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W. C. TOLAND ET AL
PRINTING PLATE SUPPORT

2,280,985

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Fig. 1.



Fig. 2.

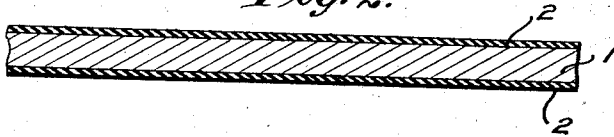


Fig. 3.

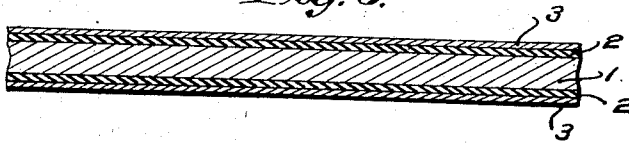


Fig. 4.

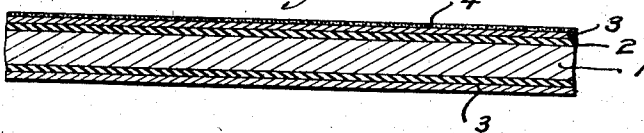


Fig. 5.



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PRINTING PLATE SUPPORT

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10 Claims. (Cl. 154—46.5)

This invention relates to printing and more especially to printing members and materials.

It is a chief object of the present invention to improve planographic printing plates and their methods of preparation and to devise a base substitute or substitutes for metal with a view to reducing the costs involved in the use, preparation, handling and storage of metal planographic plates. It is a further purpose of the invention to simplify the preparation of planographic plates and to provide as a base a translucent product which increases the utility of printing plate bases and which is adapted to fields of use outside of the printing plate field.

Attainment of these and other objects of the invention will be readily 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 appended claims.

In the accompanying drawing:

Fig. 1 indicates a web or sheet employed in the invention.

Fig. 2 is a diagrammatic view illustrating a coating step in a method of making a printing plate base.

Fig. 3 is a diagrammatic view illustrating a laminating step in the method referred to.

Fig. 4 is a diagrammatic view illustrating the association of a hydrophilic coating with a base product such as that shown in Fig. 3.

Fig. 5 is a diagrammatic view illustrating a modified base construction.

In an earlier Patent No. 2,230,981, issued Feb. 4, 1941, we have disclosed novel planographic printing surfaces and a method of preparation therefor which consists in coating on any suitable support a layer of a synthetic hydrophilic colloid adapted to absorb and retain moisture in sufficient amounts to be satisfactorily grease-repellent in a plate surface. The layer of colloid acts as a substitute for a grained metal surface to retain moisture and is adapted to support a printing image thereon in the same manner as a metal plate does. Since conventional graining operations may be eliminated, other materials than metals which could be suitably grained may be employed to support the coating and comprise plates.

However, certain difficulties occur in providing a satisfactory substitute for metal. One of the greatest difficulties is encountered in effecting a suitable bond between the coating of colloid and the surface of the substitute. This difficulty is particularly pertinent with respect to substitutes

composed of greasy materials which might be desired to be employed due to their resistance to the action of water. Another difficulty arises in connection with exposing the substitute to water as is necessary in the development and subsequent operation of a printing plate. An immediate effect in the case of many materials is the occurrence of a stretching or shrinking, creating changes not permissible in a lithographic support.

In accordance with our invention, we provide non-metallic base or support means which in addition to being water-resistant and strong, are capable of retaining in a suitably bonded condition a coating of a hydrophilic colloid of the character described in our Patent No. 2,230,981 above referred to. For purposes of illustrating a suitable hydrophilic coating with which our plate may be used, polyvinyl alcohol is cited and will be referred to throughout the specification. However, other synthetic hydrophilic resins may be desired to be combined with our improved base means, as for example vinyl resin derivatives and others. Base means without the coating comprises a substitute for a metal plate in an ungrained state and constitutes one aspect of the invention. The combination of base means and the hydrophilic coating makes up a product which is a substitute for a metal plate having a lithographic grain, and constitutes another aspect of the invention.

