UNITED STATES PATENT OFFICE.

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PROCESS FOR PRODUCING PRINTING-PLATES.

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To all whom it may concern:

Be it known that I, ALBERT J. HAIN, citizen of the United States, residing at Lakewood, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Processes for Producing Printing-Plates, of which the following is a specification.

This invention relates generally to processes for producing printing plates, and particularly to those which produce half-tone type plates having dots or stipples.

More specifically the process contemplates several new steps and combination of steps in the production of a printing plate and the preferred process consists generally in doing away with the use of a screen in the production of a half-tone type of printing plate and utilizing a medium comprising a plate forming a support for a multiplicity of isolated areas such as dots or stipples, containing an element susceptible of being affected by light, exposing the plate or surface to the image thereby affecting the light sensitive element of the areas, eliminating the unaffected light-sensitive elements of the areas, and finally intensifying the areas in point of varying the size thereof.

The invention may be further briefly summarized as consisting in the process and the steps thereof set forth in the following description and claims.

A specific process which is in accordance with the invention consists in coating a clean smooth metal or other plate with a resist or substratum, from which a pattern is formed for the production of the etched plate by the etching fluid. Any of the well known resists may be utilized for substratum, and some of these are: gum dammar, gum shellac, bitumen, dragon's blood, pyroxylin in solution or copper plating. This resist or substratum preferably extends over the entire plate to protect it against the etching fluid. Upon this resist or substratum, which has been previously dried, a light-sensitive emulsion is applied in the form of a multiplicity of isolated areas in dot or stipple formation, the number of the areas depending upon the half-tone effect which the finished print is to have, that is for certain grades of work eighty spacings to the lineal inch between the areas might meet the requirements, whereas in other cases one-hundred spacings between the areas to the lineal inch might be desirable, this point being previously determined upon by the process worker.

Any suitable formula for the light-sensitive emulsion may be used, and if it is desired that the image be of the print-out type, then the following formula is an instance of one which may be employed:—

Gelatin	500	gr.
Alum	15	gr.
Rochelle salts	15	gr.
Ammonium chlorid	15	gr.
Distilled water	6¼	oz.

Heat to 112 degrees Fahrenheit and add

Silver nitrate	115	gr.
Citric acid	62	gr.
Water	1	oz.

If the plate is to be exposed under a negative, or in a camera, and an image is to be developed out, any preferred formula may be utilized for the light-sensitive emulsion, and the following is one which may be used effectively:—

Potassium iodid	3	gr.
Potassium bromid	8.7	gr.
Silver nitrate	11.4	gr.
Gelatin	18	gr.

Water and ether in varying amounts.

The light-sensitive material or emulsion may be applied to the surface in any suitable manner, the particular manner not forming a part of the present invention. For example it may be applied by the use of a stencil, said stencil being first applied to the surface, the light-sensitive material or emulsion being then applied as a continuous layer upon the stencil, and the stencil being then stripped from the surface leaving the dots or separated areas adhering to the surface at the openings in the stencil. It might also be applied by first applying a continuous coating of the light sensitive material or emulsion to the surface, then applying a stencil or perforated sheet to the light sensitive material, so as to adhere thereto, and then stripping the stencil or sheet from the surface, removing therewith the adhering light sensitive material and

leaving separated isolated areas opposite the stencil openings.

According to one manner of producing the process the light-sensitive emulsion used is of the print-out image type, and in use the plate is placed in contact with the negative and exposed until a good clear image is obtained. The image is then fixed in any fixing solution such as one containing 2 oz. of "hypo" in 10 oz. of water. This fixing process dissolves out the soluble elements of the light-sensitive emulsion, leaving those which have been rendered insoluble by the action of the light, and causing them to be fixed upon the plate. The product at this point then represents a plate containing the image made up of a multiplicity of isolated areas which vary in the point of color with the image, but are of the same size. They vary, however, in point of amount of the light-affected element, for example, silver chlorid according to the extent to which they have been acted upon by the light.

Since all the areas, which protect in a sense the resist or substratum, are of the same size, it is necessary in order to produce a printing plate to vary these in size so that in the process of printing, various sized printed areas will be produced in order to bring out the lights and shades. To accomplish this result the product at this stage is subjected to the action of a solution which will deposit additional substance on the areas to vary their size to the proper extent for the finished printing plate, and this may be readily accomplished, by reason of the presence of silver in the areas, by metallic deposition from a suitable solution containing a metal in the proper form, such a solution being:—

Lead nitrate	100 grains.
Potassium ferricyanid	150 grains.
Acetic acid	25 mins.
Water	5 oz.

This solution is flowed over the plate until the image is bleached, when the plate is washed thoroughly in water and then flowed with ammonium sulfid, 1 part, water 10 parts, which blackens the image. This action of bleaching and blackening the image may be repeated until the proper half-tone formation is obtained.

The plate is then dried and subjected to the action of a suitable solvent for dissolving the resist of substratum when the metal of the plate is bared at all points which were unprotected by the emulsion and the metallic deposit. The product then comprises the plate itself with a pattern in the resist in half-tone formation upon its surface, when it may be etched in any approved manner well known to workers of the etching process.

The process has been described where the plate is provided with a light-sensitive emulsion of print-out type, but where the light-sensitive emulsion is of the developing-out type and has been exposed in a camera, the image when developed out in any approved manner, appears as a negative in half-tone areas, and the positive is produced therefrom in any approved manner.

In this case the process is followed in the same manner until the bared metal is exposed between the areas, which have been previously varied by the deposition process, after which the bare portions of metal are coated preferably with etching ink in any well known manner and the remaining original substratum and any particles of the emulsion removed, when the plate may be etched in any well known manner producing a positive printing plate.

If desirable the isolated areas of the light-sensitive emulsion may be applied to a glass plate or other support, which may be exposed in a camera and utilized in the same manner in which an ordinary glass half-tone negative is used in the production of the etched printing plate.

The process may be utilized in any preferred manner, that is the etching plate itself may be provided with the light-sensitive areas of the print-out type, may be exposed under a negative and fixed, or the plate may be provided with a light-sensitive emulsion of the developing-out type, exposed under a negative or in a camera, and then developed out, or still further the light-sensitive areas may be provided upon a glass plate from which the half-tone type of printing plate may be produced, the main object being that a half-tone type of medium for use in the production of a half-tone type of printing plate, containing dots or stipples, is produced without the aid of a screen and by providing at some step a surface with a multiplicity of isolated light-sensitive areas. It is obvious that any suitable emulsion with corresponding treatment solutions may be utilized without departing from the spirit of the invention, and that the surface containing a multiplicity of isolated light-sensitive areas may be used in various ways in practising the process without departing from the spirit of the invention.

Having described my invention, I claim:—

1. A step in the production of etched plates which consists in providing a suitable surface with a multiplicity of isolated light-sensitized areas.

2. A step in the production of etched printing plates consisting in providing an etching plate with a suitable etching fluid resist and applying upon this a multiplicity of isolated areas of a material containing an element affected by light.

3. A step in the production of etched plates which consists in providing a suitable support with a suitable etching fluid resist and applying upon this a multiplicity of isolated areas containing a light-sensitive metallic salt.

In testimony whereof I affix my signature in presence of two witnesses.

ALBERT J. HAIN.

Witnesses:
ALTON H. BEMIS,
D. TOZER.