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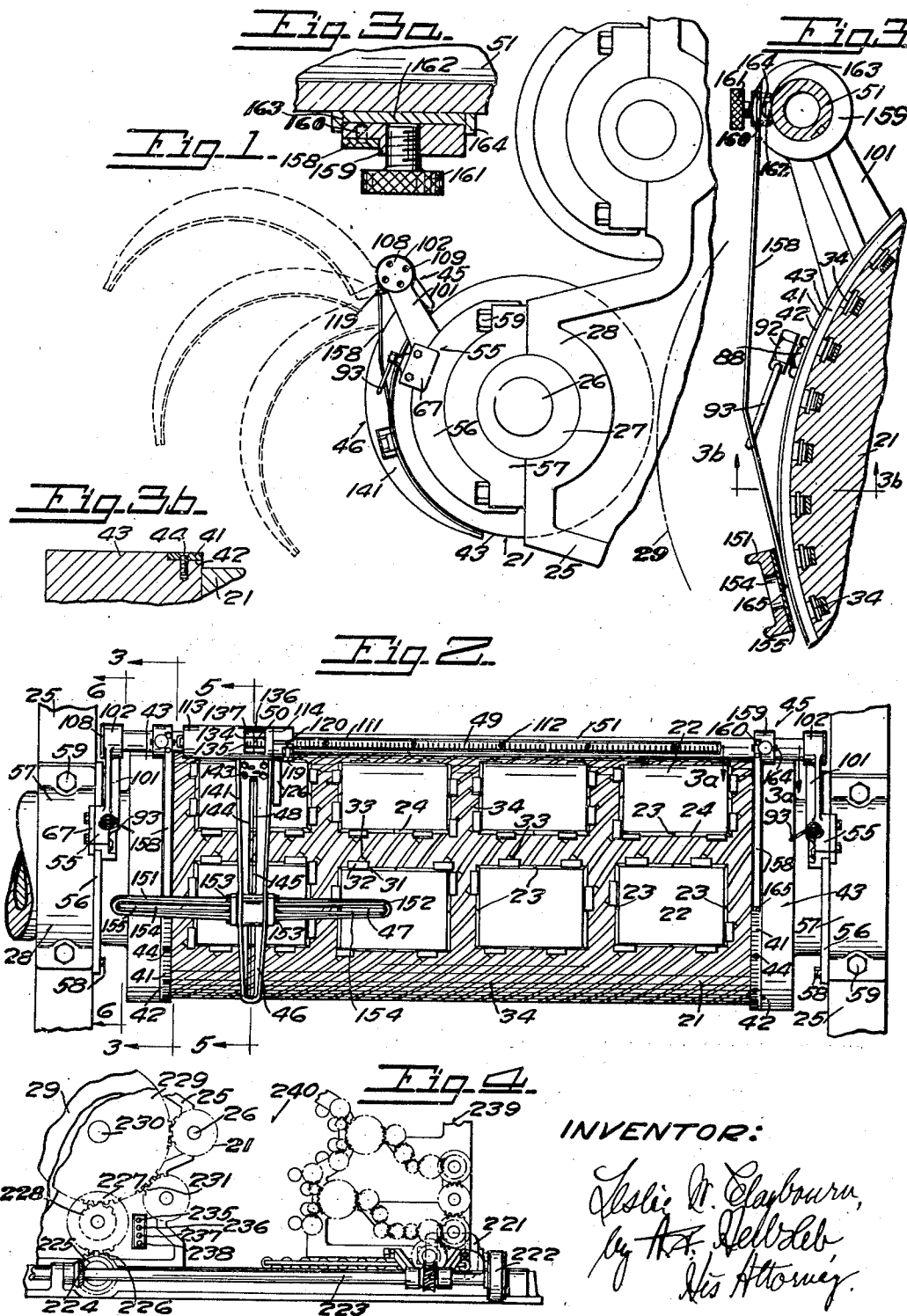
L. W. CLAYBOURN

