Jan. 18, 1944. W. K. ECKHARD ET AL 2,339,467

MECHANISM FOR REGISTERING PRINTING PLATES

Filed Feb. 13, 1942 3 Sheets-Sheet 1

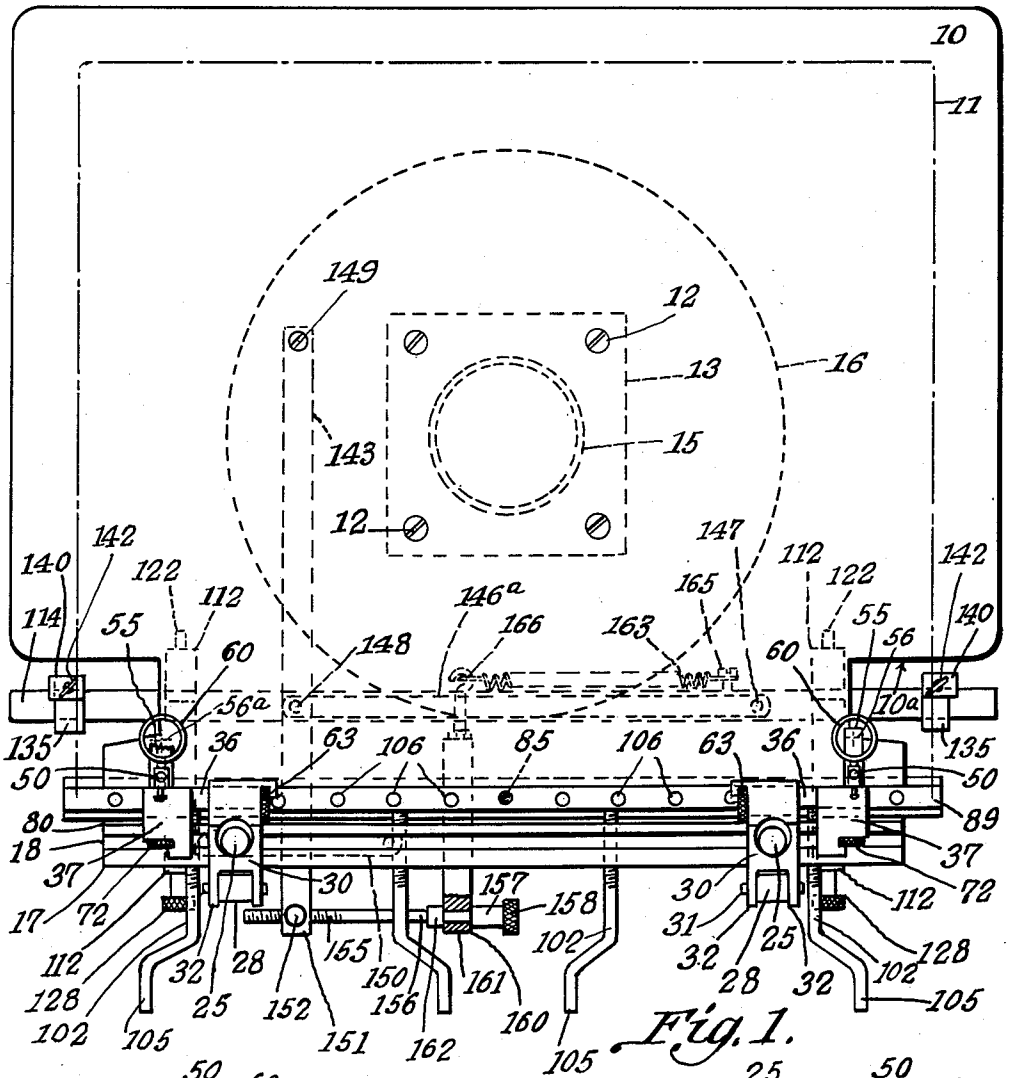


Fig. 1.

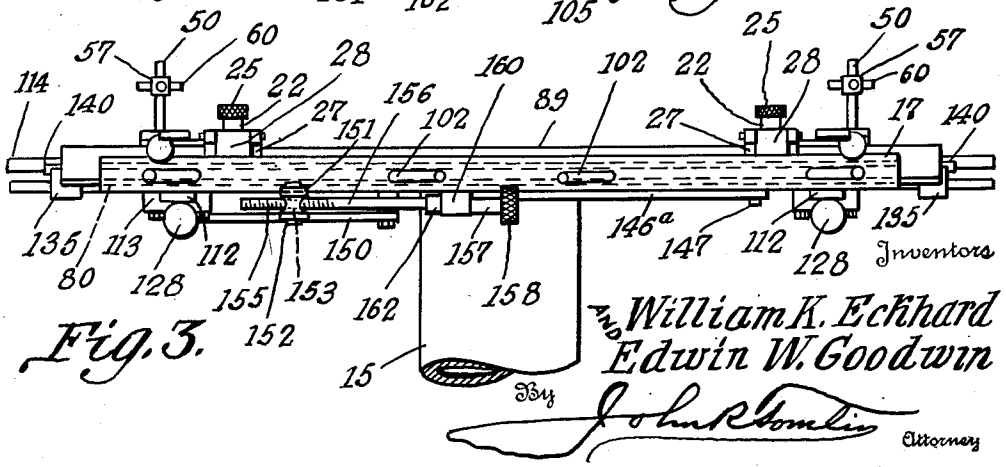


Fig. 3.

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Filed Feb. 13, 1942 3 Sheets-Sheet 2

Fig. 2.

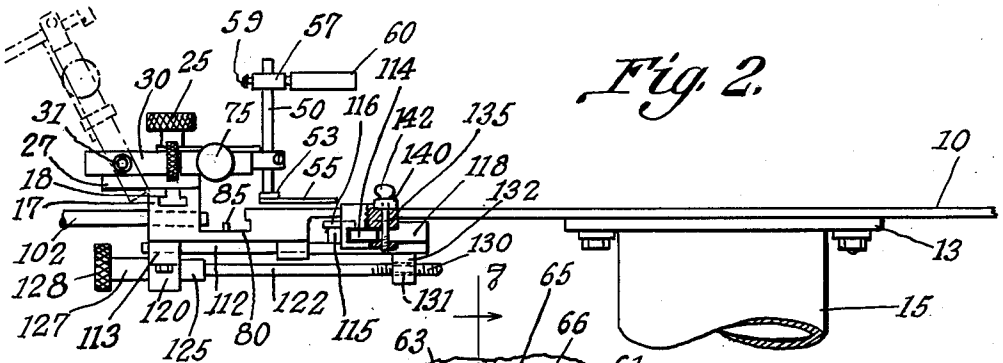


Fig. 4.

