

May 15, 1956

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2,745,186

UNIVERSAL PRINTING PLATE REGISTERING AND PUNCHING MACHINE

Filed Dec. 1, 1951

4 Sheets-Sheet 1

FIG. 1.

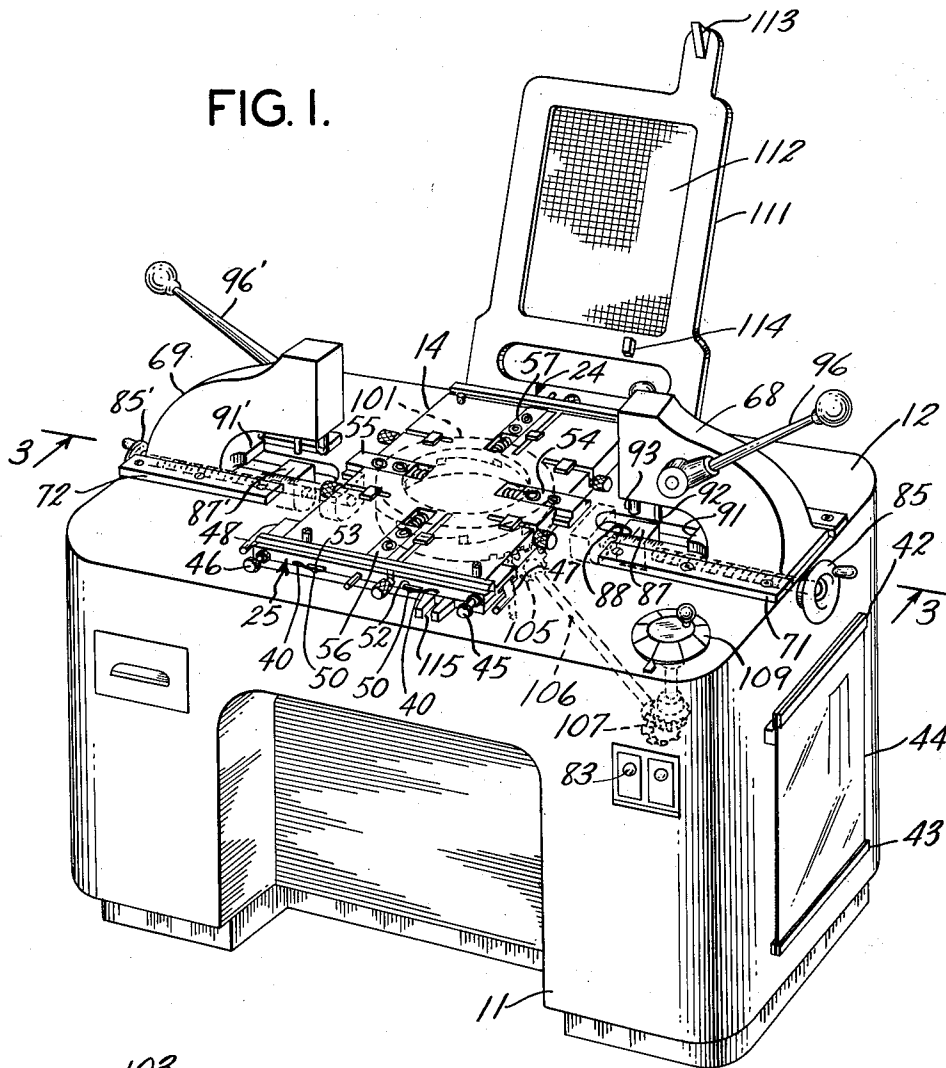
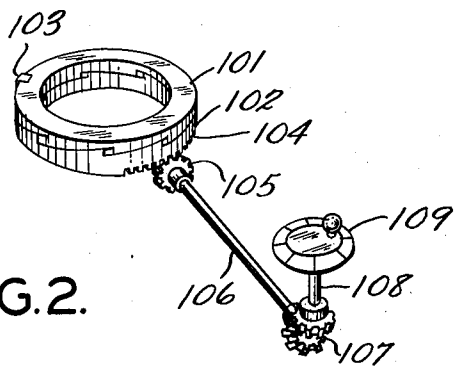


FIG. 2.



