Feb. 23, 1943. W. C. TOLAND ET AL 2,311,888

LIGHT-SENSITIVE ELEMENT

Filed Jan. 2, 1941

Fig. 1.

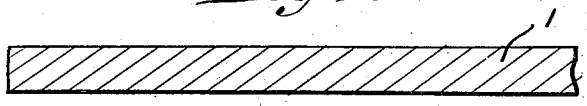


Fig. 2.

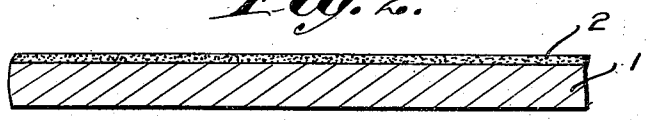


Fig. 3.

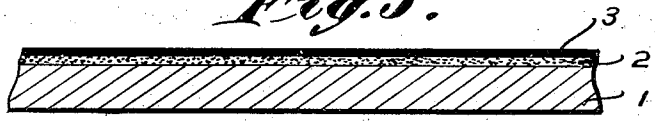


Fig. 4.

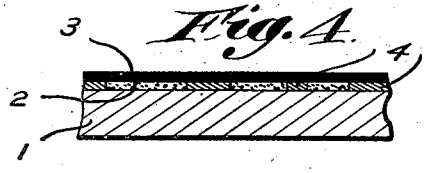


Fig. 5.

Fig. 6.

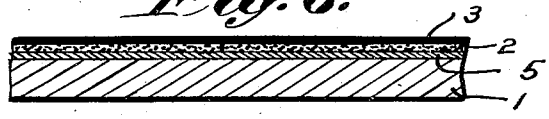
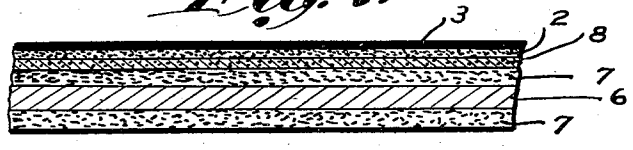


Fig. 7.



Inventor
William C. Toland
Ellis Bassist
Munro H. Hamilton
By
Attorney

Patented Feb. 23, 1943 2,311,888

UNITED STATES PATENT OFFICE

2,311,888

LIGHT-SENSITIVE ELEMENT

William Craig Toland and Ellis Bassist, Brookline, Mass., assignors to William Craig Toland, as trustee

Application January 2, 1941, Serial No. 372,727

5 Claims. (Cl. 95—8)

This invention relates to light-sensitive elements and more especially to light-sensitive elements of the type utilized in making printing plates.

In preparing planographic printing plates, it is necessary to form a grease-receptive printing image. One procedure for forming an image of this character consists in applying upon a suitable support a coating made up of a colloid and a light-sensitive salt, as bichromated albumin. The coated support is placed under a photographic negative and exposed with actinic light to form hardened water-insoluble portions. After exposure the surface is rubbed over with a greasy developing ink which renders the hardened or exposed portions of the coating grease-receptive. Thereafter the plate is washed under running water to remove the unexposed portions and the ink which covers these portions. This leaves the desired grease-receptive printing image. The step, however, of applying developing ink to the coating after exposure, requires time and careful treatment on the part of the operator, and results in the waste of expensive developing ink materials, thereby increasing plate costs.

It is an object of the invention to improve light-sensitive elements and to devise, as an article of manufacture, a light-sensitive product having greasy developing material combined therewith for the purpose of simplifying the preparation of planographic printing plates and reducing their cost. A further object is to provide, on a light-sensitive coating, an overlying layer or film which is translucent with respect to actinic light and which serves as a protective body. Still another object is to provide novel developing materials, and to present such developing materials in association with light-sensitive coatings on a base of continuous strip or roll form. The invention also aims to provide a rapid and positive method of developing a planographic printing plate.

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:

Figure 1 is a fragmentary cross section of a support for a light-sensitive element.

Fig. 2 is a fragmentary cross sectional view illustrating a support of the character shown in Fig. 1, coated with a photo-sensitive emulsion.

Fig. 3 is another fragmentary cross sectional view illustrating the light-sensitive product of the invention.

Fig. 4 is a view illustrating a step in developing a light-sensitive product of the type shown in Fig. 3.

Fig. 5 is a cross sectional view illustrating a further step in the method of developing referred to.

Fig. 6 is a fragmentary cross sectional view of a modification of the invention; and

Fig. 7 illustrates a further modification.