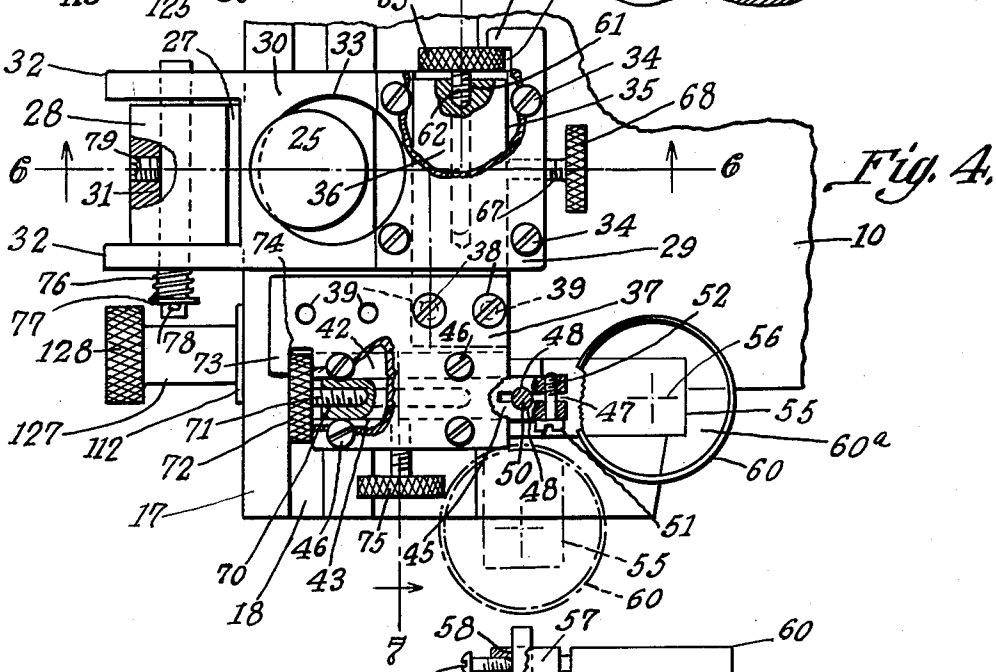
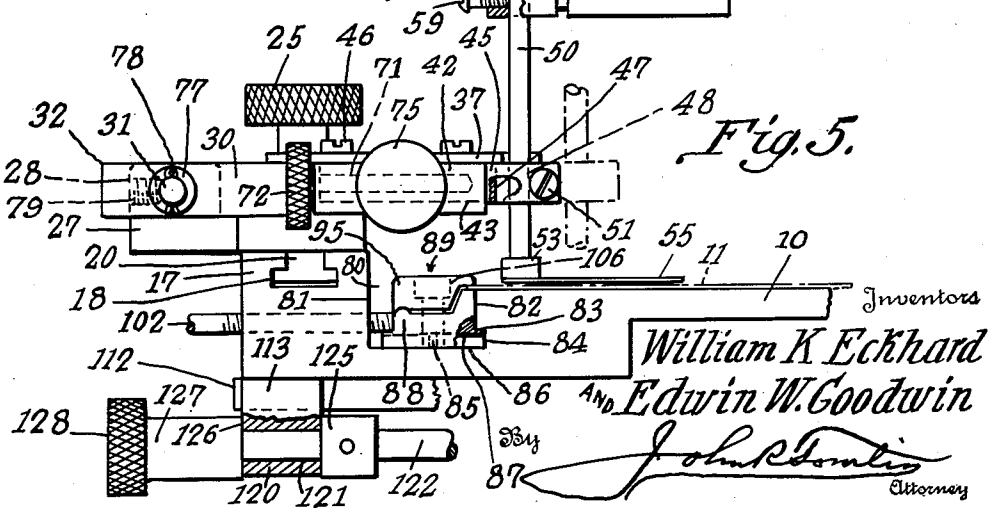


Fig. 5.



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MECHANISM FOR REGISTERING PRINTING PLATES

Filed Feb. 13, 1942 3 Sheets-Sheet 3

Fig. 6.

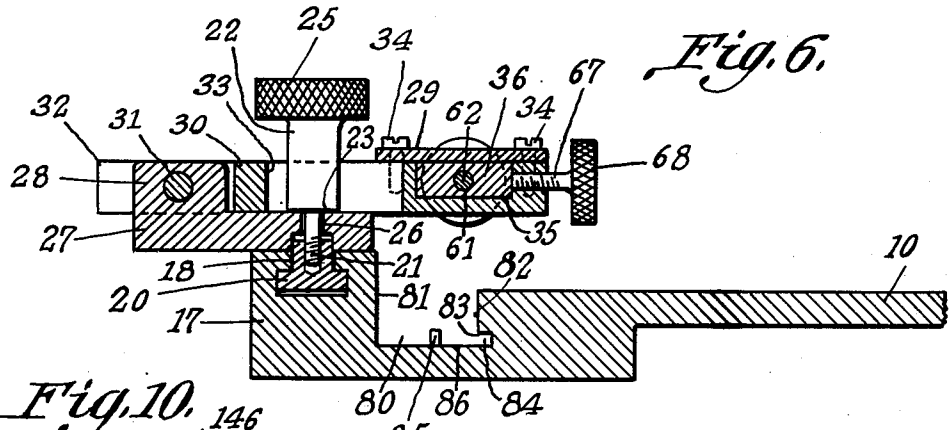


Fig. 10.

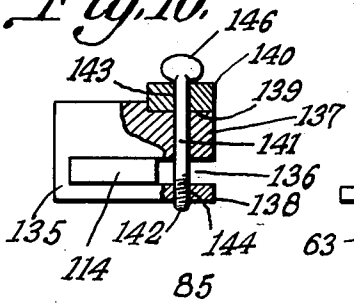


Fig. 7.

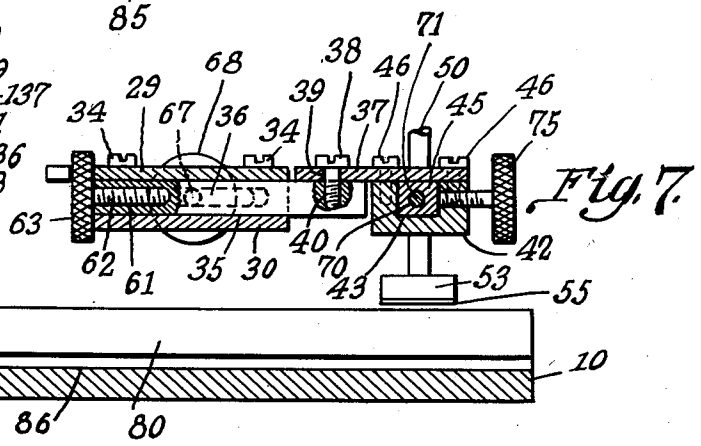


Fig. 8.