2,104,553

MEANS FOR REGISTERING PRINTING PLATES

Filed April 22, 1935

3 Sheets-Sheet 1

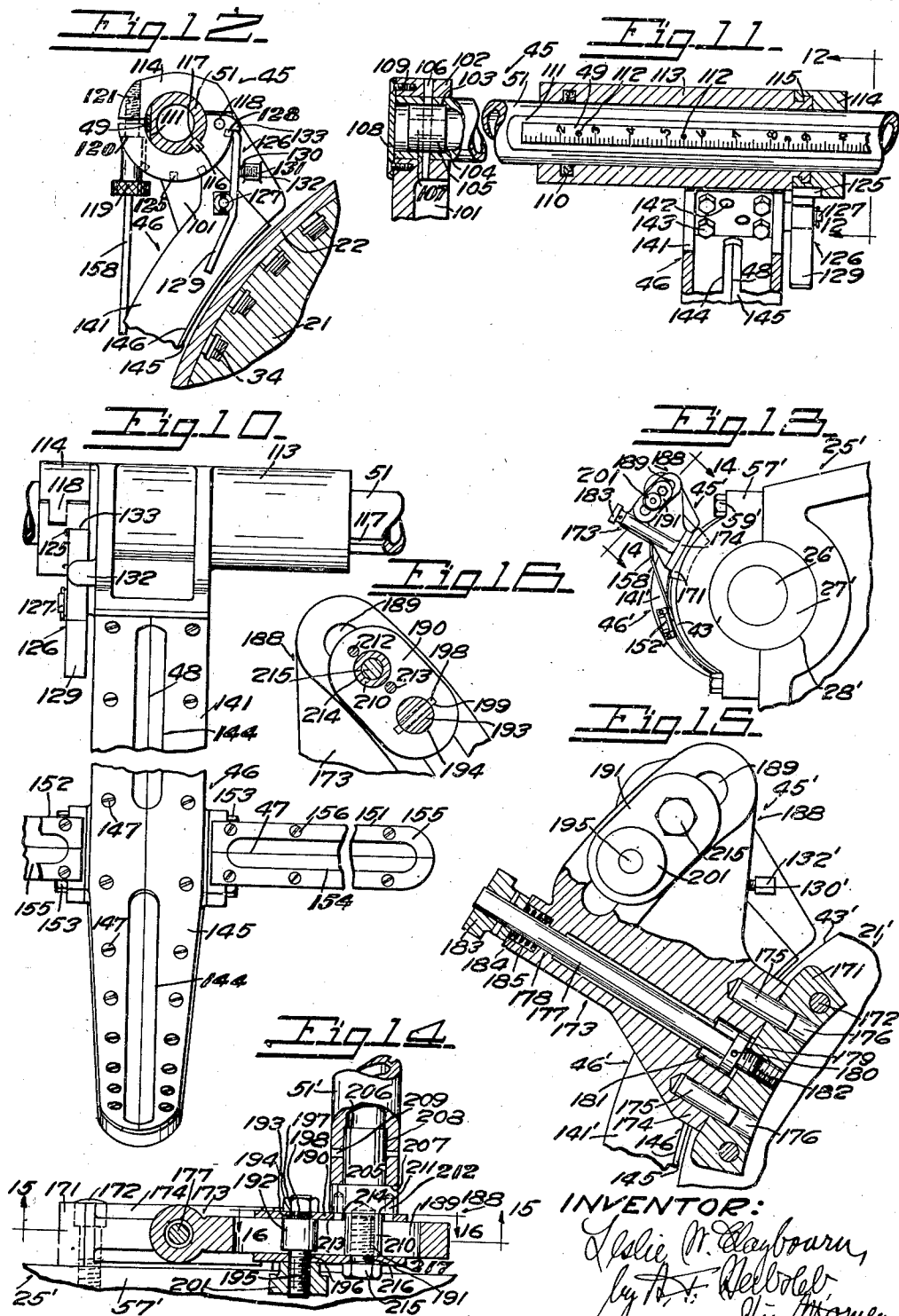


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Filed April 22, 1935

3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE

2,104,553

MEANS FOR REGISTERING PRINTING
PLATES

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Application April 22, 1935, Serial No. 17,673

21 Claims. (Cl. 33—184.5)

The term printing plate herein is to be understood as including printing plates for mounting on so-called bases, type high printing plates, and stones and other plates, sheets and blocks on which matter to be transferred by impression is located.

The present invention is exemplified in connection with curved printing plates less than type high, and the support for the printing plates is exemplified as a plate cylinder, although it is obvious that certain parts of the invention are also applicable to registering flat printing plates.

The present invention is an elaboration or carrying forward of the invention shown, described and claimed in my copending application on improvements in Means for registering printing plates, Serial No. 16,646 filed April 16, 1935, and exemplifies additional modifications of said invention.

It is the object of the present invention to provide novel means for determining the proper position of a printing plate on its support, further, to provide novel means for determining proper related positions of printing plates on their support, for instance, in making up a form of printing plates; further, to provide novel means whereby printing plates for successive printings are positioned relatively to each other so that the printing lines for printing different colors of a multi-color subject are properly related in the successive printings, for instance, on a multi-color printing press having a plurality of plate cylinders for printing successive colors; and, further, to provide novel means adapting my improved device as an attachment for a printing press whereby the printing plates may be properly positioned on the plate cylinder or cylinders.

The invention consists in novel means for attaining these objects and in novel parts and arrangements of parts for obtaining the results desired.

The invention consists further in providing novel means for supporting an indicator or indicators in manner for indicating the correct position of the printing plate or plates; further, in providing novel means for mounting an indicator frame; further, in providing novel means for positioning the indicator frame in operative position and in retracted position; further, in providing novel means for lateral movement of the indicator frame into co-relation with different portions of the plate support; further, in providing novel means whereby to register different portions of a plate support with the

indicating means; and, further, in providing novel means whereby to register the indicating means with relation to the plate support.

The invention consists, further, in mounting indicating means for plate positions on the frame of a printing press, means whereby to relate the plate position on the plate support of the printing press with the indicating means, and means whereby to relate the indicating means with the plate support; further, to provide novel means whereby to shiftably mount the indicator means on the frame of the printing press; further, to provide novel means for insuring parallelism between the indicating means and the axis of rotation of the plate cylinder; and further, to provide novel means whereby to releasably mount plate registering means on the frame of a printing press.

The invention is exemplified in connection with a plate cylinder of a rotary printing press, only so much of the printing press being shown as is necessary to illustrate the invention. Such plate cylinder may be a single plate cylinder of a printing press or one of a number of plate cylinders, for instance, of a multi-color printing machine. The printing machine is assumed to contain the usual parts, features and functions of a machine of this character.

The term cylinder includes any cylinder or sector of a cylinder capable of supporting a curved printing plate or plates being registered.

While the invention is exemplified as applied to a plate cylinder as a support for the printing plate or plates, it is, of course, obvious that certain parts of the invention are applicable to a flat printing plate or plates mounted on a flat support or bed of a printing press.

In the drawings:

Fig. 1 is an end elevation of my improved device, applied to a rotary printing press, partly broken away, the indicator frame being shown in operative position in full lines, and in retracted positions in dotted lines.

Fig. 2 is a front elevation of the same, partly broken away.

Fig. 3 is a vertical section of the same, taken on the line 3—3 of Fig. 2, and partly broken away.

Fig. 3a is a cross sectional detail view taken on the line 3a—3a of Fig. 2.

Fig. 3b is a cross sectional detail view taken on the line 3b—3b of Fig. 3.

Fig. 4 is a side elevation of a rotary printing press, showing the driving means for the cylinders, partly broken away.

Fig. 5 is a vertical section of my improved device, taken on the line 5—5 of Fig. 2, and partly broken away.

Fig. 5a is a front elevational detail view, partly broken away.

Fig. 6 is a vertical section of my improved device, taken on the line 6—6 of Fig. 2.

Fig. 7 is a cross sectional detail view, taken on the line 7—7 of Fig. 6, and showing clamping means of my improved device.

Fig. 8 is a cross section of the same, taken in the plane of the line 8—8 of Fig. 7.

Fig. 9 is a longitudinal section of a detail of the same, taken in the plane of the line 9—9 of Fig. 8.

Fig. 10 is an enlarged rear elevation of the indicator frame and its mounting, partly broken away.

Fig. 11 is a longitudinal section of the same, taken in the plane of the line 11—11 of Fig. 5.

Fig. 12 is a cross-section of the same, taken in the plane of the line 12—12 of Fig. 11.

Fig. 13 is an end elevation, partly broken away, showing a modification of the mounting means.

Fig. 14 is a cross-section of the same, taken on the line 14—14 of Fig. 13.

Fig. 15 is a section of the same, taken in the plane of the line 15—15 of Fig. 14; and,

Fig. 16 is a cross-sectional detail view of the same, taken in the plane of the line 16—16 of Fig. 14.

