Feb. 23, 1943. E. BASSIST 2,311,809

PRINTING MATERIAL

Filed Dec. 28, 1940

Fig. 1.

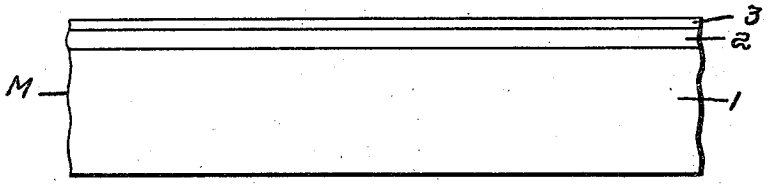


Fig. 2.

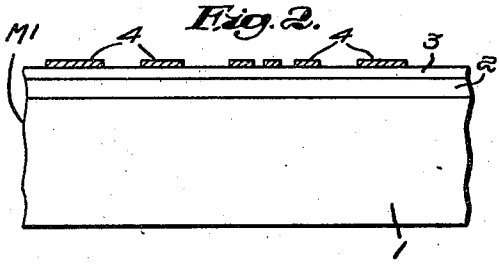


Fig. 3.

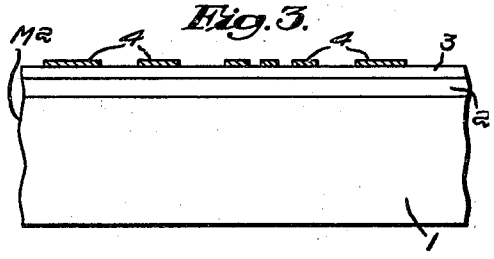


Fig. 4.

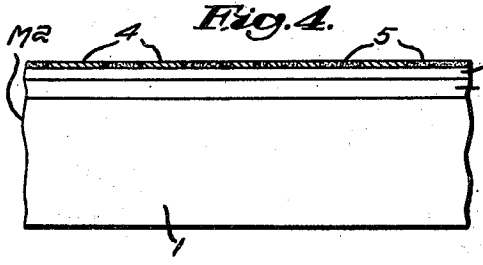


Fig. 5.

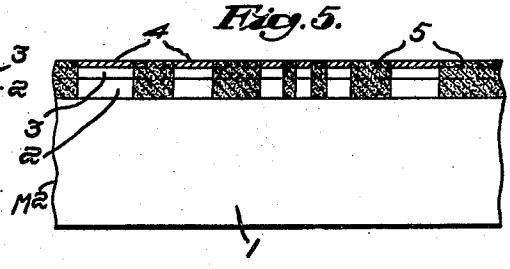
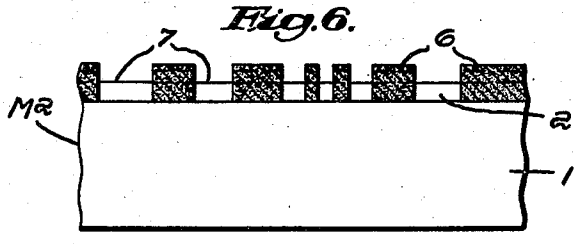


Fig. 6.



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PRINTING MATERIAL

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9 Claims. (Cl. 95—5.4)

This invention relates to printing members and more especially to materials and methods for preparing planographic printing plates.

In making a set of planographic printing plates to reproduce multicolor subject matter, the colors of which occur in juxtaposed relation, it is necessary to form grease-receptive colloid printing parts, and to arrange the greasy printing parts of a plate of one color in register with respect to the greasy printing parts of plates of other colors. One conventional method of making a set of color plates of this character is to prepare separate tracings of each of the color sections in the original subject matter. These tracings are photographed to provide negatives which in turn are employed to make the color printing plates in accordance with the albumin process. This method is relatively expensive and requires considerable time. A cheaper and faster method is to directly draw in the color sections with a greasy material as tusche on lithographic surfaces. The greasy material takes ink and becomes the printing image. However, direct application of greasy materials develops imperfections and inaccuracies, generally lowering the quality of work done.

