VARIABLE CUT-OFF WEB PERFECTING PRESS

Filed Nov. 19, 1968, Ser. No. 777,017
Int. Cl. B41F 7/12, 13/44, 27/06
U.S. Cl. 101—220

15 Claims

ABSTRACT OF THE DISCLOSURE

A web fed perfecting press for printing offset images of different size on the printed web. Both the top and bottom plate cylinders are journaled in a press frame for rotation about fixed axes. The top and bottom blanket cylinders are journaled in auxiliary frames that are supported by the main frame. The auxiliary frames are adjustable horizontally on the main frame to move the blanket cylinders toward and away from each other, and vertically to move the blanket cylinders away from the fixed plate cylinders. Both the blanket cylinders are mounted on the main frame for operatively positioning plate and blanket cylinders of different diameters thereon.

Several solutions have been suggested in the past to remedy this problem and provide web presses capable of printing different sized products. For example, in U.S. Pat. #2,165,652, a web printing press is disclosed that includes a plurality of printing modules, i.e., impression cylinders and plate cylinders for each side of the web. The plurality of modules are mounted on radially extending arms of an auxiliary frame that is pivotally positioned on the main frame. The separate modules have cylinders of different circumferences journaled thereon. To change from one length of printed image to a second different length image, the auxiliary frame is rotated about the central axis to position a different module in printing position. The arrangement disclosed in U.S. Pat. #2,165,652 is limited to the number of modules mounted on the auxiliary frame. Further, the apparatus is expensive to fabricate and maintain because complete printing units must be provided for each length of printed image desired on the printed web.

Another proposed solution to the above problem is disclosed in U.S. Pat. #3,323,452 for printing on one side of the web. An impression cylinder is positioned beneath a module that includes both the blanket and plate cylinders. To change from one size printed product to another size, the entire module is removed from the press and another module having plate and blanket cylinders of different diameter is positioned on the press. The arrangement disclosed in U.S. Pat. #3,323,452 is not suitable for perfecting printing, and also separate modules are required for each particular size, which again is expensive and limits the versatility of the press. There is a need therefore for a versatile web type press, particularly a perfecting press that can be quickly and economically converted to print different size printed products.

BACKGROUND OF THE INVENTION

(1) Field of the invention

This invention relates to a web fed perfecting press that includes plate and blanket cylinders operable to receive cylindrical plates and cylindrical shims of different dimensions so that the circumferential dimensions of the plate and blanket cylinders can be readily changed. The plate cylinders are mounted for rotation about fixed axes in the main frame and the blanket cylinders are mounted for rotation in auxiliary frames. The auxiliary frames are movably supported in the main frame to permit positioning of the plate and blanket cylinders of different circumferential dimension in operable printing position. Gearing is provided for driving the plate and blanket cylinders of different dimension. To change the length of the printed image on the web, the plates and annular shims on the plate and blanket cylinders are changed and the blanket cylinders are moved by means of the auxiliary frames and eccentric bearings into operative printing position.

Accordingly, the principal object of this invention is to provide a variable cut-off web fed printing press with plate and blanket cylinders having different circumferential dimensions.

(2) Description of the prior art

The conventional web printing press has one inherent disadvantage in that the maximum length of the printed image is fixed by the circumference of the plate and blanket cylinders. In conventional web presses this maximum size is usually the size of the printed image produced. It has been found uneconomical to print less than the plate cylinder capacity because the segments of the web that remain blank are wasted.
Another object of this invention is to provide a web fed perfecting press that has variable effective printing surfaces on the same plate and blanket cylinders.

The last and other objects and advantages of this invention will be more completely disclosed and described in the following specification, the accompanying drawings and the appended claims.

**BRIEF DESCRIPTION OF THE DRAWINGS**

FIGS. 1 and 2 are schematic views in side elevation illustrating the web press with a pair of blanket cylinders of different diameters and the relative position of the auxiliary frames in the two positions shown.

FIGS. 3 and 4 are enlarged views similar to FIGS. 1 and 2 illustrating in greater detail the relative positions of the auxiliary frames when plate and blanket cylinders of different diameters are positioned on the press.

FIG. 5 is a schematic representation of the gearing for driving the pairs of plate and blanket cylinders of different diameters.

FIG. 6 is a view in side elevation and partially in section illustrating the cylinders mounted in the main frame and the auxiliary frame members and further illustrating the bearings and drive gearing for the cylinders.

FIG. 7 is a fragmentary view in side elevation and partially in section of the auxiliary frame member illustrating the eccentric bearing adjustment means for the blanket cylinder.

FIG. 8 is a view in section taken along the line VIII—VIII of FIG. 7.

FIG. 9 is a diagrammatic illustration of the arcuate path followed by the axis of a blanket cylinder during adjustment for different diameters of the blanket cylinder.

FIG. 10 is a fragmentary view in elevation of a cylinder with a cylindrical plate secured thereto.

FIG. 11 is a view similar to FIG. 10 illustrating the same cylinder with a cylindrical shim member positioned around the cylinder and a cylindrical plate of increased circumferential dimension positioned on the shim member and secured to the cylinder.

