

Feb. 4, 1941.

W. C. TOLAND ET AL
METHOD OF MAKING PRINTING PLATES

2,230,982

Original Filed Oct. 25, 1937

Fig. 1.

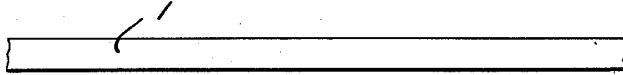


Fig. 2.

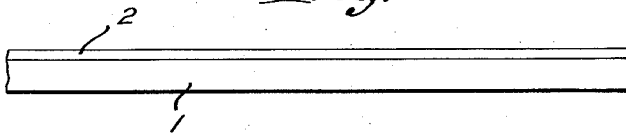


Fig. 3.

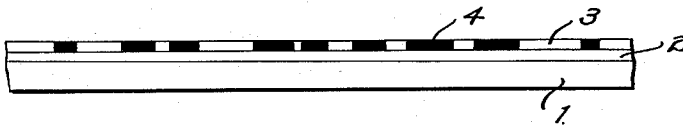
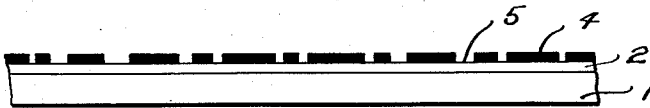


Fig. 4.



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UNITED STATES PATENT OFFICE

2,230,982

METHOD OF MAKING PRINTING PLATES

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Continuation of application Serial No. 170,762, October 25, 1937. This application November 25, 1939, Serial No. 306,140

7 Claims. (Cl. 95-5.4)

This invention relates to methods of making printing plates and more especially to methods of preparing planographic printing plate surfaces, and is a continuation of an earlier application Ser. No. 170,762 filed October 25, 1937.

In the preparation of planographic printing plate surfaces, it is now customary, in most cases, to employ metal plates. The surfaces of these plates are required to be roughened by a graining operation which renders the surfaces capable of retaining films of water and becoming thereby grease-repellent. The graining operation increases to an objectionable extent the cost of preparation of plates by both the time and labor required and the equipment employed. In addition to its cost, the graining operation is further objectionable due to the fact that plates prepared by it must be subjected to etching or gumming operations both during the preparation and operation of the plate. Furthermore, the graining operation and subsequent gumming are limited in scope and can effect satisfactory water-receptive plate surfaces on only a few relatively expensive metals.

It is a chief object of the present invention to improve methods of making planographic printing surfaces, and to devise a novel method of providing the water-receptive portions of a planographic printing surface, with a view to avoiding graining operations, eliminating some etching and gumming treatments now required to be carried out in connection with metal plates, and making possible the use of various metals and other materials to comprise a base for a printing coating. It is a further object of the invention to provide a method of limiting water receptivity of hydrophilic colloids in connection with the preparation of planographic printing plates, and generally to make available a quick, cheap and efficient method of plate preparation.

The nature of the invention and its objects will be more fully understood from the following description when read in connection with the accompanying drawing, and the novel features will be more particularly pointed out in the accompanying claims.

In the accompanying drawing:

Fig. 1 is a view in side elevation illustrating a support for use in a printing plate.

Fig. 2 is another view in side elevation illustrating a step of coating the support of Fig. 1.

Fig. 3 is another elevational view illustrating a further step in the method; and

Fig. 4 is still another elevational view illus-

trating a final step of the method resulting in a finished plate.

In the construction shown, 1 indicates a support which may be of any suitable character as for example the conventional metals aluminum or zinc, or other metals, or materials as paper, plastics and the like. In the usual methods of preparing planographic plates, as for example by the albumin method, it is customary to rely on grained surfaces for retaining water and repelling greasy inks in the non-printing portions. The usual practice is to employ the metals aluminum or zinc to comprise the support 1, and to grain one side of the metal so that it may retain water by capillary attraction. This is expensive and slow, and involves tying up of many thousands of metal plates which have to be stored and which require therefore a large amount of space. In addition, graining machinery is costly and represents a very considerable investment of money. It may therefore be seen that it is highly desirable to avoid the graining step in the process of preparing a planographic printing plate.