A chief object of the invention is to improve planographic printing members and to provide a novel printing material, by means of which colloid printing portions, for color plates, are efficiently formed, and quickly arranged in register, thereby shortening the period of time normally required in making printing plates, and in particular printing plate for reproducing juxtaposed multicolor subject matter. It is a further object of the invention to present novel methods of applying greasy materials and water-soluble materials on a lithographic support and other types of printing members, and generally to provide a cheap colloid printing plate of improved quality and durability.

The nature of the invention, and its objects, will be fully understood from the following description of the drawing and discussion relating thereto.

In the accompanying drawing:

Figure 1 is a fragmentary view in elevation illustrating the printing material of the invention;

Fig. 2 is a fragmentary view in elevation illustrating a color printing plate made from a printing material similar to that shown in Fig. 1;

Fig. 3 is a fragmentary view in elevation illustrating a step in the method of making another color plate in accordance with the invention;

Fig. 4 is a fragmentary elevational view illustrating another step in the method referred to;

Fig. 5 is a fragmentary elevational view illustrating still another step in the method noted: and

Fig. 6 illustrates a finishing operation resulting in a completed plate.

Referring in detail to the drawing, Fig. 1 illustrates a novel printing material M which I have devised for use in making printing members, and in particular planographic printing plates for reproducing multicolor subject matter.

The printing material M includes a support or base 1 having a hydrophilic coating 2 associated therewith. Overlying and impregnated in the coating, at one side of the base, is a water-soluble film or layer 3. The base 1 may be composed of any suitable substance which is capable of withstanding exposure to water without stretching or shrinking. One example of a suitable substance is paper impregnated with waterproofing materials such as water-repellent resins. Other suitable substances are metal, glass, plastics, and the like.

In the preferred impregnated paper form of base, the hydrophilic material 2 may be partly impregnated therein and may overlie the base in the form of a coating. By the term "hydrophilic material," I mean a substance which will absorb water, and in some instances become swollen thereby, and yet will not dissolve away in water. One example of a hydrophilic material, of the type referred to, is a coating of a vinyl compound as for instance polyvinyl alcohol and the like. The coating or hydrophilic colloidal body 2 may in some cases include a filler material consisting of a finely divided clay-like substance such as calcium carbonate, china clay, and similar substances. The filler when so used tends to impart hardness to the hydrophilic colloidal body 2, and to modify its water-receptivity without limiting this characteristic to too great an extent.

The water-soluble film 3 is partly impregnated in and overlies the coating 2 at one side of the base and consists of a film of gum arabic of some suitable strength, such as a film obtained from an aqueous suspension of gum arabic of a ten percent solution strength. The film of gum arabic, by reason of its being partly impregnated in the coating 2, presents a novel combination of a water-soluble body, which is itself absorbent, absorbed in a water-insoluble or hy-

drophilic material. In addition, the gum arabic film affords a writing surface which readily accepts and holds either greasy ink or aqueous mixtures, which is absorbent with respect to such materials, and which may be readily dissolved away in water. These characteristics render the printing material of value in connection with various types of printing.

One application of my novel printing material is in connection with making planographic printing plates for juxtaposed multicolor subject matter such as two-color circulars and other similar types of advertising. A common practice now resorted to, in making plates for two-color subject matter, is to draw with a tusche, on a counter-etched and grained zinc plate, a greasy image of one color section of the subject matter referred to. This forms a plate for one color section. The greasy image thus effected is used to provide an ink impression, obtained for example in a drag press. The greasy ink impression is dusted over with a powder which is adapted to offset when the proof is placed upon another zinc printing plate of the character already described. The powder image thus offset provides an outline around which a second greasy image, corresponding to another color section of the subject matter, may be drawn. The powder is washed away after greasy printing portions corresponding to the second color section are developed. This provides printing portions, corresponding to the second color, in register with the printing portions of the first plate.

