

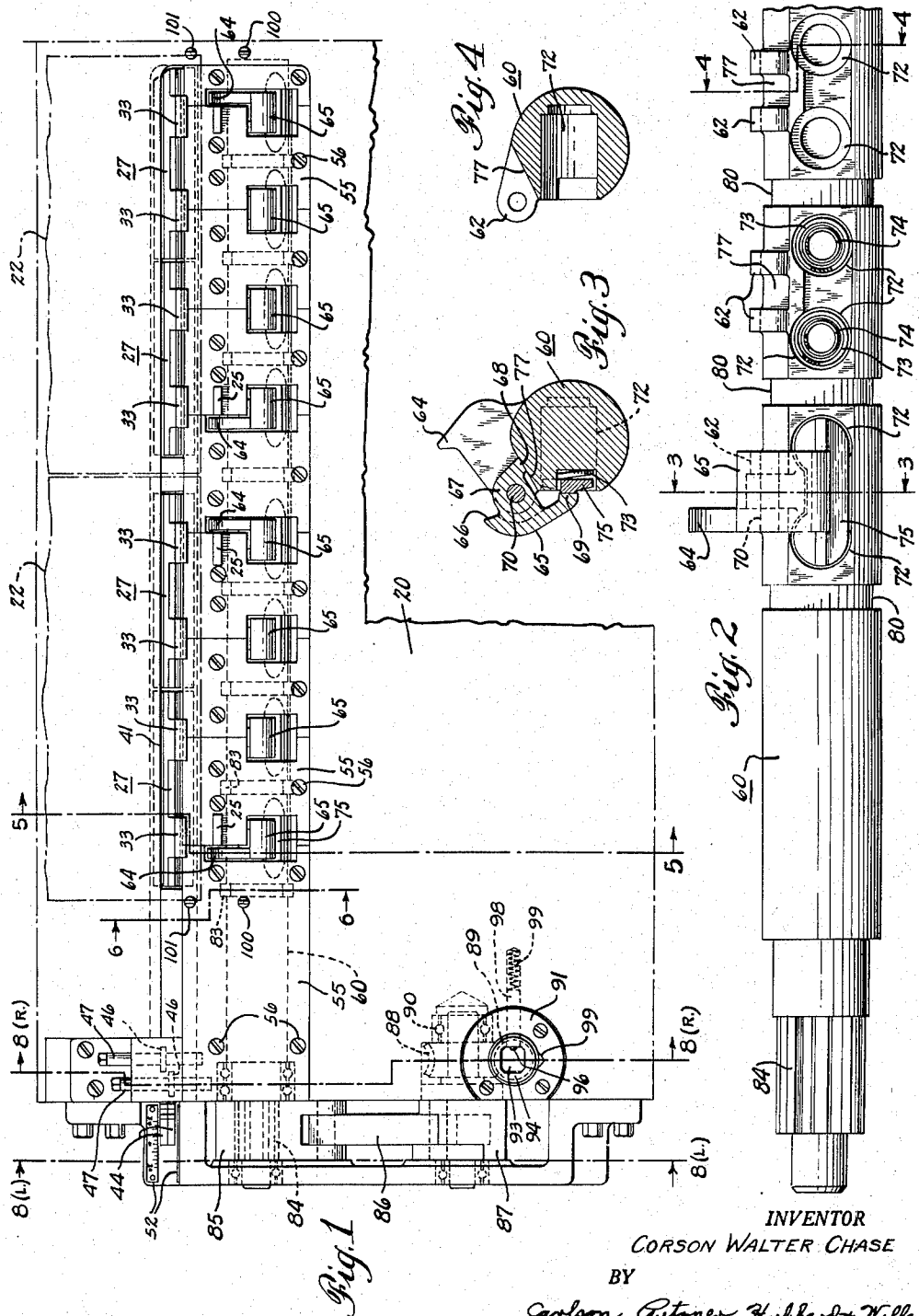
Aug. 25, 1959

C. W. CHASE
PRINTING CYLINDERS

2,900,903

Original Filed Sept. 10, 1948

5 Sheets-Sheet 1



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