FIG. 12 is a schematic view in end elevation of the web press illustrating the vertical side frames with the auxiliary frames mounted thereon and the plate and blanket cylinders journaled in the vertical side frames and auxiliary frames.

**DESCRIPTION OF THE PREFERRED EMBODIMENTS**

Referring to the drawings and particularly to FIG. 12 the web press generally designated by the numeral 10 has a pair of vertical side frames 12 and 14 mounted on a base member 16 and maintained in spaced parallel relation to each other by tie bars 18. The vertical frames 12 and 14 both have an upper auxiliary frame generally designated by the numeral 20 and a lower auxiliary frame generally designated by the numeral 22. The upper and lower auxiliary frames 20 and 22 are adjustable mounted on the respective vertical side frame members 12 and 14 for positioning the different diameter blanket cylinders, as later described.

Referring to FIGS. 1–4 the web fed press 10 has an upper plate cylinder generally designated by the numeral 24 that is journaled in the vertical side frames 12 and 14 for rotation about a fixed axis 26. Similarly, a lower plate cylinder 28 is journaled in the vertical side frames 12 and 14 for rotation about a fixed axis 30. As later discussed, the plate cylinders 24 and 28 may be journaled in eccentric bearings mounted in the frame for limited radial movement of the plate cylinders in the vertical frames. The upper and lower plate cylinders 24 and 28 are arranged in parallel spaced relation to each other and rotate about the fixed axes 26 and 30. An upper blanket cylinder 32 is journaled for rotation about an axis 38 in the lower auxiliary frame 22. The upper blanket cylinder 32 is offset laterally relative to the lower blanket cylinder 36 and the plane through the axes 38 and 34 of the respective blanket cylinders is angularly displaced from a vertical plane extending through either one of the axes. The lower blanket cylinder 36 is arranged to serve as an impression or back-up cylinder for the upper blanket cylinder 32 and the upper blanket cylinder is arranged to serve as an impression or back-up cylinder for the lower blanket cylinder 36. The pairs of auxiliary frames 21 and 23 support extending flat vertical side frames 12 and 14 and are adjustable mounted on the side frames 12 and 14 to permit movement of the respective blanket cylinders 32 and 36 toward and away from the adjacent plate cylinders 24 or 28 and toward and away from each other.

The plate and blanket cylinders 24, 28, 32 and 36 as illustrated in FIGS. 1 and 3 have the same diameter and are arranged to rotate at the same angular velocity. Each of the cylinders includes a standard cylinder 40 of a preselected diameter, as illustrated in FIGS. 10 and 11. The cylinder 40 has a longitudinal gap or slot 270 therein that has a first side wall 272, a second side wall 274 and a bottom wall 276 with a longitudinal recessed portion 278. The wall 272 is at an inclined angle to permit the plate engaging member to be secured therein, as later discussed. The side wall 274 has an arcuate surface 280 that conforms to the surface of an eccentric member 282. An elongated member 284 is positioned in the recessed portion 278 and has an outer arcuate surface 286.

Positioned within the elongated slot 270 are a pair of plate engaging members or clamps generally designated 288 and 290. The clamp 288 has a body portion 292 with a surface 294 that abuts the inclined side wall 272 of the elongated slot 270 and has a pin member 296 that extends into a receiving passageway 298 in the cylinder 40. A securing means as, for example, a ball member 300 is engaged in a detent in the pin 296 to maintain the clamp 288 within the slot 270. The body portion 292 has an arcuate recess 302 to provide clearance for an eccentric member 304.

A clamping member 306 has a triangular configuration in section as illustrated in FIGS. 10 and 11 and is secured to the body portion 292 by means of screws 308. Rotatably mounted on the clamping member 306 is a shaft 310 to which is nonrotatably secured the eccentric member 304. Suitable means are provided externally of the cylinder 40 to rotate the shaft 310 for purposes later explained.

The other clamp 290 has a body portion 312 with an external surface 314 that has the same arcuate configuration as the cylinder 40 and an arcuate lower surface 316 that has substantially the same arcuate configuration as the outer arcuate surface 286 of the elongated member 284. A second shaft 318 is rotatably mounted in the body portion 290 and has the eccentric member 320 nonrotatably secured thereto. A clamping member 320 has a triangular configuration in section and is secured to the body portion 290 by means of screws 322 and has an arcuate surface portion 324 for the eccentric member 304.

An annular plate 50 which may also be referred to as an annular cover has a pair of interrupted end flange portions 52 and 54. The flange 52 is positioned between the clamp body portion 292 and the clamping member 306 and engaged therebetween. Screws 308 urge the clamping member 306 against the body portion 292 and secure the interrupted flange 52 therebetween.

The annular plate 50 for an interrupted flange portion 54 is secured between the clamping member 320 and the body portion 312 of clamp 290 in a similar manner.