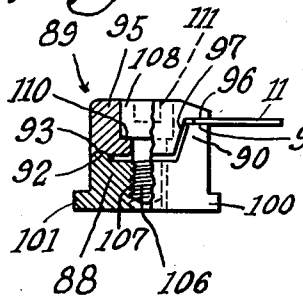
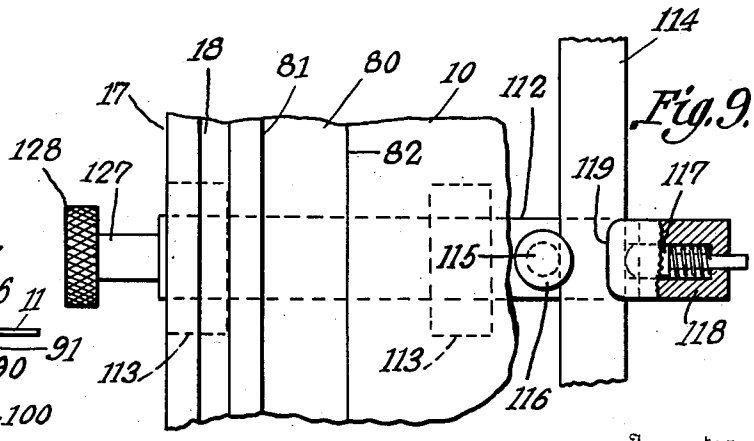


Fig. 9.



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UNITED STATES PATENT OFFICE

2,339,467

MECHANISM FOR REGISTERING PRINTING PLATES

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Application February 13, 1942, Serial No. 430,816

14 Claims. (Cl. 33—184.5)

This invention relates to method and mechanism for preparing flexible printing plates for subsequent application to form or plate cylinders of rotary printing machines, and especially to the preparation of sets of multicolor plates, each of which is to be applied to the form or plate cylinder of a rotary printing machine that employs plates of this character.

These plates are usually formed of flexible sheet metal, and have the forms or designs to be printed, produced on their printing surfaces by methods well known in the art. A locating and clamping bar is secured to the leading edge of each plate in predetermined relation to the designs and register marks on the printing surface. Then the plate is wrapped around a form or plate cylinder, and it is secured in place on the cylinder by suitable securing means well known by those skilled in the art. An arrangement whereby flexible planographic printing plates are wrapped around form or printing cylinders and suitably secured in printing position on the cylinder surface is disclosed in United States Patent No. 2,320,239, granted to William F. Huck on May 25, 1943.

Mechanism made in accordance with the invention is especially applicable to use in connection with a multicolor printing machine having a plurality of identical form cylinders, on each of which a printing plate is applied. Multicolor printing can, however, be produced on a single color machine, by printing from each of a set of multicolor plates successively, and it will be seen that the use of the registering mechanism herein disclosed is equally advantageous where a single color machine is used.

In multicolor printing of this character where a plurality of printing cylinders are employed, each form or plate cylinder is provided with a recess to receive the locating or clamping bar to which a flexible printing plate is secured in predetermined positional relation. This recess is formed in each plate cylinder at a location which corresponds to the location of similar recesses formed in the other plate cylinders, so that a design on the printing plate of one cylinder will be positioned at a location which corresponds to the location of similar designs on the plates of other plate cylinders, to thus insure accurate register in multicolor work. This register accuracy is assured because the locating bar is secured to the leading edge of each plate in predetermined relation to designs and register marks on the plate, and then each plate is wrapped around the peripheral portion of each plate cylinder with its locating bar positioned in a recess which is similarly located in each plate cylinder.

An object of this invention is to provide method and mechanism for preparing flexible printing plates for application to plate or form cylinders of printing machines, so that a design on each plate will be positioned at a corresponding printing location on each plate or form cylinder to insure accurate registration in multicolor printing.

Another object of this invention is to provide a fixture for expeditiously locating a number of printing plates of a set with respect to their clamping or locating bars, so that a design on one plate bears the same positional relation to its clamping bar as a similar design on the other plates of the set bear to their respective clamping bars, whereby when the bars are secured to the plates, and the plates with their clamping bars are placed on and secured to similarly arranged printing cylinders, the plates will print in accurate register.

Another object of this invention is to provide a method for preparing plates for application to printing cylinders, whereby a plurality of plates may be applied to their respective printing cylinders in proper registration to produce accurate multicolor printing without the necessity for subsequent adjustment of any plate with respect to its cylinder.

A specific object of this invention is the provision of a fixture for expeditiously securing a locating or clamping bar to the leading edge of each plate of a set of multicolor plates in predetermined positional relation to the design and register marks on each plate, the plates being employed for use on a number of similar form cylinders having similarly located longitudinally extending recesses formed therein for the reception of the locating bars, so that when a plate is wrapped around a cylinder with its locating bar positioned in its recess, a design on this plate will positionally correspond to similar designs on the plates on the other cylinders of the set to thus produce accurate register in multicolor printing.

Still another object of this invention is to provide a method of securing accuracy in the register of lithographic printing plates without interfering with the operation of the press.

It is also an object of this invention to provide a printing plate registering fixture of generally improved construction, whereby the device will be simple, durable, and inexpensive in construction, as well as convenient, practical, serviceable and efficient in its use.

With the foregoing and other objects in view,

which will appear as the description proceeds, the invention resides in the disclosed method and also the disclosed combination and arrangement of parts, and in the details of construction hereinafter described and claimed, it being understood that various changes in form, proportion, and minor details of construction may be made within the scope of the claims without departing from the spirit or sacrificing any advantages of the invention.

For a complete disclosure of the invention, a detailed description of it will now be given in connection with the accompanying drawings forming a part of the specification, wherein:

Figure 1 is a plan view of the plate registering fixture showing the plate in dot and dash lines thereon;

Figure 2 is an end elevation of the improved fixture, a part of the standard being broken away;

Figure 3 is a front view of the fixture, a part of the standard being broken away;

Figure 4 is an enlarged fragmental plan view disclosing a target and magnifier assembly;

Figure 5 is an end view of the portion shown in Figure 4, parts being shown in section;

Figure 6 is a vertical transverse sectional view taken on lines 6—6 of Figure 4;

Figure 7 is a vertical longitudinal sectional view taken on lines 7—7 of Figure 4;

Figure 8 is an enlarged end view of the composite plate clamp, parts being shown in section;

Figure 9 is an enlarged plan view in which the table is broken away to disclose an adjusting slide; and

Figure 10 is an enlarged view of a slide clamp, parts being shown in section.

Referring to the drawings, in which similar reference characters designate corresponding parts, there is depicted a registering fixture which includes a plate supporting table or platform 10 (Figure 1) of rectangular configuration and of a size to conveniently receive thereon flexible planographic printing plates 11 which have the usual designs produced thereon by methods well known to those skilled in the art. The plate supporting platform 10 may be formed of metal or other suitable material, and its undersurface is secured by screws 12 to a securing flange 13, which extends laterally from a standard 15. The lower terminal of the standard 15 is provided with a foot or supporting flange 16, to thus rigidly support the table 10, and the length of the standard 15 is such as to position the table 10 at a height for convenient manipulation of its components by an operator.

