

B. F. UPHAM.  
PRINTING SURFACE AND METHOD OF PRODUCING THE SAME.  
APPLICATION FILED JAN. 22, 1901.

979,111.

Patented Dec. 20, 1910.

Fig. 1

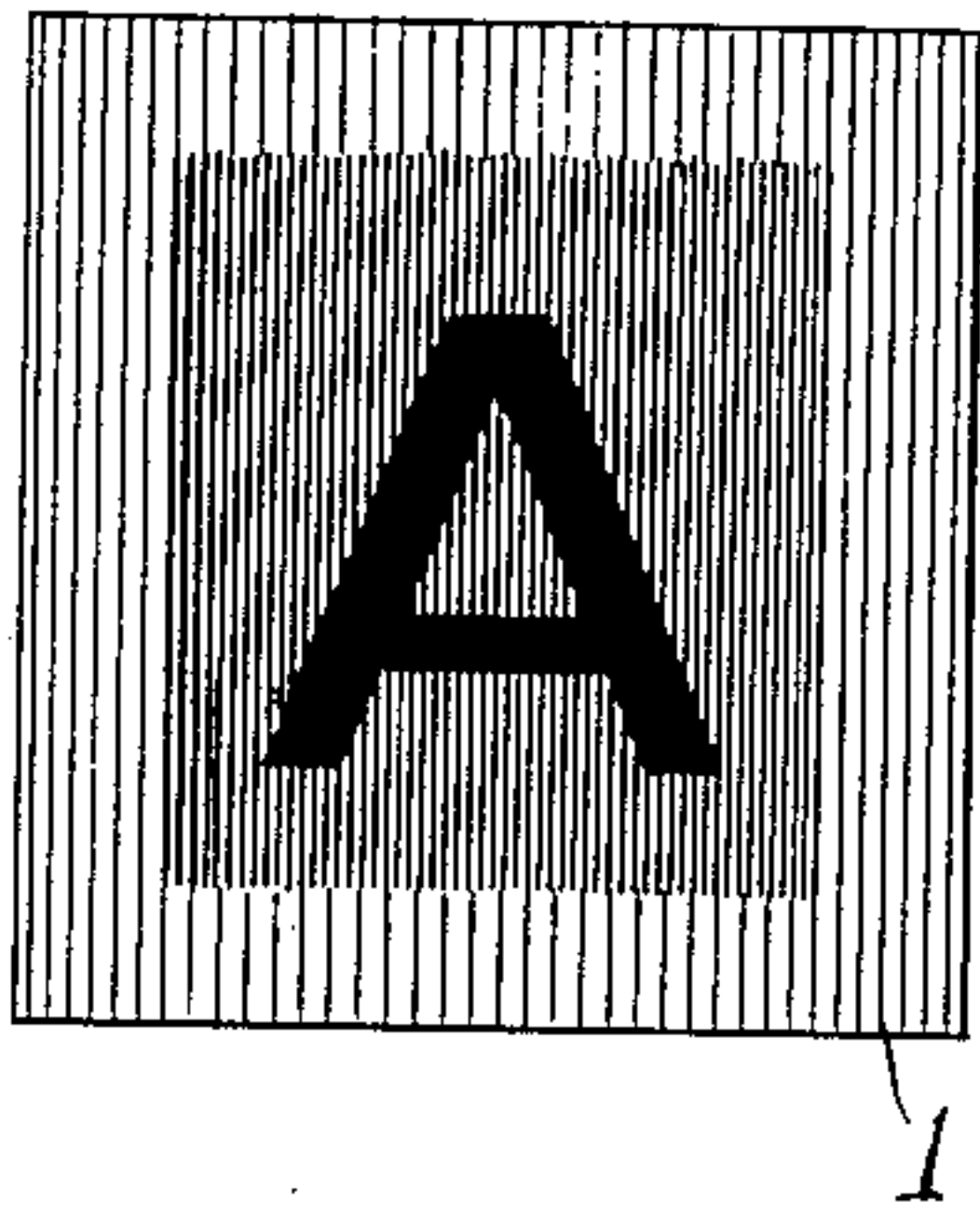


Fig. 2

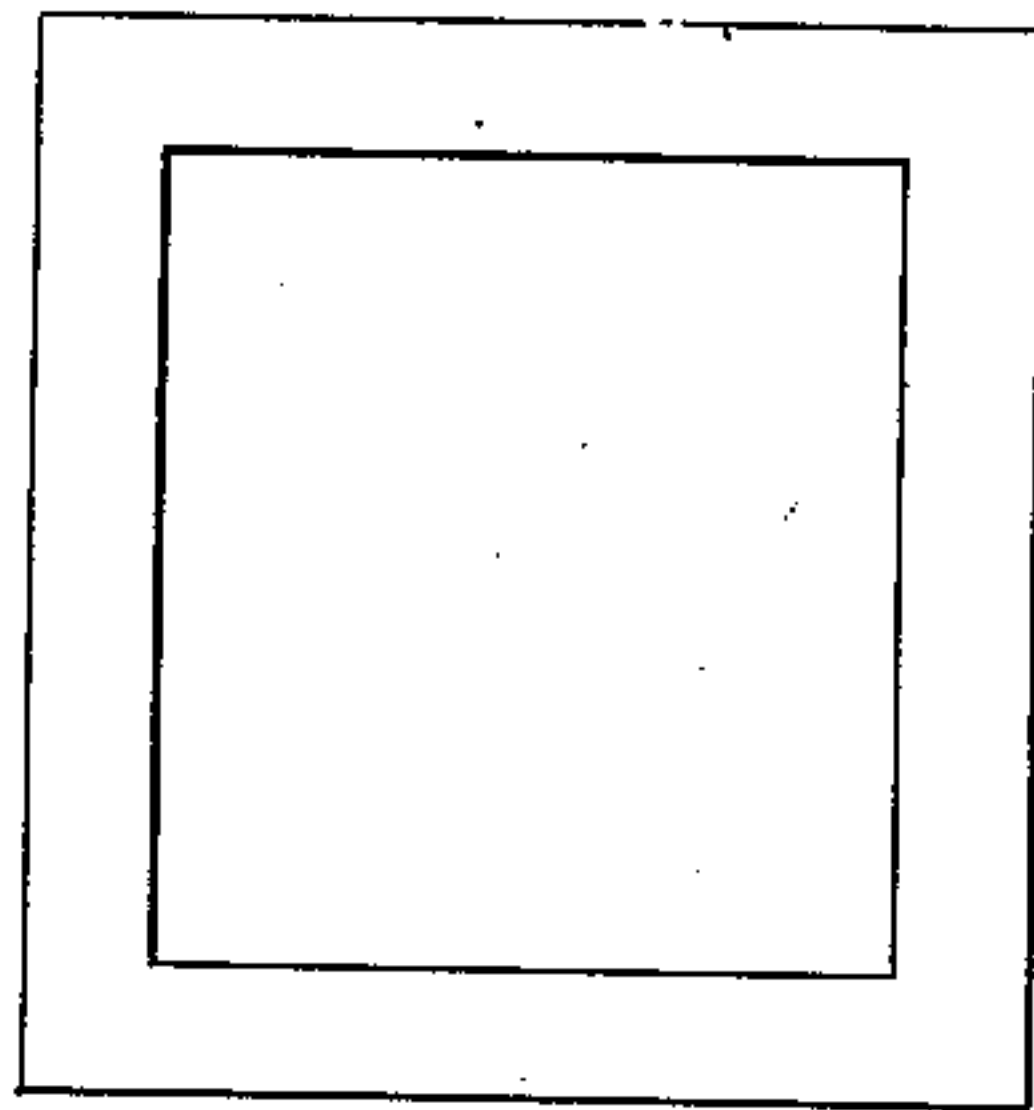