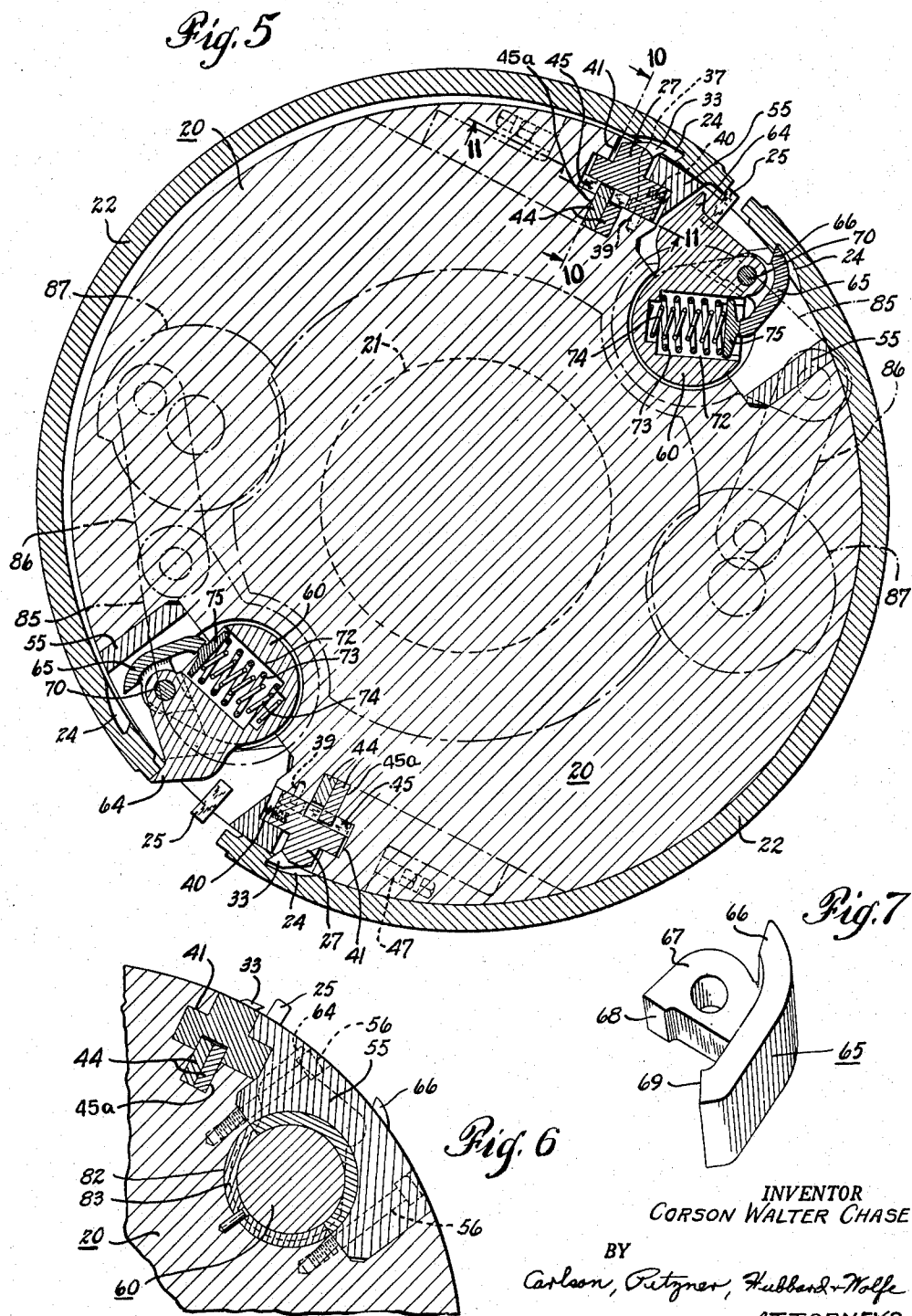
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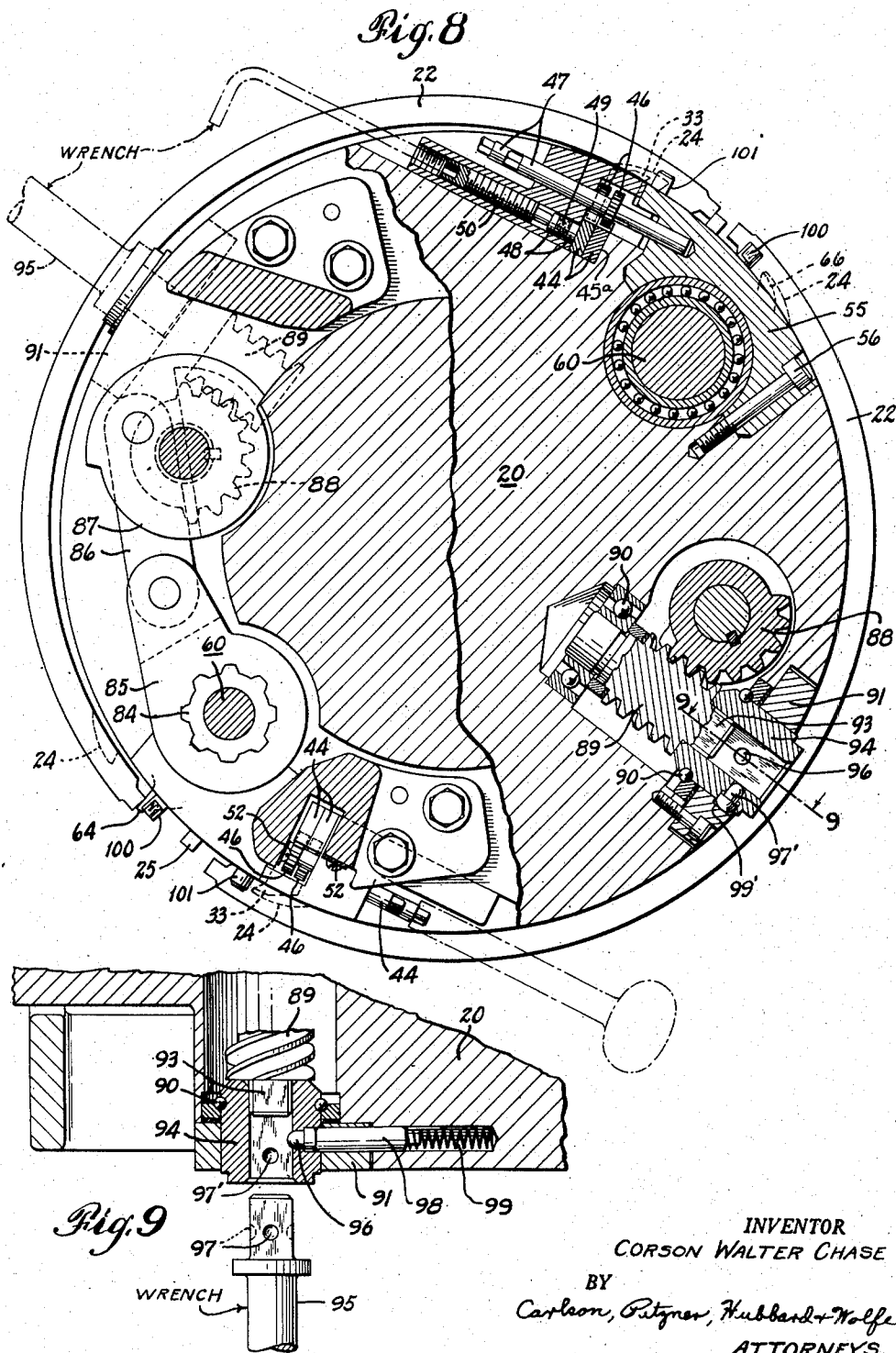
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5 Sheets-Sheet 3



