

May 26, 1953

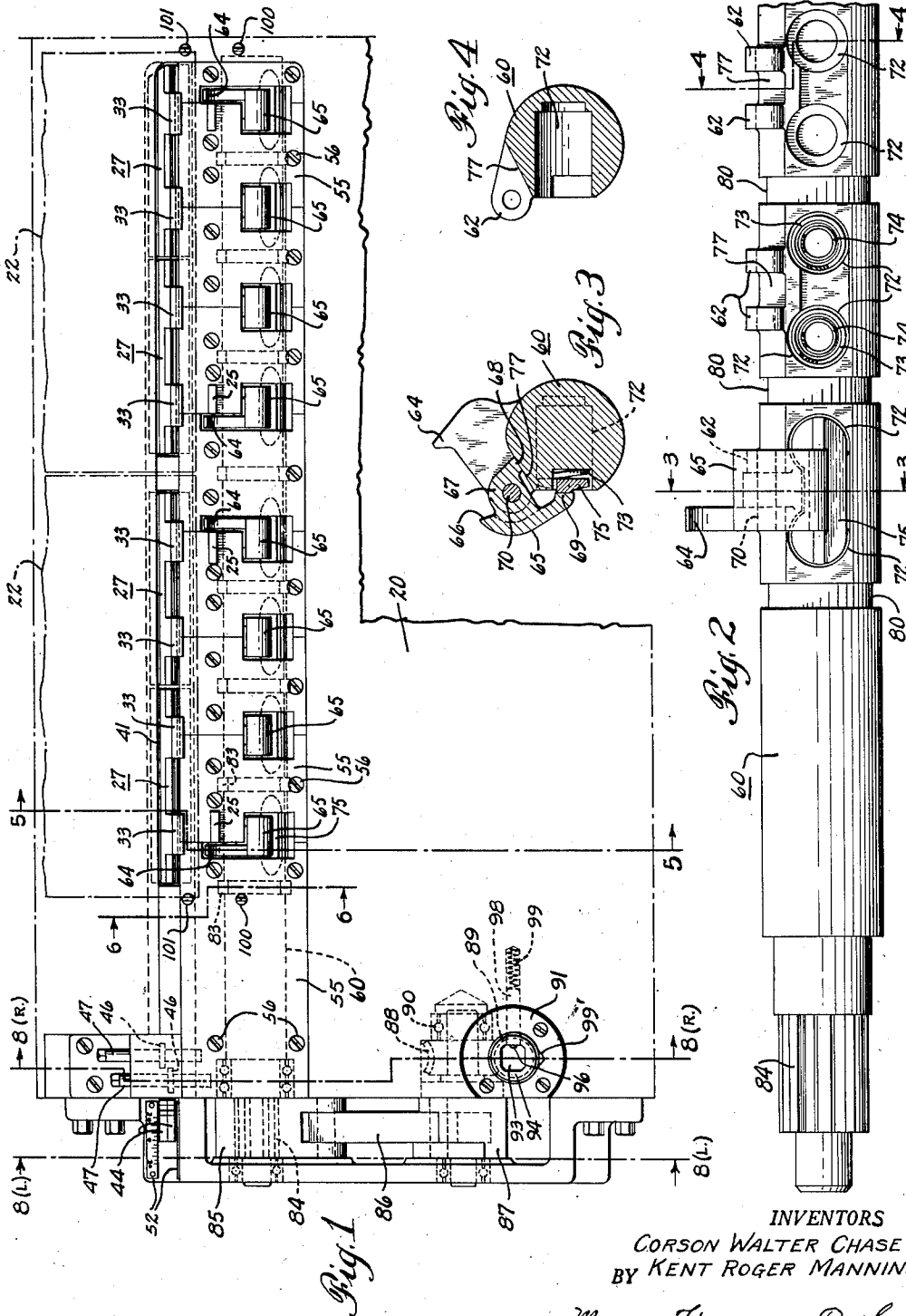
C. W. CHASE ET AL

2,639,668

PRINTING CYLINDER

Filed Sept. 10, 1948

5 Sheets-Sheet 1



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5 Sheets-Sheet 2

Fig. 5

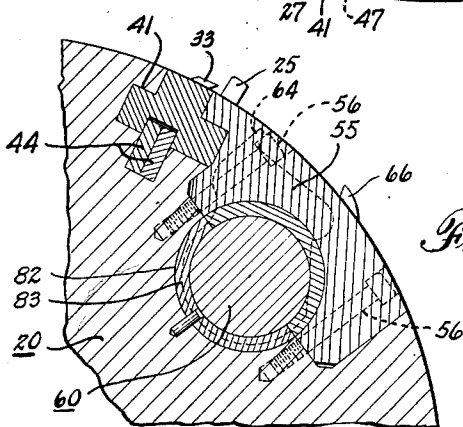
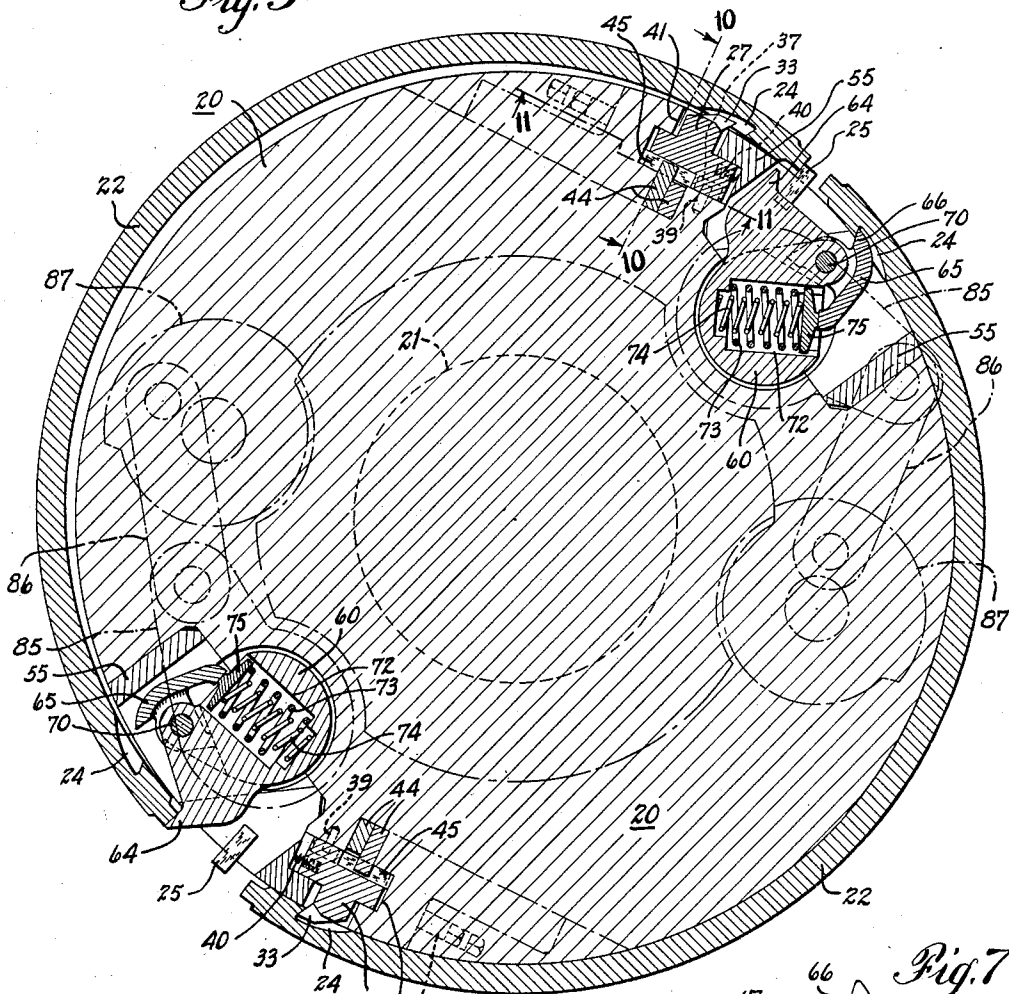