In assembling the annular plate 50 on the cylinder 40, the depending flange 52 is clampingly engaged by the clamp 288 and the depending flange 54 is engaged by
clamp 290. The clamp 288 with the end of plate 50 secured thereto is first positioned in the elongated slot 270 and secured therein by engaging the ball 300 in the detent of pin 296. The cylinder is then rotated in preferably a clockwise direction as viewed in FIGS. 1, 2, and 3 preferably by engaging the press drive mechanism to cover or enclose the cylinder 40 with the annular plate 50. The cylinder 40 is rotated until the clamp 290 is in an overlying relation with the slot 270. The clamp 290 with the flanged end of plate 50 secured thereto is then inserted in slot 270, as illustrated in FIG. 10. The shaft 310 associated with eccentric member 302 is then rotated exerting a radial inward force on the clamp 290 and engages clamp 290 to clamp 288. The shaft 318 is also rotated in a clockwise direction to urge the eccentric member 282 against the surface 280 and draw the annular plate 50 taut about the cylinder 40. In drawing the annular plate 50 taut against the cylinder 40, the arcuate surface 316 of clamp 290 moves along the arcuate surface 286 of the elongated member 284. With the two eccentricities 282 and 304, the annular plate 50 will be drawn taut over the cylinder 40 and rigidly secured thereto.

In FIGS. 2 and 4, the plate and blanked cylinders 24, 28, 32, and 36 have a greater diameter than the plate cylinders illustrated in FIGS. 1 and 3. The diameter of the respective plate and blanked cylinders has been increased by substituting a second annular plate 56 and an annular shim member 58 for the annular plate 50 on the standard cylinder 40, as illustrated in FIG. 11. The annular shim member 58 has a predetermined thickness and a longitudinal slot 60. The shim 58 is arranged to provide support for the plate 56 on the standard cylinder 40. The annular plate 56 is similar to the plate 50 in that it has longitudinal flange portions 62 and 64 that extend into longitudinal slot or gap 270 of the standard cylinder 40 and are engaged by the clamps 288 and 290.

The shims 58 and plate 56 are preferably premounted and the register checked on a separate master cylinder remote from the press. On the master cylinder the clamps 288 and 290 are secured to the respective flanges 62 and 64 of annular plate 56 with the shim 58 therebetween. The assembly of the plate 56 and shim 58 is then positioned on the cylinder 40 of the plate or blanked cylinders by first inserting the clamp 288 in slot 270 and rotating the cylinder until the annular plate 56 is wrapped around cylinder 40 and the clamp 290 is in an overlying relation with slot 270. Plate engaging member 290 with the flanged end 64 of plate 56 is then inserted in slot 270 and the clamp 288 is drawn taut by the eccentric member 282 and 304 to provide a cylinder having an enlarged diameter as illustrated in FIGS. 10 and 11.

The upper and lower blanket cylinders 32 and 36 are rotatably mounted in the respective pairs of upper and lower auxiliary frames 20 and 22. The auxiliary frame 22 is illustrated in detail in FIGS. 7, 8 and includes a body portion 74 and end portions 76 and 78. The body portion 74 has an outer wall 79 forming a recess 80 within the lower auxiliary frame 22. The outer wall 79 has threaded apertures 81 therein to receive studs 82. An annular bearing carrier 84 has a plurality of semi-circular threaded slots 86 through which the studs 82 extend into threaded apertures 81 in the body portion outer wall 79. The studs 82 mount the bearing carrier 84 within the recess 80 for limited rotation relative to the body portion 74. A portion of the bearing carrier outer surface 88 has a gear segment 90 formed thereon. An adjusting gear 92 is rotatably secured to the body portion 74 and meshes with the gear segment 90 on the bearing carrier 84. With this arrangement rotation of an actuator 94 connected to the gear 92 rotates the bearing carrier 84 within the recess 80 on the studs 82.

The blanket cylinder 36 has an end shaft 96 mounted in the central passageway 98 of an eccentric bearing generally designated by the numeral 100. The bearing 100 may be similar to the eccentric bearing disclosed in United States Patent No. 2,896,086 entitled "Anti-Friction Eccentric Journaling Mounting for a Rotatable Member" granted on May 30, 1961 to Carl O. Siebke. The bearing includes an outer sleeve 102 with and inner sleeve 104 and 106 that are eccentric to each other. The outer sleeve 102 is nonrotatably positioned in a circular opening in the bearing carrier 84. An outer bearing race 108 is mounted in the inner circular periphery 106 of the outer sleeve 102 and has inclined bearing elements 110. An intermediate annular member 112 has an outer circular periphery 114 and an inner circular periphery 116 that is eccentric to the outer periphery 114. The inner and outer peripheries of the intermediate member 112 are generally convex in shape to cooperate with the sets of roller bearings. A second series of roller bearings 118 abut the inner periphery 116 of intermediate member 112. An inner bearing race 120 is positioned within the inner periphery 116 of intermediate member 122 to maintain the roller bearings 118 in operative relation therebetween. The shaft end portion 96 of blanket cylinder 36 extends through the central opening or passageway 98 in the bearing inner race 120. A clamp 124 is secured to the eccentric intermediate member 112 to maintain the intermediate member 112 in fixed relation relative to the body frame 74. With this arrangement, rotation of the bearing carrier 84 by means of gear 92 moves the outer eccentric member 102 relative to the inner eccentric member 112 and moves the inner bearing race 116 and the blanket cylinder shaft 96 within the auxiliary frame 22 to thus move the blanket cylinder 36 within the auxiliary frame 22. The pairs of auxiliary frames 20 and 22 each include the above described eccentric bearing for mounting and adjusting the respective blanket cylinders 32 and 36.

