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W. C. TOLAND ET AL

2,373,357

METHOD OF MAKING PRINTING PLATES

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Fig. 1.

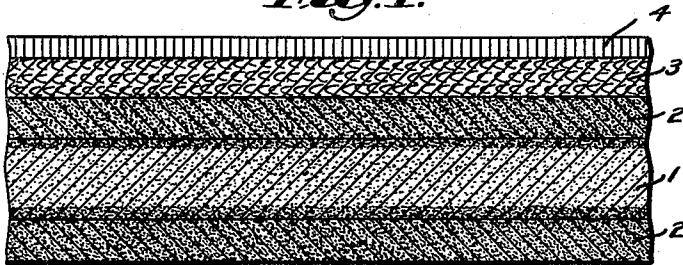


Fig. 2.

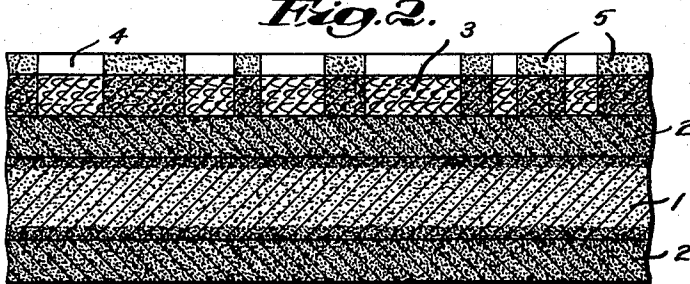
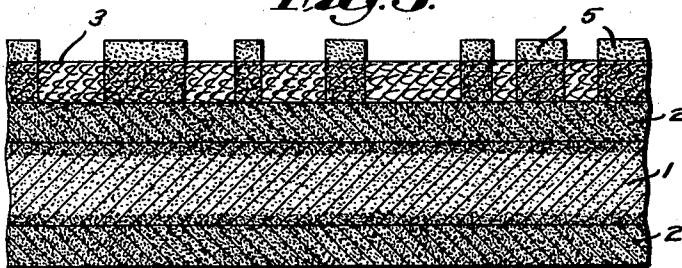


Fig. 3.



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METHOD OF MAKING PRINTING PLATES

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4 Claims. (Cl. 95—5.4)

This invention relates to planographic printing plates and more especially to colloidal printing plates, and is a continuation in part of an application Ser. No. 315,412, filed January 24, 1940, which issued as Patent No. 2,312,852 on March 2, 1943.

A principal object of the invention is to improve planographic printing plates and methods of making planographic printing plates, and to devise an improved method of utilizing light-sensitive silver salts to provide grease-receptive printing portions. Another object of the invention is to provide grease-receptive printing portions which are obtained from silver salts and which include a plurality of colloidal materials, with a view to cheapening and simplifying methods of making planographic printing plates, and to imparting increased durability and efficiency to printing plates of colloidal character.

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 step in a method of making a planographic printing plate in accordance with the invention;

Fig. 2 is a fragmentary cross sectional view illustrating another step in the method referred to; and

Fig. 3 is a fragmentary cross sectional view illustrating another step in the method.

In accordance with the invention, we have provided an improved method of utilizing silver salts in which a film of gelation containing a silver haloid is applied over a special water-receptive colloidal printing base. The light-sensitive film is exposed and developed while supported on the water-receptive colloidal base which allows exposed portions of the film to become embedded in the base. Thereafter the unexposed portions of the silver salt and gelatin are completely washed away to uncover the underlying water-receptive lithographic base surface, thus avoiding the preparation of the gelatin for non-printing portions. The exposed portions of the silver and gelatin become impregnated in and hardened together with the underlying water-receptive layer to provide printing portions which are of improved durability and which are very strongly anchored in the water-receptive layer.

Referring more in detail to the method, Fig. 1 illustrates a base preferably made up of an impregnated sheet 1, such as a tough kraft paper,

which may be impregnated with a resin such as polyvinyl alcohol. Other suitable papers for sheet 1 are parchment papers, fiberboard, and the like.

Over the sheet element 1 are disposed coatings 2 of waterproofing material which lightly impregnate either side of the paper element 1. The waterproofing material may comprise resin materials such as aqueous dispersions of urea formaldehyde resin glues, as for example "Casco," or "Plaskon," and other types of waterproofing agents such as "Bakelite" compositions and others.

The combination of the impregnated paper and the waterproofing coatings provides a base for planographic printing which will not stretch or shrink when immersed in water, which is flexible and will not crack, and which is sufficiently tough to withstand being pulled apart by the pull exerted on a printing press. Other types of bases such as those composed entirely of resin materials may also be employed.

Upon the base made up of the paper element 1 and the layers 2, at one side thereof, is disposed a coating 3 of a colloidal material which will not dissolve in water but will absorb water and is thereby adapted to function as the water-receptive portions of a planographic printing plate. A preferred example of a material of this character is a water-receptive vinyl compound and in particular, a water-receptive polyvinyl alcohol. Other water-receptive resins exhibiting the properties noted may be used.

The coating 3 is allowed to dry and a film 4 of a photo-sensitive emulsion is applied to it. The film preferably includes a suspension of gelatin or a similar colloid and a light-sensitive agent such as a silver haloid or a mixture of silver haloids. Other suitable light-sensitive metal salts may be desired to be employed.

The base containing water-receptive coating 3 and light-sensitive film 4 is then exposed to light passed through a photographic negative in any suitable manner. This provides a latent image made up of exposed portions 5, as illustrated in Fig. 2.