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4 Sheets-Sheet 2

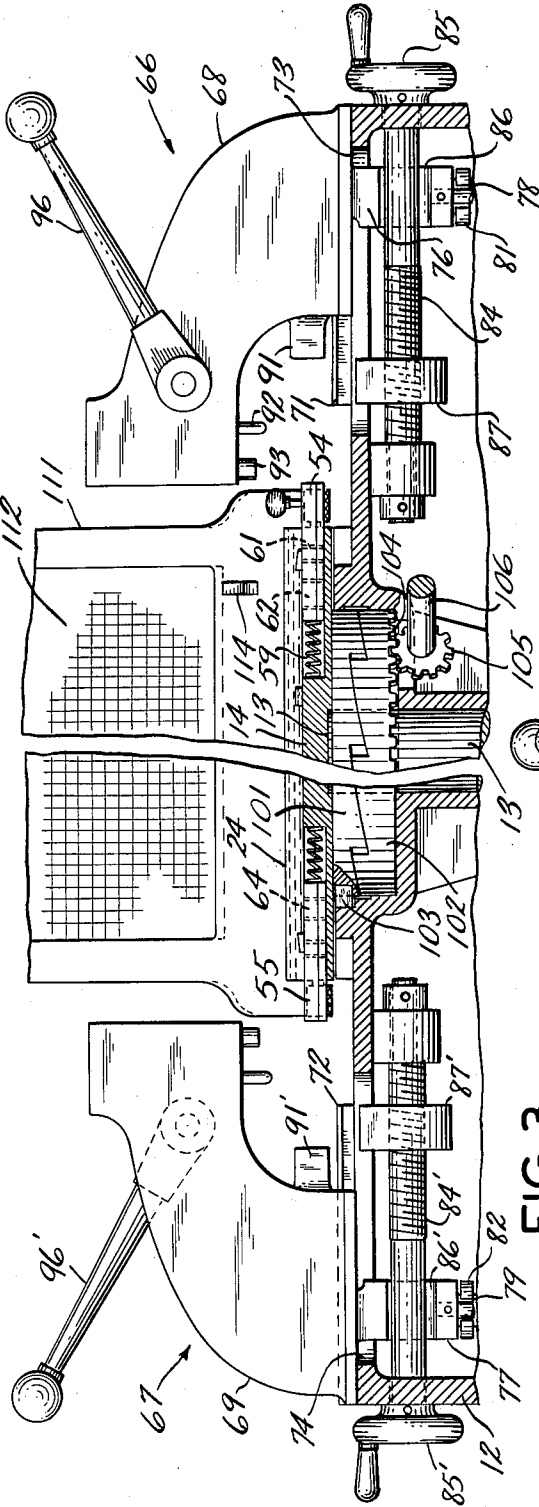


FIG. 3.

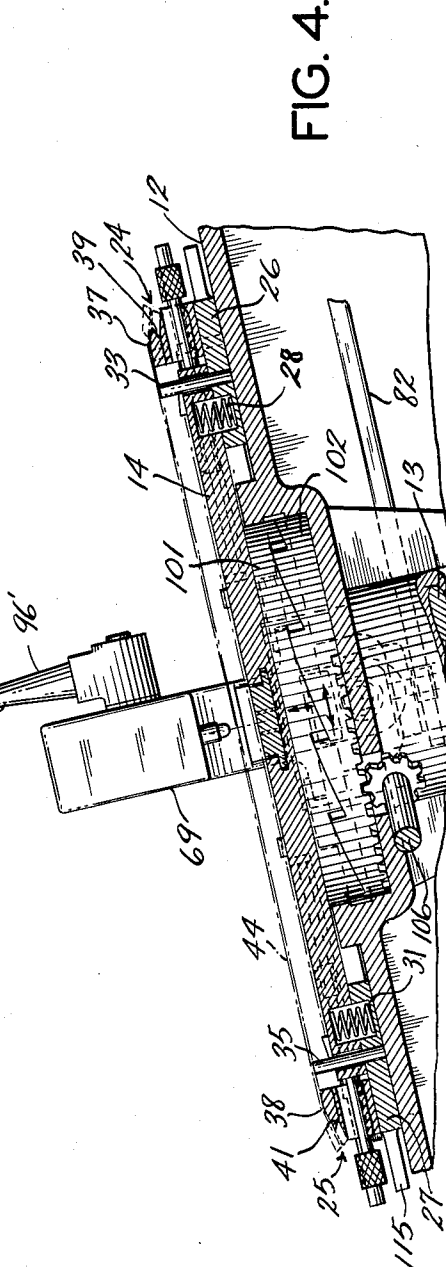


FIG. 4.

