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ETCHING LITHOGRAPHIC PLATES

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In the manufacture of deep-etch lithographic plates it is customary to coat a cleaned and counter-etched zinc or aluminum plate with a "resist" which is sensitive to light, and the plate is then exposed to light in the form of the subject matter which is to be reproduced, such that in those areas where no image is desired on the finished plate the resist is hardened; then the unhardened areas of the resist are removed by a developing agent so as to leave the image portions of the plate clean. A so-called "deep-etching solution" is then applied to the plate and allowed to attack the exposed image areas until the metal is etched away to the desired depth, and after drying, the deep etched areas are treated with material, commonly referred to as a lacquer, to render them receptive to ink. Subsequently the light-hardened areas of the resist, which during etching have served to protect the non-image areas of the plate, are removed by a "clean-up" solution. The plate is then given a desensitizing etch to make the non-image areas receptive to water and is ready for printing. In accordance with the present invention, improved procedure and materials are involved, such as to afford more easy manipulation and control, and more reliable and positive action, and making possible the production of plates having improved longevity, definition, fidelity and uniformity.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described, and particularly pointed out in the claims, the following description setting forth in detail certain illustrative embodiments of the invention, these being indicative however, of but a few of the various ways in which the principle of the invention may be employed.

In the preparation of plates in accordance with my invention, I may employ any usual or preferred materials, as for instance the well known glue or gum arabic. Such coating material, suitably sensitized with a suitable dichromate or the like as usual, is applied to the metal plate, as in the well-known practice.

The coated metal plate, (the metal being usual or as preferred, zinc, aluminum, etc.), having been exposed to light and the subject matter which is to be reproduced, is treated with the developer, which may be of any usual or preferred material, for instance a concentrated solution, about 50° Bé., of calcium chloride containing a small percentage of lactic acid, and following the developer, anhydrous alcohol may

be used to remove the residue of the developer remaining on the plate.

Following removal of the unhardened portions of the resist by the developer, the plate is deep-etched. According to customary procedure, zinc plates are etched with a solution of anhydrous alcohol and hydrochloric acid and aluminum plates are etched with a concentrated solution of iron chloride. These solutions however have the disadvantage that their etching action is more rapid in its early stages than is desirable and subsequently diminishes rapidly, thus making it difficult to control accurately the extent of the etching action. Such solutions also tend to preserve or emphasize the rough character of the plate surface. In addition, in the case of such iron chloride solution a portion of the iron chloride may crystallize out or may form ferric hydroxide or metallic iron, thus leaving a deposit on the plate causing the lacquer to lift where it should adhere. In etching in accordance with the present invention however, I apply a saturated solution of magnesium chloride in water to which has been added a small amount, for instance two to five per cent by weight of each of two water-soluble monobasic aliphatic acids, viz. formic and glycollic (the latter also known as hydroxyacetic), or formic and hydroacrylic acids. Less advantageously, acetic or propionic acid can be used in lieu of formic acid in some cases. This etching material results in certain new and different effects distinguished by the following characteristics: (1) it has the effect of smoothing out the grain of the etched areas, that is, it removes metal from the peaks of the roughened surface to a greater extent than from the valleys; (2) it has a slower and more moderate action than previously known etching solutions, requiring a longer time, such as one and one-half to three minutes, for the completion of a suitable degree of etching, and is therefore more easy to control; (3) it maintains its etching activity for a longer period and etching continues throughout the extent of the time required in normal operation. This deep-etching material may be used on aluminum as well as on zinc, but for best results on aluminum plates it is desirable to include ferric chloride, as in amount of five to twenty per cent in substitution for equivalent amounts of the magnesium chloride.

Having etched the plate by the usual or the preferred etching materials as indicated, the hardened resist is next removed from the non-image areas of the plate which it has protected

during the deep-etching, and for this, I prefer to employ a water solution of gluconic acid, for instance about one to five per cent. Gluconic acid is novel in this relation, and is very useful with known resists, but is particularly desirable where the preferred resists as above described have been employed.

This application is a continuation, in part and as to common subject matter, of my application Serial No. 223,523, filed August 6, 1938.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims, or the equivalent of such, be employed.

I therefore particularly point out and distinctly claim as my invention:

1. In a process of making lithographic plates, etching the developed plate with a saturated solution of magnesium chloride containing two to five per cent by weight each of formic and glycollic acid.

2. In a process of making lithographic plates, etching the developed plate with a solution of magnesium chloride containing formic and glycollic acid.

3. In a process of making lithographic plates, etching the developed plate with a saturated solution of magnesium chloride containing a small per cent of a water-soluble monobasic aliphatic acid.

4. In a process of making lithographic plates, etching a developed aluminum plate with a solution of magnesium chloride and ferric chloride, containing formic and glycollic acids in amount two to five per cent each.

5. In a process of making lithographic plates, etching a developed aluminum plate with a solu-

tion of magnesium chloride and ferric chloride, containing formic and glycollic acids.

6. In a process of making lithographic plates, etching a developed aluminum plate with a solution of magnesium chloride and ferric chloride, containing a small per cent of a water-soluble monobasic aliphatic acid.

7. In a process of making lithographic plates, etching the developed plate with a saturated solution of magnesium chloride containing two to five per cent by weight each of formic and glycollic acid, and then treating the plate with a one to five per cent water solution of gluconic acid.

8. In a process of making lithographic plates, etching the developed plate with a solution of magnesium chloride containing formic and glycollic acid, and then treating the plate with a one to five per cent water solution of gluconic acid.

9. In a process of making lithographic plates, etching the developed plate with a saturated solution of magnesium chloride containing a small per cent of a water-soluble monobasic aliphatic acid, and then treating the plate with a one to five per cent water solution of gluconic acid.

10. In a process of making lithographic plates, etching a developed aluminum plate with a solution of magnesium chloride and ferric chloride, containing formic and glycollic acids in amount two to five per cent each, and then treating the plate with a one to five per cent water solution of gluconic acid.

11. In a process of making lithographic plates, etching a developed plate, and then treating the plate with a solution of gluconic acid.

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