In accordance with the present invention, we provide a novel light-sensitive element prepared as illustrated in Figs. 1–3 inclusive. Numeral 1 denotes a lithographic printing plate base, as for example a grained metal plate or other prepared lithographic support, on which is applied a coating 2 of a light-sensitive colloid suspension. The coating 2 is in turn covered with a layer 3 of a developing material.

The light-sensitive coating 2 consists of a colloid material having incorporated therewith a light-sensitive body of the chromic salt type which is hardened by exposure to actinic light. An example of a suitable coating is one obtained from a mixture of albumin and ammonium bichromate.

The layer 3 consists of a relatively thin film of a greasy material which offers little if any resistance to the passage of actinic light. One suitable material is a paste or liquid compounded from pigments which are substantially translucent with respect to actinic light. For instance, pigments of a blue color have the property of being highly translucent to actinic light, and a developing material made up of linseed oil, a filler and a blue colored pigment is suitable. Various other developing mixtures may be employed such as mixtures of a greasy material containing little if any opaque materials or pigments.

We have discovered that a light-sensitive product, coated with greasy developing material of the character described, may be sufficiently exposed by actinic light to effect hardened colloid portions suitable for printing. It has further been discovered that the greasy developing material 3 will adhere to those hardened portions of the coating resulting from exposure to actinic light and render them grease-receptive, in the same manner as is effected by conventional application of developing ink to a plate coating after it has been exposed to actinic light. After exposure, in accordance with the method of the invention, the unhardened parts of the light-sen-

sitive coating are washed away in the usual manner and they carry with them portions of developing material adhering thereto.

In Fig. 4 a plate coating of the type referred to is illustrated after having been exposed to actinic light passed through a contact negative. It will be noted that there are formed hardened printing portions 4. The plate may be washed under running water to remove unhardened portions of the coating and leave a finished printing plate, as illustrated in Fig. 5.

An important feature of the invention is the method of applying developing material to a coating before the latter is exposed. In the conventional method of making and developing plates, a hardened colloid printing image is prepared of an area substantially smaller than the area of the light-sensitive coating surface originally coated on the lithographic support. In applying developing ink, excess amounts become spread over most of the surface of the coating. As a result a large amount of plate surface is unnecessarily treated and considerable developing ink is wasted. By the method of the invention a size of coated plate stock may be utilized more nearly approximating the size of the desired printing image to be effected thereon. This makes possible substantial savings in the developing material used and in the time ordinarily required to apply it.

The layer 3 of developing material also functions as a protecting medium both in preventing the coating 2 of light-sensitive material from being scored or rubbed off, and in shutting out light, such as sunlight, which might tend to affect the sensitivity of the coating. In some instances, in the earlier method of applying developing ink, faulty application occurred and the hardened colloid printing image was not rendered satisfactorily grease-receptive, resulting in dull or blurred prints. This is avoided to a large extent in the method of applying developing material herein disclosed, as the developing material is more thoroughly brought into contact with the photo-sensitive emulsion. A still further result of applying the developing material before exposure is the formation of sharper printing images. The quality of the printing image is also improved by the presence of talc or similar dusting agents on the surface of the coated developing material.

Use of developing material, in the manner described, is also important in connection with special light-sensitive coatings. In general, light-sensitive materials of the chromic salt type utilized in making planographic printing plates, rapidly lose their sensitivity to light, and as a result it has been necessary for the light-sensitive materials to be exposed within a few hours of the time when they were prepared. In a co-pending application, Ser. No. 315,412, filed January 24, 1940, we have described and claimed means for prolonging the sensitivity of such light-sensitive materials. The materials are applied over special colloid films coated on suitable lithographic support materials, and by this means may be maintained in satisfactory condition for extended periods. As a result, large amounts of lithographic support material, for example, paper in the form of rolls or sheets, may be cheaply and efficiently coated in a continuous coating operation.

It is pointed out that the application of developing material over a light-sensitive coating, occurring on a lithographic support in the form of a continuous roll or sheet, may be very efficiently and cheaply carried out. The invention, while not limited thereto, is particularly directed to application of developing materials on paper printing plate stock, having light-sensitive coatings which may be held active for extended periods.

Fig. 6 indicates a light-sensitive product illustrating the combination of a layer of greasy developing material with a light-sensitive coating which may be held active for extended periods. In detail, the light-sensitive member consists of a lithographic support 1, having a coating 5 of a colloid material, and a layer 2 of light-sensitive material overlying and impregnated in the coating 5. Developing material 3 covers the layer 2.