The auxiliary frame members 20 and 22 movably secured to the vertical side frames 12 and 14 are similar in construction and similar parts will be designated by the same numerals. Referring to FIGS. 7, 3 and 4, the auxiliary side frame 22 has end portions 76 and 78 connected to the body portion 74. The end portion 76 has an upper horizontal edge portion 126 and a lower horizontal edge portion 128 and a vertical end portion 129. A pair of spaced longitudinal slots 130 and 132 extend through the end portion 76 adjacent the upper and lower edge portions 126 and 128. Between the slots 130 and 132 there are a plurality of pin receiving positioning apertures 134, 136, 138, 140, 142, 144 and 146 extending in a horizontal direction relative to the vertical edge portion 129. The auxiliary frame opposite end portion 78 has a similar upper edge portion 148 (FIGS. 3 and 4) and a lower edge portion 150 (FIGS. 1 and 4) which are aligned with the respective upper and lower edge portions 126 and 128 of edge portion 76. The opposite edge portion 78 has longitudinal slots 152 and 154 which are aligned with the slots 130 and 132 in the edge portion 76.

The vertical side frame 12 has a pair of spaced bottom rails 156 and 158 with rectangular recessed rail portions 160 and 162 arranged to receive the auxiliary frame end portions 76 and 78 with the respective end portions 128 and 130 in sliding relation with the surfaces of the rectangular recessed rail portions 160 and 162. The vertical side frame 12 has intermediate T shaped rails 164 and 166 with lower rectangular recessed rail surfaces 168 and 170 and upper rectangular recessed rail surfaces 172 and 174. The rectangular recessed rail portions 168 and 170 are parallel to the rectangular recessed rail portions 160 and 162 and are arranged to receive the upper portion of the auxiliary frame end portions 148 and of the lower auxiliary frame 22 to thereby slideably position the auxiliary frame 22 on the vertical side frame 12. The auxiliary frame 22 is similarly positioned on the vertical side frame 14 on similar rails. Bolts 176 extend through the slots 130, 132, 152 and 154 to fixedly position the auxiliary frames 22 relative to the respective vertical side frames 12 and 14. Both the
vertical side frames 12 and 14 have an aligned vertical slot 178 that is in underlying relation with one of the adjusting apertures 134, 136, 138, 140, 142, 144 or 146 depending on the relative position of the auxiliary frame 22 on the respective vertical side frame 12. For example, in FIG. 3 the vertical slot 178 is aligned with the adjusting aperture 146 in the lower auxiliary frame 22 and in FIG. 4 the vertical slot 178 is in underlying relation with the upper adjusting aperture 134. To index the relative position of the auxiliary frames 22 on the main frames 12 and 14, the auxiliary frames 22 are inserted linearly on the respective rail portions until the desired adjusting aperture is in overlaying relation with the vertical slot 178 in both of the side frames 12 and 14. A pin member 180 preferably having substantially the same diameter as the width of the slot 178 is inserted in the indexing aperture in the side frame and extends into the vertical slot 178 to accurately position the respective lower auxiliary frames 22 on the vertical side frames 12 and 14.

The vertical side frames 12 and 14 have brackets 182 extending laterally therefrom adjacent the vertical edge 129 of the auxiliary side frame 22. A bolt 184 is threadedly secured in the bracket 182 and abuts the vertical edge portion 129 of the lower auxiliary frame 22. A lock nut 186 locks the bolt 184 in the preselected position on the respective vertical side frame. Both of the vertical side frames 12 and 14 of the brackets 182 are exactly the same vertically therefrom adjacent the opposite end 78 of the lower auxiliary frame 22. A second adjusting bolt 190 is threadedly secured in the bracket 188 and abuts the other vertical edge portion 151 of the lower auxiliary frame 22. A similar lock nut 192 maintains the bolt in its adjusted position.

The vertical side frames 12 and 14 have upper rail portions 194 and 196 extending laterally therefrom with rectangular recessed rail portions 198 and 200. The upper auxiliary frames 20 which are similar to the lower auxiliary frames 22 are slingly mounted in the lower rectangular recessed rail portions 172 and 174 and the upper rectangular recessed rail portions 198 and 200 to permit the upper auxiliary frame 20 to be adjusted longitudinally relative to the respective vertical side frames 12 and 14. Other brackets 182 and 188 are provided on the side frames 12 and 14 for other adjusting bolts 184 and 190 to fixedly position the upper auxiliary frames 20 on the vertical side frames 12 and 14. Bolts 176 extend through similar slots 130, 132, 152 and 154 to secure the upper auxiliary frames 20 in their adjusted position. The vertical side frames 12 and 14 have other vertical adjusting slots 178 that are in underlying relation with the indexing apertures 134, 136, 138, 140, 142, 144 and 146 in the upper auxiliary frames 20. As illustrated in FIGS. 3 and 4, the indexing apertures 134, 136, 138, 140, 142, 144 and 146 and the vertical slots 178 are positioned on opposite ends of the respective frames.

