

Sept. 16, 1947.

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2,427,556

METHOD OF AND APPARATUS FOR INTAGLIO PLATE PRINTING

Filed June 10, 1944

3 Sheets-Sheet 1

Fig. 1.

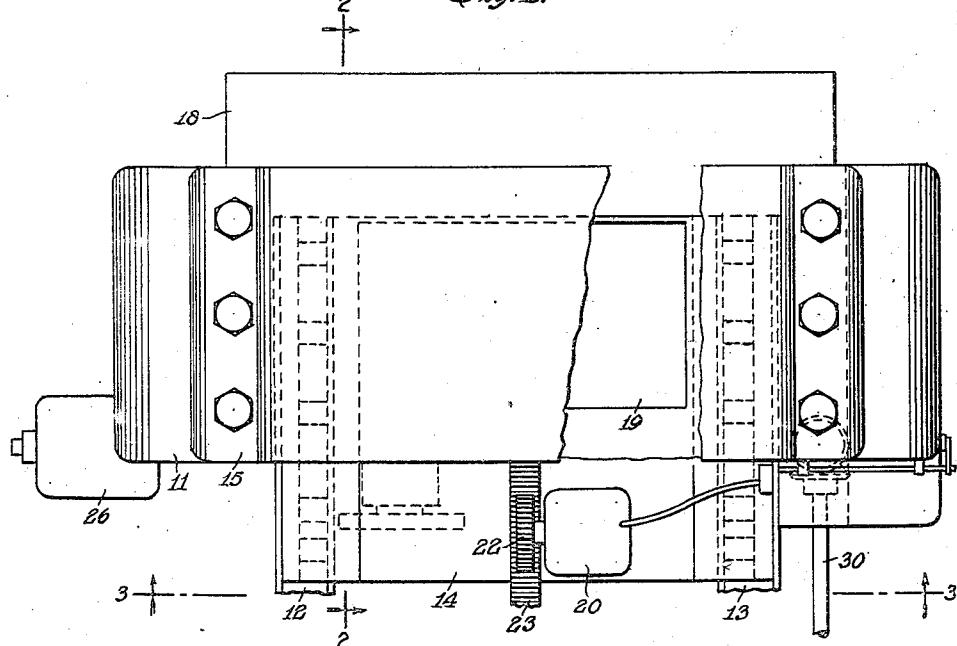
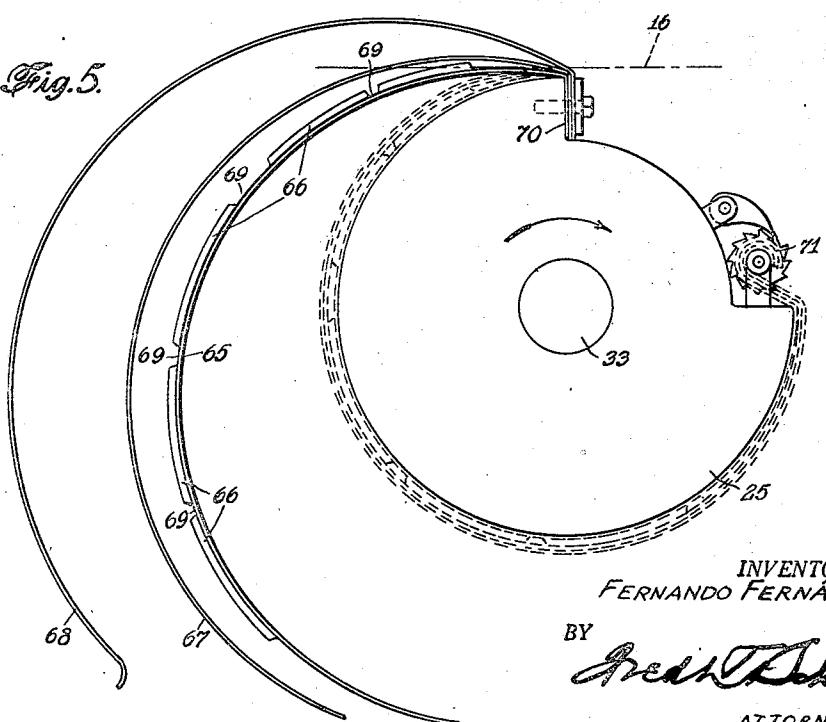


Fig. 5.



