UNITED STATES PATENT OFFICE.

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PROCESS FOR MAKING DIE-PLATES.

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To all whom it may concern:

Be it known that I, WALTER R. BARDSLEY, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Processes for Making Die-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.

This invention relates to new and useful processes for making dies or matrices of zinc, copper or other metal, adapted for use in embossing of printing plates and adapting the plates for use without an overlay or other make-ready.

My invention consists of various steps in the process, hereinafter fully described and then specifically defined in the appended claim.

In carrying out the steps of my process, a polished and clean sheet of zinc or other metal is wiped thoroughly dry, afterward the same is coated with a solution of asphaltum or bitumen, commonly used in photo-engraving processes. After the coating is dry, an impression is made upon the coated sheet of metal of the printing plate it is desired to emboss, using preferably a heavy, greasy, printing ink. This being done, the sheet of metal is heated until the printing ink combines with the asphaltum coating, the heat being raised to substantially 250 degrees Fahrenheit. After the sheet of metal becomes cool, it is rubbed gently over the printed image with a piece of cloth or cotton wool, saturated with any oil which will combine quickly with printing ink, but slowly with asphaltum and in a few seconds the ink and asphaltum beneath with which it is combined will wash away, leaving the clean metal exposed where formerly the ink impression was made. Sperm oil, third run rosin oil, olive oil and linseed oil have been found satisfactory but for this purpose the third run rosin oil is preferred. After development thoroughly, the oil is thoroughly wiped off with a soft cloth and then with cotton wool dipped in alcohol, removing any scum that may remain. The back of the sheet of metal is then painted with asphaltum or other acid resisting material. The picture now upon the metal is in reversed form in color, dark where it formerly was light and light where formerly dark and the etching may then be accomplished by using an acid suitable for whichever metal may be employed. The etching is first done to about one-thousandth of an inch depth. After rinsing and drying, the coating is washed off with benzole, caustic potash or other suitable solvent. All of the engraving is covered excepting the darks and the middle tones with a suitable acid resist and etched another one-thousandth of an inch. This being accomplished, the acid resisting material is washed off and then only the extreme high lights are covered and the plate etched again, making this step of the etching a little deeper than the former etchings. When the original printing plate has vignetted edges, it has been found advisable, after once more cleaning the surface of the die, to cover the edges of all such vignetted places and give all the rest of the die another etch about as deep as the one preceding. The depths of the different etchings may be varied according to the printing requirements of the various plates to be treated, shallower for printing on fine stock and deeper for printing on rough stock. The surface of the die is then thoroughly cleansed with lye and is given a short etch, rocking the acid tray rather quickly for the purpose of etching away the edges. If it is desirable to further soften the edges, the entire surface may be rubbed over with a piece of cloth or felt, moistened and dipped in emery or carborundum powder, or a piece of engraver's charcoal may be employed for this purpose.

In carrying out my process, it is essential that the entire back of the die be thoroughly protected from acid at all stages of the procedure.

Should it be desired to utilize the stencil method, instead of painting over the extreme high lights and the secondary lights, in the second and third steps in the etching of the die, an impression may be made of the original printing plate on some material suitable for use as a stencil, such as heavy paper, thin card board or thin metal, after which it may be etched where metal is used or the desired portions cut out where paper or card board is used. The stencil is then placed in register on the surface of the die and pasted down to the corners, after which the blank places may be inked in with brush or I may proceed as follows:—

By taking a heavy sheet of rubber or other pliable material and coat the surface with some printing or etching ink. This is then laid face down to the stencil covered die and subjected to considerable pressure in a suitable press and the spaces on the die left exposed by the stencil will be found covered with ink. This done, the stencil is removed and powdered and etched as before. Other steps of the etching may be prepared for in the same way. During the operation, if refined photographic asphaltum is used, I may proceed as follows:—After making an impression on a sheet of coated metal with printing ink, expose to the light for a sufficient length of time to make the exposed portions of the asphaltum coating insoluble in rectified spirits of turpentine, then the printing ink is washed away and the unexposed parts of the asphaltum beneath with turpentine. The plate is then ready for etching.

In substitution for the last method, the pull off process or method of reversing may be employed, consisting in coating the sheet of metal with some greasy printing or lithographic ink and on the coated sheet of metal an impression is made of the printing plate which it is desired to emboss, using no ink. It will be found that the clean surface of the printing plate will pull off some of the ink from the coated sheet of metal. The surface of the printing plate is cleaned of the ink in readiness for another impression in exact register with the first, then the printing plate is again cleaned. This operation may be repeated until all of the ink has been removed from portions of the coated sheet of metal where it comes into contact with the surface of the printing plate, afterward it is coated with an etching powder, burnt in and the plate will be ready for etching.

The method of reversing by the use of glycerin-ink consists of making the impression on a polished sheet of metal of the printing plate it is desired to emboss, utilizing a printing ink which is soluble in water, then warming the sheet of metal slightly to stiffen the ink, after which it may be coated with a soft lithographing, etching or greasy printing ink applied with a soft roller. After spreading this coating until quite thin, the sheet of metal is placed in a tray containing tepid water and the parts containing the impression made in the ink, which is soluble in water, will wash away, leaving the metal bare. The surface, after drying, is dusted with etching powder and heated until the powder is melted and is then ready for etching.

It is my intention to use the die in connection with the McKee treatment of printing plates. In this treatment several sheets of paper are dissected and pasted together, to form a matrix of various depth as desired which is placed face down in perfect register on the printing plate (practically always an electrotype) and nailed fast. The plate is then placed in a specially devised hydraulic press with heating attachment and, after being heated almost to the melting point, is subjected to sufficient pressure to make the matrix become indented to its full depth. The plate is then cooled and, before removing the matrix, is placed face down in a special planing machine which removes any inequalities that may have been caused on its back by the indentation of the die. The die is then removed from the face of the plate and which latter will be found thinner where it has been indented. My metal matrix is a cheaper and more efficient substitute for the above described paper matrix.

What I claim to be new is:—

An improved process for making dies or matrices of zinc, copper or other metal for embossing of printing plates, adapting the plates for printing without an overlay, consisting of first polishing a clean sheet of suitable metal and wiping it dry, afterward coating the sheet of metal with a solution of asphaltum or bitumen and, when dry, making an impression upon the coated surface by the printing plate, utilizing a heavy, greasy, printing ink, afterward heating the sheet of metal until the printing ink combines with the asphaltum coating and, when cool, rubbing the printed image with soft fiber, saturated with an oil which will combine quickly with the printing ink but slowly with the asphaltum, thus cleaning away the ink and the asphaltum beneath with which the ink has combined, leaving the clean metal exposed where was formerly the ink impression, afterward painting the back of the sheet of metal with asphaltum or other acid resisting material, then afterward etching to a certain depth and washing off the coating with a suitable solvent, afterward covering all of the engraving excepting the dark and middle tones with an acid resisting material and again etching and, after washing off the acid resisting material, the surface is again coated over the extreme high lights and again etched, then cleaning the surface of the die once more thoroughly and giving it another etch to take away the sharp edges.

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

WALTER R. BARDSLEY.

Witnesses:

M. E. REMICK,

R. M. REMICK.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."