The plate is developed by treating with a developing reagent. Examples of a satisfactory developing agent are hydroquinone, catechol, and the like. Developing changes the exposed portions 5 into free particles of silver. The developed silver image is further fixed by subjecting the plate to the action of a non-hardening fixing agent of conventional character.

The portions 5 are then treated with an agent

such as ammonium dichromate for changing the silver into silver chromate. The ammonium bichromate reacts with the silver and hardens the gelatin, vinyl compound and silver chromate into solid masses.

The plate is next covered with a greasy developing ink, which renders the portions 5 grease-receptive. Thereafter the plate is washed to dissolve away unexposed portions of the photosensitive emulsion 4, and to uncover parts of the water-receptive layer 3 which are adapted to absorb moisture and function as the grease-repellent portions of the plate.

An important feature of the invention is the method of combining with a coating, such as a water-receptive vinyl compound, a film obtained from an emulsion of a silver haloid and gelatin, and exposing and developing the film so that portions of the exposed and developed silver haloid become embedded in the vinyl coating in which state the portions may be hardened to obtain a strongly anchored association of silver chromate and gelatin in the vinyl compound. This forms exceedingly desirable printing portions.

Another important feature of the invention is the step of removing the unexposed portions of the photosensitive emulsion 4, and especially the gelatin occurring in these unexposed portions. No attempt is made to partially harden the gelatin, as has heretofore been the practice, so as to utilize it as a water-insoluble but water-receptive material. Instead, all of the gelatin in the unexposed areas is completely washed away down to the surface of the water-receptive layer 3. This avoids several difficulties attendant upon treating gelatin to make it both durable and water-receptive.

The method described is simple, cheap, and quickly carried out. The silver salt emulsion may be prepared at considerably less cost than a corresponding mixture of albumin and ammonium bichromate, and the use of expensive exposing apparatus such as actinic light equipment is avoided. The plates, prior to exposure, if held in darkness, may be maintained for extended periods with suitable sensitivity, and may be shipped and stored in this form.

The printing plate obtained by this procedure is characterized by long life, cheapness, durability, and fine quality of printing. The printing image obtained from the silver salt and gelatin emulsion admirably combines with the water-receptive layer to provide a bonded relation which will withstand extended press operation without the occurrence of scumming or without breaking away or deteriorating.

It will be seen that a novel printing member and method of preparation therefor has been provided, and a highly desirable combination, obtained between a light-sensitive film and a layer of water-receptive colloidal material. Various savings in time, equipment, and handling are obtained, and an improved planographic printing plate member made available.

While we have shown and described a preferred embodiment of the invention, including specific materials and procedures, it should be understood that various other materials than those noted may be resorted to, and other combinations of light-sensitive salts with a water-soluble colloid coated over a film of a second water-insoluble but water-receptive colloid may

be resorted to, in keeping with the spirit of the invention as defined by the appended claims.

We claim:

1. That improvement in methods of making planographic printing plates which comprises providing a base element, applying a coating of a polyvinyl alcohol on the base element, said polyvinyl alcohol being water-receptive and water-insoluble, combining the coating of polyvinyl alcohol with a photosensitive emulsion, said emulsion consisting of gelatin and a silver halide, exposing the film to light passed through a photographic negative thereby to obtain a latent image in the photosensitive emulsion, developing the latent image to produce grains of free silver in the latent image portions, treating the grains of silver with a chromium compound to harden portions of both gelatin and polyvinyl alcohol occurring adjacent the grains of silver, coating the plate with a greasy developing ink, and washing away unexposed portions of the emulsion to leave water-receptive surfaces of polyvinyl alcohol.

2. That improvement in methods of making planographic printing plates which comprises coating upon a water-receptive base of polyvinyl alcohol a photosensitive emulsion which includes gelatin and a silver halide, exposing and developing the emulsion to obtain a silver image, treating the silver image with a chromium compound to harden together gelatin portions and polyvinyl alcohol portions which occur adjacent the silver image, applying a greasy developing material to the hardened gelatin and alcohol portions to form grease-receptive printing portions, and then removing unexposed portions of the gelatin to present underlying surfaces of polyvinyl alcohol which constitute non-printing portions.

3. That improvement in methods of making planographic printing plates which comprises combining a photosensitive emulsion and a water-absorbent colloid base of polyvinyl alcohol, said photosensitive emulsion including a mixture of gelatin and a silver halide, exposing the coating of photosensitive emulsion to light passed through a photographic negative thereby to form a latent image which extends into the polyvinyl alcohol, converting the latent image to grains of silver, treating the silver grains with an agent for reacting with the silver and hardening portions of both polyvinyl alcohol and gelatin occurring adjacent the silver grains, applying a greasy material to the coating, and then removing unexposed portions of the photosensitive emulsion.

4. A method of making a planographic printing plate which comprises combining a photosensitive gelatin emulsion with a water-receptive base of polyvinyl alcohol, drying the coating, exposing the coating to light passed through a photographic negative for the purpose of obtaining a latent image, treating the latent image with a developing agent to provide grains of free silver lying in and on the polyvinyl alcohol, reacting the grains of silver with a chromium compound to form a chromium hardening compound, said hardening compound being adapted to harden portions of the gelatin and polyvinyl alcohol occurring immediately adjacent the said grains, and then washing away unexposed portions of the photosensitive emulsion to leave uncovered surfaces of polyvinyl alcohol, said surfaces being adapted to constitute non-printing portions of the printing plate.

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