Nov. 24, 1942. W. C. TOLAND ET AL 2,302,816

PLANOGRAPHIC PRINTING

Filed Jan. 11, 1941

Fig. 1.

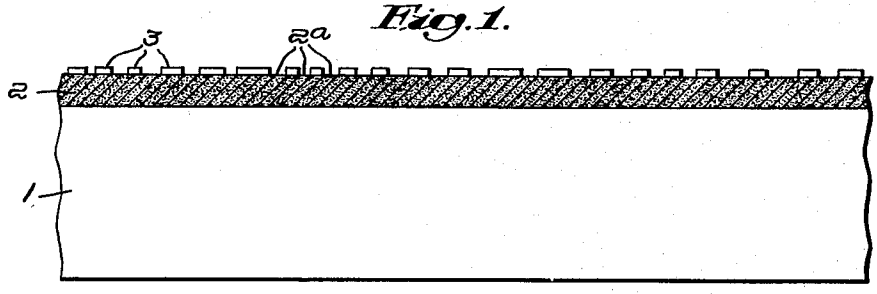
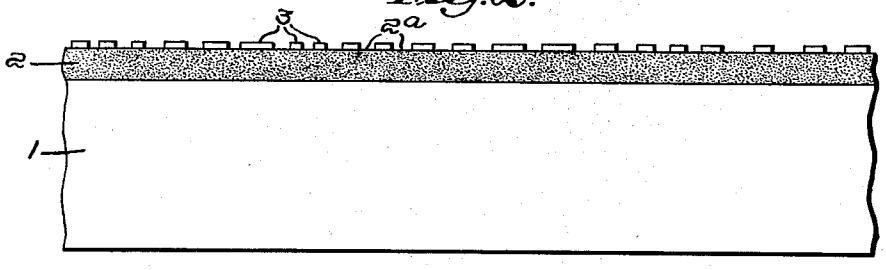


Fig. 2.



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PLANOGRAPHIC PRINTING

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2 Claims. (Cl. 101—149)

This invention relates to planographic printing and more especially to improvements in planographic printing plates.

It is an object of the invention to improve planographic printing and to devise a novel method of desensitizing the non-printing portions of a planographic printing plate to grease, with a view to improving the functioning of the non-printing portions of such plates and thereby securing better line and halftone printing. Another object of the invention is to provide a planographic printing plate which is more strongly ink-retentive, and which has printing portions of novel sharpened water-retentive character. The invention also aims to provide a planographic plate particularly adapted for halftone printing with fine mesh screens and for continuous tone printing. A still further object is to provide a planographic plate and method of preparation therefor, which are simple, cheap and efficient.

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 another fragmentary elevational view of a modified printing plate construction.

The novel printing plate of the invention is of the type in which a hydrophilic material is utilized to constitute the non-printing portions. These plates are sometimes referred to in the art as "colloid" printing plates. The word "hydrophilic" as employed in the specification means water-absorbent and water-retentive but water-insoluble. In Patent No. 2,230,981 issued to us February 4, 1941, we have disclosed and claimed novel synthetic hydrophilic materials adapted to function as a water-receptive material of the character described. An example of the synthetic materials is a hydrophilic vinyl resin, as for instance polyvinyl alcohol and the like. 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 with actinic light passed through a contact negative, covered with greasy developing ink, and developed in the usual manner in water.

In accordance with the present invention, we employ a hydrophilic material such as a vinyl resin, of the character referred to, and we specially treat the hydrophilic material with ingredients which limit and render substantially constant its absorptive character. A coating of the treated hydrophilic material is applied on a suitable base and provided with printing portions in accordance with the albumin process described above. The portions of the coating constituting the non-printing parts, in this limited and fixed absorptive state, are then treated with hot water, as for example by lightly rubbing over the plate surface with a pad of soft material such as cotton. We then incorporate a hygroscopic liquid substance in the non-printing portions.

Fig. 1 of the drawing 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 waterproof sheet. Other base substances may be employed as metals, plastics, and the like. Overlying the base 1 is a coating 2 of a hydrophilic vinyl resin such as polyvinyl alcohol. The coating 2 forms the non-printing portions of the plate, presenting grease-repellent surfaces 2*a*. Numeral 3 indicates printing portions prepared for example by the albumin process above noted.

The non-printing portions 2 preferably include a filler of a finely divided clay-like material such as calcium carbonate, china clay, or the like, and a chemical reagent such as ammonium bichromate, iron chloride, cupric chloride, and others. The filler 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 tend to reduce and render constant the water receptivity of the hydrophilic material, and to set the hydrophilic material in and around the filler to effect a somewhat porous, highly durable body.

The non-printing portions also preferably include a hygroscopic substance such as glycerine. Other hygroscopic substances may be used, as phosphoric acid and the like. The hygroscopic material may be coated on the plate surface or applied with the water roller of a printing press. The step of treating the surface of the plate with hot water is important. It exercises a plasticizing effect on the hardened hydrophilic material and thereby makes possible satisfactory incor-

poration of a hygroscopic substance such as glycerine into the non-printing portions.