A support 21 is exemplified as a cylindrical support for the printing plate 22, which is shown as a curved printing plate. (Figs. 2 and 5.) The printing plate is shown rectangular and is provided with suitable register marks 23, which may be notches or incisions made on the beveled edges 24 of the printing plate, as exemplified in Letters Patent No. 1,839,886, granted to me January 5, 1932, for Means for registering printing plates, although the register marks may be of any suitable character.

The register marks on opposite edges are in spaced apart relation, the register marks on edges at angles to each other being respectively in lines at right angles to each other on the center lines of the key plate, and on the center lines of the printing portions of other printing plates. The printing plates may be of different sizes and of different shapes, but the register marks are coincidentally placed on all the printing plates gauged by their printing lines, so that printing portions of a plurality of multi-color printing plates for color printing of a given subject may be registered in co-related positions.

The support may be the usual plate cylinder of a printing press, a portion of the frame of the printing press being shown at 25. (Figs. 1, 2 and 4.) The plate cylinder is provided with end trunnions 26, journaled eccentrically in bushings 27, rockable in usual bearings 28 of the frame. The bushings are rockable by any suitable or usual means for placing the plate cylinder in on-impression or in off-impression relation to a usual impression cylinder 29 of the printing press. The plate cylinder coacts with the impression cylinder, to form a printing couple, as exemplified in Figs. 1 and 4. There may be a number of such plate cylinders about the impression cylinder, as, for example, in a multi-color rotary printing machine, and a number of the printing plates may be registered and secured in registered positions to each cylinder.

The printing plate is arranged to be adjusted and secured in adjusted position to the plate

cylinder by suitable so-called register hooks 31, (Figs. 2 and 5), respectively provided with a pivoted hook member 32 pivoted to a body 33 arranged to be adjusted and held lengthwise in undercut or dove-tailed grooves 34 in the support, all as more fully shown and described in Letters Patent No. 1,486,323, granted me March 11, 1924, for Printing plate securing means. The hook member is provided with an undercut beveled face arranged to impinge the beveled edge of the printing plate, the printing plate being shifted and secured firmly to its support by register hooks coacting with the respective bevel edges of the same.

The cylinder is provided with a scale 41 about its circumference concentric with its axis. (Figs. 2, 3, 3b, 5 and 5a.) This scale in practice has very finely divided graduations for delicacy of adjustment. There are preferably two of these scales respectively at the ends of the cylinder. They are shown on bands, for instance, of steel, which are let into rabbets 42 at the inner ends of the usual bearers 43 at the respective ends of the cylinder. Graduations of the respective scales are accurately placed with relation to each other so that similar marks denoting equal values are coincidentally in the same radial plane of the cylinder when the scale bands are secured to the cylinder, as by screws 44.

A cross frame 45 extends lengthwise of the cylinder and supports an indicator frame 46, which is provided with a linear indicator 47 extending lengthwise of the cylinder and with a linear indicator 48 extending about the cylinder. The cross frame is provided with a scale 49, and the indicator frame is provided with a linear indicator 50 in line with the linear indicator 48. The scale 49, similarly to the scale 41, has very finely divided graduations for delicacy of adjustment. The indicator-frame is preferably arcuate about the cylinder, and is preferably concentric with the cylinder when the latter is in off-impression relation, which is preferably the position of the plate cylinder when the printing plates are being registered thereon.

Adjustment is provided between the cylinder and the linear indicator extending lengthwise of the cylinder. By mounting the indicator frame on the machine frame, this adjustment may be obtained by rotation of the cylinder. Adjustment is also obtained between the linear indicator 47 and the scales on the cylinder by adjustment of the cross member 51 of the cross frame on which the indicator frame is mounted about the cylinder, so as to shift the indicator frame about the cylinder into registry with given values on the scales thereon, and such adjustment is preferably obtained at each end of the cross member, so that the linear indicator 47 extending lengthwise of the cylinder or crosswise of the machine, may be adjusted into true parallelism with the axis of the cylinder.

In the preferred form of the device herein exemplified in Figs. 1 to 12 inclusive, the cross frame comprises a head 55 at each of its ends, arranged to be stationarily secured to the frame of the printing press. (Figs. 1, 2 and 6.)

Each of the bearings about the trunnions of the plate cylinder is provided with an arcuate guide 56. (Figs. 1, 2 and 6.) This arcuate guide is shown as a plate rigidly secured to the inner end face of the cap 57 of the bearing by bolts 58, this cap being fixed rigidly to the solid part of the bearing by bolts 59. The arcuate guide has a guiding face for the head which is concentric

with the axis of rotation of the plate cylinder, preferably when the latter is in off-impression position, although such arcuate guide is substantially concentric with said axis of rotation during all adjustments of the plate cylinder, as the range of such adjustments is small.

It will be understood that there is one of these guides and one of the heads at each end of the plate cylinder, the parts being reverse but being otherwise duplicates and being designated by the same reference numerals. One of the bolts 58 is shown countersunk within the guiding face of the arcuate guide in order to extend the range of adjustment of the head thereon. The frame may be provided with such guides at each of the plate cylinders, which may remain in place, as they are in such positions as not to interfere with the operation of the printing press.

Each of the arcuate guides comprises parallel inner and outer side guide faces 61, 62, an outer arcuate guide face 63 and an inner guide face 64. (Fig. 7.) The body of the head 55 comprises an inner side guide face 65 and an outer arcuate guide face 66. A plate 67 has an inner guide face 68 and is fixed to the body of the head by bolts 69.

A clamping shoe 71 has a clamping face 72 which coacts within the arcuate guide face 64. (Figs. 6, 7, 8 and 9.) The outer end of this clamping shoe is received in an undercut inner rabbet 73, having the inner arcuate guide face 64 as one of the walls thereof. This shoe is arranged to be moved into and out of said rabbet for facility in removing and replacing the head, and toward and from its coacting clamping face for clamping and unclamping the head to the guide. The shoe is shiftable between lugs 74, depending from the body of the head, and is held in release position by yieldable positioning parts, shown as balls 75 located in hollow bolts 76 threaded in the head, the balls being spring-pressed by springs 77 in the bolts into positioning holes 78 in the shoe.

A rockable stem 81 (Figs. 6, 7, 8 and 9), is rotatable in bearings 82, 83 of the body of the head. It is provided with an eccentric 84 in a slot 85 in the shoe for moving the shoe into and out of its rabbet 73, and is provided with a flange 86 located under the shoe. The other end of the rockable stem is threaded, as at 87. It has a nut 88 thereabout, which is endwise positioned, as by having an annular groove 89 in which the inner end of a screw 90 threaded in a bearing 91 is received. The upper end of the stem has a nut 92 threaded thereover, a handle 93 being located in holes in said nut and in said stem for rotating said stem and thereby rotating the eccentric thereon and shifting the shoe. Rotation of the nut 88 moves the stem axially for clamping and unclamping the shoe.