Fig. 3

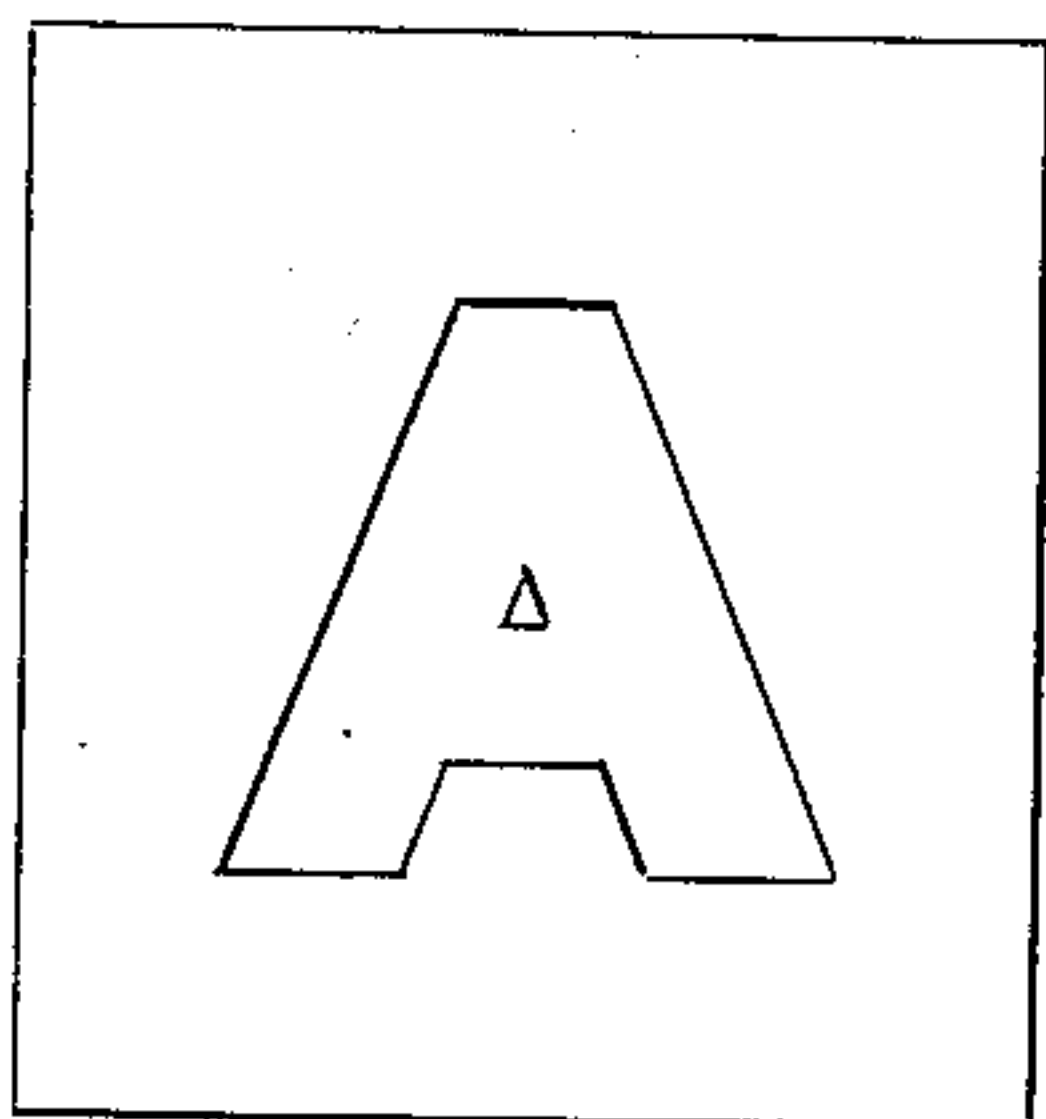
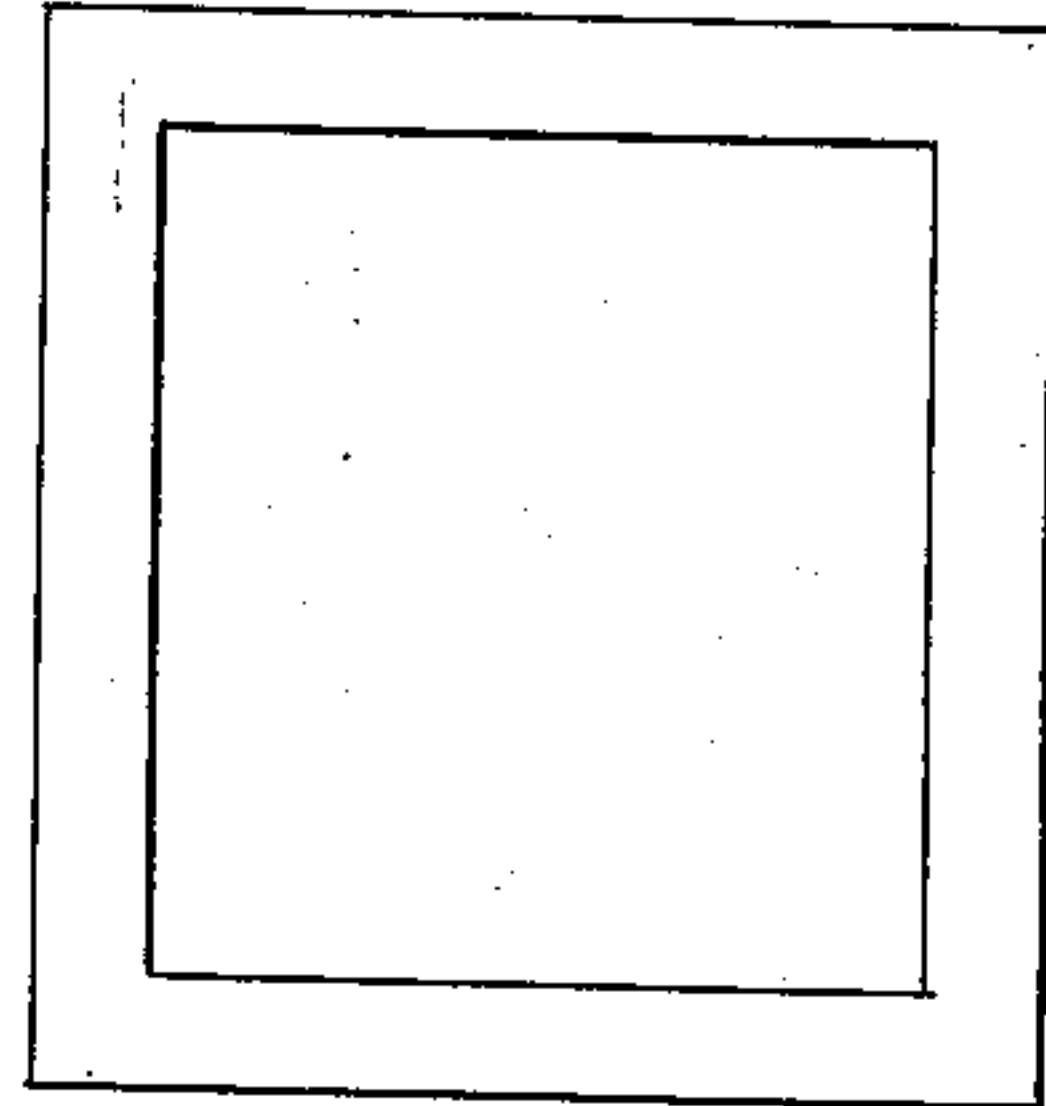