A slide rail 17 is positioned at the front of the table 10, and this rail may be formed integral with the table or suitably secured thereto. As shown in Figure 6, the rail is indicated as an integral part of the table for the sake of simplicity. This rail has an inverted T-slot or recess 18 formed in its upper portion for the reception of a pair of T-shaped slide members 20 each having a threaded aperture formed therein to threadedly receive the threaded terminals 21 of locking screws 22, and each screw 22 is provided with an annular locking shoulder 23 and manipulating head 25, for a purpose to be hereinafter disclosed. Each screw 22 extends through an aperture 26 formed in a slidable base plate 27, which has an upstanding securing lug or block 28.

A hinge plate 30 is hingedly secured to each base plate 27 by extending a shaft or pin 31 through the securing lug 28 and through spaced extensions or legs 32 (Figures 4 and 6) formed by bifurcating one terminal of the hinge plate 30. Each hinge plate 30 is provided with a circular aperture 33 positioned to clear the manipulating head 25 of each locking screw 22, in order that the hinge plate 30 may be swung freely about its hinge pin 31, for reasons to be hereinafter disclosed. The upper surface of each hinge plate 30 is provided with a transversely extending rectangular slideway or groove 35 for the sliding reception of a slide 36, which is slidably retained in the groove 35 by a cover plate 29 which is secured to the hinge plate 30 over the slide groove 35 by screws 34, in order that the slide 36 may slide freely relative to the hinge plate 30. A supporting or cover plate 37 (Figures 4 and 7) is secured to a terminal of each slide 36, and extends beyond the hinge plate 30. Two securing screws 38 extend through a selected two of four equally spaced apertures 39 formed in the cover or supporting plate 37, to rigidly secure the cover plate 37 to its slide 36, and the threaded portions of these screws threadedly engage the threaded apertures 40 formed in the outer terminal of each slide 36, so that the position of the plate 37 may be adjusted relative to its slide 36, for a purpose which will be later elucidated. A rectangular slide bearing block 42 is secured to the undersurface of each slide cover or support 37, and this block is provided with a rectangular elongated recess 43 for the sliding reception of a rectangular slide 45. Each slide bearing block 42 is secured to the supporting plate 37 by screws 46, or other suitable securing devices. The outer terminal of each slide 45 is slit, as indicated at 47 (Figure 4), to bifurcate this terminal of the slide 45, and the intermediate portion of the slit 47 is enlarged to provide arcuate recesses 48 for the reception of a bar or stem 50. Each stem 50 is rigidly secured to its slide 45 by a securing screw 51, which extends through a cylindrical aperture formed through one furcation of the slide 45, and threadedly engages a threaded aperture 52 formed in the other furcation, as indicated. When the screw 51 is tightened, the stem 50 is securely grasped, but when this screw is loosened, the stem 50 may be turned for a purpose to be explained hereinafter.

A foot 53 (Figure 5) is secured to the lower terminal of each stem 50, and this foot has a transparent panel or target 55 suitably secured to the underside thereof, which is used as an alignment gauge. This panel or target 55 is preferably formed of transparent cellulose material, but of course any other suitable transparent material may be employed. Each target 55 has register marks 56 (Figure 4) inscribed thereon, and these marks are preferably of cruciform configuration or perpendicularly disposed lines of a type usually employed in the art for register work. A supporting block 57 (Figure 5) is secured at the upper terminal of each stem 50 by providing the block with a cylindrical aperture 58 for the reception of the stem, and then threading a locking screw 59 through a threaded aperture formed in the block 57 to enter the aperture 58 and engage the upper terminal of the stem 50. Each block 50 supports a magnifier 60, which includes the usual magnifying glass 60a (Figure 4), and the axis of this glass is preferably positioned above or vertically aligned with the crossing point of the register

marks 56, for a purpose to be more fully explained hereinafter. The provision of the locking screws 59 permits each magnifying glass 60 to be moved to accurate adjustment relative to the register marks 56, and the provision of the locking screws 51 permits each stem 50 to be secured in different angular positions relative to the slide 45, for a purpose to be hereinafter explained.

Each slide 36 (Figures 4 and 6) is provided with a longitudinally extending threaded aperture 61 for the threaded reception of an adjusting screw 62, which has an enlarged knurled manipulating head 63. The manipulating head 63 is preferably of cylindrical configuration, and it is held against longitudinal movement relative to the hinge plate 30 by a finger or projection 65 which overhangs a recess 66 in which the manipulating head 63 is received. By this arrangement, when the knurled head 63 is rotated the slide 35 is longitudinally moved in order to move the supporting plate 37 relative to the hinge plate 30, to thus adjustably move the target 55 and the magnifier 60 longitudinally along the plate supporting table 10, for a reason to be hereinafter explained. The slide 35 is retained in predetermined position relative to the hinge plate 30 by a locking screw 67, which is threadedly secured to the hinge plate 30 and engages the slide. Each locking screw 67 is provided with an enlarged knurled manipulating head 68 in order that it may be conveniently rotated.

Each slide 45 is provided with a longitudinally extending threaded aperture 70 (Figures 4 and 7) for the threaded reception of an adjusting screw 71 which is provided with an enlarged knurled manipulating head 72. The manipulating head 72 is held against longitudinal movement relative to the slide cover or supporting plate 37 by a finger or projection 73 which overhangs a recess 74 in which the manipulating head 72 is secured. Each slide 45 is held against longitudinal movement by a locking screw 75, which is threadedly secured in a threaded aperture 44 formed in the slide bearing block 42.

By this arrangement, a target 55 and aligned magnifier 60 are located at each end of the plate supporting table 10, and each target may be positioned in contact with or immediately above a printing plate 11 when its supporting hinge plate 30 is in its lowered position where it is supported by the upper surface of the base plate 27. When the hinge plate 30 is thrown upwardly about its hinge pin 31 (Figure 2), it is moved to inoperative position, or away from the printing plate 11. If preferred, each hinge pin or shaft 31 may have a helical extension spring 76 (Figure 4) positioned on one terminal thereof between a washer or collar 77 and an extension 32 of the hinge plate 30. The washer 77 is held against longitudinal movement on its hinge pin 31 by a cotter pin 78, and the hinge pin 31 is held against longitudinal movement by a set screw 79 which is screw threaded into the block 28. By this arrangement, lost motion between the block and the hinge plate 30 is prevented and the targets 55 and magnifiers 60 may be moved to inoperative position when desired. Furthermore, each target 55 and magnifier 60 may be adjusted transversely or across the printing plate by rotating the adjusting screw 71, and when the target and magnifier have been moved to the desired position, the slide 45 is locked against longitudinal movement by tightening the locking screw 75.