Fig. 6

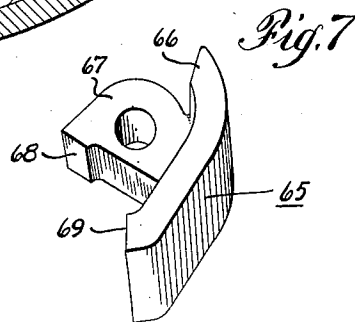


Fig. 7

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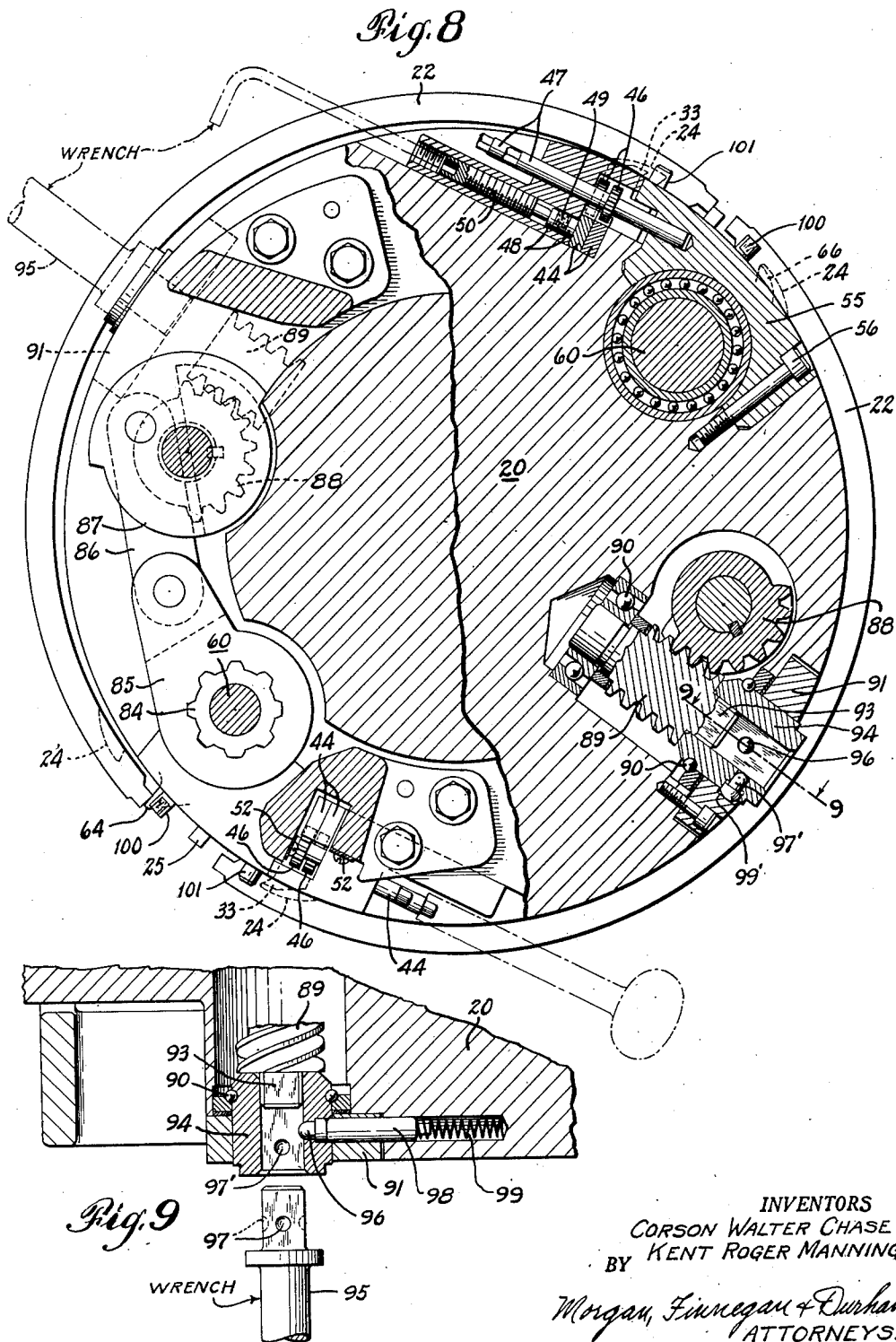
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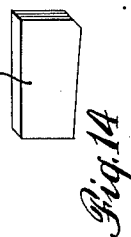
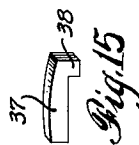
