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W. C. TOLAND ET AL

2,280,986

COATING MATERIALS

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Fig. 1.

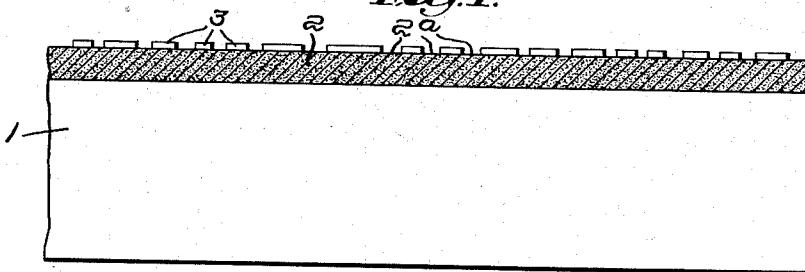
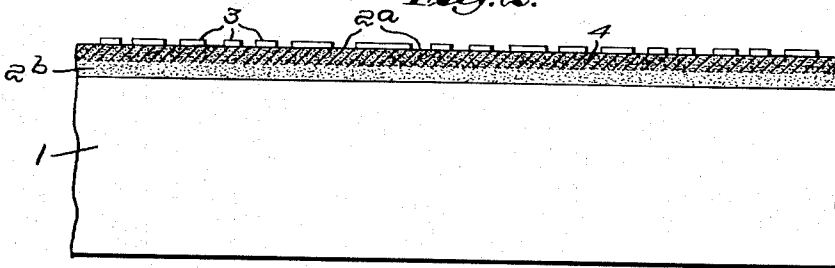


Fig. 2.



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COATING MATERIAL

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14 Claims. (Cl. 41—41.5)

This invention relates to printing and more especially to novel combinations of materials for use in printing plates.

A principal object of the invention is to improve planographic printing and to devise a planographic printing plate with non-printing portions made up of novel combinations of materials which impart improved printing ability, durability, and other desirable characteristics to the plate. Another object of the invention is to provide improvements in methods of making planographic printing plates, and in particular to improve methods of bonding grease-receptive colloid printing portions to water-receptive coatings on a lithographic support. The invention also aims to provide a simple, cheap and efficient planographic plate of novel controlled water-receptivity.

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 elevational view of the printing plate of the invention; and

Fig. 2 is a fragmentary elevational view of a modified printing plate structure.

Figs. 1 and 2 of the drawing illustrate planographic printing plates of the type in which a hydrophilic material is utilized to constitute the ink-repellent non-printing portions. Plates of this character are sometimes referred to in the printing art as "colloid" printing plates and it is intended that the word "plates" as herein-after employed in the specification shall refer to colloid printing plates. The word "hydrophilic" as employed in the specification means water-absorptive and water-retentive but water-insoluble.

In an earlier Patent No. 2,230,981, issued February 4, 1941, we have disclosed and claimed synthetic resins adapted to function as a hydrophilic material of the character described. An example of the synthetic resins is a hydrophilic vinyl compound, as polyvinyl alcohol. The vinyl resin, for example in the form of a powder, is dissolved in hot water and may be readily coated on a lithographic support, forming a film which will absorb cold water but is not dissolved by it. The printing portions for a plate of this type may be prepared by the conventional albumin process, in which a coating of bichromated albumin is applied over the vinyl resin coating described. The bichromated albumin is allowed to dry, exposed to actinic light passed through a contact

negative, covered with greasy developing ink, and washed in the usual manner in water.

We have discovered that coatings for forming the non-printing portions of plates, particularly coatings of vinyl compounds, are improved by having small amounts of water-repellent materials dispersed therein. In attempting to introduce water-repellent substances into a coating of a water-receptive material, considerable difficulty is encountered since the two types of materials repel one another and refuse to become intimately mixed together.

In accordance with a preferred embodiment of the invention, we incorporate suspensions of water-repellent substances with an aqueous suspension of hydrophilic material to provide a novel coating mixture. In mixing the two liquids, we make use of an emulsifying agent such as a clay, or other finely divided inert substance, to secure intimate incorporation of the ingredients with one another, and to provide a coating mixture of uniform consistency adapted to being applied in a thin uniform film.

Referring in detail to the drawing, Fig. 1 illustrates a preferred embodiment of the plate of the invention, in which numeral 1 denotes a lithographic support or base, preferably composed of paper and water-repellent materials laminated together to provide a substantially waterproof sheet. If desired, other base substances may be employed, as metals, plastics, and the like. Overlying the base 1 is a coating 2 formed from a coating mixture of water-receptive and water-repellent materials, as described. The coating 2 forms the non-printing portions of the plate, presenting grease-repellent surfaces 2a. Numeral 3 indicates printing portions prepared for example by the albumin process above noted.