The drive mechanism for the plate and blanket cylinders 24, 32, 28 and 36 is illustrated in FIGS. 5 and 6. The plate cylinder 24 has a shaft end portion 202 on which a gear 204 and a bearer 206 are nonrotatably mounted. Similarly, the upper blanket cylinder 32 has a drive gear 208 and a bearer 210 nonrotatably mounted thereon. A lever 212 is pivotally positioned on the plate cylinder shaft 202 and has rotatably mounted thereon intermediate gears 214 and 216 and bearers 215 and 217. A second lever 218 is pivotally mounted on the shaft 220 of the upper blanket cylinder 32. The opposite end of lever 218 is pivotally connected to lever 212 to pivot about the axis of gear 216. The intermediate gear 214 is in meshing relation with the gear 204 on the upper blanket cylinder 32 and intermediate gear 216 meshes with both intermediate gear 214 and with the gear 208 on the upper blanket cylinder 32. The shaft 202 of the upper blanket cylinder 24 is suitably journaled in the vertical side frame 12 and is connected to suitable bevel gearing within gear box 222.
are illustrated in abutting relation with the plate cylinders 24 and 28 with the springs 262 in an expanded position. The springs 262 continually urge the movable form rollers 248 and 250 against the surface of the plate cylinders instead of the diameter of the plate cylinders. It should be understood that other inker arrangements may be used with the previously described web press as long as the form rollers are maintained in operative abutting relation with plate cylinders of different diameters.

OPERATION

The variable cut-off web press 10 may be used with plate cylinders of a relatively small diameter, as illustrated in FIGS. 1 and 3, or with plate and blanket cylinders of a larger diameter, as illustrated in FIGS. 2 and 4. Plate and blanket cylinders of diameters between the diameters illustrated in FIGS. 3 and 4 may also be positioned on the press to provide different sized printed images. For convenience, seven different diameter cylinders can be positioned on the web press previously described, the number being controlled by the number of index apertures 134, 136, 138, 140, 142, 144 and 146 provided on the auxiliary frames 20 and 22. It should be understood, however, depending on the desired number of different lengths of printed image desired, the number of different diameter cylinders that may be positioned on the press may be increased or decreased by increasing or decreasing the number of indexes on the auxiliary frames 20 and 22.

To change from one length of printed image of a printed web to a second different length, the plate cylinders 24 are removed therefrom and the plates and shims, where necessary, for the other length of printed image are positioned on the standard cylinder 40. For convenience a conversion from the size cylinder illustrated in FIGS. 1 and 3 to the size cylinder illustrated in FIGS. 2 and 4 will be described in reference to FIGS. 1—4, 10 and 11. Assuming the press has been operating with cylinders of the diameter illustrated in FIGS. 1 and 3, with the lateral displacement of the blanket cylinders 32 and 36 and the angular displacement between the plane through the axes 34 and 38 illustrated in FIG. 1, the press is stopped and the indexing pins 180 are moved from the apertures 134 and slots 178 in all of the auxiliary frames 20 and 22. The bolts 176 are loosened to release the auxiliary frames 20 and 22 from the respective side frames 12 and 14 and the auxiliary frames 20 are moved in a direction from right to left, as illustrated in FIG. 3, to move the blanket cylinder 32 away from plate cylinder 24. The eccentric bearing support 84 may also be adjusted to move the blanket cylinder downwardly to a limited extent and away from the plate cylinder 24. The clamp 290 (FIG. 10) is disengaged from the cylinder 40 by rotating shafts 310 and 318 with eccentrics 364 and 282 in a counterclockwise direction and the plate 50 is loosened on the standard cylinder 40. The clamp 290 with flange 54 is removed from the slot 270 and the cylinders of the press are slowly rotated through a complete revolution while the relatively flexible plate 50 is being removed from the standard cylinder 40. The same procedure is repeated with the plate cylinder 24. The lower auxiliary frames 22 are moved longitudinally in a similar manner to space the lower blanket cylinder 36 from the lower plate cylinder 28 and the upper blanket cylinder 32. The plates 50 secured to the plate and blanket cylinders 28 and 36 are removed therefrom in a similar manner.

The shim 58 and plate 56 for the plate and blanket cylinders 24, 32 and 36 are premounted and the register checked on the master cylinder remote from the press. The shims 58 and plates 56 with the clamps 288 and 290 secured thereto are removed from the master cylinder and positioned on the standard cylinder 40 of the respective plate and blanket cylinders in the following manner. The clamp 288 is positioned in the elongated slot 270 and engaged therein by the ball 300 extending into the detent on pin 296. The cylinder 40 is then slowly rotated by the press drive mechanism to position the shim 58 and plate 56 on the outer surface of the cylinder 40. The cylinder is rotated until the clamp 290 is in overlying relation with the elongated slot 270. The clamp 290 is inserted in the slot 270 in abutting relation with the clamp 288 and the shafts 310 and 318 are rotated to engage the clamps 288 and 290 within the slot 270 and pull the plate 56 up into intimate contact with the cylinder 40. The shim 58 can be fabricated of any suitable material, as for example, any commercially available relatively flexible and dimensionally stable plastic or reinforced rubber or a relatively flexible metal or alloy similar to that now employed as plates in the graphic arts industry.

