Dec. 12, 1933. T. E. RICHARDS 1,938,667

PRINTING PLATE

Filed June 18, 1930

Fig. 1.

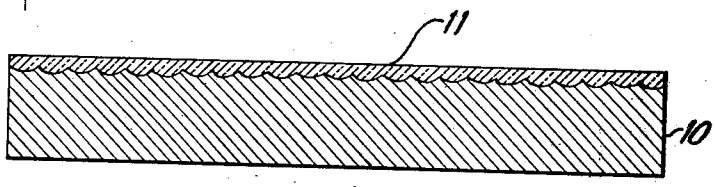


Fig. 2.

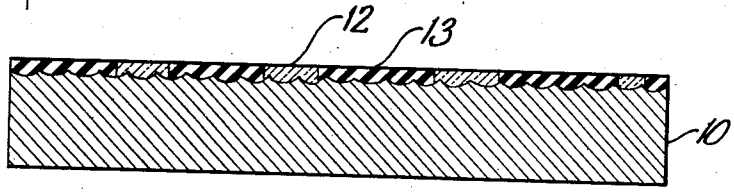
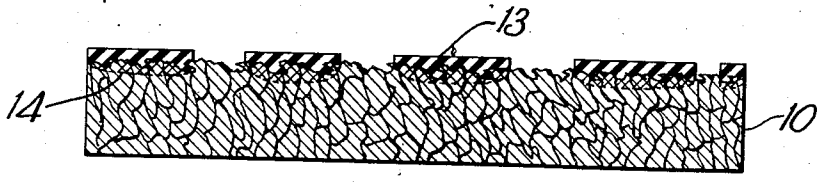


Fig. 3.



INVENTOR
Thomas Ernest Richards
BY
Harfield, Fraser & Brown
ATTORNEY

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PRINTING PLATE

Thomas Ernest Richards, Auckland, New Zealand

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14 Claims. (Cl. 41—41.5)

This invention relates to lithographic printing plates and to the method of preparing the same, especially when prepared photographically; it has for its object the production of plates which will be superior to the plates heretofore in use with respect to cost and rapidity of preparation, durability, speed at which the plates may be run in printing machines and quality of the work produced.

The present invention is particularly adapted for the production of planographic plates for offset printing presses, especially newspaper presses, but it is nevertheless contemplated applying the invention to the preparation of lithographic plates of any type.

By the present invention, one is able to produce a planographic printing plate having a very strong, distinct and durable image from which prints may be made, for example in offset presses, particularly in web-fed offset presses where a higher rate of speed is required than in sheet-fed presses. The image substance here employed is characterized by the fact that it will soften under the application of heat and penetrate into the cavities of the surface of the metal plate, this latter being heat-treated during the process of forming the image, so as to form the bond between the metal and the image substance. The heating here practiced, however, is of a character such as to provide an especially good bond, as cavities in the surface of the metal are thereby formed into which the image substance flows when heated and keys itself to the plate. Microscopic examination of the improved bond thus obtained indicates that it is the result of recrystallization in the metal produced by the heat treatment. There is also indication, that the improved bond is in part due to chemical reaction between the image substance and the metal.

This application is a continuation in part of my co-pending application, Serial Nos. 227,623 and 368,424.

The invention accordingly comprises the several steps and the relation and order of one or more of such steps with respect to each of the others, and the product embodying features of construction, and arrangement of parts, all as exemplified in the following detailed disclosure, and the scope of the application of which will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawing, in which:

Fig. 1 is an enlarged cross section showing schematically a portion of a grained plate having an image-receiving film;

Fig. 2 shows a plate of the character shown in Fig. 1 having a developed image to which is applied a coating containing an image substance of the character employed in the present invention; and

Fig. 3 is a similar view showing the plate with the image film removed, but with the image substance firmly attached in accordance with the present invention.

Referring now to the drawing, 10 denotes a grained metal plate of any suitable ink-repellant metal, for example aluminum or zinc, to which is applied a film 11 adapted to take an image, for example a colloidal film which has been made photosensitive. When an image has been formed or developed, by removing portions of the film from the plate, there remain upstanding portions as indicated at 12 in Fig. 2, about which the image substance is applied. A coating 13 containing the image substance of the present invention is applied evenly to the plate about the image.