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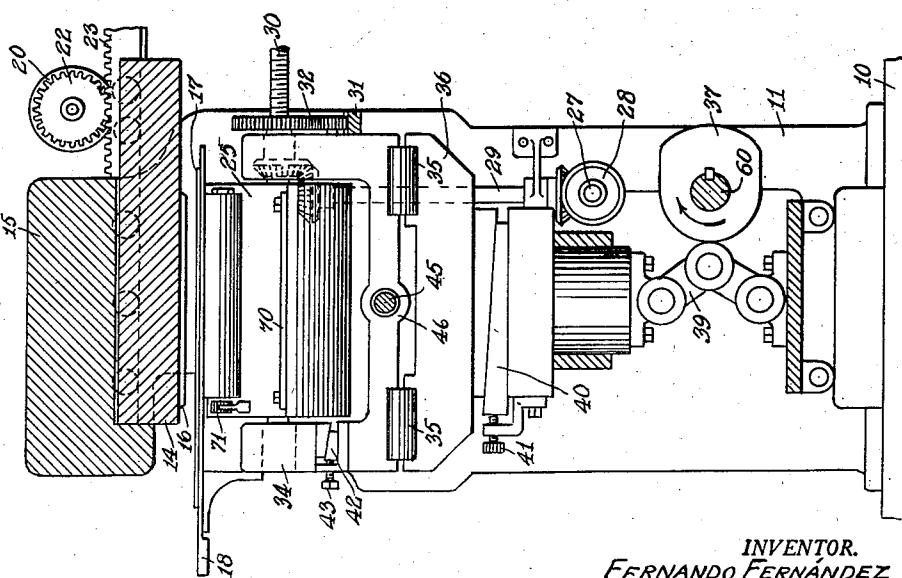
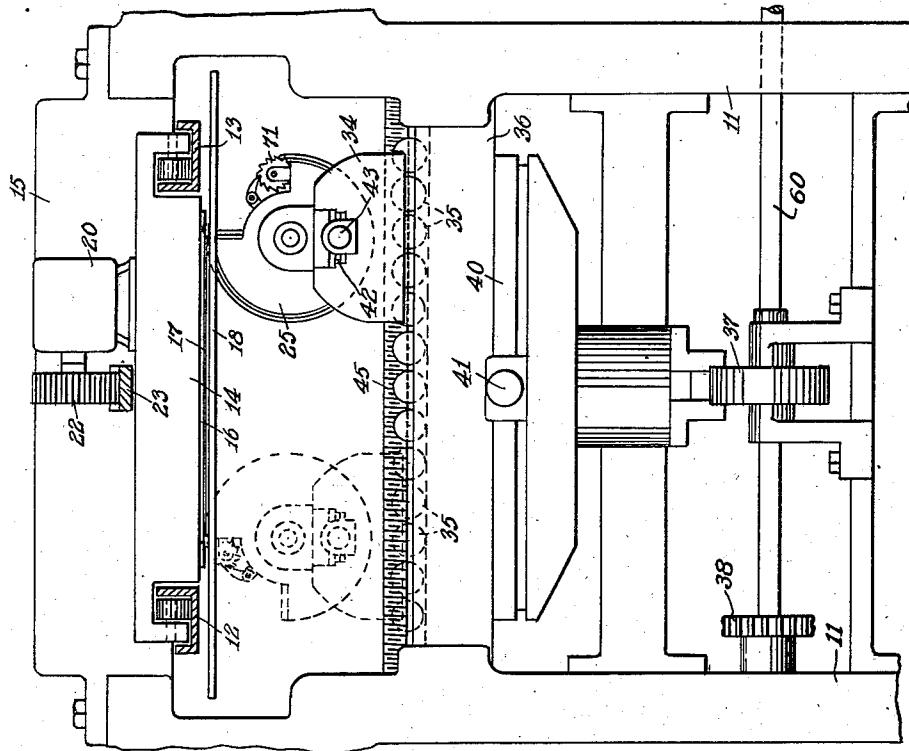
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3 Sheets-Sheet 2