In placing the head on its guide, the handle 93 is rotated for moving the shoe out of the plane of the guide-face 65, whereupon the opposing guide-faces 65 and 68 of the head, which together form a groove, may be slipped upon and along the guide-faces 61, 62 of the arcuate guide, which thereby forms a tongue received in the groove, and the arcuate guide-face 66 on the head may be caused to coact with the arcuate guide-face 63 on the guide. The handle 93 is then turned for shifting the shoe into the rabbet 73, and the nut 88 is rotated for clamping the shoe upon the guide-face 64 for clamping the head to the arcuate guide. This clamping may be accomplished at any position of the head along the arcuate guide.

The head 55 (Figs. 1, 2, 6 and 11) is provided

with a bracket 101, which has a bearing 102. The cross member 51, which is shown as a tube, extends between and is secured in said bearings. Each end of the tube is provided with an enlarged bore 103 to form an annular internal shoulder 104. A plug 105 is received in said enlarged bore against said shoulder, and a pin 106 is received through registering holes in the bearing 102 and the walls of said bore and in said plug for rotatively locating said tube with relation to said bearing and instanced as rigidly securing the parts together. One of said plugs may be provided with a hole 107 for ease in assembling the parts. A cap plate 108, secured to the bearing by screws 109, closes the outer end of each bearing.

The outer circumference of the cross member lengthwise of the cross member is provided with a flattened face 111, to which the scale 49 is secured as by means of screws 112. (Figs. 2, 5 and 11.)

The indicator frame 46 is shiftable mounted on the cross member. (Figs. 1, 2, 5, 11 and 12.) It is provided with a bearing 113, which is shiftable lengthwise of the cross member, and is shown rotatable thereon. An additional bearing 114 has annular tongue and groove connection 115 with the bearing 113, and is shiftable therewith lengthwise of the cross member, and is arranged to be fixed to the cross member at suitable positions therealong. The bearing 114 is provided with a spline 116 which slides along a groove 117 in the cross member for preventing rotation of this bearing on the cross member. The inner face of the bearing 113 may be provided with an inner annular wiper 110.

The bearing 114 is shown as comprising two segments hinged together by a hinge 118 and arranged to be clamped about the cross member by a clamp screw 119 having a shoulder 120 on one of said segments and threaded as at 121 into the other of said segments.

The clamp bearing is provided with notches 125. (Figs. 10, 11 and 12.)

A latch 126 is pivoted at 127 to the indicator frame and has a tooth 128 releasably received in any of the notches. It is operated by handle 129. A spring 130 in a hole 131 in a lug 132 on the indicator frame bears upon the latch for normally pressing the tooth 128 into the notches 125. The latch positions the indicator frame in operative position close to the supporting face of the support for the printing plate when registering the printing plate, and in spaced relation in different positions away from said supporting face for convenience in insertion and removal of printing plates between the indicator frame and the supporting surface and for observation. The end of the latch is arranged to engage a shoulder 133 on the bearing 114 for limiting movement of the indicator frame toward the plate supporting surface to avoid damage to printing plates.

There is preferably just sufficient space between the inner surface of the indicator frame and the supporting surface for the printing plate when the indicator frame is in operative or normal position to allow adjustable shifting of the printing plate on its supporting surface for registry of the spaced apart register marks on the printing plate with the linear indicators on the indicator frame.

The printing plates may also be slipped under the indicator frame when the latter is in normal position, but it is preferred to raise the indicator frame when initially placing the printing plates, although the printing plates may be initially

placed in approximate positions on the plate cylinder before attempting to register the same.

The bearing 113 is provided with a slot 134 through which the scale 49 may be viewed. Figs. 2 and 5.) The indicator 50 extends along this slot across this scale and may be placed in registry with any of the values on the scale 49 by movement of the indicator frame lengthwise of this scale. The indicator 50 is shown as a locating line on a transparent sheet 135, this line being exemplified as a scribe line on the sheet close to the scale 49. The sheet may be a sheet of suitable preferably non-frangible flexible transparent substance, for instance, so-called pyralin, which can be made very thin and the scribed line placed in close adjacency to said scale. This sheet is secured to the end faces 136 of the walls of the slot 134 by screws 137.

The indicator frame 46 (Figs. 1, 2, 5 and 10) comprises an arm 141 which extends about the cylinder and is shown of arcuate form so that all portions thereof may be arranged close to the printing face of printing plate on the plate cylinder. For convenience, the arm may be separate from its bearing 113 and be secured in relation thereto by locating pins 142 and bolts 143. (Figs. 5 and 11.) The arm is provided with viewing slots 144, through which the registering marks on the printing plate may be observed. The linear indicator 48 is in line with said slots and in line with the linear indicator 50.

The linear indicator 48 may be a scribed line on a sheet 145 of suitable preferably non-frangible flexible transparent substance, similar to the transparent sheet 135, and secured to the arcuate face 146 on the under side of the arm 141, as by screws 147.

The indicator frame comprises laterally projecting arms 151, 152, which may be arms formed separate from the arm 141 and fixed in rigid position thereon by bolts 153. These laterally projecting arms (Figs. 1, 3, 5 and 10) are provided with viewing slots 154 in which sections of the linear indicator 47 are located. These sections of the linear indicator may also be scribe lines on similar suitable preferably non-frangible flexible transparent sheets 155, secured to the inner faces of said laterally projecting arms by screws 156. These scribe lines are in line with each other at right angles to the scribe lines 48, 50, and are arranged to register with similar value marks on the scales 41 about the axis of the cylinder.

For convenience in obtaining registry between the cylinder and the linear indicator extending lengthwise of the cylinder, and for insurance of registry between said linear indicator and the scales about the cylinder regardless of the lateral position of the indicator frame lengthwise of the cylinder, a separate register bar 158 is provided, for registering the rotative relation of the cylinder and the indicating means. (Figs. 1, 2, 3, 3a and 5a.)

The register bar is fixed to a collar 159, as by screws 160, fixing the bar to a flat face on the collar, and the collar is shiftable lengthwise of the cross member, and is arranged to be clamped in adjusted positions by means of a clamp screw 161 threaded in the collar and acted upon by a shoe 162 located in a slot 163 in the collar and bearing upon the cross member. The shoe moves with the collar, as by being provided with end lugs 164 bearing upon the respective ends of the collar.

