May 31, 1955 D. H. KNOWLES 2,709,406

TENSION LOCKUP FOR PRINTING PRESS

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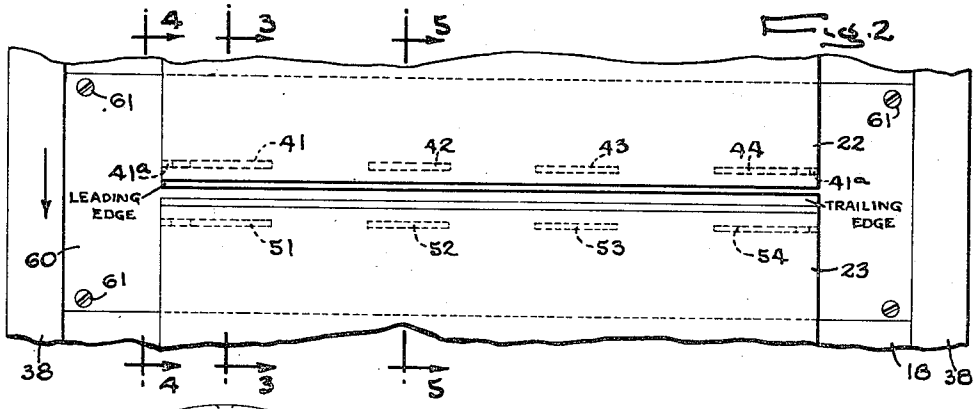