In drawing the greasy image of the second color section around the powder outline referred to, great care must be exercised as the last overlap will appear in the finished plates and prevent proper register. Also, application of greasy materials, as by a tusche, is relatively expensive and limited in scope since it is very difficult to apply minute amounts of greasy materials and maintain sharp lines or edges.

According to the invention I apply on a sheet of printing material M—1 a light-sensitive ink material corresponding to one color section of juxtaposed multicolor subject matter to be reproduced. The light-sensitive ink may be formed of a light-sensitive salt, as ammonium bichromate, and a colloid such as, for example, albumin. The mixture may also contain a bodying agent such as a dye to make the ink more readily apparent, and to facilitate its application with a pen or other writing means. The plate with the light-sensitive ink section thus applied is exposed to photographic light, covered with a greasy ink and washed under running water, in accordance with the conventional development procedures, to form printing portions 4 as has been illustrated in Fig. 2. In developing the plate M—1, the portions of the gum arabic coating 3 not covered with the light-sensitive ink are dissolved away down to corresponding surfaces of the hydrophilic body 2. These surfaces of the hydrophilic body 2 are water-receptive and therefore may act as the non-printing parts of the plate. There is thus effected a colloid printing plate for one of the color sections of the subject matter required to be reproduced.

The printing image 4 is then inked with a greasy ink and an impression is obtained on a second sheet of printing material M—2, as has been illustrated in Fig. 3. One suitable method of effecting this operation is to offset the impression by means of an offset proof press. I then apply a layer 5 of a water suspension of the bichromated albumin over the surface of the printing material M—2. The bichromated albumin thus applied adheres to the surface of the printing material M—2 in those areas around the greasy image 4, being rejected by the greasy ink of the image in an exact manner, as illustrated in Fig. 4.

The coating of bichromated albumin is allowed to dry and the light-sensitive salt, ammonium bichromate, together with the albumin, is absorbed in the film of gum arabic 3 and strikes through into the underlying coating of hydrophilic material 2. The plate is then exposed to photographic light, which hardens the portions of albumin occurring between the greasy outline 4 as well as portions of hydrophilic material 2 and gum arabic 3 into which the bichromated albumin has become absorbed, as illustrated in Fig. 5.

The entire surface of the plate may then be covered with a greasy developing ink, and the plate developed in the conventional manner of developing exposed lithographic printing plates; that is, by holding the plate under running water and lightly rubbing the surface with a pad of soft material such as cotton. This allows water to be absorbed into the unhardened parts of the plate and wash away the original greasy outline, and those portions of the gum arabic film directly under the grease outline, leaving greasy printing portions 6 for the second color section and water-receptive surfaces 7 adapted to constitute non-printing portions of the plate surface.

The printing portions 6 include the hydrophilic material 2, the gum arabic 3 and albumin, all bonded together and hardened by ammonium bichromate into a solid, grease-receptive mass which is of pronounced durability and exceedingly well bonded to the base 1. The water-receptive surfaces 7 are made up of the hydrophilic material 2 from which the gum has been removed.

The entire procedure of applying a light-sensitive colloid coating, exposing the coating and developing in conventional manner, is a relatively simple one which requires considerably less care and time than are required in connection with painting in greasy ink around a powder outline. By the procedure noted, the coating material may be quickly brushed on over the entire surface of the plate without any margin lines being adhered to at any point. The steps described are operations familiar to all lithographers and require only a short time to be carried out, as compared with the much longer periods of time necessary to the older methods of making color plates.

An important feature of the invention is the provision of a novel light-sensitive albumin mixture designed to act as an ink, and the novel step of selectively drawing or brushing in this material on a hydrophilic surface, to directly form a printing plate. Also of importance is the combination of the gum arabic layer with a layer of hydrophilic material such as polyvinyl alcohol. This combination makes possible a new principle of selectively applying a water suspension or solution of the light-sensitive colloid around a greasy image, and each of the layers performs important functions in connection therewith.