In a preferred form of base of the invention, a sheet of paper is made use of to act as a bonding agent for retaining the polyvinyl alcohol coating, and the sheet is supported by a laminated structure. The method of preparing the base consists in first providing a web 1, as shown in Fig. 1, preferably composed of paper. The web 1 is covered with a resin material 2 at both sides thereof, as illustrated in Fig. 2. Paper bonding sheets 3 are then applied over the coatings 2, as has been illustrated in Fig. 3. The result is a substantially non-stretchable base product.

The web 1 may comprise any cheap flexible material and preferably will comprise a tough paper adapted to receiving and retaining the bonding material 2 partly impregnated therein. The resin comprising the coatings 2 is required to be of substantially water-resistant character, and one example of such a resin is a urea formaldehyde resin commercially known as "Casco." This resin is characterized by being capable of occurring in both a water-soluble and

water-insoluble state and is further not a moulding type of resin.

In applying the coatings 2, care must be taken to avoid excess impregnation of the web 1 as there may develop brittleness which ruins the material for use as a base. To avoid such a condition, limited amounts of the resin may be applied, and one means of effecting this consists in lightly coating the resin on a web, and then squeegeeing the web to rub off all but a very thin layer of resin. Other means as brushing may also be employed. It may be desired to allow a first application of resin layers to dry and then apply additional layers as may be found necessary. Other suitable resins of a waterproof character may be employed for this purpose as for instance Bakelite. Also, if desired, other arrangements of the resin layers and supporting web layers may be employed such as that shown in Fig. 5 and others. It will be noted in Fig. 5 that two of the webs 1 are used with a layer of the resin 2 therebetween.

The paper employed for the bonding sheets 3 may comprise a tough paper such as parchment, whose fibers have been digested with sulphuric acid, fiberboard of a pulp digested with zinc chloride, or a paper impregnated with resin. Preferably the sheets will be laminated to the resin coating on both sides of the web to avoid curling, and a preferred method is to apply heat and pressure as by rolls, to increase impregnation of the resin coatings in the sheets. If desired, however, the sheets may be applied to the resin while in a tacky state without the use of heat and pressure and at only one side thereof. It has been found that heat and pressure can be used to combine the parchment with the dried resin by the addition of glycerine or glycerine-like substances, to the resin. It is pointed out that using the glycerine is a novel and useful step in laminating sheets, since it facilitates use of the Casco in other laminating procedures, wherever it is difficult to combine a sheet with the resin in a dried state.

The size and character of the bonding sheets 3 are important features of the invention as it has been found that by employing a very thin sheet of paper highly impregnated with plastic, it is possible to limit the amount of water absorbed by the sheet to a point where no objectionable results occur from wetting. The chief function of the bonding sheets 3 is to properly retain by the paper fibers a coating such as that of polyvinyl alcohol. However, it is pointed out that it is very important to maintain resistance to water in order to avoid stretching or shrinking, and this the bonding sheets 3 also succeed in doing. The sheets have a still further function in that they act as laminating members for strengthening the base as a whole, particularly due to their composition from a thin resistant sheet. A sheet thickness which has been found to be satisfactory for the purposes described may be of from .001 of an inch to .00125 of an inch. Other thicknesses may be employed, as .0015 of an inch and up, with less satisfactory results. It may be seen that such a thin sheet presents little body for water to be effective upon. In addition the resin coating 2 is partly impregnated in the under side of the sheet, which further reduces the available paper body, which may absorb moisture. It has been found that after the parchment thickness increases over .002 of an inch, the amount of water receptivity of the paper may begin to

cause trouble. In considering the absorption of water in the bonding sheets 3, it should be understood that with a finished plate, water which reaches the paper must pass through a hydrophilic coating applied thereto in the manner to be described.

The function of the coatings 2 and web 1, in addition to partly impregnating and supporting, respectively, the bonding sheets 3, is to provide a support which is sufficiently impervious to the action of moisture or water as not to develop any substantial stretch or shrink, and yet is tough enough to resist being pulled apart on the press, strong enough to withstand clamping, and flexible enough to be bent around the press. Another purpose of the web 1 is to provide a cheap medium for carrying the resin coatings 2, and it is pointed out that paper is much cheaper than the resin and yet it can retain sufficient amounts of resin to develop the characteristics required. The several laminations are of a cheapness such that their total cost is less than the cost of graining a metal plate. Graining costs for metal plates average roughly 75 cents per plate. It will be seen, therefore, that a considerable cost range is present to manufacture and sell a substitute at a price less than the cost of graining.