Each entire target and magnifier support or assembly may be moved longitudinally along the table 10 or plate 11 by loosening the locking screw 22, and then sliding the slide member 20 in the slide slot 18. After the target 55 has thus been adjusted roughly to the desired longitudinal position, the screw 22 is again tightened by manipulating its knurled head 25, to thus secure the target and magnifier in position.

Each target and magnifier may then be limitedly adjusted longitudinally of the plate 11, or the supporting table 10 to the accuracy desired, by rotating its adjusting screw 62 by its manipulating head 63 to thus adjustably move the slide along its slideway 35. When the correct longitudinal position of the target and magnifier is located, the slide 36 is locked in this position by tightening the locking screws 67 through its manipulating head 68.

A recess 80 (Figure 6) is formed near the front edge of the plate supporting table 10 at a location where the inner face of the slide rail 17 forms the outer wall 81 of the recess. The recess 80 has an inner wall 82 which is offset at 83 to provide an undercut portion 84, for a purpose to be hereinafter explained. A dowel or locating pin 85 projects upwardly from the intermediate portion of the bottom wall 86 of the recess 80, and this pin is to be received in a transversely extending locating slot 87 (Figure 5) formed in the lower face of a lower clamping component or jaw 88 of a composite plate clamp or bar 89 (Figure 8), which, when positioned in the recess 80, is located accurately longitudinally by the reception of the locating pin 85 in the locating slot 87. The lower clamping jaw 88 is provided with a longitudinally extending upstanding portion or projection 90 having an upper gripping surface 91 of predetermined dimensions. The projection 90 extends along the inner longitudinal edge of the lower clamping jaw 88, and a locating rib 92 having an upper arcuate face, extending along the outer longitudinal edge of the lower jaw 88, and this longitudinally extending arcuate rib 92 engages a longitudinally extending arcuate recess 93 formed in the lower face of an upper clamping jaw 95, to definitely locate the upper clamping jaw 95 relative to the lower clamping jaw 88. An inset gripping or clamping face 96 extends along the inner longitudinal edge of the upper clamping jaw 95, and this gripping face 96 coacts with the gripping face 91 of the lower jaw to grip the leading edge of a printing plate, as best shown in Figure 8. The gripping face 96 is of predetermined dimensions and intersects the upper terminal of an inclined face, to thus provide a stop surface or shoulder 97, for a purpose to be hereinafter explained. The lower jaw 88 is provided at its opposed longitudinal edges with outwardly projecting flanges 100 and 101, and the inner flange 100 is received in the undercut portion 84 of the recess 80 when the composite clamping bar 89 is located in the recess 80 to receive a printing plate 11. The lower clamping jaw 88 of the clamping bar 89 is locked in this position by a plurality of locking screws 102 (Figure 1), which are threadedly received in the slide rail 17, and the inner terminal of each locking screw 102 (Figure 5) engages the outer face of the lower jaw 88, and preferably the upper edge of the outer flange 101, to securely lock the clamping bar within the recess 80. Each locking screw 102 is provided with crank handles 105 (Figure 1) for convenient manipulation to rotate the

screw. The upper jaw 95 is securely locked and clamped to the lower jaw 88 by a plurality of clamp screws 106 (Figure 8), which are threadedly received in threaded apertures 107 formed in the lower jaw 88, and each clamping screw 106 is provided with an enlarged head 108, to thus define an annular clamping shoulder 110, which engages an annular shoulder formed in the upper clamping jaw 95, to thereby clamp the upper jaw 95 to the lower jaw 88. Each screw 106 is provided at its upper terminal with a socket 111 for the reception of a wrench or other suitable manipulating tool not shown, of usual construction to conveniently rotate the screw 106.

A slide or adjusting member 112 (Figure 2) is slidably supported adjacent each end of the front edge of the table 10 in brackets 113 (Figures 2 and 3) which are secured to or extend from the lower face of the table below the clamping bar recess 80. The table 10 is cut away at each front corner adjacent the slide 112 to provide recesses 10a (Figure 1), for a purpose to be hereinafter disclosed. Each slide 112 is movably attached at its inner terminal to a longitudinally extending bar 114, which is approximately the same length as the table 10. The bar 114 is engaged at each terminal by a stud 115 (Figure 9) which is secured to a slide 112 and has an enlarged head 116. Each terminal of the bar 114 is held against a stud 115 and under its head 116 by a spring pressed plunger 117, which is slidably supported in a block or housing 118 carried by the inner terminal of each slide 112. A flange or finger 119 extends from each block 118 and overhangs the bar 114. By this arrangement, the bar 114 is secured to the adjusting slides 112 in a manner that permits swinging movement of the bar 114 relative to these slides, for a reason to be hereinafter explained. A bearing lug 120 (Figure 2) extends downwardly from the outer bracket 113 at each terminal of the table 10 and it has a cylindrical aperture 121 (Figure 5) formed therein to rotatably receive an adjusting shaft 122. A collar 125 is pinned or otherwise secured to each adjusting shaft 122, and this collar 125 abuts the inner face of the bearing lug 120, while the outer face of each lug is engaged by the inner terminal 126 of a sleeve 127 which is secured to each shaft 122. Each sleeve is provided with an enlarged knurled manipulating head 128, in order that rotary motion may be imparted to the adjusting shaft 122, for a purpose to be hereinafter disclosed. Each shaft 122 is provided with a threaded portion 130 (Figure 2), which threadedly engages a threaded aperture 131 formed in a lug 132 which extends downwardly from each slide 112. By simply rotating the adjusting shafts 122 through their manipulating heads 128, longitudinal sliding motion is imparted to the slides 112, for a purpose to be hereinafter explained.

A slide clamp 135 (Figures 1 and 10) is slidably secured to the cross bar 114 adjacent each terminal thereof, and each slide clamp is of U-shape configuration and has a recess 136 formed therein between an upper jaw 137 and a lower jaw 138 to slidably receive the bar 114. The upper jaw 137 of the slide clamp 135 is reduced to provide a surface 139 for the reception of a margin plate clamp or clip 140. The unthreaded portion of the shank 141 of a thumb screw 142 extends through a cylindrical aperture 143 formed in the plate clip 140 and a similar aperture formed in the reduced portion of the upper jaw 137 of the slide clamp 135. The screw shank 141 is provided with a threaded portion which threadedly engages a threaded aperture 144 formed in the lower jaw 145 of the slide clamp 135, and this clamp screw 142 is provided with a manipulating head 146 of usual construction. When the clamp screw 142 is tightened, the clamp 135 grips the cross bar 114 and securely holds the plate clips 140 in this position, for a reason to be later explained.

