

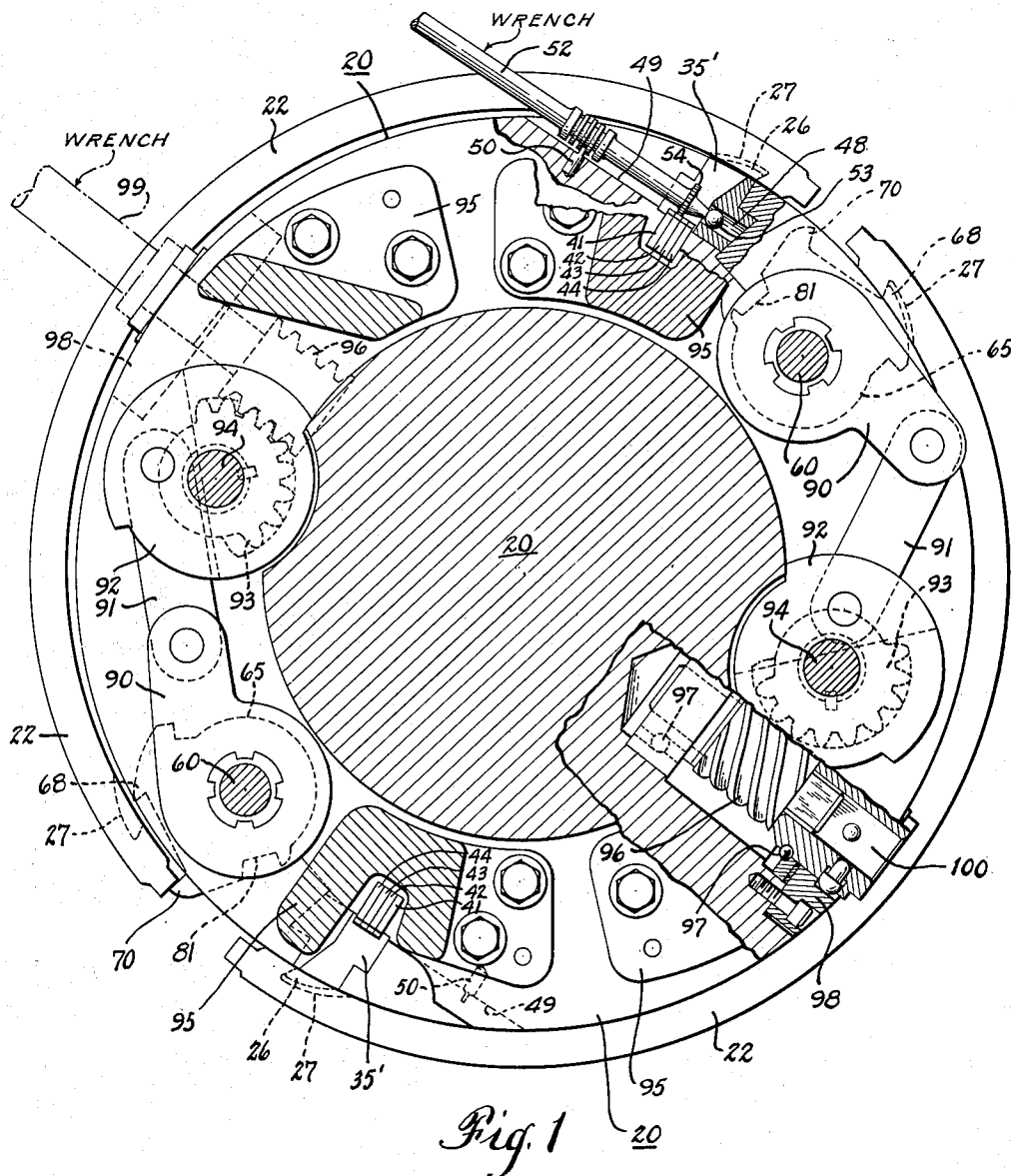
Jan. 31, 1956

C. W. CHASE
PRINTING CYLINDERS

2,732,798

Filed Oct. 11, 1949

5 Sheets-Sheet 1



INVENTOR
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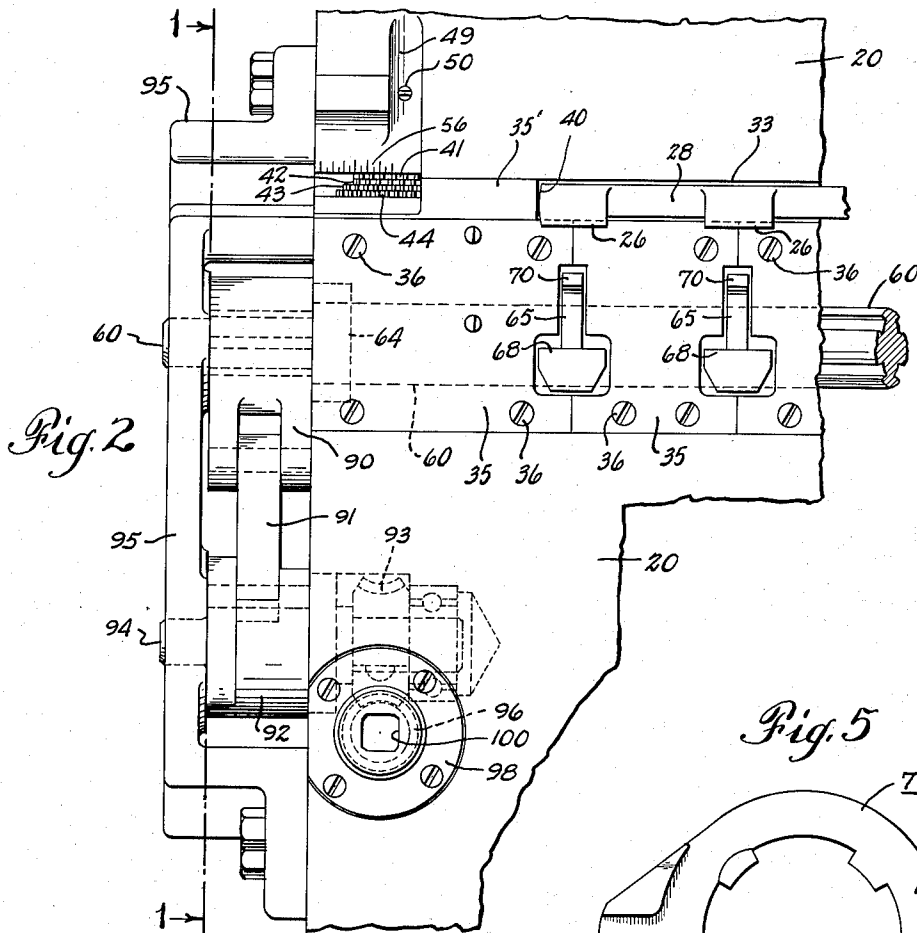
