

UNITED STATES PATENT OFFICE.

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MANUFACTURE OF PRINTING-SURFACES.

SPECIFICATION forming part of Letters Patent No. 711,101, dated October 14, 1902.

Application filed November 19, 1901. Serial No. 82,925. (No specimens.)

To all whom it may concern:

Be it known that I, OSCAR FOERSTER, a subject of the Emperor of Austria-Hungary, residing in the city and county of New York, in the State of New York, have invented a new and useful Improvement in the Manufacture of Printing-Surfaces, of which the following is a true and exact description.

In preparing printing-surfaces upon a suitable base—i. e., upon stone or upon metal plates—from photographic negatives it has been customary during the photographic exposure to interpose a ruled or grained transparent screen between the sensitized surface and the negative, so as to divide the picture into regularly-disposed dots, grains, or stipples of regular diameter, or to employ upon the stone or metal a lithographic crayon or ink having a surface grain of suitable fineness, or for intaglio printing to produce an asphalt grain on the printing-surface before the application of the picture. The purpose of my present invention is to dispense with these expedients and also to obtain a printing-surface made up wholly of the body or substance of the stone or metal plate itself in contradistinction to a printing-surface consisting of an applied coating or external layer of a relatively softer and less durable material.

In carrying out my invention I copy the photographic negative upon a sensitized layer placed upon the stone or metal plate, which sensitized layer contains salts which have been crystallized out during the operation of drying the layer, thereby constituting a background of extremely fine and uniform grain for the developed picture. In order to unite this sensitized layer to the metal or stone surface, I preferably apply to said metal or stone surface a subjacent or first layer or coating of a composition that will firmly adhere to said surface and which itself contains crystallizable salts of somewhat larger grain than the outer layer. I also prefer to associate with the said first or subjacent layer a salt or salts sensitive to light, so that when the negative is developed upon the upper layer the lower layer

will be similarly affected. I have found that after washing, inking, and etching there is left upon the surface of the metal or stone under treatment a printing-surface of great durability, consisting of those portions of the stratum or crystallized and hardened salts upon which the picture was developed. Up to this point my invention is the same in substance as that described in my application for Letters Patent of the United States, Serial No. 989, filed January 10, 1900. I have discovered, however, that similar effects can be obtained with a much harder printing-surface by further manipulation of the plate, (particularly with respect to the washing, inking, and etching operations,) which I will now proceed to describe and which constitutes the subject of the present application. This further manipulation is based upon the discovery that the substance of the developed printing-surface of crystallized salts is itself of a finely-porous character, and that by reason of such fact the inking, etching, and washing of such surface, repeated for a sufficient number of times, results in conveying down into the surface of the metal or stone plate itself a reproduction of the picture developed upon the sensitized layer, so that the sensitized layer of crystallized salts and its substratum may be entirely removed from the stone or metal, thereby leaving an exact reproduction of the picture in the body of the metal or stone itself.

Having thus set forth in general terms the character of the invention, I will now proceed to more particularly describe my preferred method of putting it into practice for the production of printing-surfaces from photographic negatives upon lithographers' stones or upon metal plates—as, for instance, plates of aluminium, zinc, copper, or steel. When metal plates are employed, they may be used either with polished surfaces or with the dull finish produced by means of a fine sand-blast, the endeavor in both instances being to obtain a surface entirely devoid of ridges, seams, or scratches and of substantial uniformity throughout. The plates are

