

UNITED STATES PATENT OFFICE.

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MRS. ALPHA O. GOLDSMITH, OF BERLIN, GERMANY, AND ONE-FOURTH
TO SOPHIE SPITZER, OF MUNICH, GERMANY.

PRINTING-PLATE.

No. 854,676.

Specification of Letters Patent.

Patented May 21, 1907.

Original application filed July 7, 1902, Serial No. 114,682. Divided and this application filed November 14, 1904. Serial No. 232,762.

To all whom it may concern:

Be it known that I, EMANUEL SPITZER, a citizen of the Empire of Germany, and residing at Munich, in the Kingdom of Bavaria and the Empire of Germany, have invented certain new and useful Improvements in Printing-Plates; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to printing plates and, in particular, to intaglio photo-mechanical printing plates or surfaces.

The object of this invention is to provide printing plates made by photo-mechanical methods which will be readily adapted for printing from by the ordinary plate printing methods and will preserve all the fine gradations of light and shadow of the original, or the diapositive from which they are produced.

Intaglio printing plates made according to my invention are distinguished from those hitherto known by the fact that they show an etched image free from any pattern foreign to the original such as produced by a screen or similar device or method, melted on asphalt dust or the like. That is to say, the cavities produced by the etching process are graded off in depth, size and closeness according to the different degrees of light and shade in the original, or diapositive, without any interruptions by cavities formed by a pattern foreign to the original, so that these cavities are deepest, largest and nearest together for the darkest portions of the image, less deep, smaller, and farther apart for the parts next in degree of shading and so on for the following higher lights up to the very highest which are not represented by cavities but by the surface of the plate. These characteristics of the minute or microscopic cavities of the plate made according to my invention result in its capability of preserving all of the fine detail and the fine gradations of light and shadow in the original or diapositive which are again reproduced in the picture printed therefrom.

Other features of the invention will be adverted to herein after and pointed out in the claims.

In my application Serial No. 114,682, filed

July 7, 1902, of which this is a divisional application, I have described a process of preparing such printing plates and, for the purpose of a sufficient disclosure of this invention, I will now describe said process:

I expose a metal plate, or other plate or object capable of being etched, coated with a light-sensitive film, such as bichromatized gelatin, glue or albumen, directly to an ordinary transparency or diapositive without the interposition of a screen or similar device so as not to hinder the gradually and progressively hardening action of the light when copying. The copy obtained must not be subject to any manipulations liable to obstruct or to impede the openness of the structure and the gradual and progressive etching capability necessary for my proceeding. The unaffected bichromatized or other sensitizer used may be removed by washing the plate and then drying. I have found, however, that by exposing the plate to the action of an etching bath without washing out the sensitizer contained in the layer or film, I obtain a very fine result. The plate is then exposed to the action of an etching fluid by which action an infinite number of cavities is formed in the plate and simultaneously the tops of the small cones which remain standing between such cavities, are gradually and progressively eaten away in such a manner, that at the end of the process this eating away of the tops of the cones has been the strongest in those portions or areas of the plate which have been the least exposed to the light. The tops of these cones will consequently lie in different levels corresponding to the lights and shades in the original. Since in printing from such a plate by intaglio or by plate printing methods the deeper cavities of the etched plate will take more ink than those whose bottoms lie at higher levels, a grading off from a darker to a lighter ink, or color-effect corresponding to the various shades of the original, or the diapositive, is attained, without interruptions formed by any pattern foreign to the original. This gradation of levels in the printing plate may be produced according to the purposes for which the plate is destined and may be so infinitesimal as only to be noticeable under the microscope—and yet will be effective in printing as above stated.

All of the above conditions and properties of the etched plate thus produced combine to produce an impression or picture in which the graded or blended effect of the light and shade of the original, or positive, as well as the contrasts of light and shade, or the plastic effect, peculiar thereto, are reproduced to an eminently perfect degree, the effect produced being highly artistic coupled with faithful reproduction.

I find that by leaving the precipitated deposits formed by the action of the etching bath on the plate and not brushing them away or shaking them out during the etching process, I obtain the finest and most accurate effects since these products form the best protection against any injury to the finest parts during the etching process.