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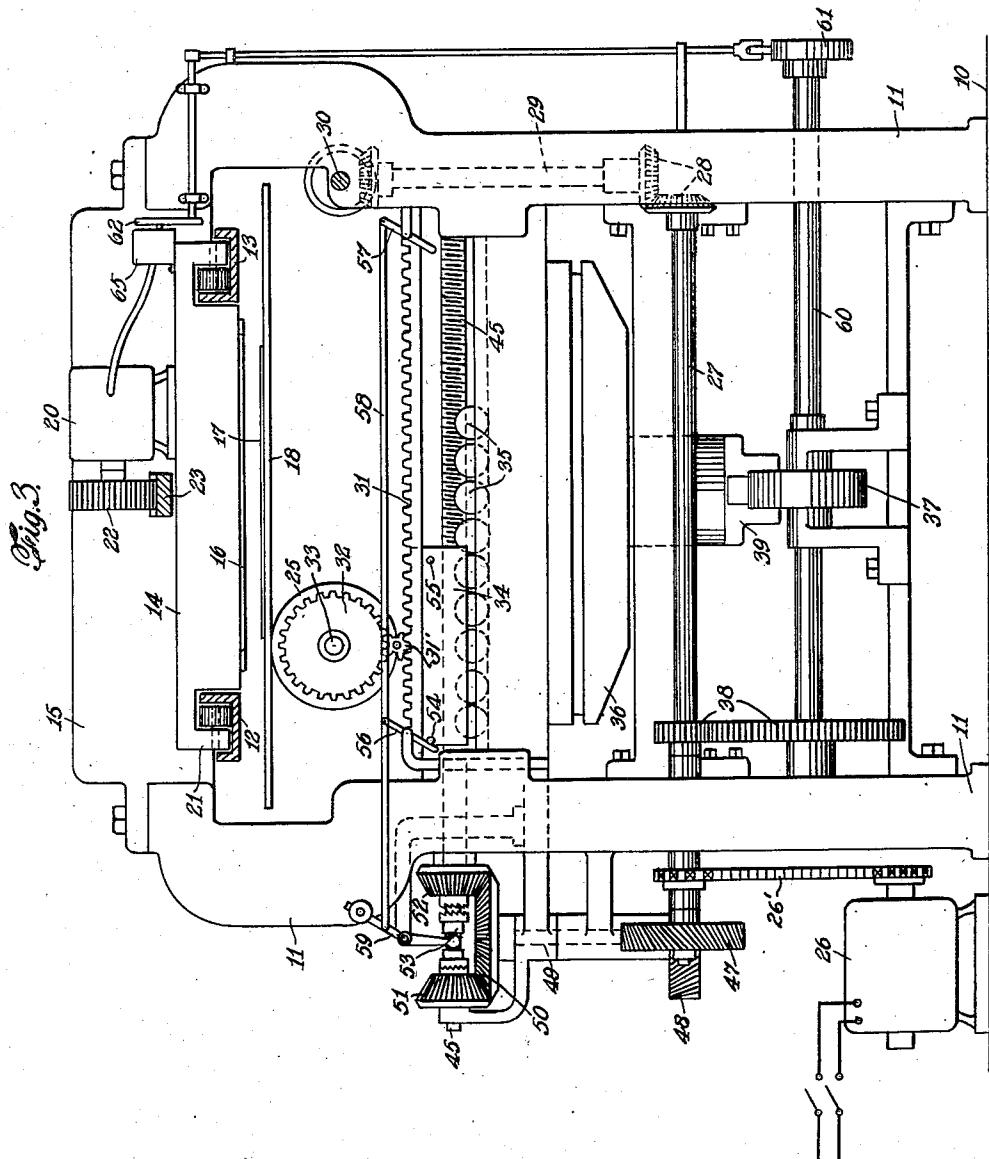
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METHOD OF AND APPARATUS FOR INTAGLIO PLATE PRINTING

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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METHOD OF AND APPARATUS FOR
INTAGLIO PLATE PRINTING

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Application June 10, 1944, Serial No. 539,721

10 Claims. (Cl. 101—269)

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The invention relates to plate printing machines for printing from intaglio metal plates and to a novel method of effecting the printing therewith, for example, in the printing of postage, revenue and other stamps, as well as securities such as bonds, stocks, and the like, from engraved metal plates.