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4 Sheets-Sheet 3

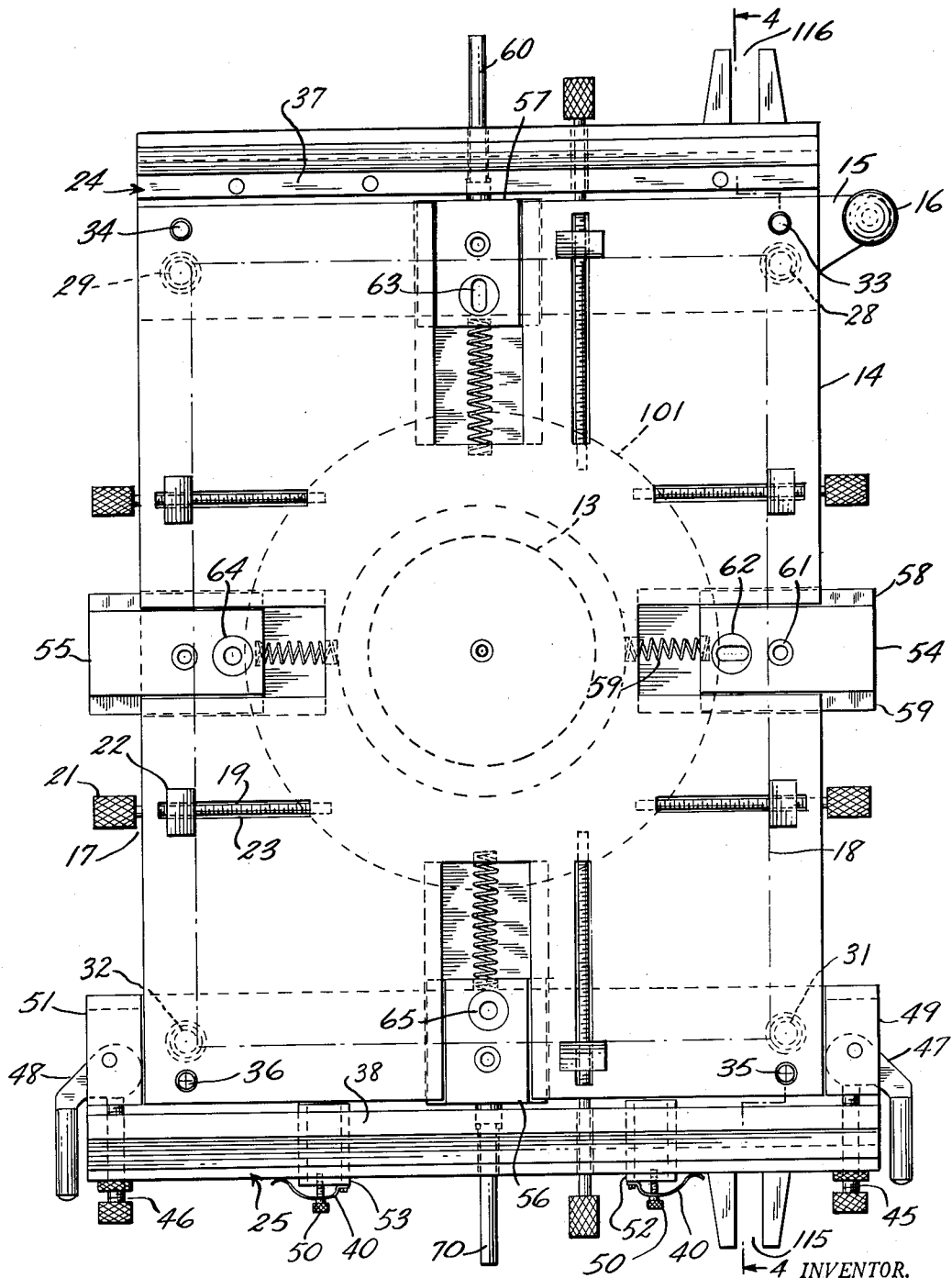


FIG. 5.

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4 Sheets-Sheet 4

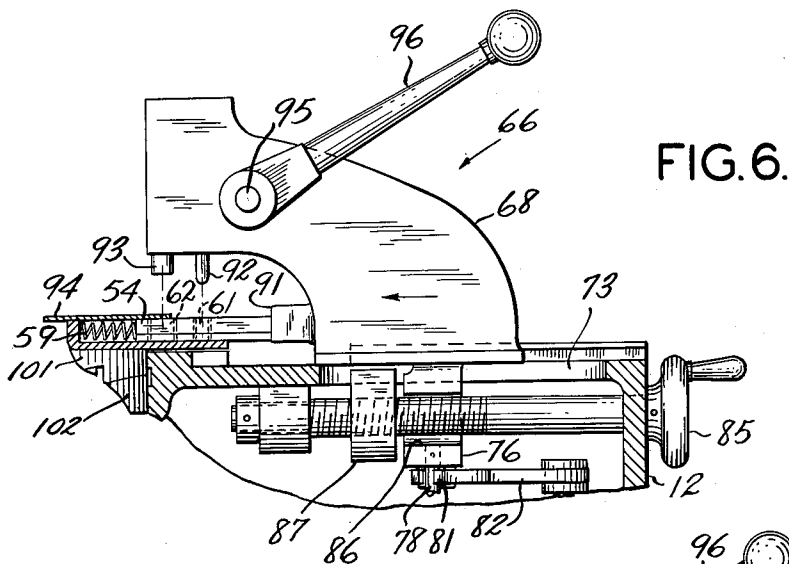


FIG. 6.