Fig. 4

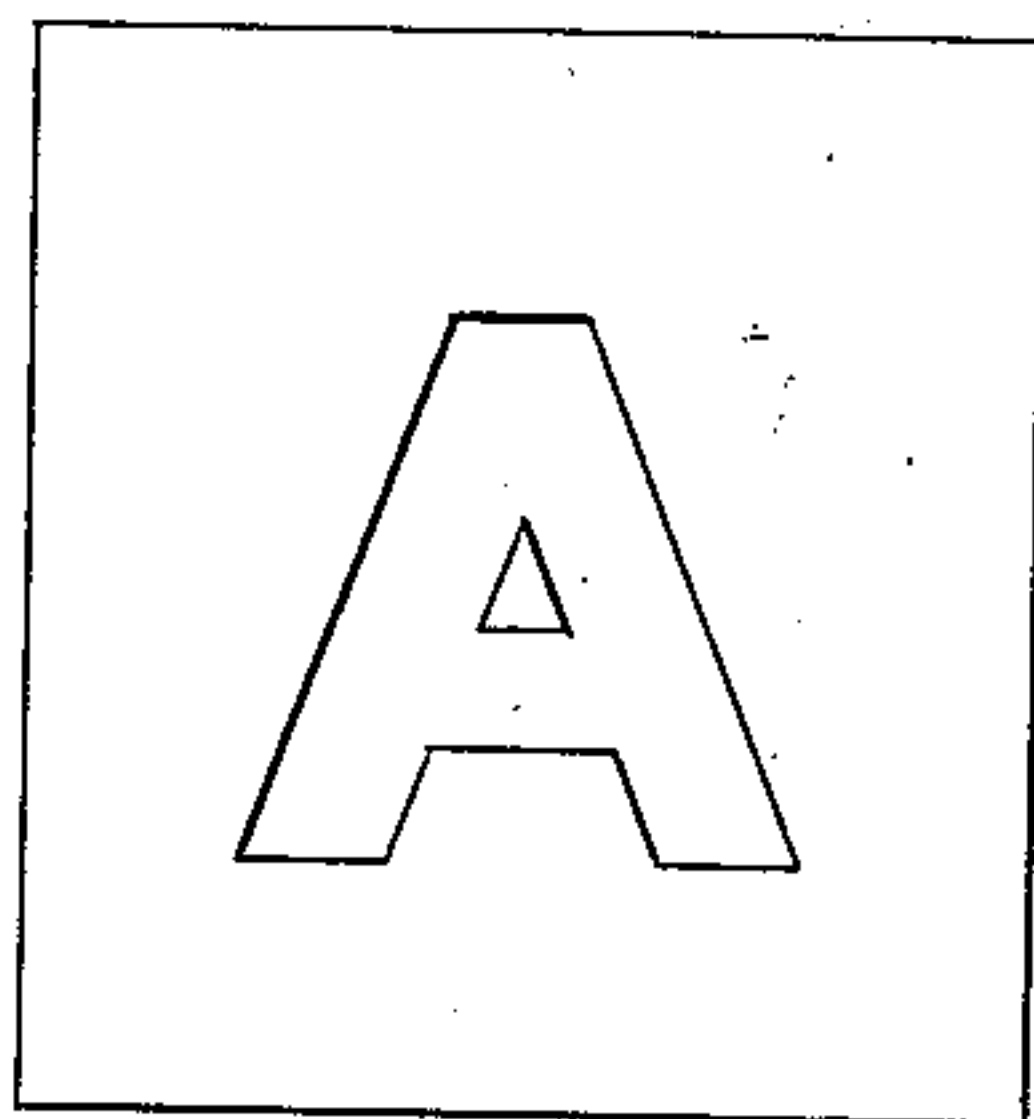


Fig. 5

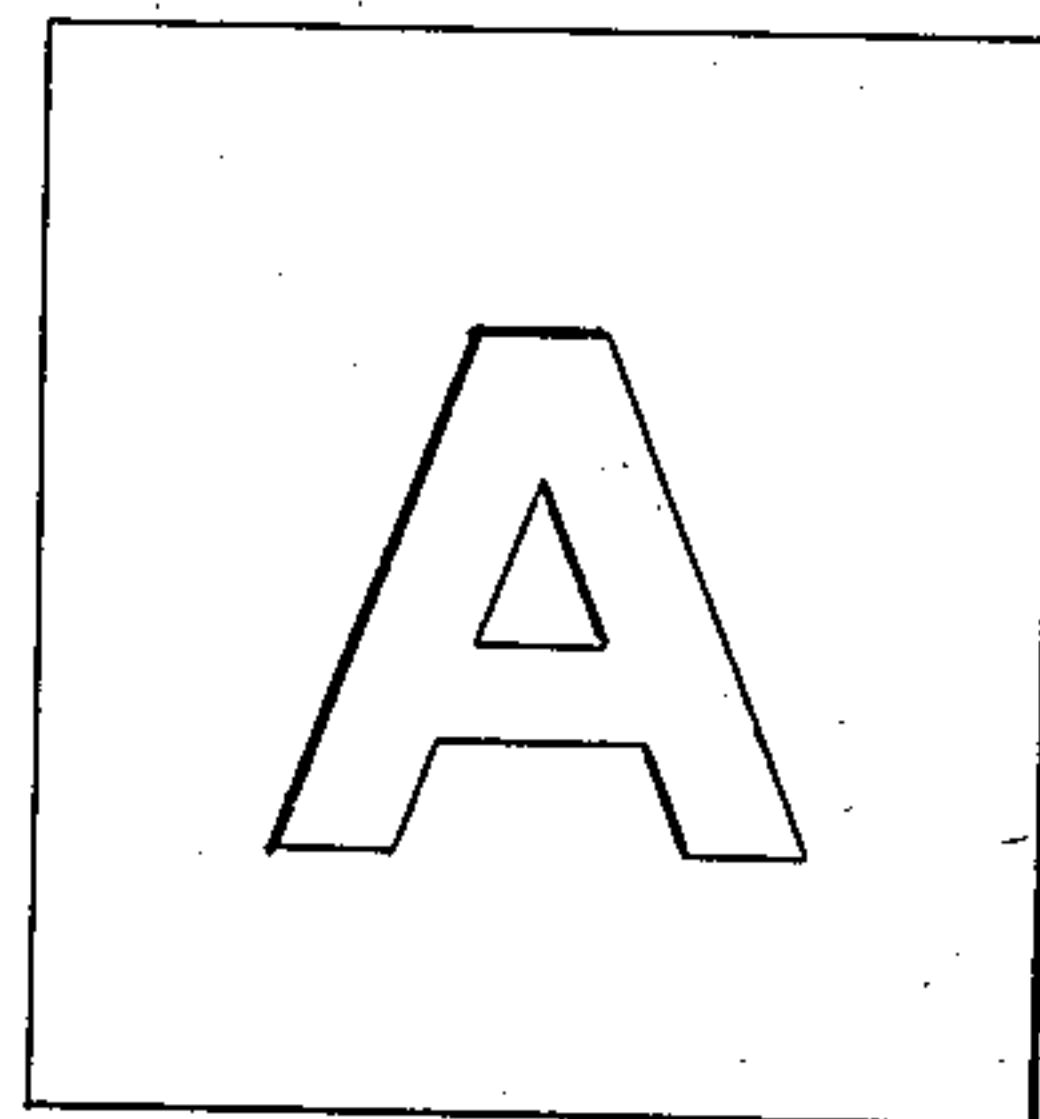


Fig. 6

Fig. 7

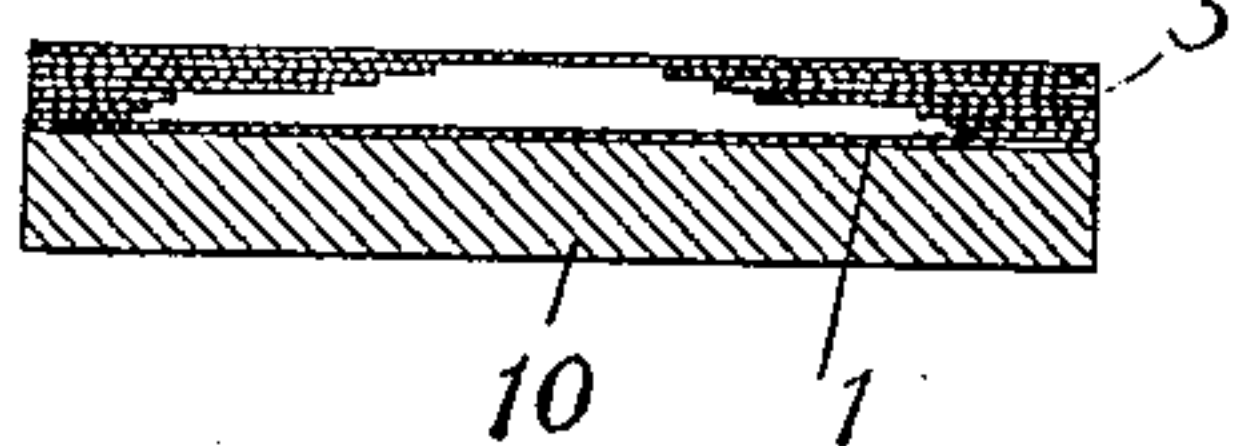


Fig. 8

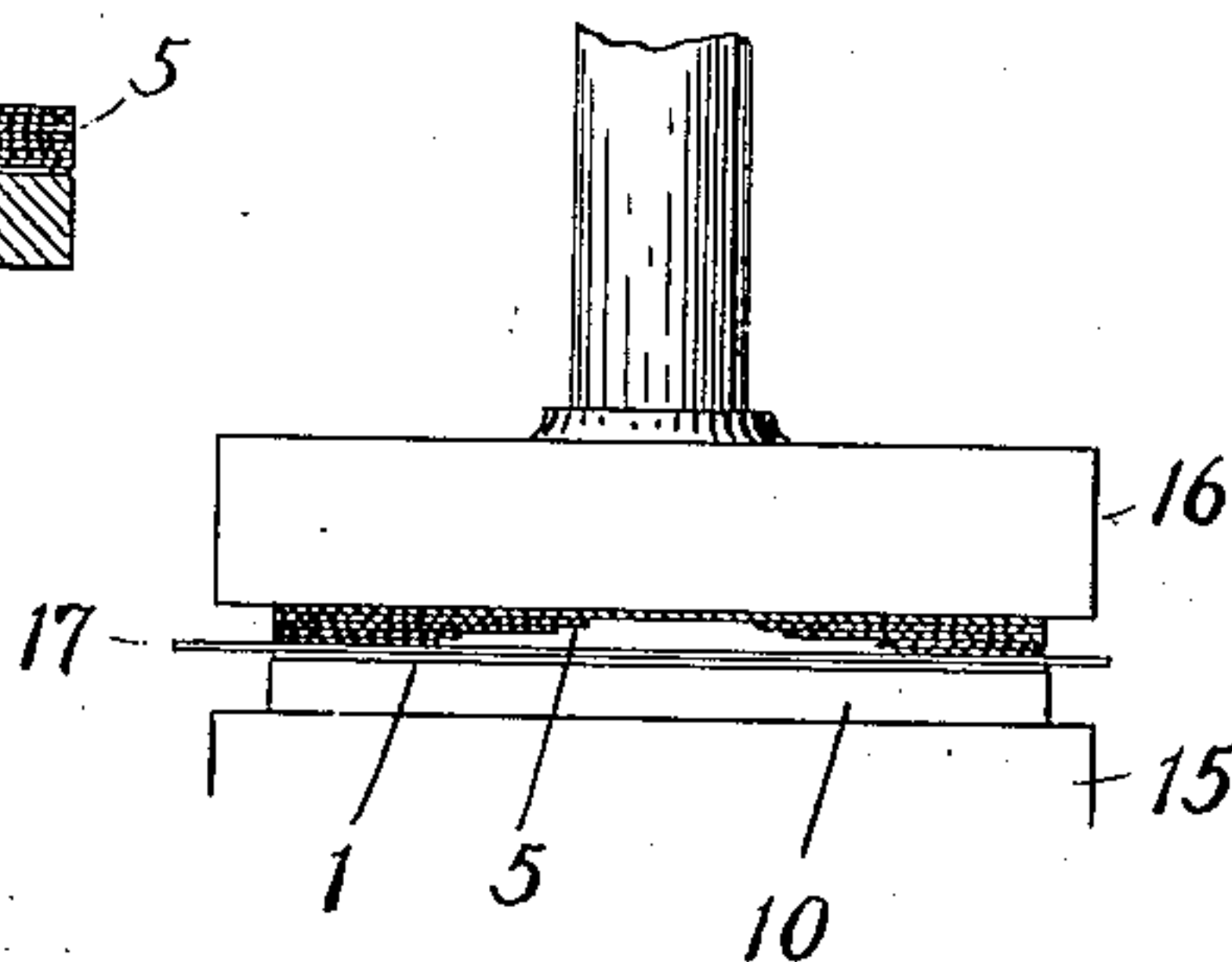
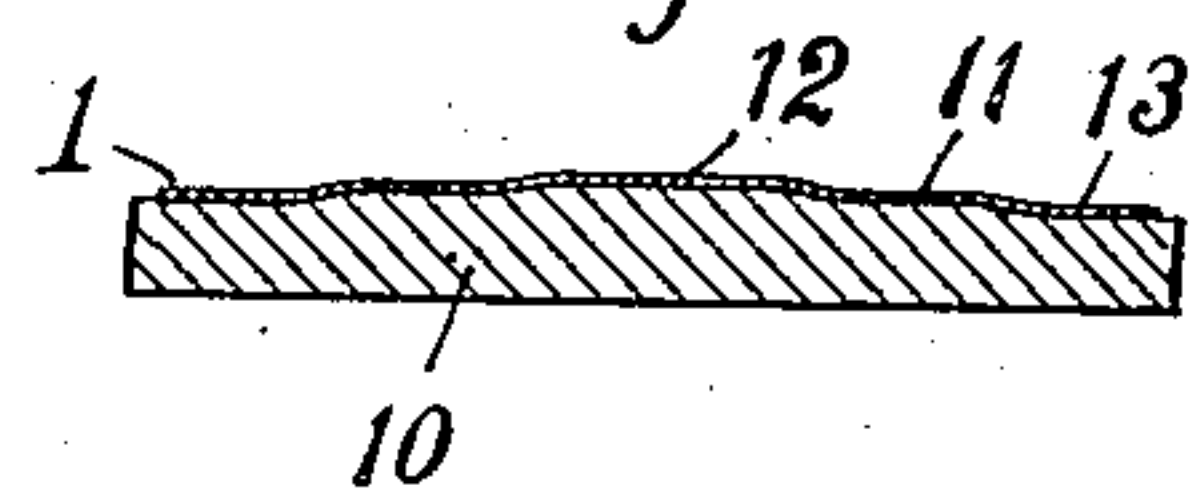


Fig. 9



Witnesses;

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# UNITED STATES PATENT OFFICE.

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PRINTING-SURFACE AND METHOD OF PRODUCING THE SAME.

979,111.

Specification of Letters Patent.

Patented Dec. 20, 1910.

Application filed January 22, 1901. Serial No. 44,308.

*To all whom it may concern:*

Be it known that I, BURT F. UPHAM, a citizen of the United States, and residing at the city of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Printing-Surfaces and Methods of Producing the Same, of which the following is a full, clear, and exact description.