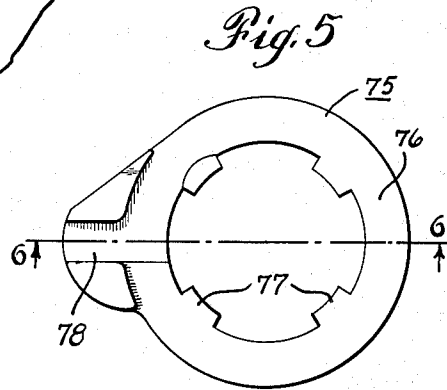
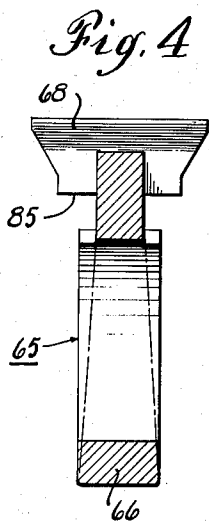
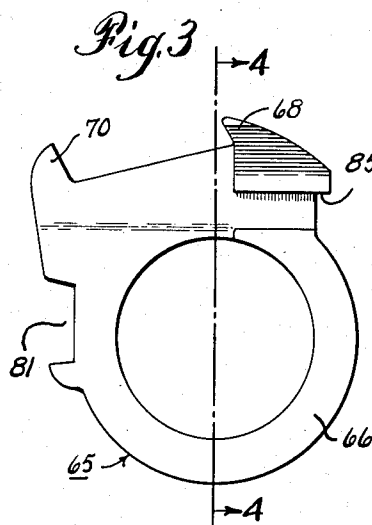
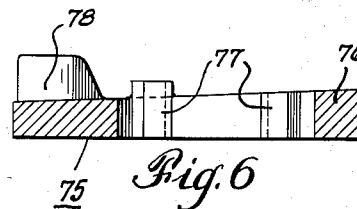
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5 Sheets-Sheet 2