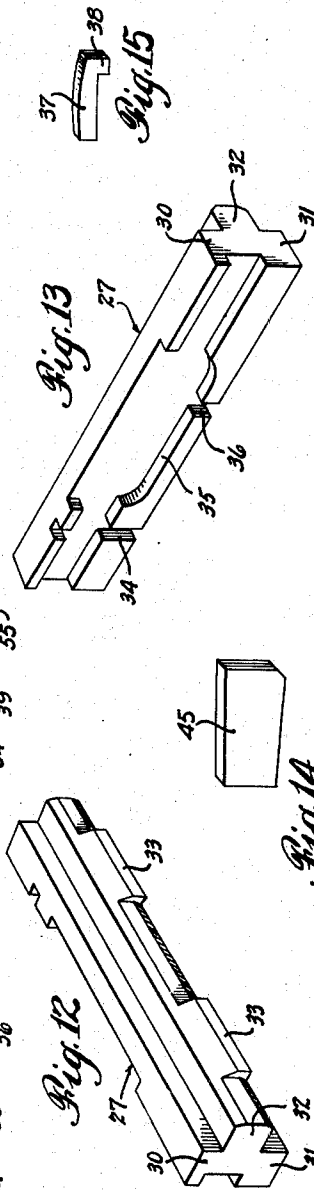
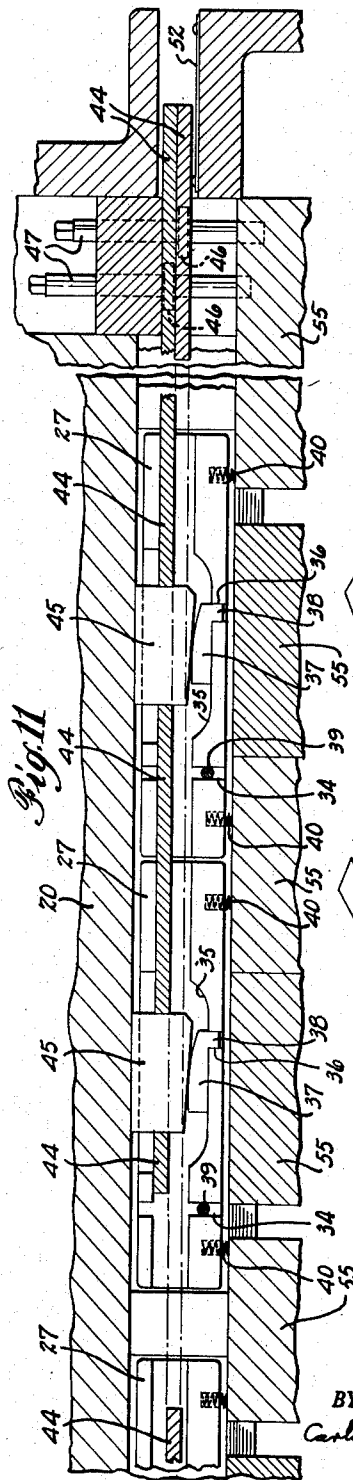
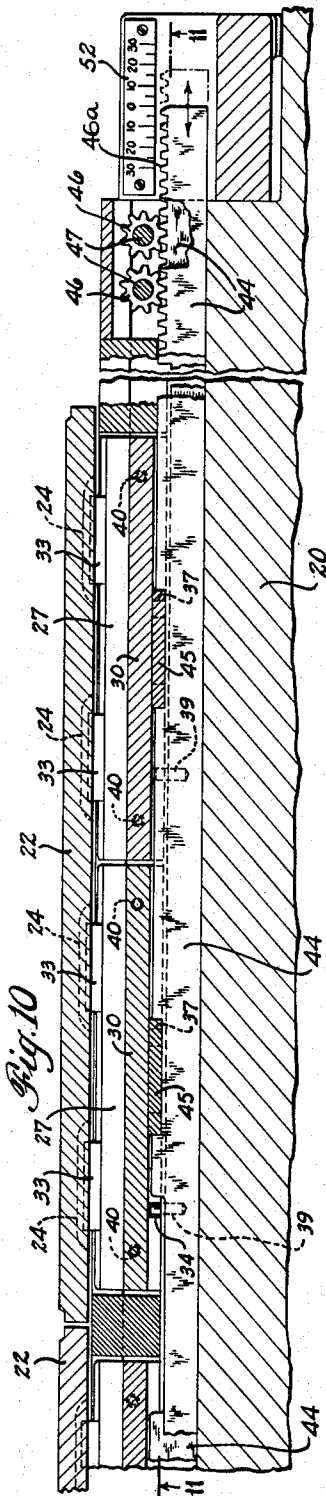
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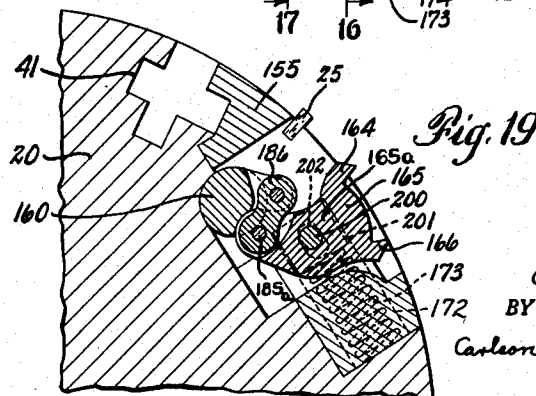
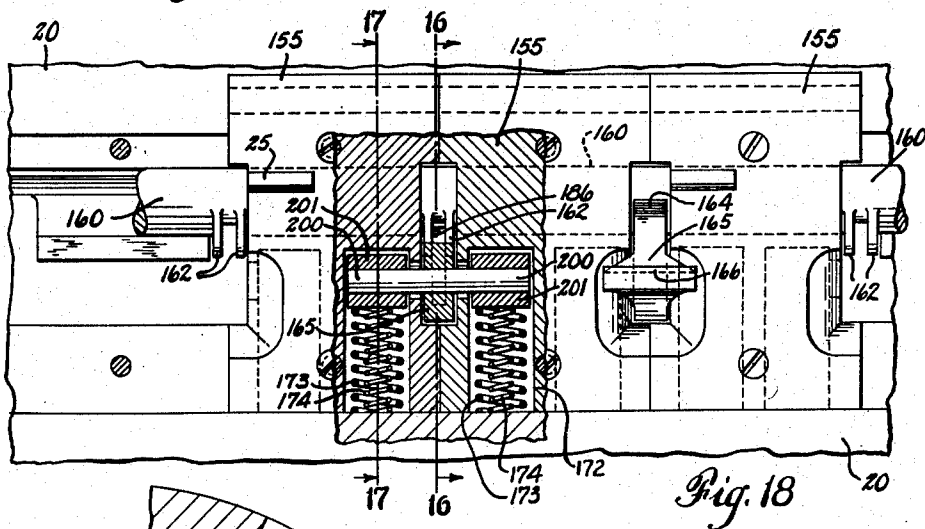
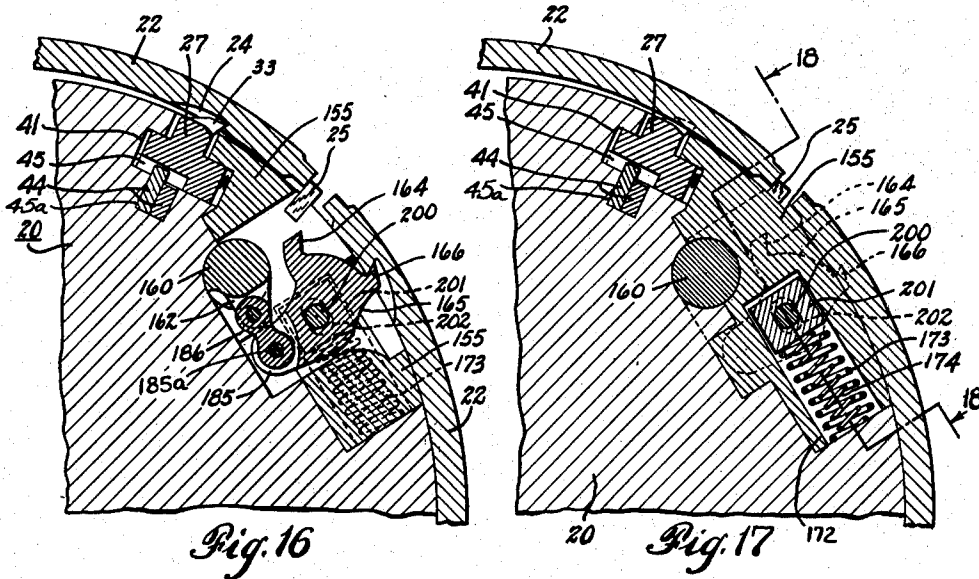
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PRINTING CYLINDERS

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2,900,903

PRINTING CYLINDERS

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Original application September 10, 1948, Serial No. 48,622, now Patent No. 2,639,668, dated May 26, 1953. Divided and this application March 4, 1953, Serial No. 340,267

20 Claims. (Cl. 101—378)

This invention relates to plate cylinders for rotary printing presses, and particularly to tension lockup plate cylinders adapted to hold printing plates by circumferentially applied tension.

The present application is a division of the co-pending joint application of the present applicant and Kent Roger Manning, Serial No. 48,622, filed September 10, 1948, and issued on May 26, 1953 as Patent No. 2,639,668. In certain respects the present invention is an improvement on the inventions disclosed and claimed in the U.S. patent to E. W. Worthington, No. 2,236,230, and the U.S. patent to Curtis S. Crafts, No. 2,428,263.

An object of the invention is to provide a plate cylinder having improved means for individually positioning or registering a plurality of printing plates disposed in generally aligned relation longitudinally of the cylinder and for holding plates on the cylinder under circumferential tension.

A further object is to provide a plate cylinder having means for individually registering a plurality of printing plates carried on the cylinder in longitudinally spaced, generally aligned, end to end relation, together with means for resiliently applying circumferential tension to the plates.

Another object is to provide a tension lock-up plate cylinder having a registering mechanism for individually registering a plurality of longitudinally aligned printing plates, the mechanism being operable from the ends of the cylinder.

It is a further object of the invention to provide a tension lock-up printing cylinder having a plurality of take-up hooks supported on bodily movable, resiliently biased pivots and connected to an actuating shaft adapted to swing the hooks simultaneously into and out of tensioning relation with one or more printing plates.

Further objects and advantages of invention will appear from the following description of illustrative embodiments of the invention. The description is to be taken in connection with the accompanying drawings, in which:

Fig. 1 is a fragmentary developed plan view showing a portion of an exemplary printing cylinder constructed in accordance with the present invention. In the view the printing plates are indicated by dot-dash lines.

Fig. 2 is a fragmentary detail view of an assembly which forms a part of the plate cylinder shown in Fig. 1, the assembly including an actuating shaft and associated plate take-up hooks.

Figs. 3 and 4 are cross-sectional views taken respectively along planes indicated by lines 3—3 and 4—4 in Fig. 2.

Fig. 5 is a sectional view taken generally along a plane indicated in Fig. 1 by a line 5—5.

Fig. 6 is a fragmentary sectional view taken along a plane indicated in Fig. 1 by a line 6—6.

Fig. 7 is a perspective view of one of the plate take-up hooks.

Fig. 8 is a sectional view having left and right-hand

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portions taken respectively along planes indicated in Fig. 1 by lines 8(L.) and 8(R.).

Fig. 9 is a sectional view taken along a plane indicated in Fig. 8 by a line 9—9.

Fig. 10 is a fragmentary longitudinal sectional view taken along a plane indicated in Fig. 5 by a line 10—10.