The register bar is provided with a register mark 165, or pointer, shown as the beveled end

of the bar, which is arranged to register with values on the scale about the cylinder. There is preferably one of these register bars at each end of the cylinder so as to insure that the positioning of each end of the cross member is correct, so that the cross member is accurately parallel with the axis of rotation of the cylinder.

The register bar is shiftable lengthwise of the cylinder and its register mark or pointer registers the same radial plane of the cylinder regardless of its position lengthwise of the cylinder. The register mark registers the correct position of the linear indicator 47 regardless of the position of the indicator frame lengthwise of the cross member, and regardless of the position lengthwise of the cylinder at which a printing plate is being registered. The cross frame is shiftable for registering a printing plate in any position lengthwise of the cylinder. It may also be shifted to an extreme position at either end of the cylinder, in which position its linear indicator 47 is directly in registry with one or the other of the scales at the respective ends of the cylinder.

In the modification shown in Figs. 13 to 16 inclusive, similar parts are designated by similar but primed reference numerals. This modification exemplifies a somewhat different means for mounting the cross member.

In this modification a securing pad 171 is secured to the inner face of the cap 57' of the bearing 28' at each end of the cylinder, as by means of screws 172. Such securing pads may be provided for each of the plate cylinders of the printing press and may remain permanently in place.

A bracket 173 (Figs. 13, 14 and 15) is secured to each of the pads, the brackets and parts thereon at the respective ends of the cylinder being oppositely formed, the parts being, however, designated by similar reference numerals.

The bracket has a foot 174 which rests upon the pad, the faces between the foot and the pad being accurately finished to accurately locate the bracket on the pad. The foot is provided with positioning pins 175, received in positioning holes 176 in the pad. A bolt 177 is journaled in a bearing 178 in the bracket and has a collar 179 fixed thereto by pin 180, the collar reciprocating in and having bearing in a hole 181 in the bracket. The lower end of the bolt is threaded and has threaded connection 182 with the pad for clamping the bracket to the pad.

The bolt 177 has a knob 183 fixed thereto. A helical spring 184 is located in a hole 185 in the outer end of the bracket, between the bottom of said hole and said knob, for normally urging the bolt outwardly so as to withdraw its screw end into the hole 181 when releasing the bracket.

The bracket has a wing 188 (Figs. 13, 14, 15 and 16) provided with an arcuate slot 189 concentric with the axis of the plate cylinder, preferably when in off-impression position. Locating plates 190, 191, are at the respective sides of the wing, slide faces being between said plates and said wing.

A stud 192 has a middle portion which fits accurately against opposite walls of the slot, a threaded end 193 which extends through a hole 194 in the plate 190, and a threaded end 195 which extends through a hole 196 in the plate 191.

A clamp nut 197 is threaded over the threaded end 193 for clamping the plate 190 to said stud. The stud is provided with a pin 198, the ends of which are received in notches 199 in the plate

190 for preventing turning of the stud. A nut 201 is threaded over the threaded end 195 for clamping the plates, the wing and the nuts together, the middle portion of the stud being slightly shorter than the depth of the slot.

Each end of the cross member 51' is provided with a plug 205 having a reduced inner end 206 forming an annular shoulder 207, and the end of the cross tube is provided with an enlarged bore 208 concentric with the tube in which the reduced inner end of the plug is positioned with the shoulder 207 abutting the end of the tube. The plug is fixed in the tube by means of a pin 209.

The outer end of the plug is provided with a reduced shank 210 of a diameter to fit accurately between the walls of the arcuate slot 189, forming an annular shoulder 211 provided with locating pins 212. The locating pins are received in locating holes 213 in the plate 190, and this plate is provided with a hole 214 in which the reduced outer shank of the stub fits.

A bolt 215 is located in a hole 216 in the plate 191 and is threaded in a threaded end hole 217 in the plug for clamping the plate 191 to the outer end of the plug. The reduced outer end of the plug is of just sufficient length to provide a sliding fit between the plates 190, 191, and the wing 188 when the bolt 215 is in clamping position. This permits the respective ends of the cross member to be adjustably positioned on the brackets when the clamp nut 201 is released, this clamp nut being clamped when the parts have been adjusted to definitely position the cross member in parallelism with the axis of the cylinder.

This enables the respective ends of the cross member to be definitely located with relation to each other, and also enables the cross member with the parts thereon, including the indicating means to be shifted bodily about the axis of the cylinder for accurate relation between the linear indicator 47 extending lengthwise of the cylinder and the scales at the respective ends of the cylinder, and for accurate relation between the register bars 158 and the scales at the respective ends of the cylinder.

In operating this improvement to register the printing plates of a form on a printing cylinder of a rotary printing press, the printing plates are registered according to dimensions given on a lay-out sheet, on which the desired positions of the register marks of the various printing plates are denoted at given distances from the zero points of the respective scales.

The zero points of the scales 41 about the cylinder are preferably in a line close to but free of the outer extremities of the sheet gripping ends of the grippers on the impression cylinder when at closest approach to the plate cylinder in their revolutions. This line is known as the dead line in the printing parlance. In the present improvement the distances for the respective printing plates about the cylinder are marked on the lay-out sheet as distances of the register marks thereon from said dead line.

The zero point for the scale 49 is at the outside edge of the scale band 41, at the feed end or operator's end of the plate cylinder, although the notations on this scale begin at "2" (Fig. 11), as this is one of the lowest values employed in the exemplifying machine. The desired positions of the printing plates arranged lengthwise of the cylinder are marked on the lay-out sheet as distances of their register marks from such

zero point corresponding with graduations on the scale 49.

The scales may be in inches or other kinds of linear measurement. They are represented in inches, and in practice have very small subdivisions for accuracy in adjusting the positions of the printing plates.

The plate cylinder 21 is rotatable for registry of any value on its scales 41 with the register marks or pointers 165 or with the linear indicator 47 as by means of an electric motor 221, (Fig. 4), which may be a reversible electric motor for rotating the cylinder in opposite directions for accuracy of such registry. This electric motor may be the usual driving motor for the printing press.

The electric motor has drive connection 222 with a shaft 223, which has a bevel pinion 224 rotating therewith, and which meshes with a bevel gear 225 on a cross shaft journaled in the machine frame. A spur pinion 226 rotates with the bevel gear and meshes with a spur gear 227 on a cross shaft journaled in the machine frame. A spur pinion 228 rotates with the spur gear 227, and meshes with a spur gear 229 fixed to the axis of the trunnion 230 of the impression cylinder 29 of the printing press.