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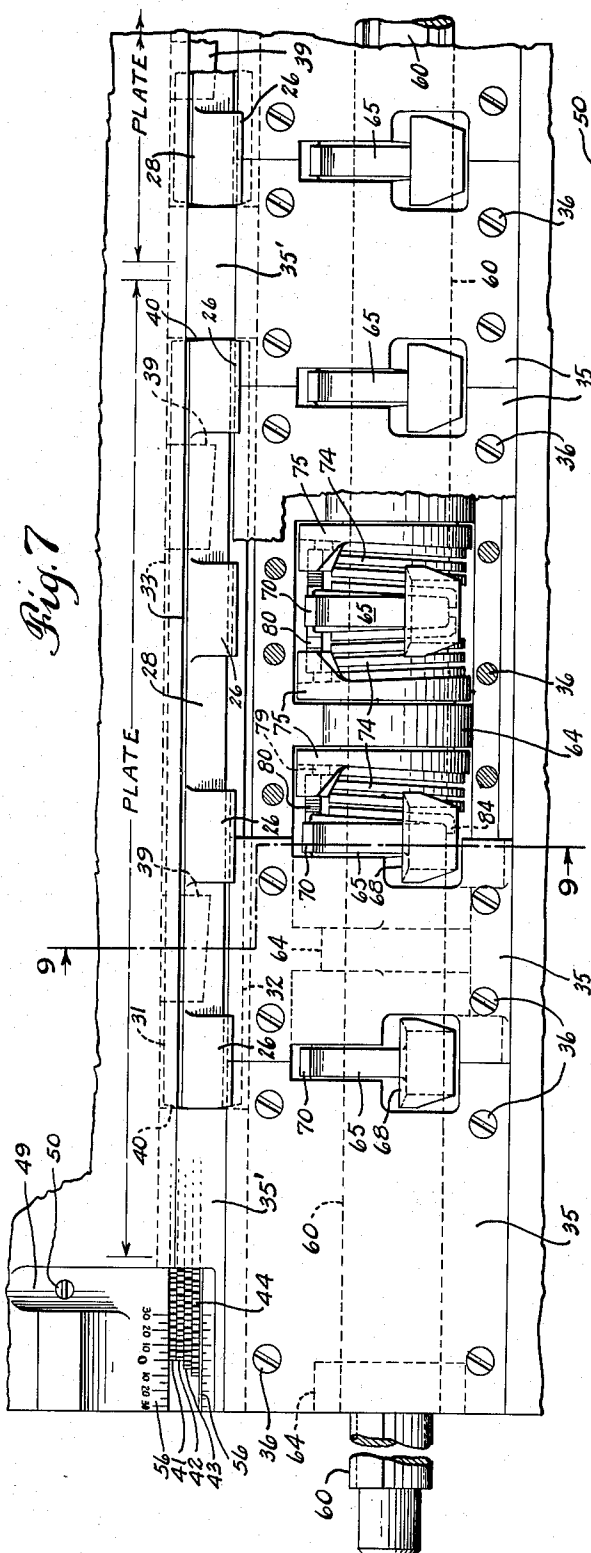
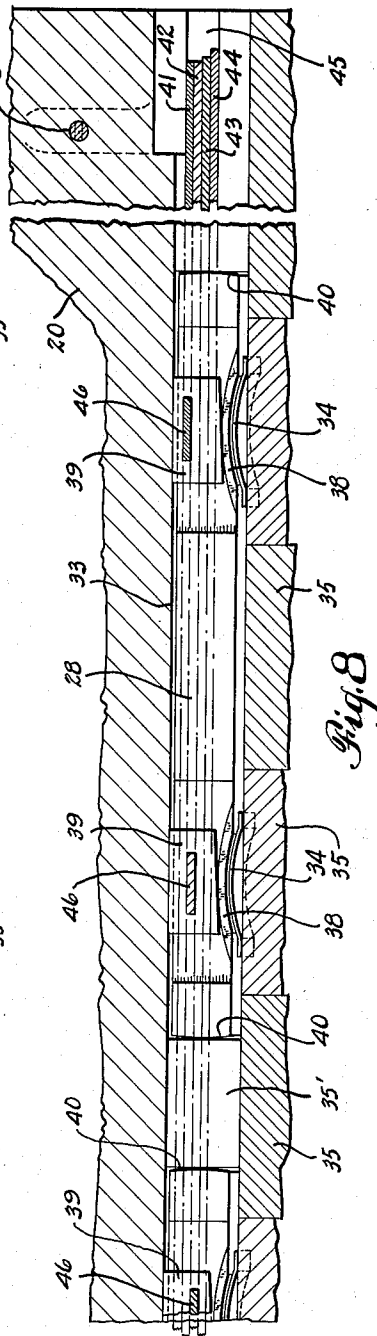
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5 Sheets-Sheet 3