The vinyl resin coating is particularly adapted to treatment with chemical reagents and fillers for modifying its water receptivity so that it may properly hold hygroscopic materials. For example, a vinyl resin may be satisfactorily hardened with chemical agents such as ammonium bichromate without danger of developing grease-receptivity, as may occur upon hardening many colloids. The vinyl coating may also be combined with filler materials such as clay, and form a liquid mixture which will spread uniformly and adhere to a base surface without crawling or forming lumps. A very marked improvement in printing quality is obtained from an albumin plate having a hydrophilic coating of polyvinyl alcohol treated with glycerine. The two materials when properly combined develop water-retentive and ink-repellent character of such unexpected sharpness as to provide a clearness of line printing not heretofore obtained in planographic plates. Vinyl resins such as vinyl acetate and others also give good results.

An important feature of the invention is the combination of a hygroscopic substance with materials of limited and substantially constant water-absorptive character. Swelling is a common occurrence upon adding liquids such as water, and in particular hygroscopic substances, to some hydrophilic materials. Too much swelling introduces a variable factor into the ink-repelling ability of the non-printing portions, and is highly objectionable. In the plate of the invention, however, the ingredients for limiting water-receptivity, and in particular the filler, prevent swelling to an objectionable point. At the same time a limited amount of swelling is made use of to accentuate the non-printing portions and secure sharper printing. The combination of the hygroscopic substance with treated hydrophilic material, therefore, both increases the water-retentive character of the non-printing portions and renders them more sharply defined in the surface of a plate.

In any attempt to modify the water or fountain solution used to repel ink in planographic plates, there is a tendency for added constituents to mix with lithographic printing ink and weaken or dilute the ink, thereby impairing the quality of printing. This results, to a great extent, from the added constituents collecting as a film on the surface of the plate and coming into contact with ink on an inking roll. In the plate of the invention, the hygroscopic material is substantially all absorbed in the non-printing portions, occurring as a water-attractive reservoir at and below the surfaces *2a*, thereby avoiding interference with the printing ink. The reservoir of absorbed hygroscopic material, however, exercises its attractiveness for water very strongly with respect to water on a water roller, and also with respect to moisture in the air. This provides augmented and sharply developed water-retentive character such as is not obtainable from application of ordinary lithographic fountain solutions to grained metal plates or to colloid plates.

An important advantage obtained from a plate made up of a hydrophilic material having limited and fixed water-receptivity and containing a hygroscopic material absorbed therein, is in facilitating the use of fine screens for making halftone plates. At the present time, screens from 55 mesh to 150 mesh are readily employed in planographic plates, but finer mesh sizes cause trouble. By the plate of the invention, it is possible to utilize screens of from 150 mesh up to 300 mesh, with excellent results, and plates may also be made without using any screen, to carry out continuous tone printing, and without objectionable loss of detail of the subject matter reproduced.

Another advantage of the plate of the invention is the improved ink handling which is obtained therefrom. Relatively large amounts of ink can be applied over minute non-printing portions which provide sharp ink impressions of improved strength and superior quality. In addition to these advantages, the plate of the invention combines durability, long life, and greatly simplified fountain solution application. Scumming is eliminated and the plate does not have to be covered with gum arabic, when at rest on the press, to prevent the occurrence of oxidation.

In Fig. 2 there is illustrated a plate made up of a base 1, a hydrophilic coating 2, having non-printing surfaces *2a*, and printing portions 3. The non-printing portions of this plate, include a layer of a vinyl resin, such as polyvinyl alcohol which has been treated with hardening agents, as ammonium bichromate, ferric chloride, and the like. The non-printing portions also include a hygroscopic material, as glycerine or glycerine and water, absorbed in the same manner as described in connection with the description of the plate in Fig. 1. This plate of Fig. 2 is intended to illustrate a hydrophilic coating without a filler, in which glycerine and water may be satisfactorily absorved in the absence of objectionable swelling.

Other changes may be resorted to, as for example we may wish to utilize hydrophilic colloids and synthetic resin materials, of a type which may be treated to properly accept hygroscopic liquids. Other hardening agencies, in place of fillers and chemical reagents, may be used, as for instance heat, pressure, and others. Similarly, modification may be resorted to in plasticizing the hydrophilic coating to facilitate absorption of the hygroscopic substance, and for other purposes.

It will be seen that the invention provides a novel printing plate having sharply defined water-retentive character which greatly facilitates halftone planographic printing. A novel method of desensitizing the non-printing portions of a planographic printing plate to grease is disclosed, and there is generally effected cheaper, more efficient, and finer quality printing.

While we have shown a preferred embodiment of the invention, it should be understood that modifications therein 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. That improvement in methods of planographic printing which consists in providing a planographic printing plate made up of grease-receptive printing portions and water-receptive non-printing portions of polyvinyl alcohol, said non-printing portions including an ingredient for limiting the water-absorptive character thereof and a finely divided filler adapted to further limit the water-receptive character of the non-printing portions, treating the surface of the plate with hot water, then applying a hygroscopic liquid material to the plate surface and allowing the hygroscopic material to become absorbed in the non-printing portions, then applying a greasy ink to the plate and printing.

2. That improvement in methods of plano-

graphic printing which consists in providing a printing plate having grease-receptive printing portions and water-receptive non-printing portions composed of a water-absorptive polyvinyl alcohol, a chemical agent for hardening the polyvinyl alcohol and limiting its water-receptivity, and a finely divided filler adapted to harden the polyvinyl alcohol and further reduce its water-absorptive character, washing the surface of the plate wtih hot water, then incorporating glycerine in the non-printing portions, then applying greasy ink and printing.

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