Each of the plate cylinders has a spur gear 231 fixed to its trunnion 26, the gears 231 meshing with the gear 229, for rotating the impression cylinder and the plate cylinders at equal surface speeds.

The electric motor is electrically controlled by suitable electric switches having usual push buttons, as a push button 235 for forward rotation of the cylinders, a push button 236 for reverse rotation of the cylinders, an inching push button 237 for rotation of the cylinders only during manual pushing of the button for short steps of rotation of the cylinders, and a stop push button 238, for cessation of rotations of the cylinders.

An inker frame 239 having the inking rollers for the plate cylinders thereon, is shown in retracted position, leaving a space 240 for the operator between it and the cylinders of the printing press, the operator manipulating the registering means of the present exemplification while in this space.

In the preferred embodiment of the invention exemplified in Figs. 1 to 12 inclusive, the arcuate guides may remain secured to the bearings at the respective ends of the various plate cylinders, as they do not interfere with the ordinary operation of the printing press. The cross frame, preferably in assembled form, is placed across the plate cylinder on which for the moment it is desired to register printing plates.

The shoes 71 are in withdrawn relation within the bodies of the respective heads, into which relations they have been placed by release of the device from the printing press when last registering printing plates thereon. The grooves between the faces 65 and 68 on the respective heads are placed over the arcuate guides, and each of the heads is preliminarily secured to its arcuate guide by rotating the handle 93 for placing the clamping end of the shoe within the rabbet 73, and rotating the nut 92 for clamping the shoe to the guide.

The plate cylinder is then rotated, as by means of the usual inching button 237 for rotary movement of the plate cylinder so as to place a sector of the cylinder which is to receive a row of the printing plates in approxi-

mate registry with the position of the linear indicator 47.

Before firmly clamping the shoes in place, the heads of the respective ends of the cylinder are manually shifted along their arcuate guides for placing the linear indicator 47, or the register marks or pointers of the register bars 158, or both, in registry with given values of the respective scales about the cylinder, so as to insure parallelism of the linear indicator 47 with the axis of rotation of the cylinder.

Accurate adjustment between the register marks or pointers of the register bars, or the linear indicator 47 on the indicator frame, with given values of the scales 41 about the cylinder noted on the lay-out sheet, may be obtained by rotation of the plate cylinder by manipulation of the usual control buttons of the printing press, as the forward button 235, the inching button 237, the reverse button 236, and the stop button 238, for corresponding functions of the electric motor 221 for the desired durations. Such adjustment may also be obtained by shifting the cross member 51 about the axis of the cylinder. For convenience the former may be employed for proximate adjustment, and the latter for more delicate adjustment.

The registry between said linear indicator 47 or the marks or pointers of the register bars with the desired value of the scales about the cylinder designated on the lay-out sheet may be obtained by either or both of said adjustments. When accurate adjustment has been obtained, the cylinder is allowed to be at rest during registering and clamping of the printing plates, and the heads are securely clamped to the arcuate guides.

The row of plates on the sector of the plate cylinder thus brought under the indicator frame is registered during this adjusted relation of the parts, the indicator frame being moved along the cylinder to positions of the respective plates in the row determined by registry of the linear indicator 50 with the given values on the scale 49 designated on the lay-out sheet.

In registering the printing plate it is shifted on the cylinder, as by means of the register hooks, so as to register its register marks 23 accurately with the crossing linear indicators 47 and 48, whereupon the printing plate is clamped in such position by means of the register hooks.

After a given row of plates lengthwise of the cylinder has been registered, the cylinder is again rotated for bringing the next desired sector of the cylinder into the field of the indicator frame, and the parts again accurately adjusted according to the next value designated on the lay-out sheet, whereupon the registry of the next row of printing plates may proceed, subsequent rows of printing plates being similarly registered.

The printing plates may be placed on their supports and may be proximately registered while the indicator frame is in raised position, the indicator frame being placed in operative position for accurate registry of the printing plates. During the latter position of the indicator frame, the transparent sheets thereon are close to the register marks on the printing plate, and the linear indicators and the register marks on the printing plates are viewed through the openings or windows in the arms of the indicator frame. The printing plates are adjusted under the indicator frame while the latter is in operative position.

Upon registry of all the printing plates on the cylinder the cross frame is removed by releasing

clamping action on the shoes 71 and turning the handles 93 for placing the shoes out of range of the arcuate slides, whereupon the registry device is readily removed from the printing press.

When employing the modified form exemplified in Figs. 13 to 16 inclusive, the respective bearings of the respective plate cylinders may be provided with the pads 171, which may be left in position for successive registries. The cross frame is positioned across the cylinder on which the printing plates are to be registered, the locating pins 175 being placed in the locating holes 176 and the clamp bolts 177 being clamped for clamping the brackets to the frame of the machine.

The cylinder is rotated as hereinbefore described for bringing the value of the scales about the cylinder designated on the lay-out sheet into registry with the markers or pointers of the register bars, or with the linear indicator 47 on the indicator frame.

If desired, this adjustment may be made for an approximation of registry and a more delicate registry may be obtained by releasing the clamp nuts 201 so as to permit shifting of the cross member on the brackets at its respective ends, the clamp bolts 215 being clamped sufficiently to obtain accuracy of sliding movement between the plates 190, 191 and the wings 188, so that manipulation of the knurled nuts 201 only is necessary for clamping and unclamping the cross member with relation to the brackets.

The respective ends of the cross member may be independently adjusted for obtaining accurate parallelism between it, or the linear indicator 47 thereon, with the axis of rotation of the cylinder, or such cross member may be shifted bodily with the parts mounted thereon along the arcuate slots 189 for registering of the pointers or marks on the register bars with the scales 41 about the cylinder.

I claim:

1. In means for registering a printing plate on a printing plate supporting surface of a printing press, the combination of a cross bar, releasable attaching means for releasably attaching the respective ends of said cross bar to the frame of the printing press so that said cross bar extends cross-wise of said supporting surface, an indicator frame pivoted bodily about the axis of said cross bar so as to overhang said supporting surface bracketwise and arranged to be oscillated bodily on its pivot toward and from said supporting surface, said indicator frame provided with an indicator for registering the printing plate, and a stop at said cross bar acting at the pivotal end of said indicator frame to stop pivotal movement of said indicator frame toward said supporting surface whereby to position said indicator frame in operative position spaced substantially the thickness of the printing plate from said printing plate supporting surface and thereby placing the indicator on said indicator frame in indicating relation with said printing plate.