Another application of coating greasy developing material on a light-sensitive emulsion is in connection with printing plate supports which include water-receptive colloid coatings adapted to constitute non-printing portions of a lithographic printing plate, described and claimed in our copending application Ser. No. 170,762, filed October 25, 1937.

Fig. 7 illustrates a layer 3 of greasy developing material overlying a light-sensitive coating 2 mounted on a layer 8 of water-receptive colloid material of the type referred to. In this light-sensitive element, the water-receptive colloid coating 8 is supported on a base made up of a web of paper 6 having layers 7 of a water-repellent resin. It is pointed out that lithographic supporting members of the type illustrated in Fig. 7, made up of laminated paper, resin and colloid coatings, may be efficiently manufactured in a roll or sheet form by continuous coating operations, in connection with which the application of developing material over a light-sensitive coating is particularly desirable.

Various other modifications of the invention may be resorted to. For example, greasy developing material may be applied over light-sensitive coatings of other types, such as those of casein, glue, gum arabic, gelatin, and the like, containing light-sensitive salts such as chromic salts, silver salts, and the like.

The developing material may be employed to act as a coloring agent as well as a grease sensitizing member, and this may be done by incorporating a dye, or colored pigment, in the developing material to carry out conventional coloring operations in making color plates for multicolor subject matter.

We may also desire to employ special protective coatings with light-sensitive emulsions applied on a lithographic support, particularly light-sensitive emulsions which may be held light-sensitive for prolonged periods of time, such as described above. These special protective coverings may not necessarily be formed of greasy materials or materials opaque to sunlight. For example, we may cover a coating of bichromated albumin with a film or layer of a translucent material such as glue, gum arabic, and similar substances. Such a film or protective body prevents the light-sensitive coating from being scored or rubbed away, and is particularly desirable in protecting such coatings during the preparation of rolls or sheets of lithographic printing plate supports made of paper or plastic materials.

It will be seen that a novel light-sensitive product is provided in which a light-sensitive coating is protected from abrasion, or the action of sun-

light, and in other ways. A new method of developing printing plates is disclosed, and novel developing materials are set forth.

While we have shown a preferred embodiment of the invention, various changes and modifications may be resorted to, in keeping with the spirit thereof as defined by the appended claims.

Having described our invention, we claim:

1. As an article of manufacture a light-sensitive element comprising a lithographic support which includes a base and a water-receptive coating on the base, a light-sensitive layer on said water-receptive coating, said layer including a colloid and a chromic salt, and a greasy developing material which is translucent with respect to actinic light overlying said coating, said greasy developing material occurring in a substantially uniformly thick layer.

2. As an article of manufacture, a light-sensitive element comprising a lithographic printing surface, a light-sensitive coating on the surface said light-sensitive coating being adapted to become grease-receptive when exposed to actinic light and a layer of greasy developing material overlying said coating, said developing material including a blue pigment for the purpose of providing translucency with respect to actinic light.

3. As an article of manufacture a light-sensitive element comprising a lithographic printing plate element, a substantially level coating of light-sensitive material superimposed on the lithographic printing element, said light-sensitive material being of a type adapted to be rendered grease-receptive upon exposure to actinic light, a layer of a greasy material overlying the light-sensitive material, said layer of greasy material being translucent with respect to actinic light and substantially uniform in thickness at all points therein.

4. As an article of manufacture a light-sensitive element comprising a lithographic printing base which is adapted to be rendered water-receptive, a light-sensitive coating of a colloid and a chromic salt superimposed on the printing base, a developing ink overlying said light-sensitive coating and occurring in a layer which is of substantially uniform thickness, the developing ink being adapted, upon exposure of the light-sensitive coating to actinic light, to render exposed portions of the coating grease-receptive, said greasy developing ink being translucent with respect to actinic light.

5. As an article of manufacture a light-sensitive element comprising a lithographic base which includes a layer of polyvinyl alcohol, said polyvinyl alcohol being water-receptive and water-insoluble, a light-sensitive coating superimposed on the layer of polyvinyl alcohol, the light-sensitive coating consisting of a colloid and a chromium compound, a uniformly thick layer of a greasy material overlying the light-sensitive coating, said greasy material being translucent with respect to actinic light and presenting a substantially dry outer surface.

WILLIAM CRAIG TOLAND.
ELLIS BASSIST.