In relief printing, it is customary to vary the pressure upon different sections of the printing surface in accordance with the depths of the shades. In other words, the lighter the printing shade, the lighter the pressure is made; and the blacker the shade, the heavier the pressure. This has usually been done by means of overlays and underlays, the former consisting in adding thin cuttings of paper to the impression surface at the points where the increased pressure is desired; and the latter consisting in introducing similar cuttings beneath the electrotyped printing surface.

My invention has for its object the permanent alteration of the printing surface itself, through the elevation of its heavier shades and depression of its lighter tints, in order that it may be ready for perfect work the instant it is placed upon the press, and so all overlays or underlays made entirely unnecessary therefor; and, further, to the end that all electro-types or other automatic duplications of the original surface may be equally ready for instant use.

While there are many ways in which this object may be accomplished, I disclose but a single method, that in which the essential features consist in producing the required permanent profiling of the printing surface by pressure.

Referring to the drawings forming part of this specification, Figure 1 is a face view of a simple printing surface or of a proof therefrom. Figs. 2 and 3 are plan views of two properly cut pieces of paper used in the construction of a reverse overlay employed in my process. Figs. 4, 5 and 6 are other pieces of properly cut paper for other sections of said reverse overlay. Fig. 7 is a cross-section of said reverse overlay laid upon the printing surface. Fig. 8 is a side sectional elevation of the same introduced between the members of a hydraulic or other

press. Fig. 9 is a cross-section of a finished printing surface made in accordance with my process.