This application is a continuation in part of my application Serial No. 399,979, filed June 27, 1941, now U. S. Letters Patent No. 2,351,030, granted June 13, 1944.

In the presses heretofore utilized, a plate having been properly prepared with the requisite amount of ink remaining in the engraved grooves of the surface was then presented to a printing roller, commonly called a "D" roller, the plate together with the paper or other material to be printed upon being carried by a moving plank or bed between said roller and a drum. As these pass between the roller and drum under the action of enormous pressure, the printing is effected upon the paper or other material.

The roller in its action applies its pressure on the whole surface of the plate, depressing the paper strongly into the grooves of the plate to cause the paper to take up the ink therein; and to attain this effect it is necessary in the case of larger sheets of paper, or other material, then to apply a certain degree of moisture to the paper in order to soften the pulp of which it is composed for the present systems do not admit of developing the requisite mechanical pressure for printing on the dry stock. This requirement of a predetermined moisture-content makes impossible the direct printing in larger sheets of gummed papers, such as are utilized in connection with the printing of postage, revenue, and other stamps; and the manufacture of these items then becomes a most complicated, difficult and costly procedure.

It is an object of the present invention to provide, in printing from intaglio metal plates, a novel and stronger press mechanism which does not require, for example, that large size gummed paper to be printed be first humidified.

The invention has for an object, also, a novel mounting for a pressure roller whereby the same, in addition to an initial movement into contact with the printing plate, is afforded a further movement longitudinally thereof to effect the printing, the printing plate during the printing operation being maintained in a stationary position, thereby permitting of materially increasing the pressure applied to the said plate especially when the roller surface is constructed in accordance with the invention.

Another object of the invention is to so locate the plank carrying the printing plate that the pressure roller acts directly against the surface of the paper being printed without any interme-

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diate element such as a moving plank heretofore present.

Still another object of the invention is to provide a novel counterboard assembly on the pressure roller such that only the surface of the printing plate at which the engraving is located receives the required pressure effect, and to retain this registry throughout successive printings.

In carrying out the invention, instead of causing a reciprocatory plate carrying plank or the like to pass during the printing operation between an abutment or drum for the plank and a D-roller designed to contact the printing plate to effect the printing during movement of the plank in one direction, the plate is brought in the novel apparatus to a predetermined location wherein it remains throughout the printing operation. This operation is effected by the novel pressure roller after making contact with the printing plate, or, rather, with an intermediate sheet of the medium to be printed against the plank or abutment, and through a translation of the said pressure roller relatively to the positioned printing plate, the said pressure roller at the same time being positively rotated about its axis and applying the requisite pressure.

The pressure roller, also, is surfaced in a novel manner so that said roller, acting directly against the paper or medium to receive the printing, through its packing exerts the excessive pressure only upon those portions of the printing plate where it is engraved. This is brought about by attaching, for example by means of a suitable adhesive, a suitable packing sheet or sheets to the exposed surface of a flexible metal strip which is mounted over the surface of the pressure roller, and trimming away such portions of this packing sheet as do not bear an impression made thereon by the printing plate in a preliminary run.

The nature of the invention, however, will best be understood when described in connection with the accompanying drawing, in which—

Fig. 1 is a fragmentary plan view of the novel press, with portions broken away.

Fig. 2 is a longitudinal section through the press, taken on the line 2—2, Fig. 1 of the drawings, and looking in the direction of the arrows.

Fig. 3 is a transverse section of the press, taken on the line 3—3, Fig. 1, and looking in the direction of the arrows.

