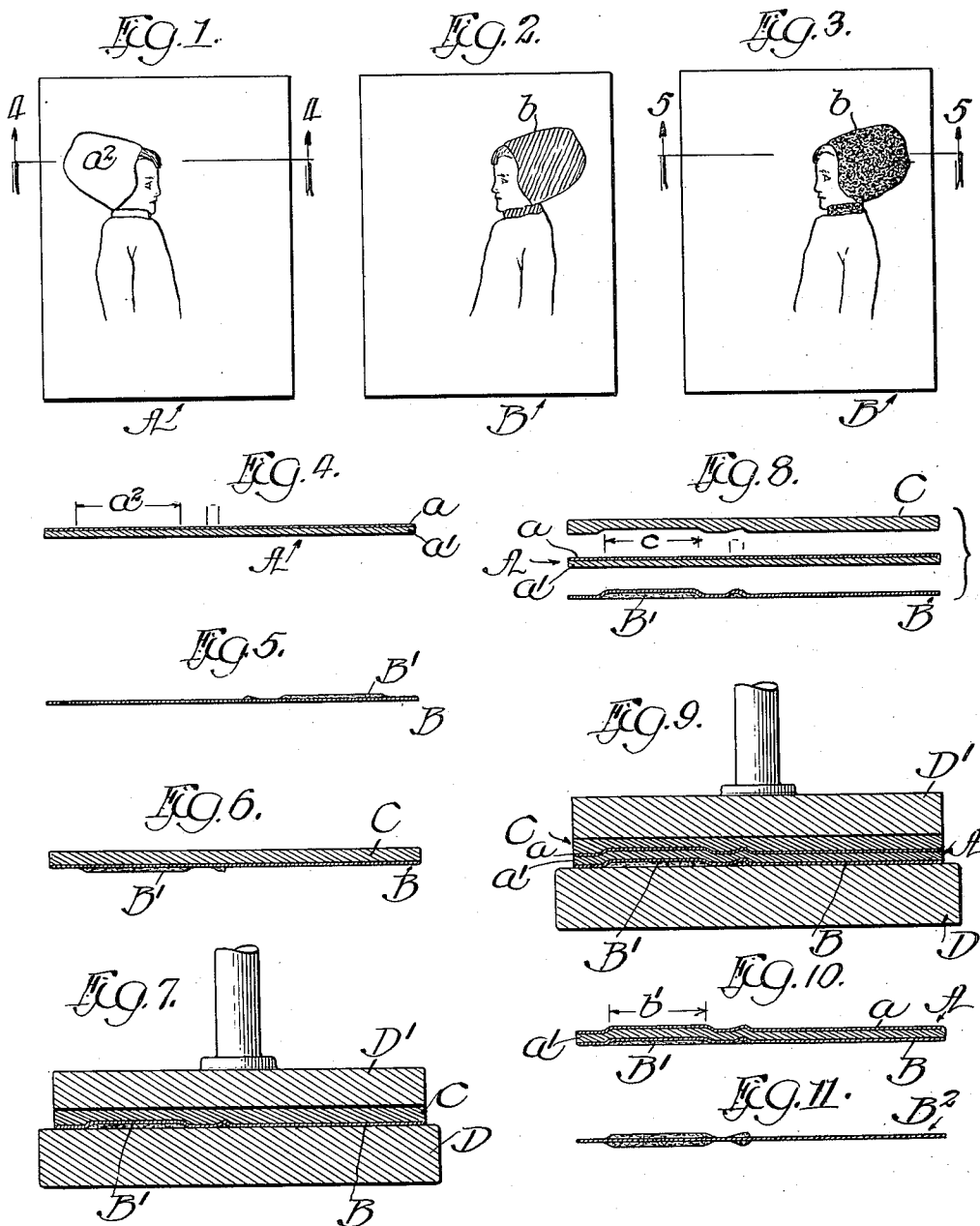


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METHOD OF PRODUCING PRINTING SURFACES.
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METHOD OF PRODUCING PRINTING-SURFACES.

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To all whom it may concern:

Be it known that I, SAMUEL E. DITTMAN, a citizen of the United States, and a resident of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Methods of Producing Printing-Surfaces; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to an improvement in the art of producing "made-ready" printing plates of that kind in which the profile of the engraved or printing surface of the plate is varied according to the depth and lightness of the shades to be printed, in such manner that the printing surface is elevated in the parts giving the heavier shades and depressed in its parts giving lighter tints, so as to avoid the use of overlays upon the tympan of the printing press.