Although the clamps 288 and 290 have been described for clamping the various plates to the standard cylinder, it should be understood that other types of locking devices may be employed.

After the shim 58 and plates 56 have been secured to all of the cylinders, the bolts 184 and 190 are adjusted in the brackets 182 and 188 to move the index aperture of the respective upper and lower auxiliary frames into overlying relation with the vertical slots 178. For example, in FIG. 4, the lower auxiliary frame 22 is adjusted by means of bolts 184 and 190 to position the indexing aperture 134 of auxiliary frame 22 in overlying relation with the vertical slot 178. Both auxiliary frames 22 supporting the lower blanket cylinder are so positioned on the respective vertical side frames 12 and 14. Pins 180 are moved in the apertures 134 and extend into the vertical slots 178. The bolts 176 are then tightened to secure the lower auxiliary frame 22 in this adjusted position. Similarly, each of the upper auxiliary frames 20 are moved longitudinally by the bolts 184 and 190 until the lower indexing aperture 146 is in alignment with the vertical slot 178 and a pin 180 is inserted through the indexing aperture 146 into the slot 178. Again, bolts 176 are tightened to secure the upper auxiliary frames 22 in fixed relation on the vertical side frames 12 and 14. The actuator 94 (FIG. 7) is then rotated to move the blanket cylinders 32 and 36 into abutting relation with each other and also into abutting relation with the plate cylinders 24 and 28. The lateral displacement of the blanket cylinders 32 and 36 is in a similar manner of the plate and the cylinders of the press are slowly rotated through a complete revolution while the relatively flexible plate 50 is being removed from the standard cylinder 40. The same procedure is repeated with the plate cylinder 24. The lower auxiliary frames 22 are moved longitudinally in a similar manner to space the lower blanket cylinder 36 from the lower plate cylinder 28 and the upper blanket cylinder 32. The plates 50 secured to the plate and blanket cylinders 28 and 36 are removed therefrom in a similar manner.

FIG. 9 illustrates the arcuate path followed by the axis of the upper blanket cylinder 32 in various positions of adjustment. The vertical lines in FIG. 9 correspond to the adjusted positions similar to indexing apertures 134, 136, 138, 140, 142, 144 and 146.

For reasons of brevity, the description of the printing plate on the plate cylinders and the printing blanket for the blanket cylinder have been omitted. It should be understood, however, that the printing plate may be the plate 50 or the plate cylinders 24 and 28 and the printing blanket may be the plate 56 or the plate 56 positioned on the blanket cylinders 32 and 36. Other suitable means for providing printing plates and printing blankets may be employed without departing from the herein described invention.

The eccentric bearings in which the blanket cylinders are journaled may also be employed to move the blanket cylinders into "on" position for printing or into "off" printing position where the cylinders are spaced relative to each other. The eccentric bearing may also be used to adjust the spacing between the blanket cylinders for paper of different thickness. Where more relative movement between the cylinders is desired, the plate cylinders may also be jouralled in eccentric bearings mounted in the side
frames 12 and 14. The eccentric rings of the bearings may be adjusted relative to each other to move the axis of the plate cylinders for adjustment of the plate cylinders in the main frame relative to the blanket cylinders.

According to the provisions of the patent statutes, I have explained the principle, preferred construction, and mode of operation of my invention and have illustrated and described what I now consider to represent its best embodiments. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. A variable size web fed printing press comprising, a pair of vertical spaced main frame members, a pair of auxiliary frame members with one of said auxiliary frame members mounted on each main frame member and operable to move linearly relative to said respective frame member, a plate cylinder journaled in said main frame members for rotation therein, a blanket cylinder journaled in said auxiliary frame members for rotation therein, the axis of said blanket cylinder being parallel to the axis of said plate cylinder, an impression cylinder positioned adjacent to said blanket cylinder, said blanket cylinder displaced laterally from said impression cylinder, means to vary the circumferential dimension of both said plate and blanket cylinders while said plate and blanket cylinders are journaled in said main frame members and said auxiliary frame members respectively to thereby change the size of the product printed by said blanket cylinder, drive means to rotate said plate and blanket cylinders at the same peripheral speed, and means to move said auxiliary frame members linearly on said main frame members to simultaneously move the blanket cylinder toward or away from both said plate cylinder and said impression cylinder a sufficient distance so that said plate and blanket cylinders of different circumferential dimensions may be positioned in operative abutting relation to each other and said blanket cylinder positioned in operative abutting relation with said impression cylinder.

2. A variable size web fed printing press as set forth in claim 1 which includes, rail members mounted on said main frame members, said auxiliary frame members mounted on said rail members for linear movement of said blanket cylinder relative to said plate cylinder.

3. A variable size web fed printing press as set forth in claim 1 which includes, adjustment means mounted on said auxiliary frame members, said blanket cylinder journaled in said adjustment means for movement of said blanket cylinder relative to said auxiliary frame members.