The product formed by the laminations now described, is well adapted to receiving the referred to hydrophilic coating 4, Fig. 4, such as of polyvinyl alcohol, and to retaining the coating in a well bonded state. The base product may, if desired, be handled and shipped to be later coated with a hydrophilic resin at the time a plate is prepared. The product may also be made up with the coating and in such condition stored, handled and shipped. It should be observed that in a coated state the base is the equivalent of a metal plate provided with a lithographic grain. The usual steps of forming a planographic printing image may be then carried out as would be on a grained metal plate according to the process employed. According to the albumin process, a light-sensitized coating solution of albumin and ammonium bichromate would be spread on the hydrophilic film 4, dried, and exposed to photographic light. The plate would then be inked and washed under running water in the usual manner of developing.

A printing plate prepared as described may be readily mounted on a press cylinder, being satisfactorily flexible and tough for clamping and bending purposes. The method of preparation with paper and the coating step is relatively quick as compared with preparation of a grained plate. The plate is very light, easy to handle and economical to store. A very important feature is that the entire cost of the paper plate is sufficiently less than the cost of graining a corresponding metal plate for the printer to afford to throw the paper base away after it has once been used, assuming the print is not required to be retained for later use. Operation substantially equivalent to that of a metal plate is possible since no objectionable stretch or shrink occurs and the plate is capable of running any reasonable number of impressions.

In addition to the use in the manner described of a thin paper web for effecting a bonding surface and preventing damaging water absorption, another modified procedure may be employed in accordance with a further aspect of the invention. This procedure consists essentially in treating the outer surface of one or both of the thin bonding

sheets 3 with a highly diluted film of a material such as the "Casco" resin described. This film tends to even further prevent absorption of water by the bonding sheets and yet is sufficiently thin as not to cover the grain of the paper fibers for bonding purposes in retaining the hydrophilic coating 4. It is pointed out, however, that a finer halftone quality of printing may be effected when this light film over the paper is utilized and this is so for the reason that the grain of the paper is made substantially fainter or less clear-cut.

It should be understood that to use relatively finer screens for halftone work in order to get improved detail and quality of printing, it is necessary to provide a relatively finer grain in the surface which takes the halftone screen. If the screen size approaches too closely the grain pattern, there will result unsatisfactory reproduction of the screened subject matter due to so-called screen imperfections or moire effects. In the present instance this would be due to the dots of the screen falling in an angularly disposed manner on the grain of the plate surface and failing to appear in their true aspect.

Therefore, attention is called to the fact that in a metal surface of the type which must retain water by capillarity, as a lithographic plate, the size of grain is limited and cannot be made under a certain degree of coarseness as the capillary attraction of water cannot be continued with such a fine grain. The result is a definite limitation to the quality or fineness of screen obtained in halftone work with a metal printing plate of this type.

It will be observed that the plate described with a coating 4 of hydrophilic material does not depend on capillary attraction of water but retains the water by absorption, in part at least, so that much finer grain may be resorted to as that of paper and for any size screen a better halftone quality is attained. By further modifying the grain of the paper with the highly diluted coating referred to, even further improvement of halftone work results.

The utility of the base constructions described is increased due to the fact that paper and/or plastic or other materials employed or comprising the laminations may readily be of translucent character to effect a substantially translucent base. The value of a translucent support is considerable as for example in connection with laying out a number of sections of subject matter to be printed on a single sheet, where color work is to be effected. By present methods, only a photo-composing machine is capable of effecting a sufficiently accurate register in such a layout for color purposes, and the scope of small operators without such expensive machines is greatly limited. By providing a translucent base, it is possible to mark off register for each negative on a base sheet superimposed over an illuminated glass plate, with the result that accurate register for each color negative may be quickly effected.

The non-stretch character of the laminated sheet of our invention is further important in connection with paper requirements. Reference is particularly had to drawing paper which is required to be absolutely of non-stretch character. It is pointed out that the laminated sheet and parchment assembly provides such a sheet for drawing purposes. Those and other uses of our non-stretch water-resistant product are contemplated.