Fig. 4 is a fragmentary view illustrating the action of the pressure roller in the printing operation.

Fig. 5 is an enlarged end view of the novel pressure roller with the arrangement of the different covers provided thereover.

Referring to the drawings, 10 designates a supporting base and 11 a frame thereon for the printing mechanism of the press. Frames 10 and 60 11 support at the top and along opposite sides of

the press a pair of tracks or channels 12 and 13 over which is adapted to travel a plate-carrying member or plank 14. Plank 14 is designed to fit within a head 15 of frame 11 and carries on its underface the printing plate 16 which is thus presented in inverted position for printing upon material 17 designed to be supported upon a table or the like 18 of the frame, the printing being effected through a window 19 of the table in the manner hereinafter set forth.

The plank 14 is designed to be reciprocated over the tracks 12 and 13, and to this end, preferably, has attached thereto an electric motor 20 with carriage 21 riding the tracks 12 and 13. Motor 20 rotates a gear 22 in mesh with the teeth of a rack 23 longitudinally disposed over the top of the printing apparatus between the tracks 12 and 13. Motor 20 is of the reversible type which may be provided with suitable limit switches or the like for controlling the reciprocations of the plank and returning for the beginning of each cycle the plank to the printing portion of the press where it remains stationary during the printing operation—as is set forth more specifically in my aforesaid application, Serial No. 399,979.

Following the usual wiping and polishing action on the printing plate 16 which is attached to the underface of the plank 14, the said plate is advanced into the printing position over table 18, and provision is made for juxtaposing thereto, through the window 19 in the table, a pressure roller 25.

The positioning of this roller is effected from a second motor 26 through intermediate mechanism including a chain drive 26' and the counter-or cross-shaft 27 and bevel gears 28 for driving a shaft 29 in turn driving a worm 30 for the inking mechanism (not shown).

A fixed rack 31 connects through a pinion 31' with the teeth of a spur gear 32 on the spindle 33 of the pressure roller, the spindle being supported in a carriage 34 reciprocable on a series of anti-friction members or rollers 35 of the movable platen 36 of the press. This platen is designed to provide the necessary contact pressure between the surface of the pressure roller 25 and the plate 16, as by means of a cam 37 operated from shaft 27 through intermediate gearing 38, said cam engaging the toggle 39 of the platen.

Pressure of the entire platen against the engraved plate may be adjusted through the interposed wedge 40, Fig. 2, and adjusting screw 41; and the pressure exerted on the plate by the roller may be adjusted by means of a second wedge 42 with adjusting screw 43 acting on the carriage 34.

As soon as this contact between the pressure roller and the plate has been established, the printing is effected by a translatory movement of the carriage in a direction at right angles to the contact movement, with simultaneous rotation of the pressure roller through the connection of its gear 32 with rack 31. Said roller will thus transverse the surface of the printing plate which maintains its stationary position. By this arrangement, materially higher contact pressure may be secured so that moistening of the paper to be printed upon will not be required.

The reciprocation of the carriage with its pressure roller is effected also from the shaft 27, through a worm 45 driven thereby and passing through a nut 46 of the carriage. Power is transmitted from the shaft 27 through a spiral gear 47 thereon, engaging the spiral gear 48 on a vertically disposed shaft 49 driving at its upper end bevel gear 50. This latter gear engages two bevel

gears 51 and 52 loosely mounted on the worm shaft 45. One or the other of gears 51 or 52 is designed to be clutched to said worm shaft by the clutch means 53 in accordance with the required direction of movement of carriage 34. The said clutch is tripped to effect the reciprocating movement by means of pins 54 and 55 which extend laterally from the carriage 34 and are designed to engage respective arms 56 and 57 of a rod 58 attached to the lever 59 of said clutch. Pressure roller 25 will thus be translated longitudinally with respect to the engraved surface of the printing plate 16 from the position shown in full lines, Fig. 4, to the position indicated by the broken lines during which the printing is effected.