Fig. 2

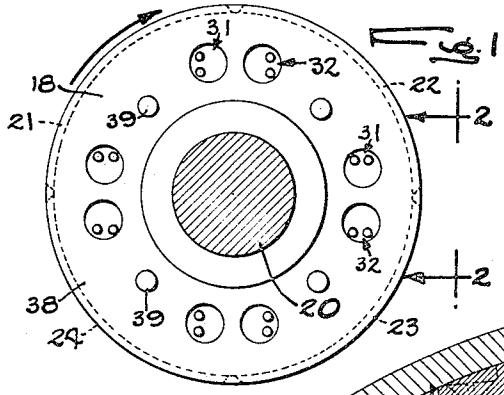



Fig. 1

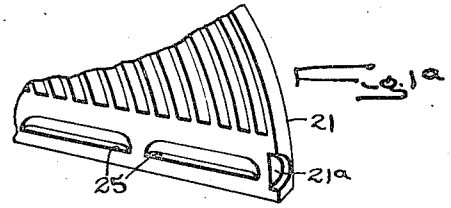



Fig. 1a

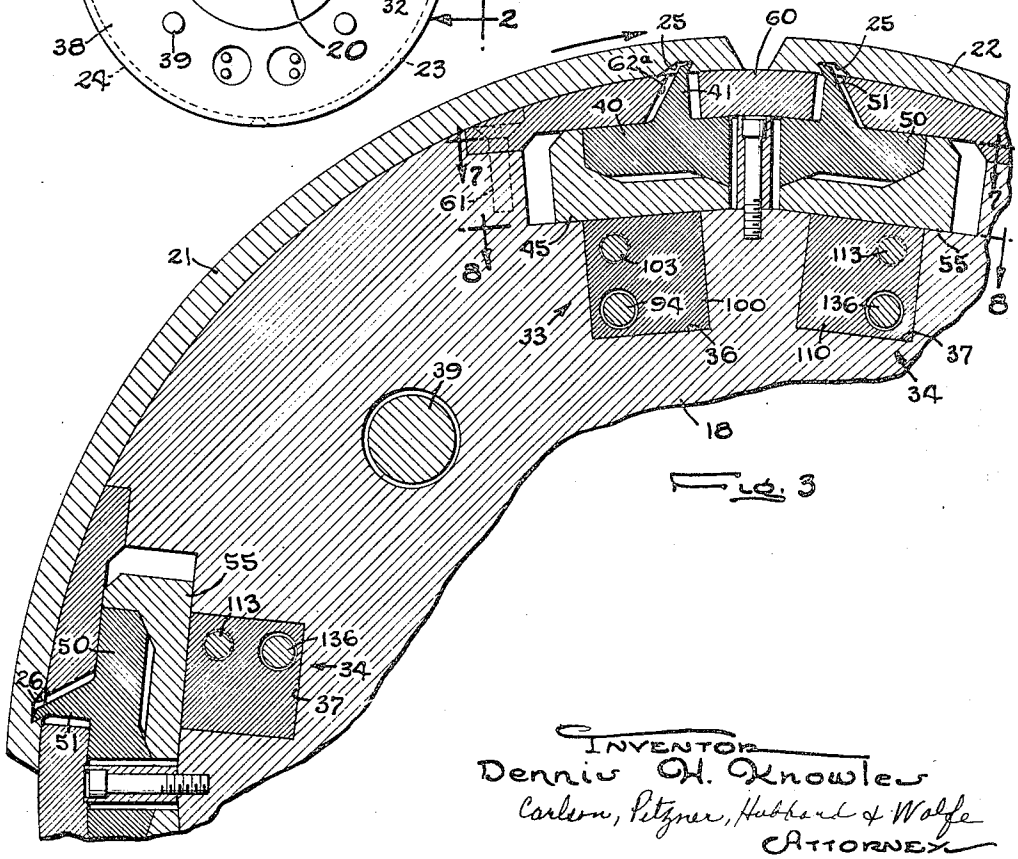



Fig. 3

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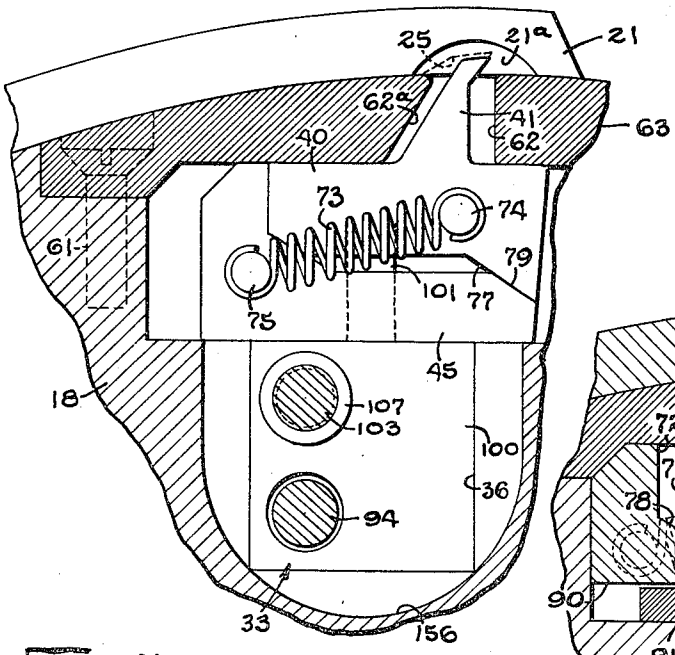