FIG. 7.

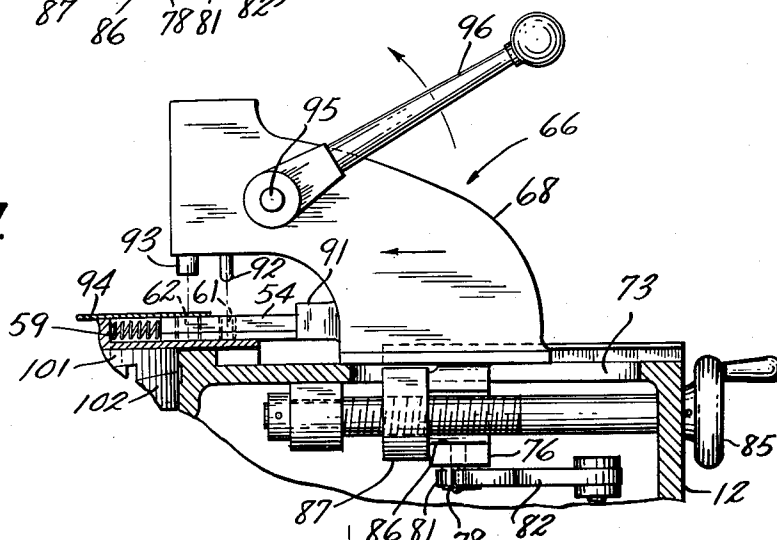
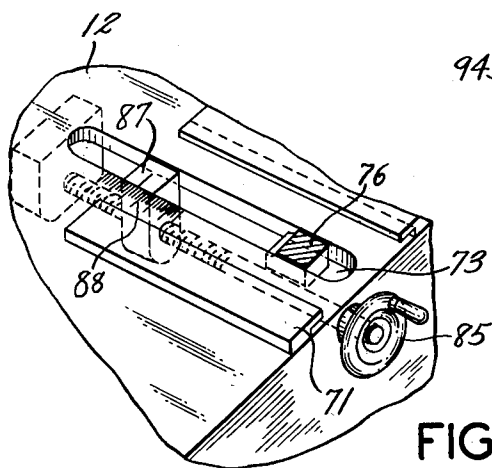


FIG. 8.

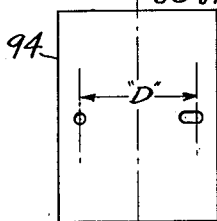


FIG. 9a.

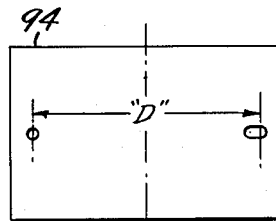


FIG. 9b.

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2,745,186

UNIVERSAL PRINTING PLATE REGISTERING AND PUNCHING MACHINE

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Application December 1, 1951, Serial No. 259,461

11 Claims. (Cl. 33—184.5)

The present invention relates to apparatus for so marking printing plates that the impression of each plate will accurately register with related printed impressions when the plates are mounted in a printing press and the press is operated in accordance with standard printing practice.

Applicant has previously disclosed in patent application Serial No. 206,452, filed January 17, 1951, apparatus for precisely and expeditiously registering and marking printing plates of standard sizes.

It is the primary object of the present invention to improve the prior apparatus by rendering it capable of accommodating printing plates of various sizes and thicknesses.

The invention resides in apparatus for registering and punching printing plates of various sizes and thicknesses, which apparatus includes a base, a registering member, such as a transparent ruled register screen or a transparent register sheet adapted to receive a master imprint thereon, and plate-supporting means for adjustably holding a printing plate in alignment with the registering member. The plate-supporting means may take the form of a turntable having manually actuated clamps for engaging the edges of the printing plate. A level-limiting means is provided for predetermining a reference plane for the registering member. The level-limiting means is disclosed as a frame attached to either end of the turntable, each frame being provided with a bearer bar. A plastic register sheet may be stretched between and a ruled glass register screen may be lowered against these bearer bars.