On the shaft 60 for the cam 37 is provided also the cam 61 for actuating a bell-crank 62 controlling the reciprocation of the plank 14. Thus all of the operations are controlled from the motor 26 which, when energized, drives the various shafts, shaft 69 controlling the energization of motor 20 through shifting its switch by means of the bell-crank 62 out of, for example, the normal vertical position to an inclined position. Said motor 20 then causes the carriage 21 to move over the tracks 12 and 13 toward the inking portion of the apparatus (not shown), eventually returning the plank to its stationary location in the head 15 of the press for the printing operation, whereupon the cycle is repeated.

In order materially to reduce the total pressure to be exerted by the pressure roller 25 against the engraved plate 16, the surface of said roller is prepared or packed in a novel manner so that in the system of printing herein set forth no substantial pressure is exerted upon said plate at places other than those bearing the engravings. Also, the pressure is applied directly from the roller element to the interposed material to be printed which is backed solely by the engraved printing plate.

This is effected by wrapping over the surface of the roller 25 a sheet of flexible material such as a metal strip 65 to the exposed surface of which is attached, as by means of an adhesive, a suitable counterboard or packing strip or strips 66 as of cardboard, a thickness of approximately one-quarter of an inch of such material usually being sufficient. In addition, a sheet 67 of press board is brought over the packing strip but this is not secured to the packing strip, and over all is provided a cloth cover 68 of rubber or flannel according to the requirements of the work to be performed. However, before the loose strip 67 and the cover cloth 68 are applied over the surface of the roller, an impression is made with the latter with only the counterboard 66 in place and there is then trimmed away from said counterboard all those portions which show no engraving impressions, as indicated at 69. The counterboard portions remaining and attached to the metal strip 65 are with said strip and the strip 67 and cover cloth 68 securely held over the periphery of the roller in the usual manner, being fastened at one end to the longitudinal wall 70 of said roller and at the other arranged to be taken up to the required tension by means of the pawl and ratchet mechanism 71 also carried by the roller—all of which is well understood and forms no part of the instant invention.

The arrangement of the printing mechanism is such that when contact is first established between the roller surface and the plate, the counterboard portions of the roller surface are not in substantial contact with the plate sur-

face, and the toggle then is in its most effective position. The actual pressure developed depends on the action of the counterboard portions and becomes effective upon translation of the roller.

The portion intermediate said ends is utilized in the printing operation and corresponds in extent to the travel and the rotational movement of the roller under pressure contact with the engraved plate, as well as the length of the plate.

By this expedient, part of the engraving can be suppressed where it is desired that the printing be accomplished with certain parts omitted, this being possible without necessitating erasure of the engraving on the plate. Prints may be effected on either dry or moistened paper due to the concentration of the pressure which permits of utilizing much greater pressures than heretofore, and large size plates may be utilized in the printing of only relatively small engravings since no appreciable pressure will be exerted over the remainder of the surface.

As the pressure of the pressure roller is rigid, that is, effected without springs of any kind, and the counterboard is covered by the strip 67, the surface of the roller does not mark the edges of the plate on the paper, and in case of printing letterheads, diplomas, wedding announcements, etc., no evidence of the counterboard will be noticeable even if the print be made on heavy stock of the finest quality.

I claim:

1. In a press for printing from an engraved metal plate: a reciprocable plate carrier, means to retain the carrier with plate stationary, a pressure roller, means for bringing, in a direction normal to the plane of reciprocation of the carrier, the roller into contact with the surface of the stationary plate to exert a predetermined pressure upon said plate, and means to then cause the positioned roller to travel longitudinally over the surface of the plate under pressure contact therewith and transversely to its reciprocatory movement.

2. In a press for printing from an engraved metal plate: a reciprocable plate carrier, means to retain the carrier with plate stationary, a pressure roller having a flexible metal strip over its surface and a counterboard secured thereto, said counterboard being trimmed to correspond to the engraved portions of the plate for engagement therewith only, means for bringing, in a direction normal to the plane of reciprocation of the carrier, the roller into contact with the surface of the stationary plate to exert a predetermined pressure upon said plate, and means to then cause the positioned roller to travel longitudinally over the surface of the plate under pressure contact therewith and transversely to its reciprocatory movement.