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5 Sheets-Sheet 4

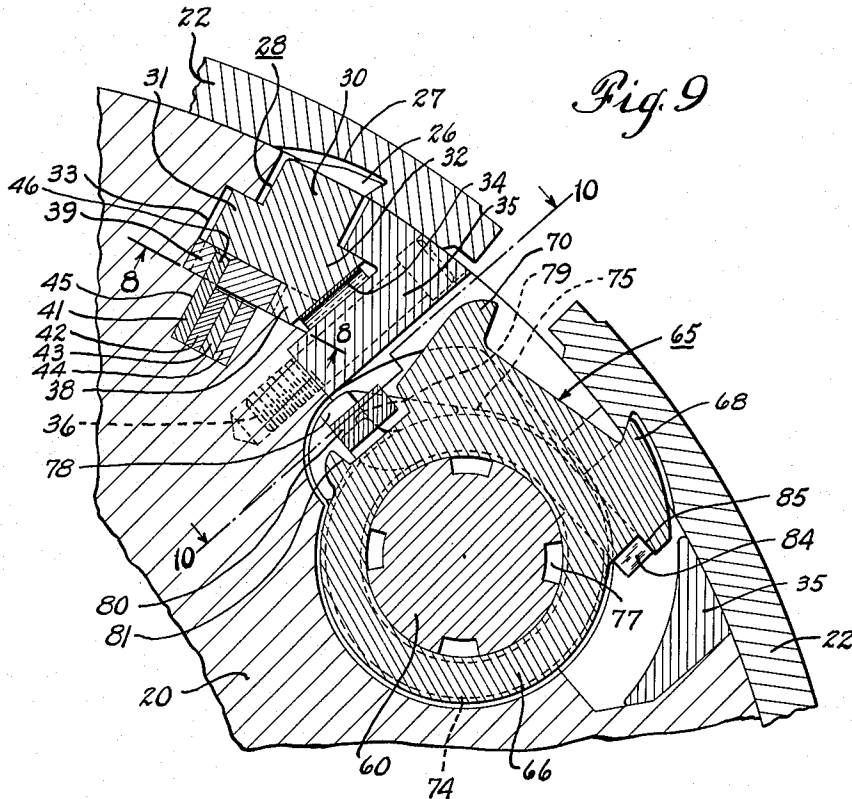
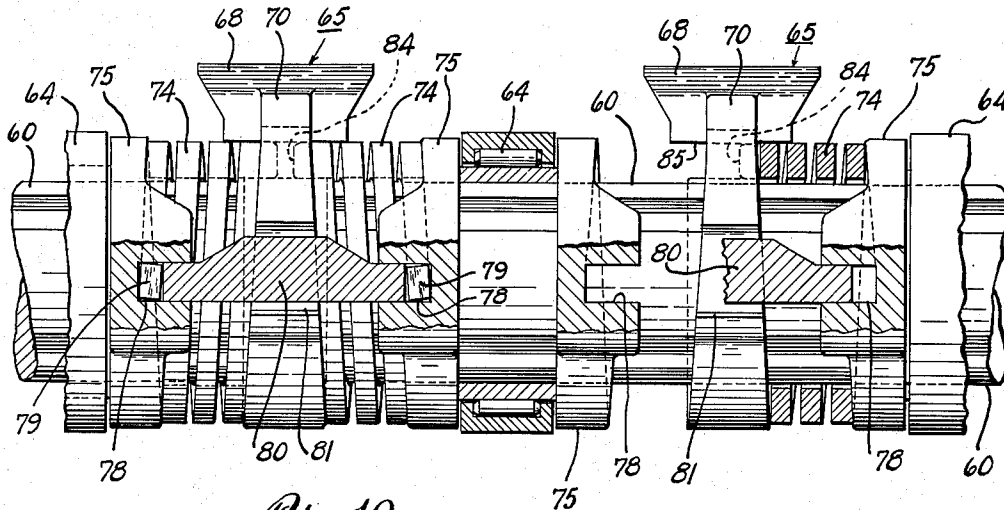


Fig. 10

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2,732,798

PRINTING CYLINDERS

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19 Claims. (Cl. 101—378)

The present invention relates to a novel and improved plate securing means for high speed rotary printing presses.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate two embodiments of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:

Figure 1 is a cross sectional view with certain parts broken away of the preferred embodiment of the present invention;

Figure 2 is a fragmentary developed plan view of the plate holding means and cylinder shown in Figure 1;

Figure 3 is a detailed side elevation, and Figure 4 is a front elevation of a plate engaging and securing hook as used in the embodiment of Figure 1;

Figure 5 is a side elevation and Figure 6 is a front elevation of certain parts shown in Figure 1;

Figure 7 is a detailed, fragmentary developed plan, with parts broken away of the cylinder shown in Figures 1 and 2;

Figure 8 is a detailed sectional view taken on the line 8—8 of Figure 9;

Figure 9 is a fragmentary sectional view taken on the line 9—9 of Figure 7;

Figure 10 is a detailed sectional view taken on the line 10—10 of Figure 9;

Figure 11 is a fragmentary detailed sectional view, taken on the line 11—11 of Figure 12 of a modified embodiment of the invention;

Figure 12 is a fragmentary longitudinal section taken on the line 12—12 of Figure 11;

Figure 13 is a detailed perspective view of a plate hook member used in this modified embodiment; and,

Figure 14 is a detailed sectional view taken on the line 14—14 of Figure 12.

The present invention has for its object the provision of a novel and improved plate securing means for rotary printing presses. A further object is the provision of an improved plate securing means in which the plate engaging hooks are individually urged into plate securing position by powerful springs compactly arranged and of relatively long length so as to exert a substantially uniform force on the plate. The invention also provides plate securing means in which the position of the plate on the cylinder is independent of the torsional deflection of the shaft. Still another object is the provision of a plate securing means for color printing cylinders in which circumferential movement of one plate while registering the plate does not affect the position of another plate which may have

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been previously registered. Still another object of the invention is to provide plate securing means for color printing cylinders whereby the plates may be adjusted to a skew position.

Referring now in detail to the preferred and illustrative embodiment of the invention as shown by Figures 1 to 10 of the drawings, there is provided a rotary plate cylinder 20 which is conventionally adapted to receive and hold eight stereotype printing plates 22, two around circumferentially and four longitudinally of the cylinder.