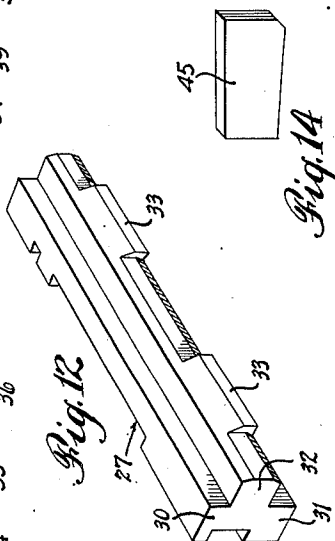
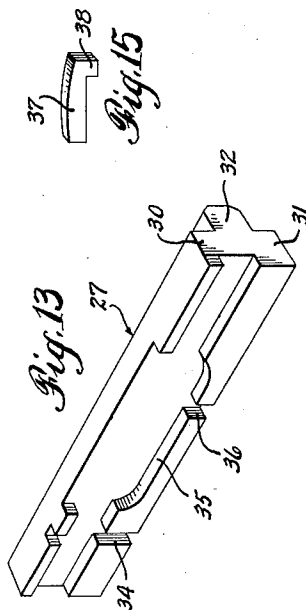
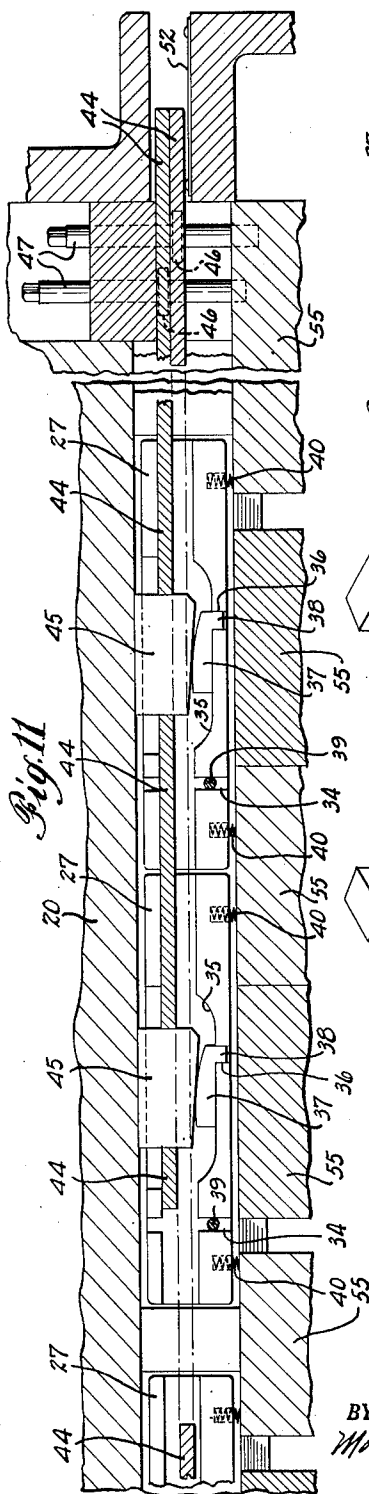
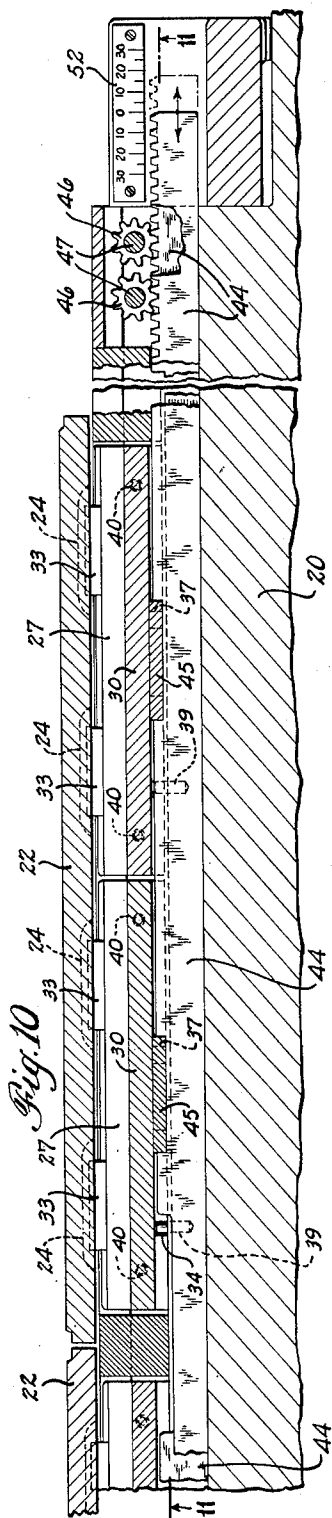
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5 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,639,668