2. In means for registering a printing plate on a printing plate supporting surface of a printing press, the combination of a cross bar, releasable attaching means for releasably attaching the respective ends of said cross bar to the frame of the printing press so that said cross bar extends crosswise of said supporting surface, an indicator frame pivoted about the axis of said cross bar and arranged to be oscillated on its pivot toward and from said supporting surface, said indicator frame provided with an indicator for registering the printing plate, and a plurality

of stops at said cross bar acting at the pivotal end of said indicator frame for stopping said indicator frame at a plurality of positions toward said supporting surface, one of said positions being a position of said indicator frame spaced substantially from said supporting surface for hand manipulation under said indicator frame and another of said positions being the operative position of said indicator frame spaced substantially the thickness of the printing plate from said printing plate supporting surface to place the indicator on said indicator frame in indicating relation with said printing plate.

3. In means for registering a printing plate on a movable printing plate supporting surface of a printing press having a scale at each side thereof moving therewith, the combination of a cross bar, releasable attaching means releasably attaching the respective ends of said cross bar to the frame of the printing press so that said cross bar extends crosswise of said supporting surface, register bars extending from the respective ends of said cross bar, means for adjustment of the respective ends of said cross bar for registry of said respective register bars with said respective scales, an indicator frame pivoted bodily bracketwise about the axis of said cross bar and arranged to be swung bodily on its pivot toward and from said supporting surface, said indicator frame provided with an indicator for registering the printing plate, and a stop at said cross bar acting at the pivotal end of said indicator frame to stop pivotal movement of said indicator frame toward said supporting surface whereby to position said indicator frame in operative position spaced substantially the thickness of the printing plate from said printing plate supporting surface and thereby placing the indicator on said indicator frame in indicating relation with said printing plate.

4. In means for registering a printing plate on the printing plate supporting surface of a plate cylinder journaled in the frame of a printing press, the combination of a bracket at each end of said cylinder, releasable attaching means for releasably attaching said brackets to said frame at the respective ends of said cylinder, a cross bar extending crosswise of said cylinder spaced from the printing plate supporting surface of said cylinder and having attachment at its respective ends with said respective brackets, an indicator frame provided with an indicator pivoted bodily bracketwise on the axis of said cross bar and slidable bodily on said cross bar lengthwise of said cross bar, and a stop at said cross bar for said indicator frame to position said indicator frame at its pivotal end with its indicator in indicating relation with said printing plate on said supporting surface.

5. In means for registering a printing plate on the printing plate supporting surface of a plate cylinder journaled in the frame of a printing press, the combination of a bracket at each end of said cylinder, releasable attaching means for releasably attaching said brackets to said frame at the respective ends of said cylinder, a cross bar extending lengthwise of said cylinder, attaching means between its respective ends and said respective brackets, said attaching means including adjusting means to relatively adjust the respective ends of said cross bar for parallelism of said cross bar with the axis of rotation of said cylinder, and an indicator frame provided with an indicator pivoted bodily bracketwise on the axis of said cross bar and slidable bodily on

said cross bar lengthwise of said cross bar for indicating relation with a printing plate on said supporting surface.

6. In means for registering a printing plate on the printing plate supporting surface of a plate cylinder journaled in the frame of a printing press, the combination of an arcuate guide on said frame at each end of said cylinder; each of said arcuate guides having end guide faces and opposed guide faces comprising inner and outer arcuate guide faces, a slide for each of said arcuate guides having end guide faces and a coacting guide face at substantial right angles thereto coacting respectively with said first-named end guide faces and one of said opposed guide faces, a rotatable stem journaled on said slide, a keeper with which said stem has operative connection to move said keeper selectively into position to coact with the other of said opposed guide faces and out of range with all said first-named guide faces, and clamping means for axial movement of said stem whereby to clamp said arcuate guides between said first-named coacting guide face and said keeper.

7. In means for registering a printing plate on a printing plate supporting surface, the combination of a cross bar extending crosswise of said supporting surface, means for rotatively limiting said cross bar with relation to said supporting surface, a collar and an indicator frame slidable on said cross bar lengthwise of said cross bar, said indicator frame pivoted about the axis of said cross bar so that its oscillating end is movable toward and from said supporting surface, means to limit pivotal movement between said collar and said cross bar, and a stop between said indicator frame and said collar to position said indicator frame in indicating relation with a printing plate on said supporting surface.

8. In means for registering a printing plate on a printing plate supporting surface, the combination of a cross bar extending crosswise of said supporting surface, means for rotatively limiting said cross bar with relation to said supporting surface, a collar and an indicator frame slidable on said cross bar lengthwise of said cross bar, said indicator frame pivoted about the axis of said cross bar so that its oscillating end is movable toward and from said supporting surface, means to limit pivotal movement between said collar and said cross bar, and stops between said indicator frame and said collar to position said oscillating end of said indicator frame respectively distanced from said supporting surface and in indicating relation with a printing plate on said supporting surface.

9. In means for registering a printing plate on a printing plate supporting surface, the combination of a cross bar extending crosswise of said supporting surface, means for rotatively limiting said cross bar with relation to said supporting surface, a collar and an indicator frame slidable on said cross bar lengthwise of said cross bar, said indicator frame pivoted about the axis of said cross bar so that its oscillating end is movable toward and from said supporting surface, means to limit pivotal movement between said collar and said cross bar, and latching means between said indicator frame and said collar to position said indicator frame in a plurality of angular relations to said supporting surface.

10. In means for registering a printing plate on a printing plate supporting surface, the combination of a cross bar extending crosswise of said supporting surface, means for rotatively posi-

tioning said cross bar, a registering scale extending lengthwise of said cross bar, an indicator frame provided with a hub about said cross bar slidable lengthwise of said cross bar, said indicator frame pivoted about the axis of said cross bar so as to oscillate said indicator frame substantially perpendicularly to the plane of said supporting surface, and means for rotatively positioning said indicator frame on said cross-bar so as to support said indicator frame in registering relation to said supporting surface, said last-named means located solely at the pivotal end of said indicator frame, and said indicator frame provided with an indicator for a printing plate on said supporting surface and an indicator related thereto on said hub arranged to register with said scale.