The layer of gum arabic 3 provides a surface which will readily accept and accurately hold lines, or other forms of subject matter, of both greasy ink and aqueous suspensions or mixtures. This allows a greasy image to be first applied, and thereafter the coating of bichromated al-

bumin to be brought into abutting relation to the greasy image without either of the materials tending to crawl or lose their sharpness of outline.

The film of gum arabic dissolves in water and washes away in the same manner as the unexposed parts of a colloid coating are washed away during conventional development of a lithographic printing plate. This allows removal of the greasy image first applied. In addition the film of gum arabic is characterized by a certain degree of softness which provides for the film being easily washed away, under the ink image referred to, without formation of ragged edges at those points where the gum is hardened in the printing portions of the plate. This is highly important in insuring sharpness of outline.

The gum arabic also tends to become impregnated in the hydrophilic coating 2, and is further important in serving as an absorptive body which ammonium bichromate and albumin may readily penetrate and pass through to strike into the hydrophilic coating. This provides for the hydrophilic coating, the gum, and the bichromated albumin becoming bonded together to form hard, grease-receptive printing portions which are particularly effective in holding desirably large amounts of ink and which present increased durability as compared with older types of plates.

The hydrophilic coating 2 is highly effective in functioning as the non-printing or grease-repellent portions of the plate in accordance with the principle of colloidal printing. The coating 2 also provides a water-receptive body which facilitates absorption of water beneath the greasy ink image first applied on the plate. This insures the greasy ink image being completely rubbed away without any tendency for scumming to occur.

Another important feature consists in the ability of the hydrophilic material, as illustrated by polyvinyl alcohol, to prevent blurring when the bichromated albumin strikes through the gum arabic layer 3. The polyvinyl alcohol is of such character that when the bichromated albumin is coated over the surface of the plate around the greasy ink image already applied thereto, this material does not diffuse or spread out but is held in the polyvinyl alcohol layer with sharp lines corresponding to the outline of the first applied greasy image. This allows a true size of line, or other subject matter, to be maintained all the way down to the alcohol layer so that when the gum layers in the parts underlying the greasy ink image are washed away, a surface of the alcohol layer is exposed which conforms exactly to the outline of the greasy ink image originally disposed on the gum arabic layer. This accuracy is particularly useful in making a set of color plates for juxtaposed color printing. The hydrophilic material also serves as an excellent bonding medium for holding the printing portions on the base 1 and securing the gum arabic film during the processing of the plate.

The ability of the combined gum arabic layer and polyvinyl alcohol layer to satisfactorily accept both greasy materials and aqueous suspensions of colloids, and to hold outlines, makes possible various other uses of the printing material M. For instance, the combined gum and alcohol surface makes possible the application of greasy ink by means of an air brush. This is an advantage in many types of work since the air brush is fast in operation and furnishes improved quality and detail. Stippling may also be resorted to.

On the printing material M of the invention, I may also apply, from an air brush, inks such as water suspensions of bichromated albumin and other aqueous light-sensitive mixtures. The gum surface is adapted to receive and hold minute accounts of colloid material applied from an air brush, which in some instances is a distinct advantage. This procedure also may improve the quality of printing plates and greatly facilitate operations for correcting or modifying the greasy printing portions of plates.

In the event that it is desired to reproduce juxtaposed colored subject matter of more than two colors, the procedure of the invention above described may be modified in some respects. A sheet of the printing material of the invention is utilized, which has a translucent or transparent base. Since a hydrophilic body such as a vinyl compound is translucent, and the film of gum arabic in a dried state is translucent, it becomes possible to trace through printing material having the translucent base referred to. Making use of such a translucent body, a master tracing is prepared which contains an outline of each of the colored sections in the original subject matter to be reproduced. This tracing is carried out with the light-sensitive ink already described, consisting of a material such as bichromated albumin and a dye. The bichromated albumin strikes through the gum and hydrophilic layer in the manner set forth. The tracing is then exposed to photographic light and the plate is developed to form printing portions corresponding to the tracing outline and non-printing portions of the hydrophilic body. The tracing may then be inked with a greasy ink and a series of impressions of the tracing outline in greasy ink is laid out on separate sheets of the printing material of the invention. Each of these sheets may then be filled in with the light-sensitive ink material, ammonium bichromate, in the parts corresponding to a given color section. Thereafter each plate may be developed in the same manner as has been described to form a series of color plates for the multicolor subject matter.