Circumferentially movable hook members are provided which extend beyond the surface of the cylinder and may be minutely moved for circumferential registration of the individual plates and also serve as means for exerting tension on one end of the plate. These hooks 26 are preferably formed as integral parts of a hook bar 28 which is movably mounted in the body of the cylinder and is positively moved in the direction of the adjacent end of the plate so as to resist the tension applied by hooks at the other end of the plate. Each bar 28 comprises an elongated T-shaped member having a radial portion 30 (Fig. 9) which extends almost to the surface of the cylinder 20 and is formed therebeyond as a plurality (usually four) hooks 26, spaced uniformly apart and aligned with each other, the ends of the hooks 26 being shaped to engage and fit in suitable recesses 27 near the straight end edges of the plate 22.

Bar 28 is provided with lateral extensions 31 and 32 by which it is held in the T-slot 33 extending longitudinally of the cylinder. Extension 31 is preferably flat, while extension 32 is bevelled to fit against a leaf spring 34 urged towards it by the filler piece 35 secured in the cylinder by screws 36, two or more such leaf springs being provided and urging the plate hooks 26 away from the adjacent end of the plate 22. At the bottom of extension 32, are cam portions 38 to bear against and be moved by wedge members 39, the cam portions 38 and the wedge members 39 being of equal thickness and filling the bottom portion of the T-slot 33, the straight edge of wedge 39 bearing against the straight side wall of the T-slot.

Preferably, a plurality of cam and wedge members 38, 39 are provided for each bar 28, and if they are moved unequal longitudinal distances, the bar 28 may be rocked slightly from a position parallel with the cylinder axis to a skew position so as to twist the plates 22 slightly on the surface of the cylinder if that is necessary for accurate register of the plates. The cam portions 38 and the ends 40 of the hook bar 28 are preferably rounded so as to facilitate the skew movement of the bars 28.

Means are provided for individually moving the wedge members 39 longitudinally of the cylinder and for this purpose each wedge is individually mounted on a separate rod extending to near one end of the cylinder. The rods are preferably formed as thin straight bars 41, 42, 43 and 44 slidable in a longitudinal groove 45 (Figs. 8 and 9). Each bar is provided with an upstanding prong 46 which is engaged in a slot in the corresponding wedge 39, the top of the prong being peened to hold the wedge firmly to it.

For selectively moving the individual rods 41, 42, 43 and 44, the end of each rod is formed with a rack portion to be selectively engaged by a manually turned pinion which may be engaged therewith for the purpose. As embodied, the filler piece 35' at the end of the cylinder is provided with a hole 48 in alignment with a shallow trough 49 formed in the cylinder at the other side of the assembly of rods 41, 42, 43 and 44. In the trough 49 is a guide pin 50 projecting a short way into the trough. A wrench 52 comprising a shaft portion having a ball end 53 to fit in hole 48, a pinion 54 and a series of four annular grooves so positioned that any one may be en-

gaged by the pin 50 to hold the wrench against axial movement and with the pinion in engagement with any selected one of the rack portions of the rods 41, 42, 43 and 44 (Fig. 1).

Adjacent the rack ends of the rods is an index member 56 supported on the cylinder graduated in convenient units, such as thousandths of an inch of movement of the hooks 26. As shown in Figure 7, rods 41 and 42 are in their normal central position, while rod 44 has been moved more to the left than 43 so as to skew the outer plate.

Means are provided for individually resiliently engaging the other ends of the plates and tensioning them circumferentially of the cylinder to secure the plates thereon. As embodied, a shaft 60 is rotatably journaled in the body of the cylinder 20 and may be positively moved to a plate locking or a plate unlocking position. Along its length from one end to past the center of the cylinder 20, shaft 60 is carried by roller or needle bearings 64 which are seated in the cylinder body 20. Spaced along the shaft 60 are sleeve-like plate hooks 65 each comprising an annular collar 66, freely rotatable on the shaft 60 and closely fitted thereto, formed integrally with a plate hook member 68 and a plate lifting finger 70, the sleeve-like plate hooks all being duplicates of each other.

For resiliently moving the plate hook members 65 by rotation of the shaft 60 torsionally deflected springs are provided between the shaft and the hooks urging the hooks towards the end of the plate to resiliently tension the plate 22 and secure it to the surface of the cylinder 20. Springs 74 are preferably formed as heavy helically coiled springs somewhat closely fitted to the shaft 60, one end of each spring being fast to hook 65 and the other end being fast to the shaft 60, each spring tending to move its hook towards plate tensioning position.

For securing each spring 74 to the shaft there is provided a collar 75 splined to the shaft 60, the collars being positioned at either side of the antifriction bearings 64. Collars 75 are shown in detail in Figures 5 and 6, each comprising an annular portion 76, splines 77 and a slot 78 to receive a radial end 79 of the spring 74. To secure the radial end 79 of the spring against displacement, and also to limit movement of the hooks 68 relative to the shaft 60, a bar 80 is provided between each facing pair of collars 75, the bars 80 entering the slots 78 so as to prevent movement of the spring ends 79 from the slots 78. Bar 80 passes through jaw 81 formed in the hook member 65 so as to limit the movement of the hook 68 relative to its supporting and actuating shaft 60. Figure 9 shows the play between bar 80 and the jaw 81, and thereby the amount of relative movement permitted.

Springs 74 pass over the extended spline 77 and are each secured to a hook member 65 by means of an axially extending end 84 which engages in a notch 85 formed directly to the rear of the hook 68, one spring being provided at either side of the hook member 65.