It will be seen that by the invention limitation

to the use of zinc and aluminum is no longer required in making planographic plates. Much less equipment is necessary, the time of preparation is shortened, and made easier, and the ultimate cost of any planographic plate is materially reduced. The use of a translucent base is of great advantage for color work and other desirable features in connection with fields other than printing are also present. Various other light-sensitive coatings than the one noted may also be desired to be associated with the base for additional purposes.

While we have shown preferred embodiments and materials in carrying out our invention, it should be understood that the invention is not limited thereto but may be effected with other materials and other types of laminated structures as defined by the appended claims.

We claim:

1. As an article of manufacture, a planographic printing element comprising a web of paper which has been impregnated with a waterproofing material to resist stretching and separation of its fibers when subjected to the planographic printing processes, a water-receptive paper bonding sheet secured at one side of the said web of paper and a film of a water-receptive colloid applied at one side of the said bonding sheet, said film being adapted to form the non-printing portions of a planographic printing plate.

2. As an article of manufacture, a planographic printing support comprising a web of paper which has been parchmented said web having coatings of resin material applied at either side thereof for rendering the web substantially waterproof, a film of a water-receptive colloid associated with the support and being secured thereto by a water-receptive paper sheet in such bonded relation as to withstand planographic development and printing procedures.

3. A printing plate base comprising a laminated paper and resin structure in which a paper web is impregnated with resin in amount sufficient to render the paper water resistant but not sufficient to cause cracking when the base is used on a printing press cylinder, said web having associated therewith and adhering thereto an outer sheet of paper, said outer sheet being of a thickness not exceeding .002 inch, and a coating formed from an aqueous mixture of polyvinyl alcohol and a hardening agent bonded to the said outer sheet.

4. In a planographic printing plate, a base element comprising a paper web coated with a urea formaldehyde resin, said resin serving to bond to said paper web a relatively thinner sheet of paper, a hydrophilic colloid material bonded to said sheet of paper, said hydrophilic colloid material adapted to comprise the non-printing portions of the plate.

5. As an article of manufacture, a paper base sheet, a water receptive paper bonding sheet and a water-receptive surface coating, said bonding sheet being impregnated at least in part by a synthetic resin which binds it to the base sheet, said bonding sheet also being impregnated at least in part with the water-receptive coating material.

6. As an article of manufacture, a paper product for use in printing, comprising layers of waterproofing material laminated together, a surface sheet of water-absorptive paper overlying, and impregnated by, the waterproofing material, said surface sheet being of a thickness such that its unimpregnated portions resist stretching when

the paper product is immersed in water, and a coating of a hydrophilic material bonded to said surface sheet, said hydrophilic material comprising a vinyl compound.

7. As an article of manufacture, a printing material comprising a web of paper which has been impregnated with a binder to resist stretching and separation of its fibers, said web being coated with a resin material for rendering the web waterproof, a thin surface sheet of water-receptive paper overlying and impregnated by, the resin material, said coated web being effective in resisting stretching and shrinking of the said surface sheet when the paper product is subjected to water, and a film of polyvinyl alcohol bonded to the said surface sheet.

8. As an article of manufacture, a paper product for use in printing, comprising a web of paper which has been coated with waterproofing material, a thin surface sheet of water-receptive paper overlying, and impregnated by, the waterproofing material, and a hydrophilic material of a type adapted to constitute the non-printing portions of the colloid printing plates secured to the surface sheet of paper, said hydrophilic material being impregnated in the water-receptive sheet, thereby to provide a bond which is unaffected by planographic printing operations.

9. As an article of manufacture, a base element for receiving materials utilized in forming the printing and non-printing portions of a planographic printing plate, said base element comprising a web of paper having its fibers impregnated with a binder to resist separation when subjected to the pull exerted by a planographic printing press, said web having a water-repellent resin coating applied to each side thereof, a thin sheet of water-receptive paper attached to one of the water-repellent resin coatings, and a coating of hydrophilic material impregnating and bonded to the outer side of said water-receptive sheet of paper, said hydrophilic material adapted to constitute the non-printing portions of a planographic printing plate.

10. A base material for a planographic printing plate comprising a laminated paper and resin structure which includes a relatively thicker sheet of paper and one or more relatively thinner sheets of paper bonded together, the thinner paper being of a thickness not exceeding .002 of an inch, and a coating of a hydrophilic vinyl compound bonded to one of the said relatively thinner sheets of paper.

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