Punch mechanisms, serving to punch alignment holes in registered plates, are movably mounted on the base to overhang the printing plate and cooperating dies are movably mounted on the plate-supporting means to underlie the plate. Each punch mechanism may comprise a punch-carrying pedestal which is reciprocable toward and away from the turntable. The dies, on the other hand, may be mounted in a slide flush with the surface of the turntable and radially reciprocable thereon. The movements of the punch mechanism and the die are coordinated to insure proper alignment of punch and die. This coordination may be effected by engagement between a portion of the base of the punch-carrying pedestal and the end of the die slide which resists inward movement by means of a radially acting compression spring. The punching dies are thus able to adjust themselves to various plate sizes. Adjustable stop blocks are provided to limit the inward movement of the punch-carrying pedestals.

In order to adjust for various printing plate thicknesses leveling means is provided for altering the level of the plate-supporting means to place the surface of the printing plate always in the reference plane of the registering member as predetermined by the level-limiting means. In the illustrated embodiment of the invention, the leveling means includes a pair of concentric rings having complementary sloping faces in engagement. The turntable is supported by and rotatable relative to these rings which

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may be rotated relative to each other for altering the height of the turntable relative to the top surface of the bearer bars of the frames. The punching dies are mounted on the turntable and, consequently, are raised or depressed according to the thickness of the printing plate but always remain flush with the bottom of the plate ready for the punching operation.

In order that the invention may be more fully understood, it will now be discussed in detail, reference being had to the accompanying drawings wherein:

Figure 1 is a perspective view of a printing plate registering and punching apparatus embodying the improvements of the present invention;

Figure 2 is a detail of the apparatus of Figure 1, showing leveling rings and associated shafts and gearing for altering the height of the turntable that holds the printing plate in order to adjust for different plate thicknesses;

Figure 3 is a front view in partial section of a detail of the apparatus taken along line 3, 3 of Figure 1, showing punch mechanisms reciprocable on the base and co-operating sliding dies mounted for reciprocal movement on the turntable;

Figure 4 is a side sectional view taken through the center of the turntable, showing the operation of the rings relative to the level-limiting means;

Figure 5 is a plan view of the turntable showing the sliding dies from above;

Figure 6 is a front view similar to a portion of Figure 3 and shows a punch mechanism at the point of engagement with the sliding die;

Figure 7 is similar to Figure 6 and shows the punch mechanism at its innermost position in contact with the stop block;

Figure 8 is a detailed view of the stop block and lead screw adjustment therefor seen in perspective from above with all but the abutting portion of the punch pedestal removed; and

Figures 9a and 9b are plan views of printing plates which have been punched at the sides and at the ends, respectively.

Referring to the apparatus illustrated in Figure 1, there is shown a base 11 formed with top or platform 12 which may, if desired, slope downward from rear to front as indicated in Figure 4. Platform 12 is provided with a central shaft 13 (Figure 5) upon which a turntable 14 is mounted for turning about an axis perpendicular to the plane of the platform 12. Angle limiting means (not shown) may be furnished within the base 11 to restrict the angular movement of turntable 14 to ninety degrees.

As illustrated in Figure 5, the turntable 14 is generally rectangular in plan and is formed with an extension 15 upon which is fixed a handle 16 for the purpose of facilitating manual swinging of the turntable from the position indicated in Figure 1 to position at a right angle thereto. The turntable 14 is provided with a plurality of manually actuated clamps 17 which are adapted to engage the edges of a printing plate, the outline of which is indicated at 18. Clamps 17 comprise lead screws 19 mounted perpendicularly in the edges of the turntable 14. Each of the lead screws has a knurled head 21 for manual adjustment thereof and has sliding blocks 22 threaded thereon. By manipulation of knurled heads 21, blocks 22 may be moved in or out along guide slots 23. Clamps 17 thus permit a printing plate to be centered on turntable 14 and locked up in accordance with standard printing practice.

Means for establishing a reference level irrespective of the thickness of the printing plate is provided at opposite ends of the turntable 14 in the form of frames 24 and 25. Frames 24 and 25 (seen in cross section in Figure 4) have face plates 26 and 27, respectively, held

in firm contact with platform 12 by means of compression springs 28, 29 and 31, 32, respectively, which act between turntable 14 and platform 12. Frames 24 and 25 are otherwise connected to turntable 14 by upright studs 33, 34 and 35, 36, which engage perpendicular holes in turntable 14. This manner of connection permits the turntable 14 to be raised or depressed, as will be discussed in detail below, without altering the height of frames 24 and 25 above platform 12. Frames 24 and 25 are, however, constrained to turn with turntable 14 while maintaining their relative alignment. Stud 35 and 36 have cross marks cut on their top surfaces for registering purposes as subsequently explained.