In printing from half-tone plates, it is customary to vary the pressure upon different parts of the printing surface, in accordance with the depths of the shades, so as to give a heavier pressure in the parts of the printing surface affording the darker portions of the impression and lighter pressure in the parts printing the lighter portions of the impression. It has been proposed heretofore to permanently change or alter the profile of the printing surface itself after the printing plate is completed through the elevation of the parts thereof which act in printing the heavier shades and depression of its parts affording the lighter tints, in order that the plate may be ready for perfect work when placed upon the press.

In carrying out my novel method, a printing plate is prepared in the usual manner, that is to say, an original half-tone plate, is made by a photo-engraver, such plate consisting of a thin sheet of copper. A print or proof is then taken on a sheet of paper, or other like thin flexible material, from such plate or a duplicate of the same, and said sheet is then so treated that the parts of the sheet on which are impressed the darker shades are made thicker than other parts, the increased thickness given to the sheet varying in accordance with the depth of tone of the print. This result may be accomplished according to a process heretofore employed

for making overlay sheets, the same consisting in making an impression or proof on paper or other thin and yielding sheet material by the use of ink or some adhesive material and then applying to the sheet, while the ink or adhesive material is still in a sticky condition, a powdered material which adheres in greater quantity or thickness to the darker parts and in a less quantity or thickness in the lighter parts, so that the sheet so treated has an added thickness of adhesive pulverized material imparted to it, varying according to the depth of shade in the different parts of the impression. Such an overlay sheet may also be prepared in other ways, as for instance, it may be a chalk overlay or a cut paper overlay. An overlay sheet having been prepared either by the particular method or some other suitable method, in such manner that such overlay sheet is made of varying thickness in its different parts, in accordance with the depth of tone to be given to the impression from the corresponding parts of the printing plate, such overlay sheet is placed in contact with a sheet or layer of papier-mâché, such as is used in making stereotypes, or other plastic material which may be prepared in a soft or plastic condition, and which is capable of becoming hard and unyielding by drying, by the application of heat, or otherwise. The overlay sheet is pressed against such layer of plastic material, while the same is in a soft or plastic condition, between flat surfaces, so that the plastic material when it dries or becomes hardened, will form a matrix or reverse overlay, having depressed portions at the side thereof that was pressed against the overlay sheet and which is thinner in its parts at which the overlay sheet is thickest and thicker in its parts corresponding with the thinner portions of said overlay sheet. In applying the overlay sheet to the sheet of plastic material for forming such matrix, the rear face of the overlay sheet is placed against the sheet of plastic material and pressure is applied to the overlay sheet on its printed side or that to which the powder has been applied; this being necessary in order that the matrix or reverse overlay shall correspond with an impression made from the original printing plate. The matrix or reverse overlay having been thus prepared, it is placed against the front or printing face of the printing plate, in register therewith, while the posi-

tive overlay, prepared as described, or a duplicate thereof, is placed in register against the rear or back face of the printing plate. These three parts are then placed between the exactly parallel and flat surfaces of a press and pressure applied. The effect of such pressure will be to produce depressions in the rear face of the plate corresponding with the thicker portions of the overlay in contact with said rear face and to force outwardly or elevate the printing face of the plate in corresponding parts thereof, by the shifting of the metal in such corresponding parts of the plate, into the depressed parts of the matrix or reverse overlay. The engraved plate will then have parts of its printing surface elevated to a greater or less extent, to correspond with the variations in the thickness of the overlay sheet; the result of the application of pressure to the overlays and plate being to shift parts of the metal of the plate in a direction transverse to the planes of the flat surfaces of the plate toward the printing face of the same, without changing the thickness of or otherwise distorting the plate, so that it will retain in all of its parts its original thickness.

The invention will be better understood by reference to the accompanying drawings, in which—

Figure 1 is a face view of a half-tone printing plate; Fig. 2 is a view of a sheet having thereon a print or impression made from the plate shown in Fig. 1; Fig. 3 is a view of the sheet shown in Fig. 2 after powdered material had been applied to the printed parts or lines of the said sheet to form an overlay sheet; Fig. 4 is a sectional view of the printing plate as taken upon line 4—4 of Fig. 1; Fig. 5 is a sectional view of the overlay sheet shown in Fig. 3, taken upon line 5—5 of said figure; Fig. 6 is a view showing the overlay sheet of Fig. 3, applied to a sheet of plastic material; Fig. 7 is a sectional view taken through the two sheets or layers shown in Fig. 6, after the same have been subject to the action of the flat pressing plates shown in said Fig. 7; Fig. 8 shows in superposed relation the sheet of plastic material shown in Fig. 7, the engraved plate shown in Fig. 4 and the overlay sheet shown in Fig. 5; Fig. 9 is a sectional view through the parts of a compressing device, with the layers shown in Fig. 8 between them; Fig. 10 shows the completed printing plate; Fig. 11 is a sectional view of an overlay sheet slightly different from that shown in Fig. 5.