In accordance with our invention, we employ the step of coating on a support a synthetic hydrophilic resin which is characterized by water receptivity when in a film state. The coating step takes the place of the graining step above referred to. By this coating step we obtain a thin layer 2 of a resin, as for example by coating from a suspension of polyvinyl alcohol (3% solution) on the support 1, as has been illustrated in Fig. 2. The layer 2 is allowed to set and is then moistened and the usual operations of the albumin process carried out, as illustrated in Fig. 3.

In detail, the albumin process consists in applying a coating material 3 on the film 2. The coating material includes albumin and a light-sensitizing agent such as ammonium bichromate, or other chromic salt. The film of sensitized albumin is allowed to dry and is then exposed under a negative to actinic light, whereby the exposed portions 4 of the albumin become hardened and grease-receptive. The plate is then rolled up with a developing ink, held under running water and developed by lightly rubbing as with a pledget of cotton to remove the ink and albumin from the non-exposed areas. This leaves printing portions of albumin which are sensitized to grease and non-printing surfaces of hydrophilic material which retain water by absorption and are therefore desensitized to grease.

It is pointed out that by the use of the coating 2, the entire step of graining with all of its attendant difficulties is avoided. In addition, by utilizing the hydrophilic film, the water-receptive areas retain water by absorption and are not limited to retention of moisture by capillarity, as is required in the development of a hygroscopic film of a grained metal plate. As a result, it is no longer necessary to carry out certain etching and gumming operations required in connection with the use of grained metal plates.

In forming the hydrophilic layer 2 various other solution strengths of polyvinyl alcohol may be employed as 5% and 10% solutions and others. In addition to the polyvinyl alcohol resin cited as a suitable coating material for effecting non-printing portions of a plate, certain other resins may be employed as vinyl resins such as vinyl acetates, esters, ethers, ketones, alcoholates, and the like. Also we may employ any hydrophilic resin capable of quickly setting or drying to a tough film which will stand wear and which, without dissolving, will absorb water in suitable amounts for lithographic printing purposes. such films may be comprised by synthesized resins which are obtained from hydrocarbons, phenols, aldehydes, ketones, amines, natural resin acids, polyhydric alcohols and polybasic acids, vinyl compounds, rubber, sulphur and fatty oils. However, most synthetic resins are water insoluble and hydrophobic. Of the materials above noted, only those resins which are hydrophilic and subject to the above cited lithographic printing limitations or which may be made so by treatment with reagents, are suitable for use as a water-receptive coating in accordance with this invention and are intended to be included.

A few such resins from which plates less desirable than vinyl plates may be made comprise (a) a product obtained from heating to 100° C. 150 parts of diethylene glycol and 70 parts of boric acid together with 80 parts of borax with agitation (aqueous solution); (b) a product obtained from treating polyvinyl alcohol with an aldehyde and a substance capable of condensing with the aldehyde as a phenol; (c) a product obtained by treating a vinyl ester-aldehyde with another aldehyde; (d) a product obtained by heating methylolurea, with a compound containing at least two free hydroxyl groups (aqueous solution); (e) and a condensation product resulting from treating aryl sulphonamido carboxylic acid amide with formaldehyde (aqueous solutions).

A further aspect of our invention deals with a method of treating hydrophilic materials with chromic salts, such as for instance ammonium bichromate, to reduce or limit the water receptivity of the hydrophilic materials in a film state, particular reference being had to polyvinyl alcohol and other vinyl compounds.

This method should not be confused with conventional hardening operations with ammonium bichromate where the ammonium bichromate has been employed as a light-sensitive agent which, upon exposure to actinic light, hardens and renders portions of a colloid coating hard and grease-receptive to form printing images.

According to our improved method of treating a hydrophilic coating with a chromic salt, we mix a solution of a salt such as ammonium bichromate with a suspension of polyvinyl alcohol and allow a film of the resulting product to dry

without necessarily employing any action of light or other agents whatever, although the action of light may not be objectionable. Our method is based upon the discovery that the use of a chromic salt, and in particular ammonium bichromate, with polyvinyl alcohol in substantially any proportion, while toughening a film of the alcohol, fails to result in the development of a product which is completely water-repellent and hence adapted to receiving grease. This is the opposite case of that which occurs from combining bichromate with most colloids such as albumin, glue, and the like, which are quickly hardened by bichromate to an extremely water-resistant mass which is quickly made grease-receptive. It is also preferable to avoid using light in reacting the chromic salt with the alcohol for the reason that if heat and/or pressure is used, instead of light, for the purpose of facilitating the action of the bichromate on the colloid, a relatively light translucent film results while if light is utilized the film is rendered dark yellow in color. Translucence is important as it may facilitate preparation or handling of the plate.