The adjacent faces of collars 76 and hook members 65 are preferably helically tapered so as to receive and bear against the contiguous surfaces of the springs 74, thereby strengthening the collars 76 and hook members 65 without adding to the bulk of the apparatus.

Springs 74 are powerfully compressed (helically wound) so as to exert a great force on the hooks 68, two springs acting on each hook. The springs are always held in a preloaded condition by bars 80 as they are never relaxed, and yet never touch or bind the shaft 60 even when fully compressed as in Figure 9 when moved in plate engaging position.

Bearings 64 are retained in plate cylinder 20 by means of the filler or cap pieces 35 which also serve to hold the hook bars 28 in place and also serve to fill in the space between the several hooks 68 and also between the hooks 68 and 28. Preferably, the pieces 35 are made in short lengths, separate lengths serving to fill

the space between each pair of hooks, the pieces also being recessed to receive one-half of a hook, so that adjacent pieces join to close the space around the hook.

Means are provided for moving shaft 60 from plate locking position to plate unlocknig position and for holding the shaft in either position. These means are located at one end of the cylinder and may be similar in construction and operation to those disclosed in the prior patent to Crafts and Pollock granted September 30, 1947. As shown, an arm 90 is splined to the end of shaft 60, and is connected by pivoted link 91 to a disc 92 fixed to worm gear 93 rotatably mounted by shaft 94 journaled in the cylinder end and by bracket 95. Worm gear 93 is rotated by worm 96 rotatably mounted in the cylinder by antifriction bearings 97 and secured by the retaining collar 98. A full turn (360°) of worm, effected by means of a wrench 99 inserted in socket 100, moves the shaft 60 from fully locked to fully unlocked position, or vice versa.

The mechanism for one longitudinal half of the cylinder has been described and usually the other half of the cylinder will be a duplicate to be operated from the other end of the cylinder so as to avoid undue length of shafts 60 and consequent weakening of the cylinder body.

Figures 11 to 14 illustrate a modified embodiment of the invention. In these figures, those parts are shown which differ from the embodiment of Figures 1 to 10 and comprise the rotatable shaft and its associated plate engaging hooks.

In this embodiment, shaft 160 is a hollow shaft to be rotated from locking to unlocking position by means of an arm 90 and the associated link 91, worm gear 93 and worm 96.

The plate engaging hooks 168 each comprise a sleeve like member 165 and a plate lifting finger 170 formed integrally and bored to fit the exterior of shaft 160, the several members 165 being coaxially alined. Shaft 160 is mounted for rotatable movement by means of the antifriction bearings 164 seated in the cylinder body and secured by the cap members and antifriction balls 167 are provided between the outer race of bearing 164 and the adjacent edge of the hook member 165. Oil seals 166 are provided at either side of the hook members.

Within shaft 160 and coaxial therewith, are mounted powerful compression springs 175 compressed by a screw plug 177 threaded into the interior of the shaft 160 and apertured, as at 178, so that a wrench may be inserted to turn them individually into position for assembly. At its other end, each spring 175 bears against a slidable abutment 180 which transmits the force of the spring 175 to a square pin 182 provided with enlarged rotatable roller ends 184 which are slidable in axial slots 186 formed in the walls of shaft 160 and bear against helical slots 188 formed in the plate hook sleeves 165.

Oil seals may be provided against the hook sleeves 165 and as shown there are resilient packing members 190 compressed against shoulders 192 formed in the cylinder and held in place by the bars 194 and cap members 195 which may be conveniently secured by screws into the cylinder body.

Shaft 160 may be swung from plate-locking to plate-unlocking position, or vice versa carrying with it the pins 182 and the plate hook sleeves 165, subject to any helical movement they may have on the shaft 160. In locking position, shaft 160 provides an abutment against which the force of each spring 175 may be exerted to push the pin 182 to the left (Figure 12) and thereby rotate the corresponding hook sleeve 165 counter-clockwise (Figure 11) into plate securing position.

Several, preferably four, plate hook sleeves 165 are provided for each plate 22, and preferably the hooks for two plates are mounted on and actuated by a single shaft, as in Figures 1 to 10.

The invention in its broader aspects is not limited to

the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What is claimed is:

1. In a plate cylinder for holding relatively thick printing plates by circumferential tension applied to the plates near their opposite ends, the combination comprising plates, hook means engageable with one end of a plate at a plurality of axially spaced points, means for moving the hook means circumferentially of the cylinder comprising a plurality of individual axially movable members slidable in the cylinder, and respective axially spaced cam means carried by the members engageable with the hook means for skewing the hook means.

2. In a tension lockup on a plate cylinder for a printing press for circumferentially tensioning a stereotype printing plate or the like having pockets in its underside near its leading and trailing ends to hold the plate on the cylinder, the combination comprising means for anchoring one end of the plate, a shaft rotatable from plate locking to plate unlocking position, a plurality of plate tensioning hooks for engaging the plate inside the pockets near the opposite end thereof, said hooks being carried on the shaft for individual coaxial rotation relative thereto, spring means coaxial with the shaft for individually urging rotation of the hooks on the shaft in a plate tensioning direction, and means on the shaft for positively retracting the hooks by rotation of the shaft.