A bearer bar 37 is permanently fixed to face plate 26. A similar bearer bar 38 is slidably mounted on face plate 27. The two bearer bars 37 and 38 have reentrant longitudinal flanges 39 and 41 formed therein for the purpose of receiving cooperating clamp bars 42 and 43 holding the ends of a transparent register sheet 44 which, when not in use, may be hung on the side of base 11 as shown in Figure 1.

Thumb screws 45 and 46 are threaded into bearer bar 38 near either end thereof and extend perpendicularly through the bar into engagement with eccentric cam levers 47 and 48, respectively. Cam levers 47 and 48 are pivotally mounted upon extensions 49 and 51, respectively, of face plate 27. Guide blocks 52 and 53 secured to the top of face plate 27 perpendicularly to its length have downwardly and inwardly sloping sides which engage complementary shaped grooves in the bottom of bearer bar 38. Guide blocks 52 and 53 permit movement of bearer bar 38 substantially only directly toward or away from bearer bar 37. Leaf springs 40, attached to the outer ends of the guide blocks 52 and 53, press in against the side of the bearer bar 38 with a resilience that may be adjusted by thumb screws 50, which are threaded in the guide blocks.

In order to mount transparent register sheet 44, cam levers 47 and 48 are swung outwardly permitting bearer bar 38 to move inwardly under the pressure of the springs 40 to its position of minimum spacing from bearer bar 37. In this position clamp bars 42 and 43 and register sheet 44 may be easily slipped into reentrant flanges 39 and 41, with the sheet 44 lying across the top of turntable 14. Thereupon cam levers 47 and 48 may be turned back to their locking position (shown in Figure 5), moving bearer bar 38 further away from bearer bar 37 and stretching the register sheet 44 tightly over the turntable. Thumbscrews 45 and 46 may be adjusted to regulate the tension of register sheet 44 as required.

In order that a registered plate may be suitably marked while it is still correctly located upon turntable 14, punch mechanisms 66 and 67 are provided on either side of turntable 14 on the top 12 of base 11 cooperating with die slides 54, 55, 56 and 57 on turntable 14.

Die slides 54, 55, 56 and 57 are each mounted in a different edge of the turntable and have top surfaces flush with the surface thereof. Die slide 54 is provided with parallel flanges 58 and 59 which underlie the surface of turntable 14 and permit slide 54 to move in or out along a line passing through the center of the turntable and perpendicular to the edge in which slide 54 is mounted. A compression spring 59 acts between the turntable and the inner end of slide 54 to urge the same outwardly and a suitable internal stop (not shown) may be employed to limit the outermost position of the slide. Slide 54 is provided with a guide bushing 61 and a die bushing 62 aligned with the direction of movement of the slide 54. Slides 55, 56 and 57 are generally similarly constructed and are also provided with guide and die bushings which are movable toward or away from the center of the turntable along lines perpendicular to the respective edges. Push rods 60 and 70, reciprocally mounted in frames 24 and 25, respectively, abut the ends

of slides 57 and 56, respectively, and serve to move the slides radially while permitting relative vertical movement between the frames and the turntable 14. The die bushing in slide 57 is adapted to receive an elongated punch identical to that receivable by bushing 62. The die bushings 64 and 65 in slides 55 and 56, respectively, serve to receive an identical round punch.

Punch mechanisms 66 and 67 comprise pedestals 68 and 69, respectively, which are reciprocally slidable in respective guideways 71 and 72. Members 76 and 77 attached to the underside of pedestals 68 and 69, respectively, extend down through slots 73 and 74 provided in the top 12 within the respective guideways 71 and 72. On the underside of members 76 and 77 wrist pins 78 and 79 respectively, are vertically mounted. Actuating levers 81 and 82 are connected to wrist pins 78 and 79, respectively, for the purpose of moving the punch pedestals toward or away from turntable 14. Levers 81 and 82 may be manually actuated but are preferably mechanically motivated in response to operation of control 83 on the front of base 11. Such automatic control forms no part of the present invention and suitable mechanism has been outlined in the above-mentioned patent application Serial No. 206,452.

The innermost position of pedestal 68 is determined by a stop mechanism comprising a lead screw 84 journaled to the base 11 and extending from a suitable adjustment handle 85 through an aperture 86 in member 76 toward the center of turntable 14 directly below slot 73. Threaded upon screw 84 is a stop block 87 which extends upward into slot 73 and is thereby prevented from turning as handle 85 is manipulated. Rotation of handle 85, accordingly, translates the stop block 87 along lead screw 84, and the innermost position of pedestal 68 is determined by the point of contact between the opposing faces of stop block 87 and the member 76. A transverse index line (shown in Fig. 8) is formed on the top surface of stop block 87, which cooperates with a scale 88 extending along the edge of slot 73. Scale 88 is calibrated to indicate the distance "D" shown in Figures 9a and 9b between the punched register holes in a printing plate held on the turntable 14.