The cross bar 114 is pivotally secured adjacent one terminal to a longitudinally extending link 146a (Figures 1 and 3), as indicated at 147, and the opposed terminal of the link 146a is pivotally secured to the intermediate portion of a lever 143, as indicated at 148. The inner terminal of the lever 143 is pivotally secured to the lower face of the table 10, as indicated at 149, and the outer terminal of the lever 143 is slidably supported by a strap 150 (Figure 3) which is secured to the lower face of the table 10. This terminal of the lever 143 is provided with a bifurcated head 151 to which a pintle or shaft 152 is rotatably secured, and this pintle is provided intermediate its terminals with a threaded aperture 153 for the threaded reception of the threaded portion 155 of an adjusting rod or shaft 156. The shaft 156 is provided at its opposed terminal with a sleeve 157 which is rigidly secured to the shaft, and the sleeve 157 has an enlarged manipulating head 158. The inner terminal of this sleeve engages an arm 160 which is supported by the table 10, and this arm is provided with an aperture 161 to rotatably receive the shaft or rod 156. A collar 162 is pinned or otherwise secured to the shaft 156, and this collar engages the opposed face of the arm 160, so that the shaft 156 is mounted for free rotary movement in the arm 160, but is held against longitudinal movement relative thereto. By this arrangement, the bar 114 may be moved longitudinally by simply rotating the enlarged manipulating head 158 of the adjusting shaft 156, for a purpose to be hereinafter explained. This longitudinal movement of the bar 114 is permitted by the provision of the hereinbefore disclosed connections between the inner terminals of the slides 112 and the terminals of the bar 114, irrespective of the relative positions of the slides 112. A helical retractile spring 163 (Figure 1) has one terminal secured to the bar 114, as indicated at 165, and its opposed terminal is secured to the plate supporting table 10, as indicated at 166, in order to take up any backlash or lost motion in the components for imparting longitudinal adjusting movement to the bar 114. This bar is permitted longitudinal movement of considerable amplitude by the provision of the recesses 10a at the corners of the table 10.

In operation, when it is desired to secure the first plate 11 of a set of printing plates in such relation to its clamping or locating bar 89 as to make designs on the plate bear given positional relation to the bar, the bar is positioned in its receiving recess 80 with its flange 100 positioned in the offset recess 84. Prior to positioning the clamping or locating bar 89 in this recess 80, its clamping screws 106 are released to insure that the upper jaw 95 is spaced sufficiently from the lower jaw 88 to receive the leading edge of the first plate 11. When the composite bar 89 is positioned in its receiving recess 80, the locating dowel 85 is received within the locating recess 87 of the lower jaw 88, to thus insure that the

bar 89 is located in accurate longitudinal position relative to the plate supporting table 10.

The locking screws 102 are then rotated by manipulating their crank handles 105 to thereby lock the plate clamp bar 89 securely within the recess 80, with the inner flange 100 of the lower clamping bar 88 positioned in the undercut recess 84, and with the inner terminals of the crank screws 102 engaging the outer face of the lower clamping bar 88 and also in engagement with the upper surface of the outer flange 101. By this arrangement, the plate clamp 89 is securely locked within its receiving recess 80.

Prior to placing the first printing plate 11 on the table 10, the slides 112 should be adjusted by rotating their manipulating heads 128, so that the slides project slightly beyond the outer face of the slide rail 17, preferably a distance of one-sixteenth of an inch.

Now the first flexible printing plate 11 is placed on the plate supporting table 10 with the printing face of the plate disposed upwardly. This plate, in common with the other plates of a set of plates, has register marks 56a (Figure 1) inscribed thereon, and it is preferable and the usual practice to make then of cruciform configuration, as shown. These marks are placed on the plate 11 in definite relation to the designs thereon and also in definite relation to the leading edge of the plate. The leading edge is then placed between the open clamping jaws 88 and 95, and it is forced inwardly until its longitudinally-extending leading edge accurately engages the stop shoulder 97 formed at the inner terminal of the clamping face 96 of the upper jaw 95. The plate is thus accurately positioned on the table 10 with its leading edge parallel with the accurately located stop shoulder 97 of the plate clamping bar.

The slide clamps 135 and plate clips 140 are next moved along the bar 114 until the plate clips 140 overhang the side edges of the printing plate 11. The plate clip screws 142 are then tightened to securely lock the slide clamps 135 to the bar 114, and to secure the plate 11 to the clips 140 and the slide clamps 135.

The manipulating heads 128 are then turned to move the slides 112 and plate 11 inwardly until the outer terminals of the slides 112 lie flush with the outer face of the slide rail 17, thereby moving the plate 11 forwardly so there is a clearance of one-sixteenth of an inch between the leading edge of the plate and the stop shoulder 97 of the upper clamping jaw 95. The space thus provided between the leading edge of the plate 11 and the stop shoulder 97 provides suitable clearance for the registering of the subsequent plates of a set of plates. The first plate of the set being thus correctly positioned, the clamp screws 106 are tightened to securely grip the leading edge of the plate 11 in the plate clamp 89. In tightening these screws, it is preferable to begin in the center and alternately tighten the screws at each side of the center until all of the screws are secured. After the plate clamping bar 89 is securely fastened to the leading edge of the printing plate 11, the plate clips 140 are loosened and slid along the bar 112 away from the plate.

The position of the plate 11 and register marks 56a thereon are recorded before the plate clamp bar 89 and plate 11 are removed from the table 10. To do this, swing the magnifiers 60 and targets 55 downwardly about their pivot pins 31 to their operative position, in which position the lower face of each hinge plate 30 engages the upper face of its base plate 27, and each target is spaced a slight distance from the upper face of the plate 11 or rests very lightly thereon. The target and magnifier slides 36 and 45, which are controlled by turning the manipulating heads of their adjusting screws 62 and 71, should be adjusted to about the center of their adjusting range, so they may be moved in either direction.

The manipulating heads 25 of the locking screws 22 are then turned to release these screws, and the entire magnifier and target assemblies are moved along the slide rail 17 until each target 55 is positioned so its register mark 56 is located approximately opposite the register marks 56a on the plate 11. If the adjustments afforded by the slides 36 and 45 are not sufficient to position the register marks 56 of the targets 55 near the register marks 56a on the plate 11, then the securing screws 38 of the cover or supporting plates 37 may be removed and placed in other apertures 39 of the supporting plates 37 to locate these plates and their slide magnifiers and targets so the target register marks 56 approximately reach the register marks 56a on the plate. As hereinbefore stated, the targets 55 and magnifiers 60 may be adjustably turned ninety degrees, if necessary, by simply releasing the screw 51. After the targets 55 are located in close proximity to the register marks 56a on the printing plate 11, they may be accurately adjusted to bring the register marks 56 or each target 55 into accurate registration or alignment with the register marks 56a on the printing plate by merely turning the manipulating heads 63 and 72 of the adjusting screws 62 and 71. When the register marks 56 on the targets 55 are accurately aligned with the register marks 56a on the printing plate, then the locking screws 67 and 75 are tightened to hold the targets 55 and magnifiers 60 in their location. When the targets 55 and magnifiers 60 are so set and secured, the target and magnifier assemblies have definitely recorded the correct position of the register marks on the first plate, and the target and magnifier assemblies may now be swung back to inoperative position to permit the removal of the plate 11 and its attached plate clamp 89.