In carrying my preferred process into effect, I form a relief engraving upon a thin sheet or plate of copper or other metal; the same being done either by hand, by electroplating or electrotyping from a wood-cut, or by any of the well known photochemical processes. The thickness which I find gives the best results is thirty-one thousandths of an inch for plates of hard copper. Having taken a number of proofs from the engraving, I proceed to make a reverse overlay, building up the same from several of these proofs; the number being five to six thicknesses of thin paper for fine work, and two to three thicknesses of heavier paper for ordinary newspaper work. In making this reverse overlay, I cut out all the blackest shades from the proofs, and more or less of the next darkest shades, the number of layers of paper permitted to remain being in inverse proportion to the depth of the shade, while the lightest shades are not cut out at all. The engraved plate is then laid upon a comparatively soft material, preferably the lead which is to constitute the backing therefor, and the reverse overlay placed in register upon the face of the said plate. The whole is then subjected to a heavy pressure between the perfectly flat and parallel faces of a suitable press. As a result, the thicker portions of the reverse overlay are made to forcibly depress the engraved plate and the lead backing beneath, giving to the engraving a surface which has its darker shades elevated above the lighter sections in proportion to their relative differences in shade, at the same time inseparably incorporating the plate and lead backing. The completed engraving can now be employed upon the printing press, or electrotypes or stereotypes can be made therefrom and these printed from, without the delay of overlays or underlays.

I show in Fig. 1 of the drawings an engraved plate 1 of a block letter A in solid black upon a moderately dark background, surrounded by a lighter border. Having pulled several proofs from this engraving, I proceed to build up the reverse overlay.



In doing this, I cut from certain of the proofs,—preferably three,—all the heavy black, and paste them in register one upon another on an uncut proof. Fig. 6 shows the one coming immediately upon the uncut proof; Fig. 5, the next, and Fig. 4, the last. As shown, the part cut away is larger than the letter A in each case, especially so in the proofs farthest removed from the uncut proof. By this means, the edges of the letter A as cut away in the three proofs do not coincide and produce an abrupt descent, but taper the same off more gradually. In the same manner, I paste the cut away proofs shown in Figs. 2 and 3, on the growing overlay; the square cut out in each being larger than the dark back-ground, the outermost one more than the other. The object of thus having the cut-out section larger than the dark shade, and thereby bringing the edges over the lighter part of the proof, will be set forth hereinafter. The reverse overlay as thus built up is indicated in an exaggerated form at 5 in Fig. 7, and also Fig. 8.

The reverse overlay 5 being properly laid upon the engraved plate 1, and the latter placed on the lead backing 10, the whole is put between the accurately parallel and true members 15, 16 of the hydraulic or other suitable press. First, however, a sheet 17 of fiber-board or thin metal is introduced between the reverse overlay and the engraved plate, for the purpose to be explained below. When the press is put in operation, the lead backing will flow sufficiently to permit the reverse overlay to force downward all the lighter sections of the engraved plate, and hence leave the blacker sections slightly elevated; as indicated in Fig. 9 where 12 represents the elevated darkest section; 11, the medium, and 13 the lightest sections. The press may now be opened and the engraving removed therefrom complete and in perfect readiness for use. It is, of course, necessary to insert a sheet of paper or card freshly coated with paste or cement between the plate and backing before placing in the hydraulic press to make the said parts solidly adhere together.

The object in "tapering off" the cut edges of the overlay, and introducing the thin sheet 17 is to prevent any sharp bends in the engraved plate and consequent blank lines in the prints, or lines of but partially printed space. I have discovered that if the cut away sections of the overlay coincides exactly with the boundaries of the blackest parts of the engraving, there would be a similar failure to print the lighter parts immediately adjoining such boundaries. Consequently, I cut out the overlay paper to bring the same outside of the said boundaries, and locate the edges of the cuts just

within the lighter parts. This wholly overcomes the difficulty complained of. The explanation of the said difficulty is seen in the probable fact of the elevated dark sections of the engraving supporting the paper being printed so that it does not sufficiently press upon the nearest parts of the less elevated plate; while, by elevating such parts also to a gradually lessening degree, the pressure is reduced more uniformly.

In adapting wood engravings to my process, I first produce an electrotpe and back the same with lead or other comparatively soft composition in the usual manner. A reverse overlay is then made as above described, and pressed into the same to secure the desired uneven printing surface.

In the use of printing surfaces thus prepared, the printer is wholly relieved of the bother and delay of cutting overlays or other systems of make-ready therefor; it being my purpose to have this proper profiling of the engraving done by the engravers or electrotypers before the original delivery thereof. This both saves the time of the printer, and in addition causes the work to be done by men who are thorough experts in the art of producing the best possible results with half-tones and other difficult forms of engravings. Secondly, in the case of engravings which are to be frequently used, there is no repetition in the work of making and fitting overlays, but the engraving is always ready for immediate use whenever desired. So also, in large establishments employing several presses engaged upon duplicate electrotypes, it is necessary to cut an equal number of similar overlays, since the electrotypes are all exact duplicates of the original properly profiled surface, and turn out similarly perfect work without further trouble or attention.

Although I prefer pressure as the means for profiling the printing surfaces, I do not restrict myself thereto as I have other ways of accomplishing this part of the process, which I do not wish at this time to disclose. Neither do I restrict myself to the reverse overlay as the means for enabling pressure to thus prepare the surface.