The innermost position of pedestal 69 is determined by a stop mechanism similar to that associated with pedestal 68 and corresponding elements are indicated by means of primed reference numerals.

When punch pedestal 68 is moved inwardly, a projection 91 extending inwardly from the base of the pedestal at the general level of the turntable 14 makes contact with the end of die slide 54 as shown in Fig. 6. Continued inward movement of the pedestal 68 simultaneously carries die slide 54 toward the center of the turntable 14. Whenever die slide 54 is in contact with projection 91, guide bushing 61 and die bushing 62 are directly beneath guide pin 92 and elongated punch tool 93, respectively. The handle 85 is so adjusted that when the member 76 projecting beneath pedestal 68 is brought to rest against the stop block 87, the die bushing 62 underlies the printing plate 94 while the guide bushing remains exposed. This condition is illustrated by Figure 7 where guide pin 92 is shown free to enter guide bushing 61 before punch 93 makes contact with plate 94, thus assuring exact alignment of punch and die. The punch may be provided with soft rubber hold-down and stripping attachments (not shown).

Punch 93 and guide pin 92 are mounted on a vertically movable carriage (not shown) within the head of pedestal 68. This carriage may conveniently be actuated by means of a rack engaging a pinion fixed on transverse shaft 95. A hand lever 96 is keyed to shaft 95 with the result that an upward movement of lever 96 forces guide pin 92 down into guide bushing 61, and punch 93 through plate 94 into associated bushing 62.

In order to adjust for various printing plate thicknesses, leveling means is provided for altering the level of turn-

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table 14 to place the top surface of printing plate 94 flush with the reference level determined by frames 24 and 25. The leveling means is shown in Fig. 2 to comprise a pair of concentric rings 101 and 102 having complementary sloping faces in engagement. The turntable 14 is supported by and rotatable relative to these rings. Top ring 101 is locked against rotation by means of key 103 engaging platform 12, while the lower ring 102 is provided on its lower edge with a gear segment 104 which is engaged by a pinion 105 actuated through shaft 106, bevel gears 107 and shaft 108 by means of a dial 109. Accordingly, upon rotating dial 109 upper ring 101 slides vertically up or down within platform 12. When the thickness of plate 94 is known, dial 109 may be turned to the appropriate index and thus place the top surface of plate 94 on a level with frames 24 and 25.

A register screen 112 (shown in Fig. 1), provided with accurate lengthwise and crosswise lines for squaring up and centralizing plate 94, is supported by a frame 111, which is hinged on its lower edge to the back of platform 12. Dogs 113 and 114, attached to the frame 111, engage slots 115 and 116 (shown in Fig. 5) when the register screen 112 is brought down upon the turntable 14 and thus insure accurate alignment of the register screen and the turntable. The frames 24 and 25 support register frame 111 with the registering lines in contact with plate 94. This prevents a parallax error which might otherwise arise if no leveling adjustment were provided for plates of different thicknesses.

In the operation of the present apparatus, the key plate is placed on turntable 14 and locked in approximate central position. If the plate thickness is accurately known, dial 109 is turned to the proper setting. If the thickness is not known, a straight edge is laid across frames 24 and 25 and dial 109 is adjusted until the top of the plate touches the straight edge. The register screen frame 111 is then lowered and by manipulating the knurled heads 21 of clamps 17 the key plate is squared with the mutually perpendicular lines on the register screen 112. The screen is thereupon raised and the key plate as well as the cross markers on studs 35 and 36 of frame 25 are inked. Next, the transparent sheet hanging on base 11 is stretched over the key plate and clamped to bearer bars 37 and 38. An impression is made on the transparent sheet of the plate and also of the markers. The transparent sheet is then removed and the plate is now ready for punching.

Handles 85 and 85' are adjusted to place stop blocks 87 and 87' at the proper distance D as shown in Fig. 9a. If the plate is to be punched at its top and bottom then the turntable 14 is rotated 90° by means of handle 16 and the distance D is adjusted as indicated in Fig. 9b. Control 83 is pushed and punches 66 and 67 move inwardly, stopping automatically in working position. Hand levers 96 and 96' are actuated to force the punch tools through the plate near opposite edges thereof. Control 83 is pushed again and punches 66 and 67 retract to their outermost positions. Clamps 17 are loosened and the now registered key plate is removed.