Fig. 11 is a fragmentary longitudinal sectional view taken along a plane indicated by a line 11—11 in Fig. 5.

Fig. 12 is a perspective view of a registering plate hook which forms a part of the plate cylinder of Fig. 1.

Fig. 13 is another perspective view showing the underside of the registering hook.

Fig. 14 is a perspective view of a wedge member adapted to effect adjustment of the registering hook.

Fig. 15 is a perspective view of a cam adapted to coast with the wedge of Fig. 14.

Figs. 16 and 17 are fragmentary transverse sectional views of a modified printing cylinder constituting a second embodiment of this invention, the views being taken along planes indicated in Fig. 18 by lines 16—16 and 17—17, respectively.

Fig. 18 is a fragmentary longitudinal view of the modified cylinder, partly in section, and taken along the line 18—18 in Fig. 17.

Fig. 19 is a view similar to Fig. 16 but showing the mechanism of the modified cylinder in plate releasing position.

Considered now in greater detail, the illustrative printing cylinder shown in Figs. 1—15 of the drawings comprises an elongated cylindrical body 20 (Figs. 1 and 5), which may be a solid steel forging, provided in the usual manner at its opposite ends with a pair of end shafts 21, by means of which the cylinder may be rotatably supported and driven. In this instance the cylinder is adapted to support eight printing plates 22, arranged in pairs around the cylinder and in groups of four longitudinally of the cylinder. In the conventional manner, the plates are nearly semi-cylindrical in extent. A plurality of axially aligned milled recesses or pockets 24 are formed in the underside or interior surface of each plate adjacent both of its straight or longitudinal edges. The pockets are adapted to be engaged by plate hooks which may be utilized to tension the plates and thereby secure them firmly to the cylinder.

To facilitate installation and removal of the plates, the cylinder is provided with pairs of longitudinally extending guide bars 25 (Fig. 5) along which one end of each plate may slide as the plate is moved longitudinally onto the cylinder. The bars are embedded in the surface of the cylinder body 20 and project outwardly from the surface less than the printing height of the plates 22.

Provision is made for individually registering the printing plates. This is accomplished by means of a registering mechanism including circumferentially adjustable elements for engaging the pockets 24 at one end of each plate. At the other end of each plate, provision is made for applying circumferential tension to the pockets 24 in the plate and thus clamping the plate to the cylinder so securely that dislocation of the plate will not occur during high speed rotary printing.

The mechanism for individually registering the plates 22 comprises a plurality of registering hooks or finger bars 27 (Figs. 12 and 13) in the form of bars which are generally T-shaped in cross-section. As illustrated, each hook bar 27 is provided with outwardly projecting hook members or fingers 33 adapted to engage the pockets 24 in one end of one plate. The hook members 33 are formed on a radial stem portion 32 of the bar 27. The portion 32 surmounts a base portion having extensions or legs 30 and 31. The underside of the base portion 30, 31 is formed with transverse slots 34 and 36 and a longi-

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tudinal recess 35. Mounted in the recess 35 is a cam 37 having a tongue 38 which fits into the transverse slot 36. The cam surface on the cam 37 is rounded as shown in Figs. 11 and 15.

The hook bars 27 are mounted in diametrically opposite T-shaped slots 41 (Fig. 5) formed in the cylinder body 20, the hook bars thus being retained in the cylinder against radial movement. To facilitate assembly and manufacture of the cylinder, one side of each T-slot 41 is preferably formed by a filler piece 55, which is secured to the cylinder body 20 by screws 56 and also forms part of the cylinder surface. In the present instance four hook bars 27 are positioned in each T-slot 41, two hook bars being provided for each plate. The T-slots may be plugged or closed off at intervals to separate the groups of two hook bars provided for the respective plates. The T-slots 41 are made sufficiently wide to permit substantial transverse movement of the hook bars 27 in the slots, along a chord of the cylinder, or in other words in a generally circumferential direction. Longitudinal movement of the hook bars 27 is prevented by a plurality of generally radial pins 39 (Figs. 10 and 11) mounted in the bottom of each T-slot in position to engage the transverse slots 34 in the hook bars 27. The hook bars 27 are drilled to receive coil springs 40 which abut against one side of the T-slot 41 and thus urge the hook bars circumferentially in one direction.

Provision is made for moving the hook bars 27 and thus adjusting the circumferential positions of the plates. For this purpose a plurality of longitudinally movable actuating bars or rods 44 (Figs. 10 and 11) are mounted in a longitudinal groove or recess 45a formed in the bottom of each of the T-slots 41. In the present instance, eight of the actuating bars 44 are provided, one for each plate. Two of the bars 44 are mounted in side-by-side relation in each end of each T-slot. Thus, each of the bars extends from one of the plates to one end or the other of the cylinder.

Camming means are provided to connect the hook bars 27 with the respective actuating bars 44 so that the hook bars will be moved circumferentially of the cylinder in response to longitudinal movement of the actuating bars. In the illustrated embodiment, two cam blocks or wedges 45 (Figs. 11 and 14) are mounted in closely fitting notches or slots formed in the upper edge of each actuating bar 44. The wedges 45 are disposed in the recesses 35 of the two overlying hook bars 27, in position to engage the cam members 37 on the hook bars 27. The wedges react against the side wall of the T-slot, opposite from the cam members 37. Thus, each actuating bar 44 is connected to a pair of adjacent hook bars 27, both of which engage pockets in a single one of the printing plates 22. At each end of the cylinder and in each of the T-slots 41, the two actuating bars disposed in end-to-end relation are associated with respective pairs of hook bars 27 which are adapted to engage adjacent axially aligned plates, one positioned at the end of the cylinder and the other inwardly of the end. It is apparent in Fig. 11 that the hook bars are floatingly mounted on the T slot, i.e., they are not blocked against movement except in the endwise direction. This combined with the rounded faces on the cam members 37 inherently permits rocking or swiveling movement of the hook bar 27 in addition to the broadwise registering movement.

Each plate may be registered individually by moving one of the actuating bars longitudinally. Moving the actuating bar in one direction will advance the wedges 45 against the cams 37 and thus move the hook bars 27 circumferentially in a direction to move the hooks into the pockets in the plates against the biasing action of the compression springs 40. Because of the illustrated mounting of the hook bars each hook bar is free to align itself, in response to the reactive force from the plate, in an aligned position relative to the plate pockets which it engages. Moving the actuating bar 44 in the opposite

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direction will permit the springs 40 to shift the hook bars in a reverse direction. Once the hook bars 27 have been adjusted, wedges 45 form stops preventing the movement of the hooks under the tension exerted by the plate in its locked or running position.

In order to provide for selective adjustment of the actuating rods 44, gear racks 46a (Figs. 8 and 10) are formed on the bars along their outer end portions. Meshing with the racks are respective pinions 46 which are mounted on square-ended operating shafts 47 journaled in the cylinder body 20. Each pinion engages only one rack, as shown in Fig. 11. The pinion shafts 47 may be rotated by means of a suitable key or other hand tool as indicated in Fig. 8.

Provision is made for locking the actuating rods 44 in adjusted positions. To this end, the cylinder is provided with a plurality of frictional locking devices, one for each set of two side-by-side actuating rods 44. Each frictional locking device comprises a compressible disc assembly including a fiber disc 49 (Fig. 8) sandwiched between a pair of metal discs 48. The disc assembly may be compressed against the adjacent actuating bars 44 by means of a clamping screw 50 threaded into the cylinder body 20. A suitable wrench may be employed to operate the clamping screw 50.

Provision is made for accurately indicating the amount of circumferential movement imparted to the hook bars 27, and also indicating the positions of the hook bars. For this purpose the cylinder is provided with indexing means comprising a plurality of scales 52 (Fig. 10) mounted adjacent the outer ends of the respective actuating rods 44. For convenience, the scales may be calibrated in thousandths of an inch of circumferential movement of the respective plates.