On account of the comparative rigidity and inflexibility of the copper plates ordinarily used for the engraving of half-tones, I find it impossible to properly profile the same; the only suitable results being accomplished with much thinner plates, those not exceeding thirty-one thousandths of an inch.

What I claim as my invention and for which I desire Letters Patent is as follows, to wit:—

1. The hereindescribed process of producing printing surfaces which consists in first forming a relief printing surface in a thin metallic plate, supporting the same upon a yielding backing, and finally forcing into



the face thereof a comparatively unyielding surface varying in profile in direct proportion to the lightness of the shades to be printed by the different sections of the printing surface, substantially as described.

2. The process of "making ready" the printing surface of a printing block, which consists in applying to one side of the printing block, a "relief" form having parts of its printing surface raised said raised parts corresponding with certain parts of the subject to be printed, covering the other side of the printing block with yielding material, and then subjecting the printing block and the said "relief" form while in contact with one another to pressure, thereby altering the level of parts of the printing surface of the printing block so as to obtain a correctly shaded impression in a single printing operation.

3. The process of making ready the printing surface of a printing block, which consists in applying to the face of the printing block a "relief" form having raised parts corresponding to the light shaded parts of the subject to be printed, covering the back of the printing block with yielding material, and then subjecting the printing block and said "relief" form to pressure, thereby setting back the level of those parts of the printing surface of the block which corresponds to the lightly shaded parts of the subject to be printed below the level of those parts of the printing surface of the printing block which correspond to the darkly shaded parts of the subject to be printed, so as to obtain a correctly shaded impression in a single printing operation.

4. The herein described process of producing printing surfaces varying in profile in accordance with the shades to be printed, which consists in subjecting a printing block or plate to the direct action of a relief form under pressure, thereby altering the level of parts of the printing surface of the printing block or plate so as to obtain a shaded impression in a single printing operation.

5. The herein described process of producing printing surfaces varying in profile, which consists in first forming a relief form varying in profile in accordance with the variations in profile to be produced in the printing surface, then superposing the relief form and the printing surface, and then subjecting the two directly to pressure so as to produce at one operation in the printing surface substantially the variations in the relief form.

6. The herein described process of producing "make ready" printing plates, which consists in forming a graded overlay in accordance with the tones to be produced in the printing plate and then pressing together the plate and the graded overlay so

as by a single operation to cause the gradations to appear permanently in the surface of the plate.

7. The herein described process of producing "make ready" printing plates which consists in constructing a "reverse" overlay graded in accordance with the tones of the picture to be produced in the printing plate, and then applying said overlay to the face of the printing plate and subjecting the two to such pressure as will by a single operation cause the gradations in the "reverse" overlay to appear in the face of the printing plate.

8. The herein described process of producing "make ready" printing plates which consists in constructing a "reverse" overlay graded in accordance with the tones of the picture to be produced in the printing plate, applying said overlay to the face of the printing plate, applying a suitable soft backing to the back of the printing plate with an intervening adhesive, and then subjecting the whole to pressure whereby the gradations of the reverse overlay are reproduced in the face of the printing plate and whereby the printing plate is caused to adhere to the soft backing.

9. The herein described process of producing "make ready" printing plates which consists in constructing an overlay of a plurality of sheets of paper or other suitable material, so cutting out the superposed plies as that the cut-out edge portions overlap and produce a tapering effect for adjacent tones, and then applying said overlay direct to the printing surface and subjecting the overlay and the printing surface to pressure and by a single operation producing the make ready in the face of the plate.

10. The herein described process of producing "make ready" printing plates which consists in forming a graded overlay in accordance with the tones to be produced in the printing plate, placing the printing plate upon a suitable separate backing, placing a thin protecting surface, as fiber board or metal, upon the face of the printing plate, then placing the overlay upon the latter and then subjecting the whole to pressure and by a single operation producing the make ready in the face of the plate.

11. The herein described process of producing "make ready" printing plates which consists in forming a "reverse" overlay with tapering cut edges, placing the printing plate upon a lead backing with a suitable adhesive between the two, placing a protecting surface upon the face of the printing plate, placing the "reverse" overlay on the protecting surface, and then subjecting the whole to pressure.

12. The herein described process of producing "make ready" printing plates which consists in making a "reverse" overlay and



then pressing the same directly into the face of a printing plate and thereby producing permanent impressions in the face of the plate.

5 13. The herein described process of producing "make ready" printing plates which consists in first producing a "reverse" overlay and then pressing the same directly into the face of an electrotpe printing plate  
10 and thereby producing permanent impressions in the face of the plate.

14. A "make ready" printing plate consisting of a thin metal shell into which the "make ready" has been directly pressed,  
15 and a suitable backing for said shell separately secured thereto simultaneously with the pressing operation.

15. A "make ready" printing plate con-

sisting of a thin metal shell in which the "make ready" has been directly formed by 20 pressure, and a lead backing for said shell separately secured thereto simultaneously with the pressing operation.

16. A "make ready" printing plate consisting of a thin metal shell and a softer 25 metal backing, the shell being pressed into the backing and undulating to correspond to the shades or tones to be printed.

In testimony that I claim the foregoing invention, I have hereunto set my hand this 31st day of December, 1900.

BURT F. UPHAM.

Witnesses:

FREDERIC S. LYNCH,

A. B. UPHAM.