The fixture will then be in readiness to receive and register the subsequent plates of the set. In registering the second and succeeding plates of a set of multicolor plates, the process is similar to that hereinbefore described, but in such case, the plates 11 are moved to register with the register marks 56 on the targets 55, whereas, with the first plate, the targets 55 are moved to register with the register marks 56a on the plate.

In registering the second and succeeding plates, the open plate clamp 89 is securely locked in its receiving recess 80, and the leading edge of each plate 11 is positioned between the clamping jaws of the plate clamp 89 and moved inwardly until its leading edge engages the stop shoulder 97 of the upper jaw 95. The plate 11 is then manually moved sidewise or laterally to as near the position of the first plate as can be determined by the eye. In this position, the plate clips 140 are then locked to the plate to securely hold the plate to the bar 114. Now the target assemblies are lowered to operative position with the targets 55 over the plate 11 to determine the requisite adjustment of the plate 11 in order to move its register marks 56a in accurate registration with the register marks 56 on the targets 55. In making this adjustment,

the plate 11 may be moved longitudinally of the table 10 by simply rotating the manipulating head 158, to thus impart the required longitudinal movement to the bar 114 through the instrumentality of the adjusting shaft 156, lever 143 and link 146a. When the register marks 56a on the plate accurately register with the register marks 56 on the targets 55, the plate clamp 89 is tightened, and the plate 11 and securing clamps 89 are removed from the table 10. With the targets and magnifiers securely locked in this determined position, all the subsequent plates of the set may be registered in the manner hereinbefore disclosed.

It is preferred in the employment of this device, that the location of the register marks 56 on all printing plates be standardized, so that it will not be necessary to disturb the target setting for different register jobs.

After each plate 11 is removed from the fixture table 10, it has its clamping or locating bar 89 secured to its leading edge, with the designs and register marks on the plate bearing definite positional relation to the bar. Each plate 11 with its clamping bar 89 attached may then be secured in the usual manner to a form cylinder, and since all the form cylinders have their clamping bar receiving recesses similarly located, a design on the printing plate of one form cylinder will be positioned at a location on the cylinder which corresponds to the location of similar designs on the plates of other form cylinders, thus insuring accurate register in multicolor printing.

It will be understood that the invention herein disclosed may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and it is therefore desired that the present embodiment be considered in all respects as illustrative and not restrictive, reference being had to the claims rather than to the foregoing description to indicate the scope of the invention.

Having thus described our invention, what we now claim as new and useful is:

1. In a fixture for pre-registering a number of printing plates of a set in order that register marks similarly located on each plate may be located in corresponding positions on a form cylinder or cylinders, a plate support, a plate clamp for each plate of the set, means for accurately locating each plate clamp relative to the plate support in position to receive an edge of a plate, means for securing each located plate clamp to the plate support, means for determining when a plate has been located on the plate support with an edge parallel with the located plate clamp, means for securing each located plate clamp to a located plate, recording means having register marks, and means to move the recording means to registration with the register marks on the secured first plate of the set to record the registering location on the plate support for each subsequent printing plate of the set.

2. In a fixture for pre-registering a number of printing plates of a set in order that register marks similarly located on each plate may be located in corresponding positions on a form cylinder or cylinders, a plate support, a plate clamp for each printing plate of the set, means for accurately locating each plate clamp relative to the plate support in position to receive an edge of a plate, means for securing each located plate clamp to the plate support, means for determining when a plate has been moved on the plate support to parallelism with a located plate clamp, means for securing each plate clamp to a plate, recording means having register marks, means to move the recording means to registration with the register marks on the secured first plate of the set to record the registering location on the plate support for each subsequent printing plate of the set, adjusting means, and means to successively secure each of the subsequent plates of the set to the adjusting means whereby each subsequent plate may be adjustably moved on the support to a position where its register marks register with the register marks of the recording means.

3. In a fixture for pre-registering a number of printing plates of a set in order that register marks similarly located on each plate may be located in corresponding positions on a form cylinder or cylinders, a plate support, a plate clamp for each plate of the set, means for accurately locating each plate clamp relative to the plate support in position to receive an edge of a plate, means for securing each plate clamp to the plate support, a stop surface on the plate clamp to be engaged by an edge of a plate to determine when the plate has been moved on the support to a position where the said edge is parallel with the secured plate clamp, means for securing the plate clamp to the plate, recording means having register marks, and means to move the recording means to registration with the register marks on the secured first plate of the set to record the registering location on the plate support for each subsequent printing plate of the set.

4. In a fixture for pre-registering a number of printing plates of a set in order that register marks similarly located on each plate may be located in corresponding positions on a form cylinder or cylinders, a plate support, a plate clamp for each plate of a set, means for accurately locating each plate clamp relative to the plate support in position to receive an edge of a plate, a stop surface formed on the plate clamp to be engaged by an edge of a plate on the support to position the said edge of the plate in parallelism with the plate clamp, plate adjusting means, means for securing each plate to the plate adjusting means whereby movement of the adjusting means adjustably moves the plate relative to the support and located plate clamp, means for clamping each located plate clamp to the leading edge of each located plate, and targets having register marks thereon and adjustably supported for movement relative to the plate support so that the register marks on the targets may be moved to registration with register marks on he first plate of the set to thus record the registering position on the support for subsequent plates.

5. In a fixture for pre-registering a number of printing plates of a set in order that register marks similarly located on each plate may be located in corresponding positions on a form cylinder or cylinders, a plate support, a plate clamp for each plate of the set, means for accurately locating each plate clamp relative to the plate support in position to receive an edge of a printing plate, means for securing each located plate clamp to the plate support, means for determining when a plate has been moved on the plate support to a position where an edge of the plate is parallel with a located plate clamp, means for securing each plate clamp to a plate, a movable magnifier, a target having register marks

thereon and secured in alignment with the magnifier and movable therewith, and means to move the magnifier and target to registration with the register marks on a secured printing plate of the set to record the registering location on the plate support for subsequent printing plates of the set.

6. In a fixture for pre-registering a number of printing plates of a set in order that register marks similarly located on each plate may be located in corresponding positions on a form cylinder or cylinders, a plate support, a plate clamp for each plate of the set, means for accurately locating each plate clamp relative to the plate support in position to receive an edge of a plate, means for securing the located plate clamp to the plate support, a stop surface on the plate clamp to be engaged by an edge of each plate to determine when the plate has been moved on the support to a position where said edge is parallel with the secured plate clamp, means for securing the plate clamp to the plate, a movable magnifier, a target secured in alignment relative to the magnifier and movable therewith, the target having register marks thereon, and means for moving the magnifier and target to registration with the register marks on a secured plate to record the registering location on the plate support for subsequent plates of the set.