PRINTING CYLINDER

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Application September 10, 1948, Serial No. 48,622

12 Claims. (Cl. 101—378)

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The present invention relates to new and useful improvements in plate cylinders for rotary printing presses and particularly to plate cylinders to which stereotype printing plates may be secured by circumferentially applied tension.

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 realised 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 fragmentary developed plan view of a portion of a printing cylinder according to the present invention with the stereotype plates indicated by dot-dash lines;

Figure 2 is a fragmentary detail of a shaft and plate hooks forming part of the mechanism shown in Figure 1;

Figures 3 and 4 are cross sectional views taken on the lines 3—3 and 4—4 of Figure 2;

Figure 5 is a sectional view taken on the line 5—5 of Figure 1;

Figure 6 is a fragmentary sectional view taken on the line 6—6 of Figure 1;

Figure 7 is a perspective view of a plate hook member;

Figure 8 is a sectional view taken partly on the line 8L—8L and partly on the line 8R—8R of Figure 1;

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

Figure 10 is a detailed longitudinal sectional view taken on the line 10—10 of Figure 5;

Figure 11 is a detailed longitudinal view taken on the line 11—11 of Figure 5;

Figure 12 is a detail perspective view of one of the registering plate hooks;

Figure 13 is a similar view of the underside of the part shown in Figure 12;

Figure 14 is a detail perspective view of a wedge member coacting with the registering plate hook;

Figure 15 is a detail perspective view of the cam to coact with the wedge;

Figures 16 to 19 illustrate a modified embodiment of the invention;

2

Figures 16 and 17 are detail sectional views taken on the lines 16—16 and 17—17 of Figure 18;

Figure 18 is a sectional view taken on the line 18—18 of Figure 17; and

Figure 19 is a view similar to Figure 16 but showing the mechanism in plate releasing position.

The present invention in certain respects is an improvement on the plate securing means shown in the prior U. S. patent to Worthington 2,236,230 and the prior U. S. patent to Curtis S. Crafts 2,428,263.

The present invention has for its object the provision of a plate cylinder having improved circumferentially acting plate tensioning means for securing the plates to the cylinder. A further object is the provision of a plate cylinder having improved plate registering means and which will operate equally well in either direction of rotation. A further object is the provision of a plate cylinder in which small torsional deflections of the plate hook actuating shaft do not produce corresponding variations in circumferential register of the plates secured on the cylinder. Still another object is the provision of a plate cylinder which can be operated at extremely high speeds of rotation and which is not readily subject to damage by the wrapping of the paper web following a web break.