For example, one suitable coating mixture may include a 5% solution of polyvinyl alcohol, with which is combined a filler of a finely divided material such as calcium carbonate, china clay, and the like, and a water-repellent substance such as the solid product obtained from a 10% dispersion in water of urea formaldehyde glue, as for example "Casco" resin glue, in an amount sufficient to constitute 2% to 3% of the polyvinyl alcohol present in the alcohol suspension. Other desirable substances which may be employed are gelatin, sodium silicate, and various water-repellent resins.

The filler acts as an emulsifying agent, which allows water-repellent substances to be uniformly dispersed throughout and held in suspensions

of water-receptive compounds. This provides a coating mixture which can be readily applied on a surface such as paper, and which adheres to the surface without cracking or forming lumps.

The filler also tends to reduce swelling of the hydrophilic material, and to provide a hard mass having a grain resembling that of lithographic stone. The chemical reagents are employed to reduce and render constant the water-receptivity of the hydrophilic material with the filler to effect a slightly porous, highly durable body.

An important feature of the invention is the combination of a hydrophilic coating, having a water-repellent substance dispersed therein, with grease-receptive printing portions made up of a colloid, as for instance albumin. There may develop difficulty in properly bonding grease-receptive printing portions to a hydrophilic coating or there may develop a tendency for the printing portions to break away from the coating when exposed to extended press operation. The water-repellent substance in the plate of the invention provides a body for which photographically hardened albumin has a definite affinity, and thereby serves as a supporting medium around which the albumin can become more firmly anchored. Since the water-repellent substance is dispersed throughout the hydrophilic coating and since the albumin, which forms the printing portions, is adapted to sink in and become impregnated throughout the coating, there is obtained a greatly improved bonded relation between the albumin and the coating generally. As a result, more durable printing portions are effected.

Another feature of the invention is the improved water-receptive character of the hydrophilic coating 2 when combined with small amounts of a water-repellent substance. Substances such as the urea formaldehyde resin, and others noted, exert a slight water-repellent action within the body of the coating and thereby provide a means of reducing or controlling the water-receptivity of the coating without impairing its effectiveness. Also, the presence of water-repellent substance dispersed throughout a hydrophilic coating tends to reduce and control swelling of the coating. This is important for the reason that too much swelling introduces a variable factor into the ink-repelling ability of non-printing portions of a plate, and is highly objectionable. A carefully limited amount of swelling, however, may be very advantageously utilized to accentuate or more sharply define the non-printing portions in the surface of a plate, and thereby secure sharper printing.

In Fig. 2, we have illustrated a plate made up of a base 1, having a hydrophilic coating 2b, presenting non-printing surfaces 2a, and printing portions 3. The coating 2b includes a stratum of water-repellent material lightly impregnated part way therethrough. The water-repellent material combined with the water-receptive material constitutes a relatively small proportionate part of the coating 2b and thereby allows the coating to continue to function as a water-receptive body. A plate having such a stratum of water-repellent material is preferably formed by adding the water-repellent material after a hydrophilic coating is applied on a lithographic base and after printing portions have been formed on the coating. A dispersion or suspension of a material as sodium silicate may, for example, be brushed or flowed over the printing and non-printing portions, and allowed to

sink into the hydrophilic coating. Other modes of application may be resorted to, as for example by dipping the plate in a bath of water-repellent material.

The stratum 4 is desirable as a means for modifying the water-receptivity of the hydrophilic coating 2 since it provides a hydrophilic coating, a part of which may absorb very little water. Application of water-repellent material over a finished plate surface may also benefit the printing portions, tending to harden them, to more firmly anchor them on the hydrophilic coating, and to sharpen their ink receptivity.

Various other modifications may be resorted to, as for example, we may prepare a plate from a coating mixture of a vinyl compound and a solution of gelatin. We then allow a coating of such a mixture to dry to form a grained surface, taking advantage of the ability of the gelatin to contract upon itself. The grained surface thus obtained is effective in carrying out continuous tone printing.

The use of gelatin is also illustrative of the step of mixing with a water-receptive coating material a substance which is soluble in water but which in a water-solution form may be rendered water-repellent. For example, a coating obtained from a mixture of a gelatin solution and a vinyl solution may be treated as by heat and/or chemical reagents such as iron chloride, etc., to render the gelatin hard and water-repellent. In this way we are enabled to incorporate a fine dispersion of a water-repellent substance in a hydrophilic compound without having to resort to the use of an emulsifying agent such as clay. Certain other colloids as albumin, gum arabic, and the like, may be similarly employed.

It is pointed out that the mixture of a water-receptive vinyl resin coating suspension with a water-repellent urea formaldehyde resin glue, as carried out by the use of a filler material in accordance with the invention, provides a novel coating compound which has not heretofore been available and which may be utilized for other purposes than printing; for example, as a special type of adhesive and in other connections.