The diapositive employed may be made by any known or suitable photographic process and the plate to be etched may be of any one of the materials used for etching, such as a copper or other suitable plate of metal, alloy, or the like which may be ground and polished in any known or suitable way. The sensitized protecting coating or film for the plate and the etching baths may also be of any known or suitable composition for this purpose, such for example, as iron chlorid solution, or nitric acid with alcohol, and all of the above elements and materials may vary within wide limits and are to be adapted to the particular exigencies of each case.

The following example embodies what I consider the preferable manner of carrying out my invention: I coat a polished copper plate in the manner well-known with a layer or film of a mixture of from ten to twenty parts, by weight of organic substance such as gelatin (which I prefer), or of one of its equivalents, *e. g.* glue or albumen, to one hundred parts by weight of water, with from three to eight parts by weight of bichromate of alkali, such as potassium, sodium or ammonium. This coating is dried by rotation or any other similar process, whereupon I expose the same directly and without interposing a screen under an ordinary diapositive (film or preferably glass-transparency), that is to say, a diapositive, which has not been broken up into dots or stipples by the interposition of a screen or similar device. The time of exposure varies according to the density of the diapositive and the character of the light and shade of the object to be copied. An exposure of from five to fifteen minutes will generally be found sufficient. The film for the purposes of my process must be smooth and homogeneous, must be practically free from any grain and must contain no granular admixtures. After the exposure is completed the plate is, according to the purposes in view, either washed, rinsed and then dried or directly subjected to the etching fluid without previously applying to the coating any

such manipulations nable to obstruct or to impede the openness of the structure of the copying layer and the gradual and progressive etching capability of the plate, necessary for my proceeding. Such manipulations would be rolling in and melting on of asphalt dust, enameling and the like.

The strength or concentration of the etching bath is that usually employed in etching of this character and where a bath of iron-chlorid, FeCl_3 , which gives good results with a plate prepared as above, is employed, the strength of the same varies between 30 and 50° Baumé. The etching operation is completed in about from one-quarter of an hour to one hour. According to the nature of the subject and of the detail and shading thereof, several etching baths of different degrees of concentration are employed, as will be understood by those skilled in the art. The temperature of the etching bath or baths and the selection of the same are matters which are governed largely by the various conditions of the work and are matters of detail which those skilled in the art will readily select. I find that, principally when I desire to obtain great niceties in the reproduction of the finest details in the shadings of the picture, the deposits formed by the etching fluid should not be brushed away or shaken out, since these products form the best protection against any injury to such details during the etching process. As before stated, the bottoms of the minute cavities occupy different levels according to the degree of light and shade which they are to reproduce, the shallower cavities taking up less ink or color than the deeper ones, in the plate printing process.

After the etching operation is completed as above, the plate is removed from the etching bath and cleaned in the usual manner and is then ready for printing from in the ordinary plate-printing press, or by ordinary intaglio-printing methods. The plates or surfaces so prepared may also be used for merely ornamental purposes, for signs and the like.

In speaking in the specifications and claims of: "without interruptions formed by any pattern foreign to the original" only such interruptions are, of course, understood, as would be produced before completion of the etching process.—Such manual work as done by the polishing steel, "roulette," chisel and the like, or by an after-etching of parts of the etched plate in order to produce stronger or softer effects, is not excluded.

What I claim and desire to secure by Letters Patent of the United States is:

1. A plate showing a photo-mechanically produced image, the minute cavities of which lie in different levels and are graded in size, closeness and depth corresponding to the different degrees of light and shade in the original without interruptions formed by cavi-

ties produced by any pattern foreign to the original.

2. An etched metallic intaglio printing plate having an image formed in the metallic surface by minute cavities or depressions graduated in size, closeness and depth, varying according to the degrees of light and shade of the picture to be produced by said

plate, without interruptions formed by any pattern foreign to said picture.

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

EMANUEL SPITZER.

Witnesses:

PAUL PHILIPPSON,
ULYSSES J. BYWATER.