The printing material, and the method of using this material in making printing plates, may also be further modified. For example, a base such as the one already described may be coated with a layer of a vinyl compound. On this coated material a greasy outline may be applied in the same manner as has been described. Thereafter a coating of bichromated albumin is applied, exposed to light, and the first applied greasy image washed away with water. This provides a method of making a printing plate of the same general character not limited to the use of the gum. For some purposes, such a procedure may be desirable.

Still other modifications of the invention may be resorted to. The procedure of separately applying greasy materials and light-sensitive ink materials on a surface such as that of my improved material M may be utilized for other purposes than to make printing plates. For example, I may make artificial negatives. In this case, development of the printing material in the manner referred to results in a negative member directly obtained without photographic exposure. Somewhat the same results may be secured by using a light-sensitive ink without

dye, developing a plate in exact accordance with the first described method of the invention, and then inking the exposed colloid portions of the plate with an opaque colloid ink. The opaque ink in this case constitutes the opaque part of the negative. Various other water suspensions of light-sensitive salts and colloids such as casein, gelatin, polyvinyl alcohol and others, may be utilized in forming the printing portions of the printing material. Similarly, other chromic salts than the ammonium bichromate may be resorted to form a light-sensitive agent.

It will be seen that I have provided a new printing material which combines a water-soluble film of gum arabic with a water-insoluble but water-absorptive layer of colloid material. This combination provides a novel writing surface and other properties which facilitate speed of preparation of printing plates, and particularly color printing plates to reproduce juxtaposed multicolor subject matter. The material may be packaged and shipped as an article of manufacture, and is cheap, efficient, and easy to use. A novel method of making plates is set forth and novel printing portions for a planographic printing plate are disclosed.

While I have shown preferred embodiments of the invention, it should be understood that various changes and modifications therein may be resorted to, in keeping with the spirit of the invention.

Having described my invention, I claim:

1. In a method of making printing plates for printing multicolor subject matter, the steps which include forming a greasy image of one color on a colloidal printing surface, then offsetting said greasy image on a printing material having a hydrophilic coating and a film of gum arabic on said coating, then applying an aqueous suspension of a colloid and a light-sensitive chromium compound in those parts of the second lithographic printing surface uncovered by the offset greasy image, exposing the second printing member to photographic light, thereby to photographically harden the aqueous suspension of colloid light-sensitive salt, introducing water to the portions of the said hydrophilic coating and gum arabic film covered by the greasy image and washing away the greasy image to leave grease-receptive areas adapted to constitute printing portions of a second color.

2. That improvement in methods of making printing plates which comprises coating on a support a hydrophilic material, applying a water-soluble colloid layer on the hydrophilic material, applying a greasy substance in selected areas of the colloid layer, coating a light-sensitive film over the portions of the surfaces of the colloid layer occurring between the greasy substance, said light-sensitive film including a colloidal mixture adapted to be hardened to a grease-receptive state upon exposure to actinic light exposing the light-sensitive film to harden same, applying a greasy ink to the exposed light-sensitive film and washing the plate in water to remove portions of the water-soluble colloid layer covered by the said greasy substance.

3. That improvement in methods of making printing plates which comprises coating on a support a hydrophilic vinyl compound, applying a water-soluble colloid layer on the vinyl compound, applying a greasy substance in selected areas of the colloid layer, coating a light-sensitive film over the portions of the colloid layer uncovered by the greasy substance, said light-sensitive film including a colloid and a chromium compound, exposing the light-sensitive film to harden same, applying a greasy ink to the exposed light-sensitive film and washing the plate in water to remove portions of the water-soluble colloid layer covered by the said greasy substance.