By utilizing the ammonium bichromate with a solution of polyvinyl alcohol, the porosity or water-absorptive character of a film of polyvinyl alcohol may be limited or reduced in a highly desirable manner, and this limitation of water-receptivity is effected without danger of hardening the alcohol to a point where it becomes grease-receptive such as would cause smurring in a plate. Heretofore, it has been considered impossible to allow ammonium bichromate to remain in a hydrophilic colloid if water receptivity was desired for the reason that when combined with colloid materials, it was believed that the bichromate would continue to harden at a slow rate until sooner or later grease-receptive surfaces were formed. One aspect of the present discovery is essentially that the ammonium bichromate can be used to limit water-receptivity of a hydrophilic colloid without its necessarily developing grease-receptivity if the treated colloid is moistened before possible contact with greasy or grease-forming materials.

We may desire to use certain other reagents to accentuate the action of the chromic salt as for example ferric chloride and ferric sulphate which may be mixed with an ammonium bichromate solution. It may further be desired to employ these and other reagents and other means for treating hydrophilic materials of the class referred to above. In employing the polyvinyl alcohol and the ammonium bichromate, various proportions may be employed of which one specific example consists in the following amounts:

	Ounces
5% polyvinyl alcohol suspension.....	7
Ammonium bichromate.....	1

If desired, about .7 c. c. of ferric chloride, 42° Bé, may be added to this mixture for hardening purposes. Either with or without the ferric chloride, suitable water-receptive films may be quickly obtained from this mixture. Thicker and more slowly drying films may be formed from mixtures of stronger proportions of the resin.

It will be seen that the invention has introduced a coating step which eliminates graining operations and attendant objections. The method of employing chromic salts and/or other reagents with hydrophilic films to reduce water receptivity with a moistening step following directly thereafter, results in a very desirable means of

toughening the films while maintaining them with a water-receptive and translucent character which is particularly suitable for planographic printing plate purposes. The step is intended to be a disclosure of the method of treating a hydrophilic material to reduce water-receptivity without promoting grease-receptivity. If the coating is employed on a grained surface it should be noted that it conforms to such grain thereby presenting a secondary grained surface of softened or modified character which in some instances may be employed to effect finer halftone quality of printing.

While we have disclosed preferred reagents, materials and procedures, it should be understood that various changes and modifications may be resorted to in the methods of eliminating grain-ing and reducing water-receptivity, in keeping with the spirit of the invention as defined by the appended claims.

We claim:

1. That improved method of making planographic printing plates which consists in providing a suitable base, coating a hydrophilic resin upon said base, and selectively locating grease-receptive printing layers on said hydrophilic resin.

2. In a method of making planographic printing plates, the steps which include treating a hydrophilic resin with a chromic salt, coating the treated resin on a suitable printing plate base, exposing said coating to water to desensitize it to grease, selectively locating grease-receptive printing layers on said coating by photographic exposure, and developing the printing layers by treatment with a greasy ink.

3. That improvement in methods of making

printing plates which consists in coating a suitable printing plate base with polyvinyl alcohol and selectively applying printing layers thereon.

4. That improved process of making a planographic printing plate which comprises providing a suitable base, coating a mixture of polyvinyl alcohol and ammonium bichromate on said base, allowing said bichromate to remain in the coating until dry, desensitizing the coating to grease by treatment with water, locating printing layers on the coating, and developing with greasy ink.

5. That improvement in methods of making printing plates which consists in subjecting a film of polyvinyl alcohol supported on a suitable base to treatment with ammonium bichromate for the purpose of effecting limited water-receptivity in the said film, then desensitizing the said film to grease by the application of moisture, then applying a light-sensitive coating on said film, then exposing under a photographic negative, then ink-ing and developing under water.

6. That improvement in methods of making printing surfaces which consists in providing a hydrophilic resin, treating said resin to reduce its water-receptivity in a film state, coating the treated resin on a printing plate and then locating grease-receptive printing layers on said coated resin.

7. That improvement in methods of making printing surfaces which consists in providing a hydrophilic resin, treating said resin with a hardening agent to reduce its water-receptivity in a film state, coating the treated resin on a printing plate base and then locating grease-receptive printing layers on said coated resin.

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