thereupon carefully washed with a solution of one part of nitric acid in one hundred parts of water. This preliminary treatment of the plates is for the purpose of obtaining the necessary adherence of the first coating subsequently applied thereto and to permit said coating to distribute itself equally and uniformly over the metal surface. Before applying the first coating to the plates I heat the plates so as to remove all moisture. I then pour over the plates a liquid consisting of the two following solutions, to wit: (A) one hundred and fifty grams of distilled water, fifty grams of magnesium chlorid, twelve grams of acetate of lead; (B) two hundred grams of distilled water, twenty-five grams of albumen, ten grams of sodium silicate. These solutions are mixed together, filtered, and the first coating is given by merely pouring the filtered liquid upon the plate. In the mixture the first solution A serves as a hardener and expedites the setting of the coating. The plate is thereupon placed in an inclined position and permitted to drain off until the coating has become dry, this preliminary taking place in the air. After the layer has become dry the plate is put in an oven and in a horizontal position, with the coated surface uppermost, and is heated therein up to a temperature of about 40° centigrade. The result of this superheating is to convert the coating into a white dull thin film of a milky color, which film, under the influence of the heat, has become exceedingly hard and within which at the same time the salts present have crystallized out in such manner as to form a fine grain or stipple. While the coated plate is still at a temperature of 40° centigrade, I remove it from the oven and pour upon it while it is in a horizontal position the second layer, consisting of the following ingredients, to wit: two hundred and fifty grams of distilled water, twenty-five grams of gelatin, fifteen grams of potassium bichromate, seven and one-half grams of ammonium chromate, five grams of chrysanilin, three grams of chrome alum. This solution is made at the temperature of 40° centigrade, so as to correspond to the temperature of the plate and is filtered before application thereto. In applying the second coating to the plate I take care that each square inch shall receive no more than five cubic millimeters of the liquid. The pouring of the solution must take place very carefully, so as to avoid the formation of bubbles, inasmuch as a bubble would leave a black spot in the finished picture. The prepared plate, which has now received the second coating, is thereupon placed once more in the drying-oven and is dried at a temperature of 70° centigrade. The drying-oven is provided with an exit-flue for the purpose of carrying away the watery vapors as soon as formed. At the temperature prevailing in the drying-furnace the second coating unites

with the first white dull layer or milky coating and the sensitive salts in the second coating permeate the first coating, supplementing the sensitive salt (magnesium chlorid) already present in the first coating. As a result both of the coatings receive the same susceptibility to the influence of the actinic rays of light. The temperature prevailing in the drying-furnace furthermore has the effect of crystallizing out the salts in the second layer or coating, so as to produce a uniform, fine, and sharp grain or stipple. An ordinary photographic negative is thereupon placed upon the second coating and screwed down into intimate contact therewith, and in this condition it is exposed to the action of light. The exposure of the plates lasts from five to ten minutes, according to the strength of the light, and is conducted in the ordinary manner. After the plate has been exposed it is rolled by means of a velvet roller with any suitable neutral ink and is thereafter placed in a bath of water and developed and is subsequently treated with a saturated solution of chlorid of sodium, (common salt,) or it may first be washed and afterward have the ink applied. In order to remove any sensitive salts that may still remain and in order to obtain complete clearness of the picture, I bathe the plate in a bath of water containing five per cent. of nitric acid. The portions of the coating which had been subjected to the influence of light hold the ink, whereas the portions of the coating not reached by the light readily dissolve and are washed away. Thereupon the plate is again put in a water-bath and is subsequently dried. After the plate has been dried it is heated somewhat and is powdered over with fine Syrian asphalt and then burned in with an etching-lamp. After cooling, the plate is etched with a solution consisting of twenty-three parts, by weight, of gum-arabic; four parts, by weight, of water; one part, by weight, of two-per-cent. nitric acid. This inking, washing, and etching operation is repeated at least three times, and finally results in the complete disappearance of the first and second layers and in the production in the body of the plate itself of a printing-surface of about one-half a millimeter in height, adapted at once for printing either by the hand-press or the machine-press, as desired, and in exact accordance with the procedure usually adopted for lithographic printing, or, if desired, transfers may be made from the original in the usual manner upon a lithographer's stone or upon a metal plate, from which in turn prints may be obtained.

Having thus described my invention, what I claim is—

The herein-described method of producing printing-surfaces directly within the substance of lithographers' stones or metal plates, which consists in coating the stone or plate

with a sensitized film containing salts which have been crystallized out to form a fine even grain or stipple, printing a picture thereon by the employment of a negative and by exposure to light, and repeatedly washing, inking and etching, until the entire film has been removed and until the picture has been etched into the stone or plate; substantially as described.

OSCAR FOERSTER.

In presence of—
N. A. BIBIKAZ,
L. E. SMITH.