Referring now in detail to the illustrative and preferred embodiment of the present invention as shown in Figures 1 to 15 of the drawings, the printing cylinder comprises a preferably solid steel forging 20 provided with the usual shaft ends 21 by which it is rotatably supported and driven. Such a cylinder is illustratively adapted to support two stereotype plates circumferentially of the cylinder and four plates longitudinally, making a total of eight plates. Two such plates 22 are shown in section in clamped position in Figure 5.

The stereotype plates 22 are conventionally formed as almost semi-cylindrical bodies having a plurality of axially aligned internally milled recesses 24 on the inner surface thereof near their straight edges into which plate hooks may be engaged to tension the plate and thereby secure it firmly to the cylinder.

Lengthwise of the cylinder, embedded in its surface and projecting therefrom less than the printing height of the plates 22 are "bars" 25 which engage and support an end of the plate 22 as the plate is slid on to the cylinder and moves over the plate engaging hooks.

Near one end of each plate are provided means

3

for engaging the plate hook recesses 24 which means are circumferentially movable so as to effect circumferential register of the plates individually, while near the other end of each plate are provided means for engaging the plate hook recesses 24 and for applying circumferential tension to the plate so as to tension the plate and securely fasten it to the cylinder against possible dislocation during high speed rotary printing.

The registering plate hooks will be first described and Figures 12 and 13 illustrate a single plate hook 27 for one end of one plate, the figures looking at the same hook from different directions, four such hooks 27 being provided in longitudinal alinement on each circumferential half of the cylinder.

Each of the registering hooks 27 comprises a T-shaped bar having one or more plate engaging hooks formed on it and adapted to slide in a guideway so as to be moved circumferentially of the cylinder along a chord for the cylinder, and also comprises means for holding the bar against axial movement, and other means to co-operate with cam means for the minute precise circumferential movement.

As embodied, the hooks and bars 27 are shown in position in the cylinder in Figures 1, 5, 6, 8, 10 and 11. Each bar comprises the base extensions 30 and 31 and the substantially radial portion 32 on the outer portion of which are formed the hook members 33, spaced and shaped to fit into the milled grooves 24 at one end of the plate 22. Base extension 31 extends to the same depth as extension 30 and is formed with a perpendicular slot 34, a recess 35 and a second slot 36. Recess 35 is to accommodate a cam 37, the tongue 38 of which fits into slot 36, while slot 34 is to receive a pin 39 which prevents axial movement of the block 27 in the cylinder. The blocks 27 are also drilled to receive coil springs 40 which serve to urge the blocks in one circumferential direction when no plate is being held.

Cylinder 20 is formed with diametrically opposed T-slots 41 to receive the blocks 27 and hold them against radial movement, the slots preferably extending almost to the longitudinal center of the cylinder 20 so that the edges of two side-by-side plates may be alined. The T-slots 41 are wide enough to permit substantial movement along the chord of the cylinder so that the hooks 33 may be moved for circumferential register of the plates, one plate at a time.

Means are provided for moving the hooks 33 for register, and operable from one end of the cylinder. As embodied, each T-slot is provided with an intersecting slot extending radially inwardly and receiving a plurality of longitudinally movable bars 44 each of which is slotted to receive wedge means 45 cooperating with the rounded cam means 37, so that as a bar 44 is axially moved, wedges 45 are moved and cause circumferential movement of the cam means 37 and the hooks 33 against the light compression of springs 40 and also form stops to limit movement of the hooks against the stronger tension to be exerted by the plate in locked or running position. One bar 44 preferably serves for the outer plate and the other bar 44 serves for the inner plate, being duplicated for each longitudinal half and each circumferential half of the cylinder.

For selectively moving the bars 44, the bars 44 are formed as racks near their outer ends and are drivingly engaged by their respective pinions 46, the pinions being mounted on the square ended

4

shafts 47 which are journaled in the cylinder body and may be individually turned by means of a key, one pinion 46 engaging one rack only as shown in Figure 11. Friction means are provided for locking the bars in their adjusted position and comprise a pair of metal discs 48 between which is a fibre disc 49, the assembly being compressed by means of the screw 50 threaded into the cylinder body and pressing against the adjacent bar 44 to lock both bars 44 in their adjusted position.

Indexing means are provided for accurately indicating the amount of circumferential movement given to the hooks 44 and for this purpose a scale 52 is mounted to cooperate with an end of each bar 44 and may be conveniently calibrated in thousandths of an inch of circumferential movement of the plate.

In the form shown, there are provided two hook bars 27 for each plate and these are preferably moved always in alinement with each other due to the mouting of both wedges 43 on the same rod 44, although this uniform movement is not essential.

To facilitate assembly and manufacture, one side of the T-slot 41 is preferably formed by a filler piece 55 which is secured by screws 56 and forms part of the cylinder surface.