4. In a method of making a planographic printing plate the steps which include applying an aqueous mixture of a colloid and a light-sensitive chromium compound on a lithographic base element which includes a substratum of hydrophilic polyvinyl alcohol, an overlying layer of gum arabic and a greasy ink image superimposed on the gum arabic, said aqueous mixture becoming thereby impregnated in the portions of the gum arabic and hydrophilic polyvinyl alcohol which are not covered by the said greasy ink image, exposing to actinic light to harden together the colloid mixture and impregnated portions of the gum arabic and hydrophilic polyvinyl alcohol, and then removing unhardened portions of the gum arabic.

5. In a method of making a planographic printing plate, the steps which include printing a greasy ink image on a lithographic base element which includes a substratum of hydrophilic polyvinyl alcohol, and an underlying layer of gum arabic, coating the base element with an aqueous light-sensitive mixture of a colloid and a chromium compound, said light-sensitive mixture being repelled by the greasy ink image and becoming impregnated in those portions of the gum arabic and hydrophilic polyvinyl alcohol which are not covered by the greasy ink image, exposing to actinic light, developing with a greasy developing agent and washing in water.

6. That improvement in methods of making planographic printing plates which comprises applying a layer of gum arabic on a base which includes hydrophilic polyvinyl alcohol, printing a greasy image on the layer of gum arabic, coating a light-sensitive mixture of a colloid and a chromium compound over the portions of the gum arabic layer which are not covered by the said greasy image, exposing the light-sensitive albumin and chromium compound to actinic light, applying a greasy developing material and washing in water.

7. That improvement in methods of making planographic printing plates which comprises providing a support which includes a hydrophilic polyvinyl alcohol, applying a layer of gum arabic on the hydrophilic polyvinyl alcohol, printing a greasy image on the layer of gum arabic, coating a light-sensitive mixture of a colloid, a chromium compound and a dye over those portions of the gum arabic which are not covered by the said greasy image, exposing the mixture of colloid and chromium compound to actinic light, applying a greasy ink to the exposed colloid and chromium compound to form printing portions, washing the plate in water to remove said greasy image and portions of the gum arabic layer covered by the said greasy image, thereby to leave nonprinting portions of hydrophilic polyvinyl alcohol.

8. That improvement in methods of making printing plates which comprises applying a layer of gum arabic on a support which includes a hydrophilic polyvinyl alcohol, printing a greasy image on the gum arabic layer, coating a light-sensitive mixture of albumin, a chromium compound and a dye over portions of the gum arabic layer which are not covered by the said greasy

image, exposing the albumin and ammonium dichromate to actinic light, applying a greasy developing ink to the exposed albumin and ammonium dichromate to provide printing portions, and washing the plate in water to remove the said greasy image and portions of the gum arabic layer covered by the said greasy image.

9. The method of making a plurality of planographic multicolor printing plates which comprises providing a plate member having a hydrophilic polyvinyl alcohol coating, applying a film of a colloid and a chromium compound over the polyvinyl alcohol coating, exposing the colloid and chromium compound to actinic light passed through a photographic color negative, developing the exposed portions of the colloid and chromium compound with a greasy developing ink, and removing unexposed portions of the colloid and chromium compound, thereby to provide printing portions for printing one color, applying a greasy printing ink to the printing portions thus formed, transferring the greasy ink to a second plate member, said second plate member having a hydrophilic polyvinyl alcohol coating and a layer of gum arabic overlying the polyvinyl alcohol coating, coating the portions of the second plate member which are not covered by the transferred greasy ink with an aqueous mixture of ammonium dichromate and albumin, exposing the aqueous mixture of ammonium dichromate and albumin to actinic light, developing the exposed portions of the ammonium dichromate and albumin with a greasy developing ink, then washing away the said transferred greasy ink and the portions of the gum arabic layer covered by the transferred greasy ink to provide grease-receptive printing portions which correspond to a second color to be printed in juxtaposed relation with respect to the colored image of the said first plate member.

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