Another aspect of the invention is the provision of novel combinations of filler materials employed in conjunction with hydrophilic substances to form coatings for planographic printing plates. It has been found that very desirable results are obtained from mixing different types of filler materials with hydrophilic substances. For example, a finely divided filler such as china clay may be mixed with a relatively coarser filler such as silica of a particle size found in the product "Silex" or similar bodies, and the two fillers then thoroughly incorporated in a hydrophilic coating substance such as the vinyl resin noted above. A coating obtained from a mixture of this type presents a greatly improved grained surface, due to the presence of the relatively coarse filler particles. At the same time undesirable porosity, such as may result from the use of coarse particles, is prevented by the fine filler particles. The relatively sharper grained surface formed from coarse filler particles is capable of retaining moisture by capillarity in addition to absorption, to improve the water-retentive character of the coating. If desired, the sharply defined grain may be modified by coating with a weak solution of a hydrophilic compound such as a 1% solution of polyvinyl alcohol. Preferably one part of coarse

filler should be employed with four parts of fine filler. Other proportions may be resorted to and other materials than china clay, silica and the like utilized.

It will be seen that the invention provides a novel printing plate having improved printing and non-printing portions. A method is provided of more solidly anchoring, on a hydrophilic coating, colloid materials forming the printing portions of a plate. Improvements are also provided in connection with the water-retentive character of hydrophilic coatings. Means are set forth for controlling swelling, imparting novel grained surface character, and generally providing a cheap, simple and efficient printing plate. The invention also provides novel combinations of filler materials with hydrophilic substances.

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

Having described our invention, we claim:

1. As an article of manufacture a planographic printing plate presenting printing portions and non-printing portions, said non-printing portions including a water-absorptive material, a filler, and a water-repellent substance.
2. As an article of manufacture a planographic printing plate presenting printing portions and non-printing portions, said non-printing portions including a coating of a vinyl compound of the type which absorbs cold water without dissolving, said vinyl compound having a water-repellent substance dispersed therein.
3. As an article of manufacture a planographic printing plate presenting printing portions and non-printing portions, said non-printing portions including a coating of a vinyl compound, a filler, and a water-repellent substance, said vinyl compound occurring in a polymerized state in which it absorbs cold water without dissolving.
4. As an article of manufacture a planographic printing plate presenting printing portions and non-printing portions, said non-printing portions including a vinyl compound of the type which absorbs cold water without dissolving, a filler, and a urea formaldehyde resin.
5. As an article of manufacture a planographic printing plate presenting printing portions and non-printing portions, said non-printing portions including a vinyl compound of the type which absorbs cold water without dissolving, a filler, and gelatin.
6. As an article of manufacture a planographic printing plate presenting printing portions and non-printing portions, said non-printing portions including a hydrophilic material, a filler, and sodium silicate.
7. As an article of manufacture a planographic printing plate presenting printing portions and non-printing portions, said non-printing portions including a vinyl compound of the type which absorbs cold water without dissolving and gelatin.
8. As an article of manufacture a planographic printing plate presenting printing portions and non-printing portions, said non-printing portions including a coating of hydrophilic vinyl material having therein a stratum of water-repellent substance.
9. As an article of manufacture a planographic printing plate presenting printing portions and non-printing portions, said non-printing portions including a coating of a hydrophilic polyvinyl alcohol having therein a stratum of water-repellent substance, said printing portions being bonded to the said stratum in the hydrophilic layer.
10. As an article of manufacture, a planographic printing plate presenting printing portions and non-printing portions, said non-printing portions including a coating of water-receptive polyvinyl alcohol, a urea formaldehyde resin, and an emulsifying agent for maintaining the urea formaldehyde resin uniformly dispersed throughout the water-receptive coating.
11. As an article of manufacture, a planographic printing plate presenting a base, a coating of water-receptive material overlying said base adapted to present non-printing portions of the plate, and a grease-receptive colloid material bonded to the said coating to form printing portions of the plate, said water-receptive coating including polyvinyl alcohol, a water-repellent substance, and an emulsifying agent for maintaining the water-repellent substance uniformly dispersed throughout the coating, said colloid printing portions extending into the water-receptive coating and bonded with the water-repellent substance therein.
12. In a method of making planographic printing plates the steps which include applying on a lithographic base a coating of water-receptive material adapted to form the non-printing portions of a planographic plate, forming grease-receptive printing portions on a water-receptive coating, and then impregnating a water-repellent material in the plate surface.
13. That improvement in methods of making planographic printing plates which comprises preparing a coating mixture which includes a water-receptive material and a colloid which is normally soluble in water, applying a coating of the said mixture on a lithographic support member to form the non-printing portions of the said plate, then forming grease-receptive printing portions on the said coating, and then treating the plate thus formed with a reagent for rendering said colloid water-repellent.
14. That improvement in methods of making planographic printing plates which comprises preparing a coating mixture including a vinyl resin and an aqueous solution of gelatin, applying a coating of the said mixture on a lithographic support member to form water-receptive non-printing portions of the said plate, then forming grease-receptive printing portions on the said coating, and then treating the plate thus formed with a reagent for rendering the gelatin water-repellent.

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