Other plate hooks are provided near the other end of the plate for exerting circumferential tension on the plate in cooperation with the registering hooks so as to securely hold the plate even at very high operating speeds. These other plate hooks apply a heavy resilient tensioning force to the plate so as to compensate for any minor dimensional variations in the length of the plate or in the relative positions of the hook receiving slots 24. Furthermore any stretch which may occur in the plate during printing does not affect the security with which the plate is held, as the hooks follow the plate.

In accordance with the present invention, the resiliently urged hooks are individually mounted for resilient movement on a relatively stiff shaft journaled in the cylinder, the springs for the hooks being preloaded and capable of being compressed to exert great force almost up to the tensile strength of the metal of which the plate is made. Figures 2, 3, 4 and 7 illustrate the preferred details of construction and assembly of the resiliently movable hooks and their supporting shaft. As embodied, there is provided a heavy, stiff shaft 60 to extend from one end of the cylinder past the center of the cylinder and to be journaled in the body of the cylinder, near its surface, the several hooks and their actuating springs being mounted on the shaft, several hooks (usually four) being provided for each plate. Along its length shaft 60 is formed with lugs 62 in which the hooks are pivotally mounted, the hooks preferably being uniformly spaced from each other to distribute the strain uniformly along the edge of the plate. The plate hook supporting portions of the shaft are preferably formed with plate lifting ears 64, as shown in detail in Figures 2 and 3. Each hook 65, as shown in Figure 7, comprises a plate engaging portion 66 having a wide, substantially straight edge, and an apertured lug 67 by which it may be pivotally mounted in the lugs 62, a stop portion 68 and a bearer portion 69 against which the spring force is applied. The hook is pivoted between lugs 62 by means of pintle 70.

Shaft 60 adjacent the lugs 62 is formed with a pair of spring sockets 72 to receive the powerful

5

coil springs 73 and 74 and the spring cover plate 75 which is interposed between the springs and the bearer 69 and is acted on by both pairs of springs 73 and 74 to urge each hook about its pivot towards plate securing position. Between lugs 62 the shaft 60 is formed with a flat 77 against which stop 68 acts to limit movement of the hook member 65, and also serving to permit the springs 73 and 74 to be substantially preloaded so that they exert a heavy resilient force on the plate as soon as they are deflected on engagement with the plate. The spring sockets 72 are cut away on adjacent sides so as to receive the median portion of the cover plate 75. The preloaded compression of the springs 73 and 74 as exerted on the plate 22 is more than enough to secure the plate at its maximum running speed, while the maximum effort of the springs is not enough to exceed the tensile strength of the plate metal, these limits preferably encompassing a considerable movement of the springs and hooks.

Shaft 60 is preferably of reduced size and of cylindrical shape between the several hook supporting portions so as to form journals 80 along its length. Shaft 60 is rotatably journaled in the cylinder by means of a cap piece which may be formed integrally with the filler piece 55 and serves to hold the shaft 60 against all but rotational movement. As embodied the cylinder 20 is formed with seats 82 to receive bushings 83 and the cap piece 55 is formed to receive and securely hold the bushings 83.

Means are provided for rotating shaft 60 from an unlocked to a locked position so that the plates may be released or secured. For this purpose, the end of shaft 60 is splined at 84 to an arm 85, connected by link 86 to a disc 87 carried by worm gear 88 journaled in the cylinder and meshing with worm 89 also journaled in the cylinder by means of antifriction bearings 90 and retained by plate 91.

A full 360° turn of worm 89 causes shaft 60 to move from fully unlocked to fully locked position, or vice versa. Figure 5 shows in dot-dash lines, one shaft 60 in fully locked position and one in fully unlocked position, which Figure 8 shows one shaft 60 and its associated link mechanism in fully unlocked position, and also shows the worm 89 and worm gear 88 adjacent one end of the cylinder.

In order to assure movement of the plate hooks to full unlocked position or alternatively to full locked position, removable means are provided for turning worms 89, which means can be removed for press operation in only one or the other position of the plate hooks 66. Any suitable means may be employed, but as preferably embodied and illustrated in Figures 8 and 9, worm gear 89 is provided with a square end 93 on which is fitted a square socket 94 to receive a socket wrench 95. Socket 94 is provided with a pin 96 to be pushed by the flat of wrench 95, thereby pushing back plunger 98 against spring 99 so as to allow the socket 94 to rotate. At the same time pin 97 enters dimple 97', and any movement of the socket 94 away from fully locked or fully unlocked position causes pin 97' to be moved radially inward, out of the shallow recess 99' and thereby holds the wrench 95 locked in position until pin 97' again registers with recess 99'. With wrench 95 removed, socket 94 is held against rotation by pin 96, and with the wrench 95 in socket 94, the wrench can be removed only in one of two positions.

In order to facilitate positioning of the plate 20

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on the cylinder, pins 100 and 101 are provided, pins 100 and 101 abutting the plate at an edge thereof. Preferably, the plate is positioned with one edge against stop 25 and its opposite end resting on lifting finger 64. Wrench 95 is then turned until the plate rests against the cylinder after which the plate is shifted by hand until it is against the pins 101 after which the wrench is moved to fully locked position, compressing the springs 73 and 74 and securely tensioning the plate to secure it to the cylinder.