11. In means for registering a printing plate on a printing plate supporting surface, the combination of a cross bar extending crosswise of said supporting surface, means for rotatively positioning said cross bar, a registering scale extending lengthwise on said cross bar, a registering scale at substantial right angles thereto along said supporting surface, an indicator frame provided with a hub about said cross bar slidable lengthwise of said cross bar so as to move said indicator frame crosswise of said supporting surface, said indicator frame pivoted about the axis of said cross bar so as to oscillate said indicator frame substantially perpendicularly to the plane of said supporting surface, and means between said hub and said cross-bar solely at the pivotal end of said indicator frame rotatively positioning said indicator frame at registering distance from said supporting surface, and said indicator frame provided with indicators arranged to be registered with said respective scales and for registry of a printing plate on said printing plate supporting surface therewith.

12. In means for registering a printing plate on a printing plate supporting surface, the combination of a cross bar extending crosswise of said supporting surface above the plane of said supporting surface, a scale extending along each side of said supporting surface at substantial right angles to said cross bar, a register bar on each end of said cross bar extending therefrom at an angle to the plane of said supporting surface and arranged to register with said respective scales, and an indicator frame provided with an indicator extending crosswise of said supporting surface, said indicator frame having sliding connection with said cross bar so as to be slidable lengthwise on said cross bar for registry of said indicator with said scales and for registry of a printing plate on said supporting surface with said indicator.

13. In means for registering a printing plate on the printing plate supporting surface of a plate cylinder journaled in a frame, the combination of a cross bar extending crosswise of said supporting surface above the plane of said supporting surface, means for supporting the respective ends of said cross bar on said frame, a cross scale extending lengthwise along said cross bar, a side scale extending along each side of said supporting surface at substantial right angles to said cross bar, a register bar on each end of said cross bar extending therefrom at an angle to the plane of said supporting surface and arranged to register with said respective side scales, an indicator frame, crossing linear indicators thereon extending adjacent to said supporting surface at right angles to said respective scales for

registry of a printing plate on said supporting surface therewith, and an indicator on said indicator frame arranged to be registered with said cross scale and located in line with one of said crossing linear indicators, the other of said crossing linear indicators arranged to be registered with said side scales, said indicator frame having sliding connection with said cross bar so as to be slidable along said cross bar for registry of said respective indicators with said respective scales.

14. In means for registering a printing plate on the printing plate supporting surface of a plate cylinder journaled in a frame, the combination of a cross bar extending crosswise of said supporting surface, supporting means on said frame for the respective ends of said cross bar comprising adjusting means for adjusting said cross bar into parallelism with the axis of rotation of said cylinder, a scale extending along each side of said supporting surface at substantial right angles to said cross bar, a register bar on each end of said cross bar extending therefrom at an angle to the plane of said supporting surface and arranged to register with said respective scales by adjustment of said adjusting means, and an indicator frame provided with an indicator extending crosswise of said supporting surface, said indicator frame having sliding connection with said cross bar so as to be slidable along said cross bar for registry of said indicator with said scales and for registry of a printing plate on said supporting surface with said indicator.

15. In means for registering a printing plate on the printing plate supporting surface of a plate cylinder journaled in a frame, the combination of a cross bar extending crosswise of said supporting surface, a scale extending lengthwise thereof, a scale extending along each side of said supporting surface at substantial right angles to said cross bar, means for adjusting the axis of said cross bar into parallelism with the axis of said cylinder, and an indicator frame provided with crossing linear indicators extending at right angles to said respective scales, said indicator frame having sliding connection with said cross bar so as to be slidable along said cross bar for registry of said indicators with said respective scales and for registry of a printing plate on said supporting surface with said indicators.

16. In means for registering a printing plate on the printing plate supporting surface of a plate cylinder journaled in a frame, the combination of a cross bar extending crosswise of said supporting surface, a scale extending lengthwise thereof, a scale extending along each side of said supporting surface at substantial right angles to said cross bar, means for adjusting the axis of said cross bar into parallelism with the axis of said cylinder, an indicator frame provided with crossing linear indicators extending at right angles to said respective scales, said indicator frame having sliding connection with said cross bar so as to be slidable along said cross bar for registry of said indicators with said respective scales and for registry of a printing plate on said supporting surface with said indicators, said indicator frame pivoted about the axis of said cross bar for tilting the body of said indicator frame away from said supporting surface, and latching means between said cross-bar and the pivoted end of said indicator frame for holding said indicator frame in tilted position.

17. A cross frame, an indicator frame for a

printing plate registering mechanism, pivoted at one of its ends on the cross frame so as to be bodily oscillatable bracketwise about its pivotal axis toward and from the printing plate supporting surface of the printing plate support and adjustable bodily laterally on its pivotal axis into registering positions.

18. A cross frame, an indicator frame for a printing plate registering mechanism, pivoted at one of its ends on the cross frame so as to be bodily oscillatable bracketwise about its pivotal axis toward and from the printing plate supporting surface of the printing plate support and adjustable bodily laterally on its pivotal axis into registering positions, and a stop at its pivotal end to limit its oscillation toward said supporting surface to spaced distance of substantially printing plate thickness from said supporting surface.

19. In combination, a cross frame, an indicator frame for a printing plate registering mechanism pivoted to the cross frame at one of its ends bracketwise so as to be bodily oscillatable about its pivotal axis toward and from the printing plate supporting surface of the printing plate support and adjustable bodily on its pivotal axis into registering positions, and a plurality of angularly spaced stops between said axis and the pivotal end of said indicator frame respectively for holding said indicator frame in substantially spaced relation from said surface for hand manipulation of the printing plate between said indicator frame and said support and for limiting oscillation of said indicator frame toward said supporting surface to spaced distance of substantially printing plate thickness from said supporting surface for registry of the printing plate.

20. In positioning means for the indicator frame of a registering device, the combination of a guide having end guide faces and opposed guide faces comprising an inner guide face and an outer guide face, a slide with which the indicator frame has connection for locating said indicator frame, said slide having end guide faces, and an additional guide face respectively coacting with said first-named end guide faces and one of said opposed guide faces, a keeper on said slide coacting with the other of said opposed guide faces, a stem on said slide having endwise connection with said keeper and provided with means wherewith to move said keeper into and out of range of said first-named guide faces, and means acting on said stem to draw said keeper and said additional guide face toward one another for clamping said first-named opposed guide faces between the same.

21. In registering means, the combination of an indicator frame provided with indicators arranged at substantial right angles to each other for registry with scales extending at substantial right angles to each other along margins of an article supporting surface of a support, means whereby to pivot said indicator frame at one of its ends on a stationarily positioned axis and to slide said indicator frame laterally parallel with said axis bracketwise crosswise of said surface, and means solely between said axis and the pivotal end of said indicator frame acting solely on the pivotal end of said indicator frame for supporting said indicator frame in spaced relation from said supporting surface and so as to move laterally across the article on said surface.

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