The engraved printing plate A shown in Figs. 1 and 4, is a copper plate, such as may be produced by the process of photo-engraving, and which consists of a thin sheet a of copper. For illustration, a part of the printing surface marked a^2 in Figs. 1 and 4, is that which gives a dark tone and requires

a heavier pressure thereon in printing from the plate.

Figs. 2 and 3 illustrate a method heretofore employed for making overlay sheets; Fig. 2 illustrating a proof or impression made from the plate A by the use of ink or some adhesive substance, and Fig. 3 showing the same impression after a powdered material has been applied thereto, so as to variably increase the thickness of the sheet at the places corresponding with parts of the plate giving darker shades and requiring a heavier pressure in printing. The sectional view, Fig. 5, shows at B', the added thickness given to the overlay sheet by the powdered material adhering to the part or area of the sheet indicated by b in Figs. 2 and 3. The corresponding part of the printing surface of the plate A is indicated in Figs. 1 and 4 by a^2 .

Figs. 6 and 7 illustrate the process of forming a matrix from the prepared overlay sheet shown in Figs. 3 and 5. As shown in Fig. 6, C indicates a plate or sheet of papier-mâché or other plastic material, such as is used in making matrix sheets for stereotype work. As shown in said Fig. 6, the said sheet is flat with opposite parallel side faces and the overlay sheet B is applied in contact with one face thereof, with the printed face of the said sheet outwardly, so that the thickened part B' is on the side of the sheet opposite the side in contact with the matrix sheet C. This arrangement of the overlay sheet with respect to the matrix sheet C is necessary in order that the parts of the overlay sheet will correspond with the parts of the engraved plate from which the impression was made, as will be seen by comparing the position of the thickened part B' in Fig. 6 with that of the corresponding part a^2 of the plate A. When the overlay sheet B has been placed in contact with the sheet C of plastic material, these parts are placed in a press having opposite, flat parallel compression surfaces, such for instance, as the base-plate D and presser D' of Fig. 7. Upon applying pressure to the sheets B and C, the thicker parts of the overlay sheet are pressed into the plastic material of the sheet C, as shown in Fig. 7, so as to form in the sheet C depressions corresponding with the thicker parts of the overlay sheet, or, in other words, making the parts of the sheet C thinner where the parts of the overlay sheet are thicker and the parts of the said sheet C thicker where the parts of the overlay sheet are thinner. The sheet C is thus converted into a matrix. The matrix sheet is then applied against the face of the printing plate A, with its depressed parts properly opposed to the parts of the printing plate, which require the greatest pressure in printing. The part of the matrix sheet C, corresponding with the part a^2 of

the plate A, is indicated by *c* in Fig. 8. After the overlay sheet B and matrix sheet C have been prepared, as above stated, the matrix sheet is applied to the printing face of the plate A and the overlay sheet B is applied in reversed position to its rear face; the three parts being thus brought into the relative position illustrated in Fig. 8, wherein the three parts are shown as separated from each other, and the overlay sheet in its condition after pressure has been applied thereto, as shown in Fig. 7. The overlay sheet B is arranged with its rear face against the rear face of the plate A, and its front face, on which the impression was originally made, outward, so as to bring the thickened parts of the overlay in the proper position relatively to the corresponding parts of the printing face of the plate. The overlay sheet B, the plate A and the matrix sheet C are then placed between the base and presser plates D and D' of a press, such as is shown in Fig. 9, and pressure applied to a degree sufficient to make the engraved plate conform in the profile of its printing face with the matrix sheet C; the thicker parts of the overlay sheet acting to depress the metal at the back of the plate to the same extent and in the same places as its printing face is elevated by being forced into the depression of the matrix sheet. By reason of the flexible or yielding character of the overlay sheet B, the pressure of the plate D against the front surface of the same, or that to which the powdered material has been applied, has substantially the same effect, in forcing the thickened parts of the sheet into the rear face of the printing plate, as would be the case if the said front surface of the overlay sheet were placed in contact with the plate A; the said front surface of the overlay sheet being flattened by its contact with the plate D, as seen in said Fig. 9. By the operation described, the printed face of the plate A is changed in profile in such manner that the parts thereof requiring a greater pressure in printing are elevated above the other parts of the plate. As shown in Fig. 10, the elevated part indicated by *b'* corresponds with the part *a'* in Figs. 1 and 4.