Figures 16 to 19 illustrate a modified form of the present invention in which the spring means for the plate hooks are embedded in the cylinder body rather than in the actuating shaft for the plate hooks. In these figures the same reference characters are used as in the other figures so far as the two modifications make use of duplicate parts.

As here embodied, the actuating shaft 160 is actuated by mechanism similar to that in the first modification, from unlocked to locking position. Shaft 160 is formed with lugs 162 which are pivotally connected to link 186 to swing arm 185 formed as an integral part of the plate hook 165. Also formed as integral parts of the hook 165 are the hook member 166 and the plate lifting member 164, the hook 165 being pivoted by means of a shaft 200 which is mounted for sliding movement by blocks 201 which hold the shaft and hook against radial movement. Blocks 201 are thus slidably mounted in slots 202 in the cap pieces 155 and are urged towards shaft 160 by means of the springs 173 and 174. Thus each hook is urged by two pairs of springs 173 and 174 to plate locking position against the link 186 as a rigid abutment.

When each link 186 is retracted (as in Figure 19) the hooks 166 are retracted and the plate lifting portions 164 serve to lift the plate from the surface of the cylinders so it may be easily removed.

The hooks 166 may be similar in number and spacing to those of the previously described embodiment.

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 printing plates by circumferential tension applied to pockets at the leading and trailing edges of the plates and having provision for mounting a plurality of plates side by side, a tension lockup arrangement comprising, in combination, a plurality of register hooks mounted in said cylinder and spaced therealong for engaging the pockets at one of the edges of said plates, means for adjusting the register hooks associated with each of the plates so that the plates may be registered independently of one another, a plurality of tensioning hooks mounted in said cylinder at the opposite edge of said plates for engaging the pockets therein, means for independently mounting said tensioning hooks for movement in a peripheral direction, a shaft extending adjacent said tensioning hooks and having means for positioning the same in the cylinder, means for interconnecting said shaft and said tensioning hooks so that the hooks are moved in unison toward and away from engagement with the associated pock-

ets in the plate upon movement of the shaft in one direction or the other, and means including springs interposed between said shaft and said tensioning hooks respectively so that said hooks may be brought into full and resilient engagement with the associated pockets in spite of misalignment of said pockets and in spite of said plates being registered out of alignment with one another.

2. In a plate cylinder for holding printing plates by circumferential tension applied to pockets on the inner surface of the plates, a tension lockup arrangement which includes a shaft mounted for movement in the cylinder and having means for manually positioning the same, a plurality of plate-engaging hooks mounted in said cylinder and spaced therealong for engaging the pockets in the plate, means for mounting said hooks independently of one another for movement in a peripheral direction, means including a pre-loaded spring associated with each of said hooks for pressing them into resilient gripping engagement with their respective pockets, and means for operatively coupling said shaft and said springs so that said springs are brought increasingly to bear against said hooks upon advancing movement of the shaft.

3. In a plate cylinder for holding printing plates by circumferential tension applied to pockets on the inner surface of the plates, a tension lockup arrangement comprising a shaft mounted for movement in said cylinder and having provision for manual positioning, a plurality of plate-engaging hooks mounted in said cylinder and spaced therealong for engaging said pockets, means for independently mounting said hooks for movement in a peripheral direction, means for interconnecting said shaft and said hooks so that the hooks are moved in unison toward and away from engagement with the pockets in said plate upon movement of said shaft in one direction or the other, and means including springs interposed between said shaft and said hooks respectively so that all of said hooks may be brought into full and resilient engagement with said pockets in spite of misalignment of said pockets.

4. In a plate cylinder for holding printing plates by circumferential tension applied to pockets on the inner surface of the plates, a tension lockup arrangement comprising a shaft mounted for movement in said cylinder and having provision for manual positioning, a plurality of plate-engaging hooks mounted in said cylinder and spaced therealong for engaging said pockets, means for independently mounting said hooks for movement in a peripheral direction, means for interconnecting said shaft and said hooks so that the hooks are moved in unison toward and away from engagement with the pockets in said plate upon movement of said shaft in one direction or the other, and means including pre-loaded springs interposed between said shaft and said hooks respectively so that all of said hooks may be brought into full resilient engagement with said pockets for effective distribution of the load between them in spite of misalignment of said pockets.

5. In a printing cylinder for holding printing plates by circumferential tension applied to pockets on the inner surface of the plates, a tension lockup arrangement which includes, in combination, a shaft mounted for movement in said cylinders and having provision for manual positioning, a plurality of plate-engaging hooks in said cylinder for engaging the pockets in the plate, each of said hooks having a plate-engaging por-

tion and having a body portion providing two fulcrum points spaced apart in the plane of movement of the hook, means on said shaft for engaging one of said fulcrum points on each of said hooks so that the hooks tend to move in unison toward and away from engagement with the pockets in said plate upon movement of said shaft in one direction or the other, and a spring for engaging the remaining fulcrum point on each of said hooks respectively for providing a resilient reactive force as said hooks are brought into contact with the pockets and for taking up any misalignment between said pockets.