It will be understood that the registering mechanism just described is operative to anchor one end of each plate 22 in a position which may be individually adjusted. Provision is made for exerting circumferential tension on the other end of each plate so that the plates will be securely held on the cylinder, even at very high operating speeds. Preferably, an individual tensioning force is resiliently exerted at each of the pockets 24 so as to compensate for any minor variations in the length of the plate or in the relative positions of the pockets. The resilient means serving to tension the plate will take up any elongation which may occur in the plate during printing, so as to obviate any possibility of the plate becoming loosened or disconnected from the cylinder.

In the illustrated embodiment the means for tensioning the plate comprises a plurality of heavy stiff shafts 60 (Figs. 2 and 8) journaled in the cylinder body 20 and extending longitudinally therein. At spaced intervals along its length, each shaft is formed with reduced journals 80 adapted to be journaled in bushings 83 (Figs. 1 and 6) which may be mounted in seats 82 formed in the cylinder body 20. The filler piece 55 is adapted to fit over the bushings so as to retain them in the cylinder. In this way the shafts 60 are held against all but rotary movement.

Formed on each shaft 60 are a plurality of spaced pairs of lugs 62 (Figs. 2-4). A plurality of take-up hooks 65 are respectively pivoted between the lugs 62 of each pair, the pivotal connections being formed by pintles 70. The hooks 65 are adapted to be swung outwardly beyond the surface of the cylinder body 20 so as to engage the pockets 24 at the ends of the plates opposite from the ends engaged by the registering hooks 33. In this instance, four of the take-up hooks 65 are provided for each plate 22. Each of the shafts 60 supports the hooks 65 for two of the plates.

Adjacent certain of the lugs 62, each shaft 60 is provided with plate-lifting ears 64 (Figs. 1-3) which serve to lift the plates away from the surface of the cylinder body 20 when the shafts 60 are rotated in a clockwise

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direction, as shown in Fig. 5. Two such ears 64 are provided for each plate.

Each of the illustrated take-up hooks 65 is provided with a wide, plate-engaging portion 66 (Fig. 7) as well as an apertured lug 67 adapted to be pivoted between the lugs 62 on the shaft. Formed on each hook 65 is a bearer portion 69 to which spring pressure may be applied. In this instance each shaft 60 is provided with a plurality of spring sockets 72 (Fig. 5) arranged in pairs adjacent each hook 65. Two coil springs 73 and 74 are seated in each spring socket, the spring 74 being disposed within the spring 73. A spring cover plate 75 is interposed between the bearer portion 69 of each hook 65 and two adjacent pairs of the springs 73 and 74 (Fig. 2). In this way each hook 65 is individually biased in one direction (clockwise in Fig. 3, counterclockwise as shown in Fig. 5).

Formed on the lug 67 of each hook 65 is a stop portion 68 (Fig. 3) adapted to engage one of a plurality of flat surfaces 77 formed on each shaft 60 between the respective lugs 62 of each pair. The engagement of the stop elements 68 and 77 limits the angular movement of each hook in one direction (clockwise in Fig. 3) relative to the corresponding shaft 60. In this way the springs 73 and 74 may be preloaded to a considerable extent.

Provision is made for rotating the shafts 60 so that the hooks 65 may be moved between operative and inoperative positions. Rotating the shafts in one direction (counterclockwise in Fig. 5) will first bring the hooks 55 into engagement with the pockets 24 and then will cause the hooks to swing on their pivots relative to the shaft so as to compress the springs 73 and 74. The tensioning force thereafter exerted by the springs will be more than enough to secure the plate to the cylinder at its maximum operating speed, yet not enough to overstress the plate. Rotation of the shaft in the reverse direction (clockwise in Fig. 5) will withdraw the hooks from the plates and move the plate-lifting ears 64 against the ends of the plates so that the plates will be lifted slightly from the surface of the cylinder.

In this instance the means for rotating the shafts 60 comprises respective arms 85 (Fig. 8) having splined connections 84 with the shafts. Connected to each arm is a link 86 which is pivoted to a disc 87 mounted on a worm gear 88. Meshing with each worm gear 88 is a worm 89 which is journaled in the cylinder body 20 on anti-friction bearings 90. A plate 91 is provided to retain each worm in the cylinder.

In this instance a single full revolution of each worm 89 will effect movement of the corresponding shaft 60 between fully unlocked and fully locked positions. In Fig. 5, one plate is shown in fully locked position and another is shown in fully unlocked position.

Means is provided to insure that each worm will be moved fully either into unlocked or locked position. In the illustrated embodiment, each worm 89 has a square end portion 93 fitted with a socketed operating member 94. The socketed member 94 is adapted to receive a removable, square-ended wrench 95 (Fig. 9) having recesses or dimples 97 in its respective end faces. Each of the socketed members is provided with a radially movable pin 96 adapted to be pushed outwardly by the head of the wrench 95 when the latter is inserted into the member 94. The pin will thereby push back a movable plunger 98 in opposition to the force of a spring 99 so as to allow the socketed member 94 to rotate. When the socketed member is rotated away from either its fully locked or fully unlocked position, the wrench will be locked in the socket by means of a pin 97' adapted to engage any one of the dimples 97. In the fully locked or fully unlocked position of the worm, the pin 97' may be moved outwardly into a recess 99'. Thus, the wrench may be removed only when the shaft 60 is fully locked or fully unlocked.

In order to facilitate the positioning of the plates 22

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on the cylinder, a plurality of stop pins 100 and 101 (Figs. 1 and 8) are mounted on the cylinder body 20, one pin being provided at each end of each plate in position to engage one curved edge of the plate and thus to locate the plate longitudinally along the cylinder.

Although the operation of the plate cylinder will now be apparent, it may be helpful to review the steps involved in installing and removing plates from the cylinder. When plates are to be installed, the shafts 60 are moved to their fully unlocked positions as shown at the left in Fig. 5. Each plate is positioned with one of its straight edges against one of the stop bars 25 and its other straight edge against the plate-lifting ears 64. The appropriate worm 89 is then rotated so as to withdraw the lifting ears 64 and thus lower the plates into engagement with the surface of the cylinder body 20. Then the plates may be moved manually along the cylinder in a longitudinal direction until they engage the stop pins 100 and 101.

Each plate may be registered by rotating one of the pinions 46. This operation will slide the corresponding actuating rod 44 longitudinally. If the actuating bar is moved in one direction (to the left in Fig. 11), the wedges 45 will cam the hook bars 27 circumferentially, against the biasing force of the springs 40. Moving the actuating rod 44 in the opposite direction will allow the springs 40 to move the hook bars 27 in the opposite direction. The actuating rods 44 may be locked in adjusted positions by tightening down the locking screws 50.

When the plates have been registered, they may be locked up by rotating the worms 89 so as to swing the shafts 60 to their fully locked positions, as shown on the right in Fig. 5. This will advance the hooks 65 against the pockets 24 and then cause separation of the stop elements 68 and 77 and compression of the springs 73 and 74. The individual, resilient take-up action of the hooks 65 will compensate for any variation in the positioning of the pockets 24 and will insure a uniform application of tensioning force to the plate.

If further registering adjustment of any plate is required, the shaft 60 for that plate may be rotated toward its unlocked position a sufficient distance to relieve the plate of tension. The hook bars 27 for that plate may then be moved an appropriate amount by rotating one of the pinions 46 and thereby moving the corresponding actuating rod 44. The proper amount of adjustment may be obtained by referring to the scale 52.

The plates may be removed by rotating each shaft 60 in turn to its fully unlocked position, thereby withdrawing all of the hooks 65 from the plates. It will be understood that rotating each of the shafts 60 will unlock two of the plates on one side of the cylinder simultaneously. The plates will be lifted away from the surface of the cylinder by the ears 64 so that the plates may readily be removed from the cylinder.