3. In a tension lockup on a plate cylinder for a printing press for circumferentially tensioning a stereotype printing plate or the like having pockets in its underside near its leading and trailing ends to hold the plate on the cylinder, the combination comprising means for anchoring one end of the plate, a shaft rotatable from plate locking to plate unlocking position, a plurality of plate tensioning hooks for engaging the plate inside the pockets near the opposite end thereof, said hooks being carried on the shaft for individual coaxial rotation relative thereto, spring means for individually urging rotation of the hooks on the shaft in a plate tensioning direction, and means for positively limiting rotation of the hooks with respect so the shaft in the plate tensioning direction so that all of the hooks are retractable by rotating the shaft.

4. In the tension lockup on a plate cylinder for a printing press for circumferentially tensioning a stereotype printing plate or the like having pockets in its underside near its leading and trailing ends to hold the plate on the cylinder, the combination comprising means for anchoring one end of the plate, a shaft rotatable from plate locking to plate unlocking position, a plurality of plate tensioning hooks for reception in the pockets and engagement with the plate near the opposite end thereof, said hooks being carried on the shaft for independent coaxial rotation relative thereto, torsional spring means for individually urging rotation of the hooks on the shaft in a plate tensioning direction, and means on the shaft for positively retracting the hooks by rotation of the shaft.

5. In a plate cylinder for holding printing plates in circumferential tension, the combination comprising a hollow shaft rotatable from plate locking to plate unlocking position, a plurality of plate tensioning hooks engageable with a plate near one end thereof, the hooks being journaled on said shaft, a plurality of compression springs within the hollow shaft and generally coaxial therewith, means operable by the springs for urging individual rotation of the hooks on the shaft in a plate tensioning direction, and means for positively retracting the hooks by rotation of the shaft.

6. In a tension lockup on a plate cylinder for a printing press for circumferentially tensioning a stereotype printing plate or the like having pockets in its underside near its leading and trailing ends to hold the plate on the cylinder, the combination comprising register hook means

movably mounted on the cylinder for reception in the pockets and engagement with the plate near one end thereof, means for skewing the hook means on the cylinder to skew the plate, a shaft rotatable in the cylinder from plate locking to plate unlocking position, a plurality of take-up hooks movable into the pockets and engageable with the plate near its opposite end, the hooks being rotatably mounted for independent circumferential movement relative to the plate, spring means for individually urging rotation of the hooks in a plate tensioning direction, and means on the shaft for positively retracting the hooks by rotation of the shaft.

7. In a tension lockup on a plate cylinder for a printing press for circumferentially tensioning a stereotype printing plate or the like having pockets in its underside near its leading and trailing ends to hold the plate on the cylinder, the combination comprising a shaft rotatable from plate locking to plate unlocking position, a plurality of plate tensioning hooks for entering the pockets and engaging the plate near one end thereof, said hooks being rotatably mounted for individual circumferential movement relative to the plate, torsional spring means reacting against the shaft for individually moving the hooks in a plate tensioning direction, and means on the shaft for positively limiting movement of the hooks relative to the shaft in the plate tensioning direction so that all of the hooks may be retracted by rotating the shaft.

8. In a tension lockup on a plate cylinder for a printing press for circumferentially tensioning a stereotype printing plate or the like having pockets in its underside near its leading and trailing ends to hold the plate on the cylinder, the combination comprising a shaft rotatable from plate locking to plate unlocking position, a plurality of plate tensioning hooks for entering the pockets and engaging the plate near one end thereof, said hooks being rotatably mounted for individual circumferential movement relative to the plate, a plurality of torsional springs surrounding and reacting against the shaft for individually urging the hooks in a plate tensioning direction, each of the hooks being acted upon by a plurality of said springs, and means on the shaft for positively limiting movement of the hooks relative to the shaft in the plate tensioning direction so that all of the hooks are movable in the opposite direction by rotating the shaft.

9. In a tension lockup on a plate cylinder for a printing press for circumferentially tensioning a stereotype printing plate or the like having pockets in its underside near its leading and trailing ends to hold the plate on the cylinder, the combination comprising a shaft rotatable from plate locking to plate unlocking position, a plurality of plate tensioning hooks for entering the pockets and engaging the plate near one end thereof, said hooks being rotatably mounted for individual circumferential movement relative to the plate, compression spring means coaxial with the shaft for individually moving the hooks in a plate tensioning direction, and means for positively limiting movement of the hooks relative to the shaft in the plate tensioning direction.

10. In a plate cylinder for holding printing plates in tension, the combination comprising a hollow shaft rotatable from plate locking to plate unlocking position, a plurality of plate tensioning hooks for engaging a plate near one end thereof, said hooks being rotatably mounted for individual circumferential movement relative to the plate, a plurality of compression springs housed in the hollow shaft and generally coaxial therewith, camming means operable by the springs for urging movement of the hooks in a plate tensioning direction, and means for positively limiting movement of the hooks relative to the plate tensioning direction.