6. In a printing cylinder for holding printing plates by circumferential tension applied to pockets on the inner surface of the plates, a tension lockup arrangement which includes, in combination, a shaft mounted for movement in said cylinder and having provision for manual positioning, a plurality of plate-engaging hooks in said cylinder for engaging the pockets in the plate, each of said hooks having a plate-engaging portion and having a body portion providing two fulcrum points spaced apart in the plane of movement of the hook, means on said shaft for engaging one of said fulcrum points on each of said hooks so that the hooks tend to move in unison toward and away from engagement with the pockets in said plate upon movement of said shaft in one direction or the other, and a pre-loaded spring for engaging the remaining fulcrum point on each of said hooks respectively for providing a resilient reactive force as said hooks are brought into contact with the pockets and for effective distribution of the load between the hooks regardless of misalignment of said pockets.

7. In a plate cylinder for holding plates by circumferential tension applied to pockets on the inner surface of the plates, a tension lockup arrangement comprising, in combination, a rotatable shaft extending axially in said cylinder and having means for manually positioning the same, a plurality of plate-engaging hooks spaced along said shaft, said hooks each being pivotally mounted on said shaft and movable in a direction into and out of engagement with the pockets in the plate, means including springs seated on said shaft for pressing said hooks respectively in the plate-engaging direction so that upon advance rotation of the shaft said hooks are all brought into firm resilient engagement with their associated pockets in spite of misalignment of the latter.

8. In a plate cylinder for holding plates by circumferential tension applied to pockets on the inner surface of the plates, a tension lockup arrangement comprising, in combination, a rotatable shaft extending axially in said cylinder and having means for manually positioning the same, a plurality of plate-engaging hooks spaced along said shaft, said hooks each being independently mounted on said shaft for pivoting movement with respect thereto in a direction into and out of engagement with said pockets, and preloaded compression springs carried by said shaft and arranged to tension the respective hooks so that upon rotation of the shaft said hooks are all brought into resilient engagement with the pockets on said plate in spite of misalignment of said pockets.

9. In a plate cylinder for holding plates by circumferential tension applied to pockets on the inner surface of the plates, a tension lockup arrangement comprising, in combination, a rotatable shaft extending axially in said cylinder and

having means for manually positioning the same, a plurality of plate-engaging hooks spaced along said shaft, each of said hooks being fulcrumed on said shaft and having a plate-engaging portion and a bearer portion, and springs seated on said shaft for pressing upon the bearer portions of each of said hooks respectively so that upon advance rotation of said shaft said hooks are brought into independent resilient engagement with the pockets in said plate.

10. In a plate cylinder for holding plates by circumferential tension applied to pockets on the inner surface of the plates, a tension lockup arrangement comprising, in combination, a rotatable shaft extending axially in said cylinder and having means for manually positioning the same, a plurality of plate-engaging hooks spaced along said shaft, each of said hooks being fulcrumed on said shaft at its center portion to define a plate-engaging portion and a bearer portion, and preloaded springs pocketed in said shaft opposite the bearer portions of said hooks respectively and arranged to press upon the same so that upon rotation of said shaft said hooks are brought into independent resilient engagement with the pockets in said plate.

11. In a plate cylinder for holding plates by circumferential tension applied to pockets on the inner surface of the plates, a tension lockup arrangement comprising, in combination, a rotatable shaft extending axially in said cylinder and having means for manually positioning the same, a plurality of plate-engaging hooks spaced along said shaft, each of said hooks being fulcrumed on said shaft at its center portion to define a plate-engaging portion and a bearer portion, and springs seated on said shaft for pressing upon the bearer portions of each of said hooks respectively, so that upon forward rotation of said shaft said hooks are brought into independent resilient engagement with the pockets in said plate, and stop means on said hooks for limiting the pivoting movement of each of said hooks relative to the shaft for preloading the spring associated therewith.

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12. In a plate cylinder for holding printing plates by circumferential tension applied to pockets at the leading and trailing edges of the plates and having provision for mounting a plurality of plates side by side in general alinement, a tension lockup arrangement comprising, in combination, means for anchoring one edge of each of said plates including a plurality of register hooks mounted in said cylinder and spaced longitudinally therealong in general alinement for engaging the pockets in each plate at one edge thereof, one set of said register hooks being provided for each of the plates, a plurality of independent means for adjusting the respective sets of register hooks associated with each of the plates so that the plates may be registered independently of one another, a plurality of independently movable tensioning hooks mounted in said cylinder at the opposite edge of said plates for engaging the pockets therein, means including springs for each of said tensioning hooks for resiliently urging said tensioning hooks into engagement with their respective pockets with substantially the same force in spite of misalignment of said pockets and in spite of said plates being registered out of exact alinement with one another, and means for simultaneously retracting all of said tensioning hooks from engagement with said pockets for adjustment and removal of the plates.

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