The plate when finally prepared in accordance with the process of the present invention, has the image film removed, and the coating hardened and firmly bonded to the plate by keying into the inter-crystalline crevices. The portion of the hardened coating which has penetrated into the plate is shown at 14 in Fig. 3, all parts in these figures being illustrated on a greatly exaggerated scale.

In the practice of the present invention, a grained metal plate such as one of aluminum is first prepared and a suitable image formed thereon about which the image substance is applied. When the image is formed photographically, the plate which has been suitably washed and etched is coated with a film of a suitable photosensitive colloidal solution, for example the following:

Fish glue	16	ounces
Water	36	do
Ammonium bichromate	1½	do
Ferric ammonium citrate	½	do
Strong solution of ammonia	1½	drams

The plate when coated is dried, then exposed and developed in the usual manner by washing with water. A negative image remains on the plate in which the colloid serves as a resist or

matrix. The plate is next dried and then coated with metal-penetrating ink-absorbing material containing image substance of the character required for the practice of the present invention.

The ink-absorbing material preferred is prepared in accordance with the following formula:

To one gallon of pure turpentine, one pound of asphaltum, the body-giving material, is added and the mixture brought to the boiling point. To this first mixture, a second is added consisting of one-half pound of transfer ink dissolved by heating in one quart of turpentine. To this, a third or liquid mixture is added comprising one dram of a preparation consisting of oleic acid and an essential oil, and one dram of substantially pure oleic acid. The preparation of oleic acid and an essential oil preferred, is that now sold on the open market under the tradename "Elbagreen oil". This mixture has the property of penetrating and adhering to the plate and being of a greasy nature has affinity for printers' ink.

This coating is evenly applied to the plate in any convenient manner, for example by rotating in a whirler and the plate is thereafter given its first heat treatment which is to a relatively moderate temperature. The preferred temperature range for this heat treatment is from 38 to 43 degrees C. This first heating sets the image substance in the grained surface of the plate sufficiently so that it is able readily to stand the more vigorous methods of treating and cleaning hereinafter used. It will be seen that the plate is now entirely coated with ink-absorbing material; the substance thereof penetrating to the metal over those portions where the plate has been washed clean by water. The colloid film hardened by light exposure and corresponding to the exposed portions of the plate adheres to the plate and underlies the other portions of the ink-absorbing coating which do not reach the metal plate.

The plate is now immersed in water and the surplus ink-absorbing material brushed away. After this, the plate is placed in a dilute solution of phosphoric acid for example a ten percent solution in order to soften the colloid film which is then brushed away. The plate is thereafter washed and immersed in a dilute solution of nitric acid, such as a ten percent solution for a period of about 20 seconds. Immediately thereafter the plate is washed with water and again immersed for about one minute in a dilute solution of phosphoric acid. The plate is now washed and dried and given its second-heat treatment. This second heat-treatment produces the deep cavities desired; the temperature range employed in this treatment for aluminum is from 150 degrees to 182 degrees C. or higher, so long as the plate is not damaged. During this heat-treatment, the image substance is caused to soften and flow into the cavities and in the surface of the metal.

When the plate has become cooled, it may be coated with a solution of gum arabic and dried. The plate is now ready to be put on a printing press and run.

If zinc plates are used, they are treated in substantially the same manner as the aluminum plates above described, except that the acid baths should be weaker, for example 2% solution instead of 10% solution. The temperature ranges employed in the first and second heat treatments are also different. The temperature range preferred for the first heat treatment for zinc is from 65 to 71 degrees C. The preferred range for the second heat treatment is up to 127 degrees C., which will avoid damage to the plate and at the same time hasten cavity formation, although recrystallization for zinc is known to take place at room temperature.

It will be understood that the particular ingredients mentioned in the foregoing description are not of the essence of the present invention and that the practice of the same is not limited to the steps in the procedure described above, except as defined in the following claims:

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. The method of preparing a lithographic printing plate, which comprises applying to the bare metal of a grained aluminum plate, in the form of the work to be printed, an image substance having an affinity for ink and capable of softening when heated, then etching the plate with acid, and then heating the plate sufficiently to develop cavities therein, and causing said image substance to soften and flow into the cavities of the aluminum.