Figs. 16-19 illustrate a modified printing cylinder which constitutes a second illustrative embodiment of the present invention. In many respects, the second embodiment may be the same as the first embodiment, and insofar as the two embodiments make use of duplicate parts, the same reference characters are employed in Figs. 16-19 as in Figs. 1-15. It will be noted, for example, that the second embodiment employs the same type of plate registering mechanism as the first embodiment.

In the modified embodiment of Figs. 16-19, provision is made for resiliently applying circumferential tension to the printing plates 22. As illustrated, the plate-tensioning mechanism comprises a plurality of plate locking take-up hooks 165 having body portions 165a and hook members or portions 166 adapted to engage the pockets 24 in the plates 22. The modified plate cylinder of Figs. 16-19 may have the same number of hooks as the first embodiment, and the hooks may be spaced along the cylinder in a similar manner.

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Provision is made for pivoting each of the hooks on an individual spring mounting means. In this instance each of the hooks is pivoted on an individual shaft or pivot 200 which extends longitudinally of the cylinder and is slidable in a generally circumferential direction along a slot 202 formed in a filler piece or cap 155 rigidly secured to the cylinder body 20. The cap 155 is made as a separate piece for convenience in manufacturing and assembling the cylinder, and, generally speaking, may be considered as part of the cylinder body 20. The pivot shafts 200 may engage the body portions 165a of the hooks at points spaced inwardly from the hook members 166. Each shaft 200 is biased in one direction by two pairs of compression springs 173 and 174, disposed in spring sockets 172 formed in the cap 155 and extending along a chord of the cylinder, or, in other words, in a generally circumferential direction. In each case, the spring 174 is positioned within the spring 173. The springs 173 and 174 are disposed between the cylinder body and a pair of blocks 201 mounted on the respective ends of the shaft 200, the blocks being slidable in the spring sockets 172. Each set of the springs 173 and 174 tends to urge one of the pivot shafts 200 against one end of the corresponding slot 202, which limits the movement of the shaft 200 and the coacting hook 165, so that the springs may be preloaded. Preloading the springs results in substantial uniformity in the application of spring pressure to the various pockets 24, even though the pockets may be appreciably misaligned with one another.

In order to lift the plates 22 away from the surface of the cylinder body so that they may readily be grasped and removed from the cylinder, the hooks 165 are provided with plate-lifting ear portions 164 positioned in opposed, circumferentially spaced relation to the hook portions 166. The ears 164 are adapted to be swung outwardly against the ends of the plates when the hooks are rocked on the pivot shafts 200 into the position shown in Fig. 19.

Provision is made for advancing and retracting the hooks 165 into and out of tensioning relation with the plates 22. This is accomplished in the present instance by means including an actuating shaft 160 which may be operated by a mechanism similar to that employed in the first embodiment. The locked and unlocked positions of the shaft are shown in Figs. 16 and 19 respectively. Formed on the shaft are spaced pairs of lugs 162 which are pivotally connected to respective links 186. The latter are connected to the hooks 165 by means of floating or movable pivots 185a which engage inwardly extending arm portions 185 of the hooks 165. Thus, the pivots 185a and 200 engage the hooks at spaced points.

When plates are to be installed on the cylinder of Figs. 16-19, the shaft 160 is rotated so as to move the hooks 165 into their unlocking position, shown in Fig. 19. Each plate 22 may then be placed on the cylinder with its opposite longitudinal ends against the ears 164 and one of the bars 25, respectively. To lock up or clamp the plates on the cylinder, the shaft 160 may be rotated in a clockwise direction so as to move the pivots 185a in a generally circumferential direction and thereby swing the hooks 165 in a counterclockwise direction on the pivot shafts 200. As a result of such movement of the hooks, the plate-lifting ears 164 will be withdrawn below the surface of the cylinder and the plates 22 will thereby be lowered into engagement with the cylinder. Further movement of the hooks 165 will bring the hook portions 166 into engagement with the packets 24 in the plates 22. During the remainder of the locking movement of the shaft 160, each of the hooks 165 will rock about the point of engagement between its hook portion 166 and the plate 22. As a result, the floating pivot shaft 200 will be moved circumferentially in such a direction as to compress the springs 173 and 174. The force of the springs acting on the hooks 165 will serve to tension

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each of the plates 22. Because of the individual action of the hooks 165, substantially equal tensioning forces will be applied to each of the pockets 24, even though there may be slight variations in the relative positions of the pockets. The springs 173 and 174 will take up any elongation of the plate which may occur during a printing run and thus will prevent the plates from becoming loosened on the cylinder.

While the invention is susceptible of various modifications and alternative constructions, the preferred embodiments are shown in the drawings and described in detail, but it is to be understood that it is not thereby intended to limit the invention to the forms disclosed, but it is intended to cover all equivalents, modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

I claim:

1. In a plate cylinder for tensioning printing plates having pockets in their undersides adjacent their longitudinal edges, the combination comprising an elongated cylindrical body for receiving a plurality of printing plates in generally aligned relation longitudinally of said cylinder, a plurality of hooks respectively engageable with the pockets at one edge of the aligned plates, means for mounting said hooks on said body in generally aligned relation longitudinally of said body for movement in a generally circumferential direction relative to said body, a plurality of generally longitudinal rods extending respectively from one end of said body to said hooks, a plurality of cams respectively coupled to said rods for individually adjusting the hooks associated with a given plate in a generally circumferential direction and thereby individually registering the plates, a plurality of take-up hooks movable circumferentially on said cylindrical body and engageable with the pockets at the other edges of the generally aligned plates, respective preloaded springs interposed between said cylinder and said take-up hooks for urging the latter against the plates in a plate-tensioning direction, and means including a shaft and a link connection therefrom to each of said take-up hooks for withdrawing said take-up hooks simultaneously from the plates.

2. In a plate cylinder for tensioning printing plates having pockets in their undersides adjacent their longitudinal edges, the combination comprising an elongated cylindrical body for receiving a plurality of printing plates in generally aligned relation longitudinally of said body, said body having a longitudinal slot in its periphery, a plurality of longitudinally spaced generally aligned clamping bars disposed in said slot and movable therein in a generally circumferential direction relative to said body, said bars having outwardly projecting hooks for engaging the pockets at one edge of the respective generally aligned plates, a plurality of rods disposed in side-by-side relation in said slot for longitudinal movement therein, a plurality of cams respectively mounted on said rods and respectively engageable with said bars for adjusting the bars circumferentially of the body in response to longitudinal movement of said rods and thereby individually registering the generally aligned plates, a plurality of take-up hooks movable individually in a generally circumferential direction on said cylindrical body and engageable with the pockets at the opposite edge of the respective plates, a plurality of springs respectively interposed between said cylindrical body and said take-up hooks for biasing the latter in a plate-tensioning direction, and means including a common shaft and a link connection therefrom to each of said take-up hooks for withdrawing the latter simultaneously from the plates.

3. In a plate cylinder for tensioning printing plates having pockets in their undersides adjacent their longitudinal edges, the combination comprising an elongated cylindrical body for receiving a plurality of printing plates in generally aligned relation longitudinally of said body, said body having a longitudinal slot in its periphery, a

plurality of longitudinally spaced generally aligned clamping bars disposed in said slot and movable therein in a generally circumferential direction relative to said body, said bars having outwardly projecting hooks for engaging the pockets at one edge of the generally aligned plates, a plurality of rods disposed in side-by-side relation in said slot for longitudinal movement therein, a plurality of cams mounted on each of said rods and respectively engageable with corresponding ones of said bars, and adjustable means accessible at one end of said cylinder body for longitudinally positioning the rods so that the bars are adjusted circumferentially of the body thereby individually registering the generally aligned plates.