3. In a press for printing from an engraved metal plate: a reciprocable plate carrier, means to retain the carrier with plate stationary, a pressure roller, means for bringing, in a direction normal to the plane of reciprocation of the carrier, the roller into contact with the surface of the stationary plate to exert a predetermined pressure upon said plate, means to then cause the positioned roller to travel longitudinally over the surface of the plate under pressure contact therewith and transversely to its reciprocatory movement, and means operative simultaneously with the travel of the roller positively to rotate the same.

4. In a press for printing from an engraved

metal plate: a reciprocable plate carrier, means to retain the carrier with plate stationary, a pressure roller, a carriage for the roller for bringing the same, in a direction normal to the plane of reciprocation of the carrier, into contact with the surface of the stationary plate to exert a predetermined pressure upon said plate, anti-friction means supporting said carriage, and means to cause the roller carriage to travel thereover and 10 the roller longitudinally over the surface of the plate under pressure contact therewith and transversely to its reciprocatory movement.

5. In a press for printing from an engraved metal plate: a reciprocable plate carrier, means to retain the carrier with plate stationary, a pressure roller, a spindle for supporting the roller, a carriage for mounting the spindle with roller, anti-friction means supporting said carriage, means for moving said carriage with roller, in a direction normal to the plane of reciprocation of the carrier, to bring the roller into contact with the surface of said plate to exert a predetermined pressure upon said plate, and means to then cause the carriage to travel over the anti-friction means 20 and the roller longitudinally over the surface of the plate under pressure contact therewith and transversely to its reciprocatory movement.

6. In a press for printing from an engraved metal plate: a reciprocable plate carrier, means to retain the carrier with plate stationary, a pressure roller, a spindle for supporting the roller, a gear wheel secured to the roller for rotating same, a fixed rack connected with said gear wheel to rotate the same, means for bringing, in a direction normal to the plane of reciprocation of the carrier, the roller into contact with the surface of the stationary plate to exert a predetermined pressure upon said plate, and means to then cause the positioned roller to travel 30 longitudinally over the surface of the plate under pressure contact therewith and transversely to its reciprocatory movement.

7. In a press for printing from an engraved metal plate: a reciprocable plate carrier, means to retain the carrier with plate stationary, a pressure roller, a spindle for supporting the roller, a gear wheel secured to the roller for rotating the same, a fixed rack connected with said gear wheel to rotate the same, a carriage for mounting 45 the spindle with roller, anti-friction means supporting said carriage, means for moving said carriage with roller, in a direction normal to the plane of reciprocation of the carrier, to bring the roller into contact with the surface of said plate to exert a predetermined pressure upon said plate, and means to then cause the carriage to travel 50 over the anti-friction means and the roller longitudinally over the surface of the plate under pressure contact therewith and transversely to its reciprocatory movement.

8. The method of printing from an engraved plate, by means of a pressure roller contacting the engraved portions of said plate, which includes the steps of mechanically locating said plate in a stationary position, then contacting said plate with the pressure roller under a substantial pressure by translating the latter in a direction normal to the plane of the said plate, and then translating transversely to the direction of 65 plate movement the pressure roller relatively to the positioned plate over the surface thereof, with interposition of material to be printed, while maintaining pressure contact between said roller 70 and plate.

9. The method of printing from an engraved plate, by means of a pressure roller contacting the engraved portions of said plate, which includes the steps of mechanically locating said plate in a stationary position, then contacting said plate with the pressure roller under a substantial pressure by translating the latter in a direction normal to the plane of the said plate, then translating transversely to the direction of plate movement the pressure roller relatively to the positioned plate over the surface thereof, with interposition of material to be printed, while maintaining pressure contact between said roller and plate, and simultaneously rotating positively the roller.

10. In a press for printing from an engraved metal plate: a reciprocable carrier for the plate, a pressure roller, means to retain the carrier with plate stationary during the printing operation, means to juxtapose the carrier with plate and

5 longitudinally over the surface of the stationary plate under pressure contact therewith.

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