7. In a fixture for pre-registering a number of printing plates of a set in order that register marks similarly located on each plate may be located in corresponding positions on a form cylinder or cylinders, a plate support, a plate clamp for each plate of the set, means for accurately locating each plate clamp relative to the plate support in position to receive the leading edge of a plate, means for securing each located plate clamp to the plate support, means for determining when a plate has been moved on the plate support to a position where its leading edge is parallel with a located plate clamp, means for securing each plate clamp to a plate, recording means having register marks, means for moving the recording means to registration with the register marks on the secured first plate of the set to record the registering location on the plate support for each subsequent printing plate of the set, adjusting means movable relative to the plate support, and means for securing a plate to the adjusting means in order that the plates may be moved by the adjusting means to registering location on the plate support.

8. In a fixture for pre-registering a number of printing plates of a set in order that register marks similarly located on each plate may be located in corresponding positions on a form cylinder or cylinders, a plate support, a plate clamp for each plate of the set, means for accurately locating each plate clamp relative to the plate support in position to receive the leading edge of a plate, means for securing each located plate clamp to the plate support, means for determining when a plate has been moved on the plate support to a position where its leading edge is parallel with the located plate clamp, means for securing each plate clamp to a plate, recording means having register marks, means to move the recording means to registration with the register marks on the secured first plate of the set to record the registering location on the plate support for each subsequent plate of the set, adjusting means movable in any direction in a plane parallel to the plate support, and means for securing a plate to the adjusting means in order that the plate may be moved by the adjusting means to registering location on the plate support.

9. In a fixture for pre-registering a number of printing plates of a set in order that register marks similarly located on each plate may be located in corresponding positions on a form cylinder or cylinders, a plate support, a plate clamp for each plate of the set, means for accurately locating each plate clamp relative to the plate support in position to receive the leading edge of a plate, means for securing each located plate clamp to the plate support, a stop surface on each plate clamp to be engaged by the leading edge of a plate to determine when the plate has been moved on the support to a position where its leading edge is parallel with the located plate clamp, means for securing each plate clamp to each plate of a set, recording means having register marks, means for moving the recording means to registration with register marks on the secured first plate of the set to record the registering location on the plate support for each subsequent plate of the set, adjusting means movable relative to the plate support, and means for securing each plate to the adjusting means in order to move the first plate of the set relative to its plate clamp, and the subsequent plates of the set to their registering location on the plate support as indicated by the recording means.

10. In a fixture for pre-registering a number of printing plates of a set in order that register marks similarly located on each plate may be located in corresponding positions on a form cylinder or cylinders, a plate support, a plate clamp for each printing plate of the set, means for accurately locating each plate clamp relative to the plate support in position to receive the leading edge of a plate, means for securing each located plate clamp to the plate support, means for determining when a plate has been moved on the plate support to a position where its leading edge is parallel with a located plate clamp, means for securing each plate clamp to each plate, recording means having register marks, means to move the recording means to registration with the register marks on the secured first plate of the set to record the registering location on the plate support for each subsequent printing plate of the set, separate slides adjustably movable transversely of the plate support, a longitudinally-extending bar movably secured to each slide, and means for securing a plate to the bar in order that the plate may be adjustably moved by the bar to registering location on the plate support.

11. In a fixture for pre-registering a number of printing plates of a set in order that register marks similarly located on each plate may be located in corresponding positions on a form cylinder or cylinders, a plate support, a plate clamp for each printing plate of the set, means for accurately locating each plate clamp relative to the plate support in position to receive the leading edge of a plate, means for securing each located plate clamp to the plate support, means for determining when a plate has been moved on the plate support to a position where its leading edge is parallel with a located plate clamp, means for securing each plate clamp to each plate, recording means having register marks, means for moving the recording means to registration with the register marks on the secured first plate of the set to record the registering location on the plate support for each subsequent plate of the set, a slide located at each longitudinal terminal of the

plate support adjacent the plate clamp and each slide being adjustably movable transversely of the plate support, a longitudinally-extending bar movably secured to each slide, a lever fulcrumed to the plate support, a link pivotally secured to the lever and bar and operably interposed therebetween, and means for adjustably moving the lever about its fulcrum to impart longitudinal movement to the bar, the slides and lever imparting movement to the bar in order that plates may be moved by the bar to registering locations on the plate support.

12. In a fixture for pre-registering a number of printing plates of a set in order that register marks similarly located on each plate may be located in corresponding positions on a form cylinder or cylinders, a plate support, a plate clamp for each plate of the set, means for accurately locating each plate clamp relative to the plate support in position to receive the leading edge of a plate, means for securing each located plate clamp to the plate support, means for determining when a plate has been moved on the plate support to a position where its leading edge is parallel with a located plate clamp, means for securing each located plate clamp to the plate, recording assemblies, each recording assembly including a base plate mounted for longitudinal sliding movement relative to the plate support adjacent one longitudinal terminal thereof, means for securing the base plate in any selected position in its path of sliding movement relative to the plate support, a transparent target having register marks thereon, the target being hingedly secured to the base plate for swinging movement to and from the upper face of a plate on the plate support, means for adjustably moving each target transversely of its base plate, means for adjustably moving each target longitudinally of its base plate, said adjustable movement of the target being provided in order that the target may be moved to registration with the register marks on the secured first plate of the set, and means for securing each target in its adjusted position to record the registering location on the plate support for each subsequent printing plate of the set.

13. In a plate registering device for use in connection with a printing machine having a form holding member with means arranged to accurately position and secure a clamping member attached to an edge of a printing plate in relation to the form holding member, a plate support having a recess arranged to secure the clamping member in position to receive an edge of a printing plate having a pair of spaced register marks thereon, means attachable to the plate for shifting the plate on the plate support and accurately locating it in a registering position, registering means including a pair of alignment gauges, and adjusting means operable to move each alignment gauge in any direction parallel to the plate to move the gauge into accurate register with a register mark on the plate.

14. In a plate registering device for use in connection with a printing machine having a form holding member with means arranged to accurately position and secure a clamping member attached to an edge of a printing plate in relation to the form holding member, a plate support having a recess arranged to secure the clamping member in position to receive an edge of a printing plate having a pair of spaced register marks thereon, means attachable to the plate for shifting the plate in any direction in a plane parallel to the plate support and accurately locating it in a registering position, registering means including a pair of alignment gauges movable to coincide with the register marks on the plate, coarse adjustment means operable to quickly move the alignment gauges approximately to registering position and fine adjustment means operable to move the alignment gauges accurately to registering position.

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