11. In a plate cylinder for holding printing plates by circumferential tension applied to the plates near their opposite ends, the combination comprising an elongated hook member movable circumferentially on the cylinder for engaging one end of a plate at a plurality of axially

spaced points, a pair of adjusting members individually slidable in the cylinder longitudinally thereof, and respective cam means carried by the adjusting members and engaging the hook member at longitudinally spaced points for moving the hook member circumferentially of the cylinder, said adjusting members being movable differentially to skew the hook member.

12. In a tension lockup on a plate cylinder for a printing press for circumferentially tensioning a stereotype printing plate or the like having pockets in its underside near its leading and trailing ends to hold the plate on the cylinder, the combination comprising register hook means movably mounted on the cylinder for engaging the plate inside the pockets near one end thereof, means for skewing the hook means on the cylinder to skew the plate, a pair of individually movable take-up hooks on the cylinder spaced longitudinally thereof for engaging the plate near its opposite end, and individual springs for urging the respective take-up hooks in a plate tensioning direction, the springs being differentially yieldable to accommodate skewing of the plate.

13. In a tension lockup on a plate cylinder for a printing press for circumferentially tensioning a stereotype printing plate or the like having pockets in its underside near its leading and trailing ends to hold the plate on the cylinder, the combination comprising a plurality of circumferentially adjustable register hooks on the cylinder spaced longitudinally thereof for engaging the plate inside the pockets near one end thereof, means for effecting relative circumferential movement of the register hooks to skew the plate, a plurality of individually movable take-up hooks on the cylinder spaced longitudinally thereof for engaging the plate inside the pockets near its opposite end, and individual springs for urging the respective take-up hooks in a plate tensioning direction, the springs being yieldable to accommodate skewing of the plate.

14. In a plate cylinder for holding relatively thick stereotype printing plates in circumferential tension, the combination comprising register hook means for engaging a plate at a plurality of axially spaced points, means mounting the hook means partially projecting from the surface of the cylinder and with freedom to shift circumferentially and skewingly with respect thereto, and plural means independently shiftable axially of the cylinder for moving said mounting means circumferentially of the cylinder and for skewing the hook means on the cylinder to skew the plate.

15. In a plate cylinder for holding printing plates in circumferential tension, the combination comprising a pair of register hooks for engaging a plate at a pair of axially spaced points, means mounting the hooks on the cylinder for relative circumferential adjusting movement, and plural adjusting means shiftable equally and differentially in a direction axially of the cylinder for moving the hooks both in unison and differentially in a circumferential direction, such differential movement bringing said hooks into skewed relationship to skew the plate.

16. In a plate cylinder for holding printing plates in circumferential tension, the combination comprising register hook means for engaging a plate near one end at a plurality of axially spaced points, means mounting the hook means on the cylinder for skewing movement with respect thereto, means for skewing the hook means on the cylinder to skew the plate including a plurality of cams spaced axially along said mounting means and a corresponding plurality of independently axially shiftable members connected with said cams and controllable from one end of the cylinder, and means for engaging the plate

near its opposite end to lock the plate in tension on the cylinder.

17. In a tension lockup on a plate cylinder for a printing press for applying circumferential tension to a stereotype printing plate or the like having pockets in its underside near its leading and trailing ends, the combination comprising means for anchoring one end of the plate, a shaft rotatable from plate locking to plate unlocking position, plate tensioning hooks engageable with the plate inside the pockets near the opposite end of the plate, the hooks being journaled on said shaft and relatively rotatable in coaxial relationship thereto, powerful spring means for individually rotating the hooks on the shaft in a plate tensioning direction, and means on the shaft for positively retracting the hooks by rotation of the shaft.

18. In a tension lockup on a plate cylinder of a printing press for circumferentially tensioning a stereotype printing plate or the like having pockets in its underside near its leading and trailing ends, the combination comprising means on the periphery of the cylinder for anchoring one end of the plate, a longitudinal shaft rotatable in the cylinder from plate locking to plate unlocking position, plate tensioning hooks engageable with the plate at points inside the pockets near the opposite end of the plate, the hooks being journaled for circumferential movement relative to the surface of the cylinder, spring means coaxial with the shaft and reacting against said shaft for individually moving the hooks in a plate tensioning direction, and means on the shaft for positively limiting movement of the hooks relative thereto in the plate tensioning direction so that all of the hooks may be retracted by rotating the shaft.

19. In a cylinder for holding printing plates in circumferential tension, the combination comprising a pair of register hooks adapted to engage a plate at spaced points along one edge thereof, means supporting said hooks in axially spaced relation on and with freedom for circumferential movement relative to the cylinder, a plurality of cams active at spaced points along said supporting means for shifting the latter circumferentially of the cylinder, a corresponding plurality of closely spaced bars connected with said cams and independently shiftable axially of the cylinder to actuate respective ones of said cams, said support means thereby being movable circumferentially of the cylinder to tension the plate and movable to a skewed position to skew the plate, and a common scale disposed in proximity to the ends of said bars for indicating the axial positions thereof and the resulting position of said hooks relative to the cylinder.

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