4. In a plate cylinder for tensioning printing plates having pockets in their undersides adjacent their longitudinal edges, the combination comprising a cylindrical body for receiving a plurality of printing plates in generally aligned relation longitudinally of said body, said body having a longitudinal slot in its periphery, a plurality of longitudinally spaced generally aligned hooks movable generally in a circumferential direction in said slot and engageable with the pockets at one edge of the respective aligned plates, a plurality of rods disposed in side by side relation in said slot underneath said hooks and extending from one end of said body to said hooks respectively, and respective cams on said rods and engageable with said hooks for individually registering the generally aligned plates.

5. In a plate cylinder for tensioning printing plates having a plurality of pockets in their undersides adjacent to and spaced along their longitudinal edges, the combination comprising an elongated cylindrical body for receiving a plurality of plates in generally aligned relation longitudinally of the cylinder, said body having a longitudinal T-shaped slot in its periphery, a plurality of longitudinally disposed generally aligned bars positioned in said slot and movable transversely therein in a generally circumferential direction relative to said cylinder, each of said bars having only two hooks spaced therealong and engageable with the pockets at one edge of the aligned plates, said body having a longitudinal groove formed in the bottom of said T-shaped slot, a plurality of rods disposed in said longitudinal groove underneath said bars, each of said rods having an outer end extending to one end of said body and an inner end extending to one of said bars, and respective wedges mounted on said inner ends of said rods and engageable with said bars for moving said bars circumferentially in response to longitudinal movement of said rods, and means forming a rounded contact surface between said wedges and respective ones of said bars so that the latter may swivelably float to align the hooks thereon for direct pull against the walls of the plate pockets.

6. In a plate cylinder for holding cylindrically curved printing plates under tension applied to pockets in the undersides of the plates adjacent their longitudinal edges, the combination comprising an elongated cylindrical body for receiving a plurality of plates in generally aligned relation longitudinally of said body, said body having a longitudinal T-shaped slot in its periphery, a plurality of longitudinally disposed generally aligned bars positioned in said slot and movable transversely therein in a generally circumferential direction relative to said cylindrical body, said bars having hooks engageable with the pockets in one end of the respective plates, said body having a longitudinal groove formed in the bottom of said T-shaped slot, a plurality of rods disposed in side-by-side relation in said longitudinal groove underneath said bars, each of said rods having an outer end extending to one end of said cylinder and an inner end extending to one of said bars, each of said bars having a longitudinal recess overlying said longitudinal groove in said cylindrical body, a plurality of wedges mounted respectively on said inner ends of said rods and disposed in said recesses for moving said bars circumferentially in response to longitudinal

movement of said rods, a plurality of cam members respectively mounted on said bars in said recesses for engaging said wedges, each of said rods having a rack formed on its outer end, a plurality of pinions on said cylinder and respectively engaging said racks for adjusting said rods, and scale means on said cylinder adjacent said rods for gauging the extent of circumferential adjustment of said bars.

7. In a plate cylinder for tensioning, and thereby holding, a printing plate having a plurality of generally aligned spaced pockets in its underside adjacent each of its longitudinal edges, the combination comprising a cylindrical body for receiving the printing plate, a finger bar having a plurality of fingers spaced therealong for engaging respective ones of the spaced pockets along one edge of the plate, means for mounting the finger bar for broad-wise circumferential movement in said cylinder while permitting swiveling of the finger bar through a limited range, a manually adjustable rod mounted longitudinally in said cylinder adjacent said finger bar, means providing a single set of camming surfaces interposed between the rod and the finger bar so that the finger bar is urged circumferentially incident to longitudinal movement of the rod, and means forming said camming surfaces so as to permit swiveling movement between them so that the finger bar is free to automatically assume a position in alinement with the pockets on said plate.

8. In a plate cylinder for tensioning, and thereby holding, a printing plate having a plurality of pockets in its underside adjacent its longitudinal edges, the combination comprising a cylindrical body for receiving the printing plate, a finger bar having a plurality of fingers spaced therealong for engaging respective ones of the spaced pockets along one edge of the plate, means for mounting the finger bar for broadwise circumferential movement in said cylinder while permitting swiveling of the finger bar through a limited range, a longitudinal adjusting rod mounted in said cylinder adjacent said finger bar, means adjacent the end of said body for manually adjusting the position of the adjusting rod, means forming a single connection to said bar, said last-named means including a pair of camming surfaces interposed between the rod and the finger bar so that the finger bar is urged circumferentially incident to longitudinal movement of the rod, at least one of said camming surfaces being curved to permit swiveling movement between them so that the finger bar is free to automatically assume a position in alinement with the pockets on said plate.

9. In a plate cylinder for tensioning, and thereby holding, a printing plate having a plurality of generally aligned pockets in its underside adjacent and spaced along each of its longitudinal edges, the combination comprising a cylindrical body for receiving the printing plate, a plurality of finger bars arranged end to end in said cylinder and each having a plurality of outwardly extending fingers for engaging said pockets, a longitudinal adjusting rod in said cylinder arranged adjacent said finger bars, means for mounting said finger bars for individual broadwise circumferential movement on said cylindrical body while permitting individual swiveling movement thereof, said rod carrying individual cam operators for circumferentially pressing against individual ones of said finger bars, the area of contact between said individual cam operators and respective ones of said finger bars having at least one curved surface for permitting relative swiveling movement between the finger bars and the adjusting rod so that each finger bar is free to automatically assume an aligned fully-seated position relative to the pockets which it engages incident to reactive force from the plate.

10. In a plate cylinder for tensioning, and thereby holding, a plurality of printing plates each having a plurality of pockets in their undersides adjacent and spaced along each of their longitudinal edges, the combination comprising a cylindrical body for receiving the printing plates side by side, a plurality of finger bars arranged

end to end in said cylinder and each having a plurality of outwardly extending fingers spaced therealong for engaging said spaced pockets, there being at least two finger bars for each plate means for mounting said finger bars for individual broadwise circumferential movement on the cylinder while permitting individual swiveling movement, a plurality of rods longitudinally arranged side by side in said cylinder and closely adjacent said finger bars and extending to one end of said cylinder, there being one rod for each plate, manual adjusters at the end of the cylinder for positioning the rods, said rods each carrying at least two cam operators for circumferentially pressing against those ones of said finger bars which engage the pockets in one of said plates, said individual cam operators being so formed as to permit relative swiveling movement between the finger bars and the adjusting rods so that the finger bars are free to automatically assume aligned fully-seated positions relative to the pockets in the plates incident to reactive force from the plates.

11. In a plate cylinder for holding a cylindrically curved printing plate having a plurality of spaced pockets in the underside of its leading and trailing edges, the combination comprising a cylinder having first and second longitudinal slots in its surface, a plurality of longitudinally spaced generally aligned finger bars disposed in said first slot and having outwardly extending fingers spaced therealong and engageable in the spaced pockets at one end of the plate, said bars being undersize with respect to said first slot and movable therein individually in a direction generally circumferentially of said cylinder and to swiveled positions, means including a rod axially movable in said first slot and having cam means thereon for shifting respective ones of said bars to engage their fingers against the pockets of the plate while permitting the bars to swivel if the pockets are misaligned, a plurality of pivot members, means mounting said pivot members in axially spaced relation in the second slot of the cylinder with freedom to shift in generally circumferential directions, a plurality of take-up hooks each mounted for rocking on one of said pivot members and having a hook portion engageable with the plate in the pockets at its other edge, resilient means interposed between said cylinder and said pivot members for individually urging the latter in a first circumferential direction, a common actuator shaft disposed axially in said second slot, and link means pivotally connected between said shaft and respective ones of said hooks at points spaced from the respective pivot members so that rotation of said shaft first rocks the hooks about said pivot members to engage the hook portions in the plate pockets and then shifts said pivot members against the respective spring means to cause biasing of the hook portions against the plate notwithstanding misalignment of the plate pockets.