4. A variable size web fed printing press as set forth in claim 3 in which said adjustment means includes, an eccentric bearing mounted in each of said auxiliary frame members, said blanket cylinder journaled in said eccentric bearing, and means to rotate each of the outer annular bearing carriers of said eccentric bearings relative to intermediate annular members of said eccentric bearings to thereby move said blanket cylinder relative to said auxiliary frame members.

5. A variable size web fed printing press as set forth in claim 1 which includes, an elongated slot in each of said main frame members, a plurality of positioning apertures in each of said auxiliary frame members, said auxiliary frame members positioned with at least one of said positioning apertures in overlying relation with said vertical slot, and pin means extending through one of said positioning apertures in said auxiliary frame into said elongated slot to position said auxiliary frame member on said main frame member.

6. A variable size web fed printing press as set forth in claim 1 in which said drive means includes, a first gear nonrotatably secured to said plate cylinder, a first lever pivotedly secured to said plate cylinder, a second gear rotatably mounted on said first lever and in meshing relation with said first gear, a third gear nonrotatably mounted on said blanket cylinder, a second lever pivotally secured adjacent one end to said blanket cylinder and pivotally secured adjacent the other end to said first lever, a fourth gear rotatably mounted on said first lever in meshing relation with said third gear on said blanket cylinder and said second gear on said first lever so that drive is transmitted from said first gear to said third gear through said second and fourth gears, said levers operable to maintain said gears in meshing relation for plate and blanket cylinders of different circumferential dimension, and drive means to rotate said plate cylinder and said first gear.

7. A variable size web fed printing press as set forth in claim 1 in which said means to vary the circumferential dimension of said plate and blanket cylinders includes, a base cylinder of fixed circumferential dimension having a longitudinal slot with an inclined wall, a first clamp member engaging a depending longitudinal flange of an annular cover member, said first clamp member positioned in said slot in abutting relation with said inclined wall, means to engage said first clamp member in said slot, a first eccentric member rotatably positioned in said first clamp member, a second clamp member engaging the other depending longitudinal flange of said annular cover member, said second clamp member positioned in said longitudinal slot adjacent to said first clamp member, a second eccentric member rotatably positioned on said second clamp member, said second eccentric member abutting a surface of said longitudinal slot and urging said cover member circumferentially toward said first clamp member, said first eccentric member urging said second clamp member radially inwardly toward said base cylinder axis, and said clamp members operable to secure annular cover members having different circumferential dimensions to said base cylinder.

8. A variable size web fed printing press as set forth in claim 7 which includes, an annular shim member positioned between the outer surface of said base cylinder and the inner surface of said annular cover to provide support for said annular cover secured to said base cylinder by said clamp members.

9. A method of printing different sized product on a web fed press comprising, simultaneously moving a blanket cylinder away from both a plate cylinder and an impression cylinder while said cylinders remain journaled in said press, removing an annular cover having a first circumferential dimension from said plate cylinder while said plate cylinder remains journaled in said press, removing an annular cover having said first circumferential dimension from said blanket cylinder while said blanket cylinder remains journaled in said press, positioning a second annular cover having a second circumferential dimension different from said first cir-
13 circumference dimension on said plate cylinder and engaging said second annular cover to said plate cylinder while said plate cylinder remains journaled in said press, positioning a second annular cover having a second circumference dimension different from said first circumference dimension on said blanket cylinder while said blanket cylinder remains journaled in said press, engaging said second annular cover to said blanket cylinder, and thereafter moving said blanket cylinder toward both said plate cylinder and said impression cylinder into abutting printing relation with said plate cylinder and said impression cylinder for printing a different sized product on said press.

10. A variable size web fed perfecting press comprising, a pair of vertical spaced main frame members, a pair of upper auxiliary frame members with one of said auxiliary frame members mounted on each main frame and operable to move linearly on said respective main frame members, a pair of lower auxiliary frame members with one of said auxiliary frame members mounted on each main frame member and operable to move linearly on said respective main frame member, an upper plate cylinder having a removable cylindrical main cover thereon journaled in said main frame members for rotation therein, a lower plate cylinder having a removable cylindrical cover thereon journaled in said main frame members for rotation therein in spaced relation to said upper plate cylinder, an upper blanket cylinder having a removable cylindrical cover thereon journaled in said upper auxiliary frame members for rotation therein, the axis of said upper blanked cylinder being parallel to the axis of said plate cylinders, a lower blanket cylinder having a removable cylindrical cover thereon journaled in said lower auxiliary frame members for rotation therein, the axis of said lower blanket cylinder being parallel to the axis of said plate cylinder, said blanket cylinders being displaced laterally relative to each other, said upper and lower blanket cylinders positioned closely adjacent to each other and spaced a distance from each other corresponding to the thickness of the web to be printed and adapted to receive the web therebetween and simultaneously print on both sides of said web, means to move said upper auxiliary frame members on said main frame members to simultaneously move said upper blanket cylinder a sufficient distance away from both said upper plate cylinder and away from said lower blanket cylinder so that the covers on said upper plate and blanket cylinders may be removed therefrom, means to move said lower auxiliary frame members on said main frame members to simultaneously move said lower blanket cylinder a sufficient distance away from both said lower plate cylinder and said upper blanket cylinders so that the outer cover on said lower plate and blanket cylinders may be removed therefrom, means to vary the circumference dimension of said plate and blanket cylinders by positioning outer cylinder coverings having different circumference dimensions thereon while said cylinders remain journaled in said respective frame members to thereby change the size of the product printed by said blanket cylinders without removing said cylinders from said press, and drive means to rotate said upper and lower plate and upper and lower blanket cylinders at the same peripheral speed.