Color plates are registered in turn by placing the same on turntable 14 in approximate central position, locking in place and chalking up. The printed transparent register sheet 44 is clamped in place over the color plate. Adjustment screws 45 and 46 are turned to align the markers on studs 35 and 36 with their original imprint on sheet 44. This procedure insures that the sheet 44 is stretched to the same degree as when the original imprint was made. The image on the color plate is then aligned with the imprint on the register sheet 44 by manipulating clamps 17. The register sheet is then removed and the punches are operated in the same manner as in punching the key plate.

I claim:

1. In mechanism for registering and marking printing plates, a base, level-limiting means on said base for pre-

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determining a reference plane for registering purposes, plate-supporting means for adjustably holding a printing plate above said base, and leveling means for altering the level of said plate-supporting means to place the surface of said printing plate in the reference plane.

2. In mechanism for registering and marking printing plates, a base, a registering member, level-limiting means on said base for predetermining a reference plane for said registering member, plate-supporting means for adjustably holding a printing plate above said base in alignment with said registering member, and leveling means for altering the level of said plate-supporting means to place the surface of said printing plate in the same plane as said registering member.

3. Mechanism for registering printing plates of various thicknesses comprising, a base, a transparent register sheet adapted to receive a master imprint thereon, level-limiting means on said base for predetermining a reference plane for said register sheet, plate-supporting means for adjustably holding a printing plate above said base in register with said register sheet, and leveling means for altering the level of said plate-supporting means to align the surface of the printing plate with the imprinted surface of said register sheet.

4. Mechanism for registering printing plates comprising, a base, a frame having a transparent ruled register screen therein, plate-supporting means for holding a printing plate above said base, means hinging said frame to said base to permit said register screen to cover the plate, and leveling means for adjusting the height of said plate-supporting means relative to said base to place the surface of the plate next to the ruled surface of said register screen.

5. Mechanism for registering printing plates comprising, a base, a registering member, a turntable supported adjacent said base for adjustably holding a printing plate in alignment with said registering member, a pair of concentric rings having complementary sloping faces in engagement, said turntable being supported by and rotatable relative to said rings, and means for rotating said rings relative to each other, for altering the height of said turntable to adjust for different printing plate thicknesses.

6. Mechanism for registering printing plates comprising, a base, level-limiting means on said base for predetermining a reference plane for registering purposes, a turntable supported adjacent said base for adjustably holding a printing plate, a pair of concentric rings having complementary sloping faces in engagement, said turntable being supported by and rotatable relative to said rings, and means for rotating said rings relative to each other for aligning the surface of the printing plate with said reference plane.

7. Mechanism for registering printing plates comprising, a base, a registering member, level-limiting means on said base for predetermining a reference plane for said registering member, a turntable supported adjacent said base for adjustably holding a printing plate, a pair of concentric rings having complementary sloping faces in engagement, said turntable being supported by and rotatable relative to said rings, and means for rotating said rings relative to each other for aligning the surface of the printing plate with said reference plane.

8. Mechanism for punching printing plates of various sizes comprising, a base, plate-supporting means for holding a printing plate above said base, a punch mechanism reciprocable on said base to overhang the plate, a die member resiliently reciprocable on said plate-supporting means to underlie the plate, and means coordinating the reciprocal movement of said punch mechanism and said die member to insure alignment of the same including means integral with said punch mechanism for abutting said die member to control the reciprocal movement thereof.

9. Apparatus for registering and punching printing plates of various sizes and thicknesses comprising, a base, a registering member, level-limiting means for pre-

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determining a reference plane for said registering member, plate-supporting means for adjustably holding a printing plate above said base in alignment with said registering member, a punch mechanism movably mounted on said base to overhang the plate, a die movably mounted on said plate-supporting means to underlie the plate, means coordinating the movement of said punch mechanism and said die to insure alignment of the same, and leveling means for altering the level of said plate-supporting means to place the surface of the plate in said reference plane.

10. Mechanism for registering and punching printing plates comprising a base, level-limiting means on said base for predetermining a reference plane for registering purposes, plate-supporting means for adjustably holding a printing plate above said base, leveling means for altering the level of said plate-supporting means to place the surface of said printing plate in the reference plane, a die carried by said plate-supporting means, and a punch mounted on said base arranged to overhang the plate-supporting means.

11. Mechanism for registering and punching printing plates comprising, a base, level-limiting means on said base for predetermining a reference plane for registering purposes, a turntable supported adjacent said base for

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adjustably holding a printing plate, a pair of concentric rings having complementary sloping faces in engagement, said turntable being supported by and rotatable relative to said rings, means for rotating said rings relative to each other for aligning the surface of the printing plate with said reference plane, a die carried by said turntable, and a punch mounted on said base arranged to overhang the turntable.

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