12. In a plate cylinder for holding cylindrically curved printing plates under circumferential tension applied to pockets in their undersides adjacent their longitudinal edges, a tension lock-up arrangement, comprising, in combination, a plurality of pivots and means mounting the same in axially spaced relation in said cylinder with freedom for movement in a generally circumferential direction, a plurality of hooks mounted for rocking motion on respective ones of said pivots and adapted to engage the pockets in one end of a printing plate, a plurality of resilient means connected respectively between said pivots and said cylinder for biasing said pivots in one direction circumferentially of said cylinder, and actuating means engaging said hooks at points spaced from said pivots for rocking said hooks about said pivots into engagement with the plate thereby moving said pivots against the biasing action of said resilient means so that said hooks will be resiliently urged into tensioning engagement with said plate.

13. In a plate cylinder for holding cylindrically curved printing plates having pockets in their undersides adja-

cent their longitudinal edges, the combination comprising a cylinder, a plurality of pivots mounted in axially spaced relation in said cylinder and movable relative to the latter in a generally circumferential direction, a plurality of hooks supported for rocking movement on respective ones of said pivots and engageable with the pockets in one end of the printing plate, resilient means for individually biasing respective ones of said pivots generally circumferentially of said cylinder in a direction tending to bodily move said hooks into engagement with the plate pockets, and actuating means operative on said hooks at points spaced from the respective pivots for rocking said hooks about said pivots into engagement with the plate and then swinging said hooks an additional amount to move said pivots bodily against the biasing action of said resilient means so that the latter resiliently urge the hooks into tensioning engagement with the plate.

14. In a plate cylinder for holding a cylindrically curved printing plate under circumferential tension applied to pockets in its underside adjacent its longitudinal edges, the combination comprising a cylinder, a plurality of take-up hooks spaced axially along said cylinder for engaging the pockets adjacent one longitudinal edge of the plate, each of said hooks having first and second supporting pivots, means mounting said first pivots with freedom to move in said cylinder in a generally circumferential direction, respective resilient means for individually biasing each of said first pivots in one generally circumferential direction, common actuating means for moving each of said second pivots in the opposite circumferential direction for swinging said hooks about said first pivots into engagement with the plate and then swinging said hooks about the point of engagement between said hooks and the plate to move said first pivots against the biasing action of said resilient means so that the latter will resiliently urge the hooks into tensioning engagement with the plate notwithstanding misalignment of the plate pockets.

15. In a plate cylinder for holding cylindrically curved printing plates under circumferential tension applied to pockets in the undersides of the plates adjacent their longitudinal edges, a tension lock-up arrangement, comprising, in combination, a plurality of hooks having respective body portions and plate engaging portions, said body portions being positioned in said cylinder, said plate engaging portions being adapted to extend outwardly of said cylinder for engagement with the pockets in one end of a printing plate, a plurality of pivots extending longitudinally of said cylinder and respectively supporting said hooks at points on said body portions, means supporting said pivots for translatory movement in said cylinder in a generally circumferential direction, a plurality of springs connected between said cylinder and said pivots respectively for biasing said pivots circumferentially of said cylinder in a direction tending to engage said hooks with the plates, means for limiting the movement of the pivots under the biasing action of said springs, an actuating shaft journaled in said cylinder and extending longitudinally thereof adjacent said hooks, said shaft having a plurality of radially projecting lugs opposite said hooks, and respective links connected between said lugs and said hooks, said links being connected to said body portions of said hooks at points spaced inwardly of said pivots so that rotation of said shaft in one direction first rocks said hooks about said pivots to cause said plate engaging portions of said hooks to engage the plate and then rocks said hooks about the point of engagement between said plate engaging portions and the plate so as to move said pivots against the biasing action of said springs and thereby resiliently tension the plate.

16. In a plate cylinder for tensioning and thereby holding a printing plate having pockets in its underside adjacent and spaced along its longitudinal edges the combination comprising a cylindrical body for receiving the printing plate, a bar having a plurality of hooks

spaced therealong and engageable with the respective spaced pockets at one edge of the plate, means mounting said bar in said body for circumferential movement while permitting the bar to swivel through a small angle, a rod disposed on and movable longitudinally relative to said cylindrical body, means forming a single connection to said bar for moving the latter circumferentially of the body, said last means including a cam on said rod engageable with said bar for moving the latter and the hooks thereon circumferentially of the cylindrical body in response to longitudinal movement of said rod, one of the coengaging surfaces on said cam and bar being rounded, and means for effecting endwise adjustment of said rod to circumferentially position said bar and hooks on said cylindrical body.

17. In a cylinder for holding printing plates under tension, such plates having at least two spaced apart pockets cut in the underside of their leading and trailing edges, registering means comprising in combination a pair of register hooks, means mounting said hooks spaced apart in said cylinder to engage two pockets in one edge of a plate, said mounting means including means affording movement of said hooks differentially and in unison in a substantially circumferential direction relative to said cylinder, a movable member in said cylinder and means for adjusting the position thereof, and means forming a single pivotal connection between said movable member and said two hooks for shifting the latter in unison circumferentially of the cylinder, said pivotal connection having a pivot axis which is disposed substantially along a radial line of the cylinder so that said hooks automatically swivel relative to one another to firmly engage plate pockets which are not alined parallel to the axis of the cylinder.

18. In a printing cylinder adapted to hold a curved stereotype printing plate under tension, such plate having at least two spaced apart pockets cut in the underside of one edge which is disposed on the cylinder generally parallel to the cylinder axis, registering means comprising, in combination, a pair of register hooks, means mounting said hooks on the cylinder spaced apart longitudinally of the cylinder to engage two pockets in the printing plate, said mounting means including means affording freedom for said hooks to move in a direction substantially circumferentially of the cylinder, a movable member, manually operable means for adjusting said movable member to different positions within its range of movement, means interconnecting said movable member and said two hooks for shifting the latter circumferentially of the cylinder in response to operation of said adjusting means, said interconnecting means including a single pivot connection between said movable member and said two hooks, said pivot connection being disposed intermediate said two hooks and having an axis disposed substantially radially of the cylinder so that said hooks automatically swivel differentially into firm engagement with two respective plate pockets which are not alined parallel to the cylinder axis.

19. In a cylinder for holding a curved stereotype

printing plate under tension, said plate having four spaced apart pockets cut in the underside of one edge which is disposed on the cylinder generally parallel to the cylinder axis, registering means comprising, in combination, two pairs of registering hooks, means mounting said registering hooks spaced apart longitudinally of the cylinder with each pair of hooks disposed to engage in respective pairs of adjacent plate pockets, said mounting means including means affording freedom for said hooks to move in a direction substantially circumferentially of the cylinder, two movable members, means for adjusting the positions of said two movable members, means interconnecting said two movable members respectively and exclusively with said two pairs of hooks for shifting such pairs of hooks circumferentially of the cylinder according to the positions of the two movable members, said interconnecting means including means forming a single pivot connection between each said movable member and the corresponding pair of hooks, said pivot connections each being spaced apart longitudinally of the cylinder and disposed intermediate the corresponding pair of hooks and defining a pivot axis disposed substantially radially of the cylinder, so that the individual hooks in each said pair automatically swivel relative to one another into firm engagement with the corresponding plate pockets even though such pockets are misalined relative to a line parallel to the cylinder axis.

20. In a cylinder for holding printing plates under tension, such plates having at least two spaced apart pockets cut in the underside of their leading and trailing edges, registering means comprising in combination a pair of register hooks having plate-engaging hook tips, means for mounting said hooks spaced apart on said cylinder to engage two respective pockets in one edge of a plate, said mounting means including means affording movement of said hook tips differentially and in unison in a substantially circumferential direction relative to said cylinder, a movable member and means for mounting it on said cylinder, means for adjusting the position of said member and holding it in adjusted position, and means interconnecting said movable member and said two hooks to shift the latter in response to adjustments in the position of the former, said last-named means including means forming a force-transmitting pivot connection for affording differential movements of said hooks so that said hook tips firmly engage in plate pockets which are not alined parallel to the axis of the cylinder.

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