2. The method of preparing a lithographic printing plate, which comprises coating a grained aluminum plate with a sensitive film, exposing the film, developing the film to uncover the aluminum of the plate in the unexposed places, coating the plate with an image substance having an affinity for ink and capable of softening when heated, removing the exposed portions of said film and the image substance thereon, and then heating the plate sufficiently to develop cavities therein, and causing said image substance to soften and flow into the cavities of the aluminum.

3. The method of preparing a lithographic printing plate, which comprises coating a grained aluminum plate with a sensitive film, exposing the film, developing the film to uncover the aluminum of the plate in the unexposed places, coating the plate with an image substance having an affinity for ink and capable of softening when heated, heating the plate to a temperature just sufficient to soften the image substance slightly and cause it to set in the grain of the aluminum, removing the exposed portions of said film and the image substance thereon, and then heating the plate sufficiently to develop cavities therein and to cause the image substance on the bare aluminum to flow and penetrate deep into the cavities in the surface of the aluminum.

4. A lithographic printing plate, comprising an aluminum sheet provided with a grained surface having cavities therein evidencing recrystallization, an image form on said surface, and ink-absorbing material in said form characterized by the property of being softened under heat, said material being fused and keyed into said cavities whereby a bond with said surface is formed.

5. A lithographic printing plate, comprising an aluminum sheet provided with a grained surface having cavities therein evidencing recrystallization, an image form on said surface, and ink-absorbing material in said form characterized by the fact that it contains a body-giving agent capable of being softened by heat and a greasy acid, said material being fused and keyed into said cavities whereby a bond with said surface is formed.

6. A lithographic printing plate, comprising

an aluminum sheet provided with a grained surface having cavities therein evidencing recrystallization, an image form on said surface, an ink-absorbing material in said form characterized by the fact that it contains asphaltum and oleic acid, said material being fused and keyed into said cavities whereby a bond with said surface is formed.

7. A lithographic printing plate, comprising an aluminum sheet provided with a grained surface having cavities therein evidencing recrystallization, an image form on said surface, an ink-absorbing material in said form characterized by the fact that it contains asphaltum, transfer ink and a greasy acid, said material being fused and keyed into said cavities whereby a bond with said surface is formed.

8. A lithographic printing plate, comprising an aluminum plate provided with a grained surface having cavities therein evidencing recrystallization, an image form on said surface, and ink-absorbing material in said form characterized by the fact that it contains asphaltum, oleic acid and an essential oil, said material being fused and keyed into said cavities whereby a bond with said surface is formed.

9. A lithographic printing plate, comprising an aluminum sheet provided with a grained surface having cavities therein evidencing recrystallization, an image form on said surface, an ink-absorbing material in said form characterized by the fact that it contains asphaltum, transfer ink, oleic acid and an essential oil, said material being fused and keyed into said cavities whereby a bond with said surface is formed.

10. The method of preparing a lithographic printing plate, which comprises providing an aluminum plate with a grained metal surface, making an image form on said plate, applying ink-absorbing material to said image form, which material has the property of being softened when heated, developing cavities in said grained metal surface by heat-treatment, and causing said ink-absorbing material to flow into said cavities and key into the plate.

11. The method according to claim 10 characterized by the fact that a grained aluminum plate is heated to a temperature of at least 150 degrees C. when developing cavities.

12. The method of preparing a lithographic printing plate, which comprises providing an aluminum plate with a grained surface, making an image form on said plate, applying ink-absorbing material consisting at least partly of a fatty acid to said form, which material has the property of being softened when heated, developing cavities in said surface by heat treatment, and causing said material to flow into said cavities and key into said plate.

13. The method of preparing a lithographic printing plate, which comprises providing an aluminum plate with a grained surface, making an image form on said plate, applying ink-absorbing material consisting at least partly of oleic acid to said form, which material has the property of being softened when heated, developing cavities in said surface by heat treatment, and causing said material to flow into said cavities and key into said plate.

14. The method of preparing a lithographic printing plate, which comprises providing an aluminum plate with a grained surface, making an image form on said plate, applying ink-absorbing material consisting partly of oleic acid and a small amount of essential oil to said form, which material has the property of being softened when heated, developing cavities in said surface by heat treatment, and causing said material to flow into said cavities and key into said plate.

THOMAS ERNEST RICHARDS.