11. A variable size web fed perfecting press as set forth in claim 10 which includes, upper, intermediate and lower rail members mounted on said main frame members in parallel spaced relation to each other, said upper auxiliary frame members mounted on said upper and intermediate rail members for linear movement of said upper blanket cylinder relative to said upper plate cylinder and said lower blanket cylinder, said lower auxiliary frame members mounted on said intermediate and lower rail members for linear movement of said lower blanket cylinder relative to said lower plate cylinder and said upper blanket cylinder.

12. A variable size web fed perfecting press as set forth in claim 10 which includes, adjustment means mounted on said upper and lower auxiliary frame members, said upper and lower blanket cylinders journaled in said adjustment means for movement of said upper and lower blanket cylinders toward and away from each other.

13. A variable size web fed perfecting press as set forth in claim 11 which includes, an eccentric bearing member mounted in each of said auxiliary frame members, said upper and lower blanket cylinders journaled in said respective eccentric bearings, and means to rotate each of the outer annular bearing carriers of said eccentric bearings relative to intermediate annular members of said eccentric bearings to thereby move said blanket cylinders toward and away from each other.

14. A variable size web fed perfecting press as set forth in claim 10 which includes, a plurality of elongated slots in said main frame members, a plurality of positioning apertures in each of said auxiliary frame members, each of said auxiliary frame members positioned with at least one of said positioning apertures in overlying relation with said vertical slot therebeneath, and pin means extending through said positioning apertures in said respective auxiliary frame into said elongated slot to position said auxiliary frame members on said main frame member in preselected positions relative to each other to thereby position said blanket cylinders relative to each other.

15. Apparatus for engaging an outer annular cover having longitudinal depending flanges to a cylinder having an elongated slot therein comprising, a first clamp member having a body portion abutting an inclined side wall of said slot, means to engage said first clamp member in said longitudinal slot in abutting relation with said inclined wall, a first eccentric member rotatably positioned in said first clamp member, said first clamp member engaging one of said depending flanges of said cover member, said cover member extending around said cylinder, a second clamp member engaging the other depending longitudinal flange of said cover member, said second clamp member positioned in said longitudinal slot adjacent said first clamp member, a second eccentric member abutting a surface of said longitudinal slot and urging said cover member circumferentially toward said first clamp member, said first eccentric member urging said second clamp member radially inwardly toward said base cylinder axis, and said clamp members operable to secure annular cover
members having different circumferential dimensions to said base cylinder.

**References Cited**

<table>
<thead>
<tr>
<th>Patent Number</th>
<th>Date</th>
<th>Inventor</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,616,751</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,763,124</td>
<td>6/1930</td>
<td>Barber</td>
<td>101—378 UX</td>
</tr>
<tr>
<td>2,186,764</td>
<td>1/1940</td>
<td>Meisel</td>
<td>101—415.1</td>
</tr>
<tr>
<td>3,463,082</td>
<td>8/1969</td>
<td>Kaufer</td>
<td>101—144</td>
</tr>
</tbody>
</table>

**UNITED STATES PATENTS**

<table>
<thead>
<tr>
<th>Patent Number</th>
<th>Date</th>
<th>Inventor</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>973,599</td>
<td>10/1910</td>
<td>Wheat</td>
<td>101—220 X</td>
</tr>
<tr>
<td>1,086,722</td>
<td>2/1914</td>
<td>Langston</td>
<td>101—247 UX</td>
</tr>
<tr>
<td>1,100,086</td>
<td>6/1914</td>
<td>Firm</td>
<td>101—220</td>
</tr>
<tr>
<td>1,320,358</td>
<td>10/1919</td>
<td>Bacon</td>
<td>101—247 UX</td>
</tr>
<tr>
<td>1,358,843</td>
<td>11/1920</td>
<td>Grass</td>
<td>101—142</td>
</tr>
<tr>
<td>1,590,742</td>
<td>6/1926</td>
<td>Goulding</td>
<td>101—220 X</td>
</tr>
</tbody>
</table>

**FOREIGN PATENTS**

<table>
<thead>
<tr>
<th>Patent Number</th>
<th>Date</th>
<th>Country</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>855,408</td>
<td>11/1952</td>
<td>Germany</td>
<td>101—415.1</td>
</tr>
<tr>
<td>387,660</td>
<td>2/1965</td>
<td>Switzerland</td>
<td>101—220</td>
</tr>
</tbody>
</table>

CLYDE I. COUGHENOUR, Primary Examiner

U.S. Cl. X.R.

101—143, 179, 247, 378, 415.1