Fig. 11 shows a sectional view of an overlay sheet B², such as is shown in Fig. 5, but having powdered material applied to both sides of the same in the parts that are required to be made thicker. Such an overlay sheet is prepared by making an impression with adhesive material from the engraved plate on the tympan of a press, then inserting a sheet of paper between the tympan and the plate and making an impression, so that the adhesive material will be applied not only to the printing face of the sheet directly from the engraved plate but also upon the back face of the sheet by transference

from the tympan. By applying powdered material to both sides of the sheet thus prepared, the same will be given an additional thickness, at the parts of the impressior where the same is required.

It will be understood that several overlay sheets, prepared as described, and arranged in superposed relation, so as to form several layers and to give additional thickness at the thickened parts, may be used both in making the reverse overlay or matrix and in the final operation on the printing plate.

The overlay sheet or sheets will be retained permanently in place beneath the prepared printing plate, so as to form a backing therefor, when the same is attached to a wooden or other block in preparing the plate for printing, or for electrotyping; the presence of the said overlay sheet serving to prevent the plate from being flattened under pressure coming in the elevated parts of its printing face.

While I prefer to make the reverse overlay sheet or matrix of material like the papier-mâché used in stereotyping, as hereinbefore described, it is to be understood the same general results may be secured by making the said matrix of metal or other material. As for instance, a metal may be used for such matrix, such as copper, which is so soft or ductile that its surface will assume the form of the overlay sheet when the latter is pressed against the same, and is at the same time harder than the metal of the printing plate to such degree that the matrix will retain its form when said printing plate is pressed against it in the final pressing operation.

I am aware that it has been proposed heretofore to place the printing face of a plate, consisting of an electrotyped copper shell backed by soft material, against a reverse hand-cut overlay, and to apply to the rear face of the plate a degree of pressure sufficient to make the printing face of the plate conform to the reverse overlay. In such cases, the rear face of the plate has been leveled up, either by the application of such high degree of heat and pressure as to flatten such rear face, or by shaving off the rear surface of the plate while the latter is pressed against the reverse overlay. A plate has also been placed with its printing face against a reverse hand-cut overlay, while applying, under pressure, to the back of the plate a thick layer of composition which is adapted to harden after it is applied and will form a support for the plate when placed in the press for printing. My novel method has the advantage over those referred to, and others heretofore used, that it may be very easily, quickly and cheaply performed, requiring only the preparation of an overlay and a reverse overlay or matrix, and the compression between them of a

printing plate made in the usual way, either of an electrotyped copper shell with a backing of type-metal or an original half-tone of copper alone. In carrying out my said method, the metal of the printing plate retains its original uniform thickness, and is merely displaced in the direction of its face to a greater or less degree in its different portions, so that I am enabled to use a printing plate of the ordinary kind, or one prepared originally in the usual way, and avoid the necessity of applying to the plate such degree of pressure as is required to lessen the thickness of the parts of the plate, or the cutting or shaving away of the metal at the back of the plate; the performance of my process requiring only the use of a suitable press, both for forming the matrix or reverse overlay and for pressing the overlays against the opposite sides of the plate.

I claim as my invention:

1. The method of preparing the printing surface of metal printing plates, which consists in preparing an overlay of paper, or like thin, flexible material, pressing said overlay against a sheet of plastic material capable of being or becoming hardened, when said material is in a soft or yielding condition, to form a hard or unyielding matrix or reverse overlay, applying the said reverse overlay to the printing face of the

plate, and a corresponding overlay of thin, flexible material to the rear face of said plate, and then subjecting the plate and the overlays to pressure between flat surfaces. 35

2. The method of preparing the printing surface of metal printing plates, which consists in preparing an overlay of paper, or like thin, flexible material, pressing said overlay against a sheet of plastic material capable of being or becoming hardened, when said material is in a soft or yielding condition, to form a hard or unyielding matrix or reverse overlay, applying the said reverse overlay to the printing face of the plate, and a corresponding overlay of thin flexible material to the rear face of said plate, subjecting the plate and overlays to pressure between flat surfaces, removing the reverse overlay or matrix, and leaving the said overlay of thin flexible material in place against the rear face of the plate to form a backing for said plate in the use of the same in printing, or in molding duplicates. 40 45 50

In testimony, that I, claim the foregoing as my invention I affix my signature in the presence of two witnesses, this seventh day of May, A. D. 1912. 55

SAMUEL E. DITTMAN.

Witnesses:

ELWOOD W. BAKER,
NELLE H. EFROS.