plate, greasy printing portions superimposed on other parts of the grained surface, the colloid substratum being adapted to prevent greasy inking materials from becoming attached to the said grease-receptive substance at points immediately underlying the non-printing portions of the plate.

7. As an article of manufacture a lithographic printing plate comprising a base covered with a grease-receptive water-repellent substance, a layer of a water-swollen colloid superimposed upon the grease-receptive substance at one side of the base, a coating overlying the layer, said coating presenting a roughened surface which includes greasy printing portions and water-receptive non-printing portions, said layer of colloid being water-swollen at points immediately underlying the non-printing portions, thereby to prevent grease from penetrating into and becoming attached to the grease-receptive substance located below the non-printing portions.

WILLIAM CRAIG TOLAND.
ELLIS BASSIST.