Fig. 4

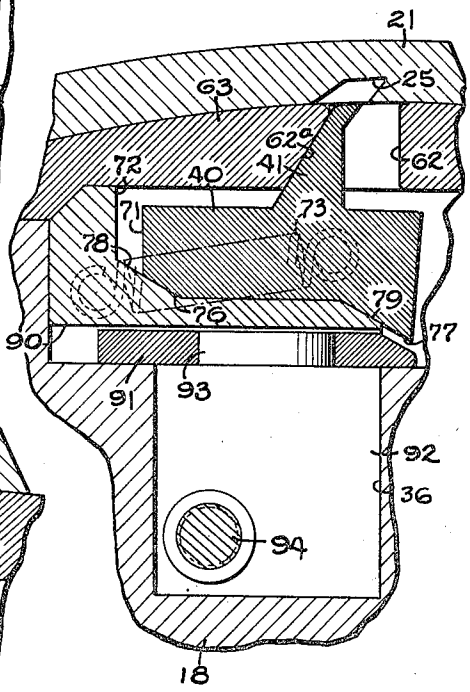



Fig. 5

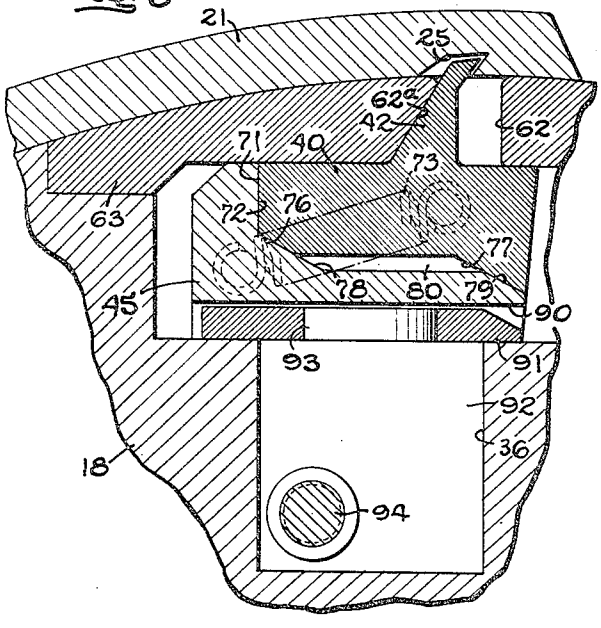



Fig. 6

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TENSION LOCKUP FOR PRINTING PRESS

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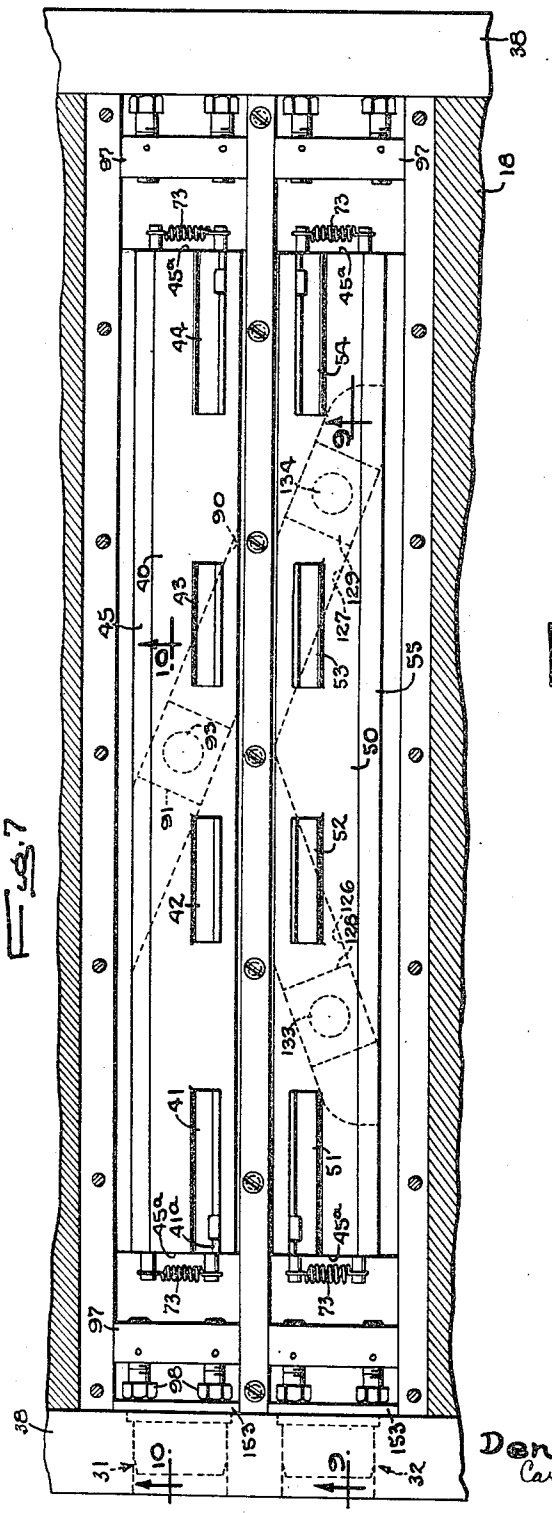


Fig. 7

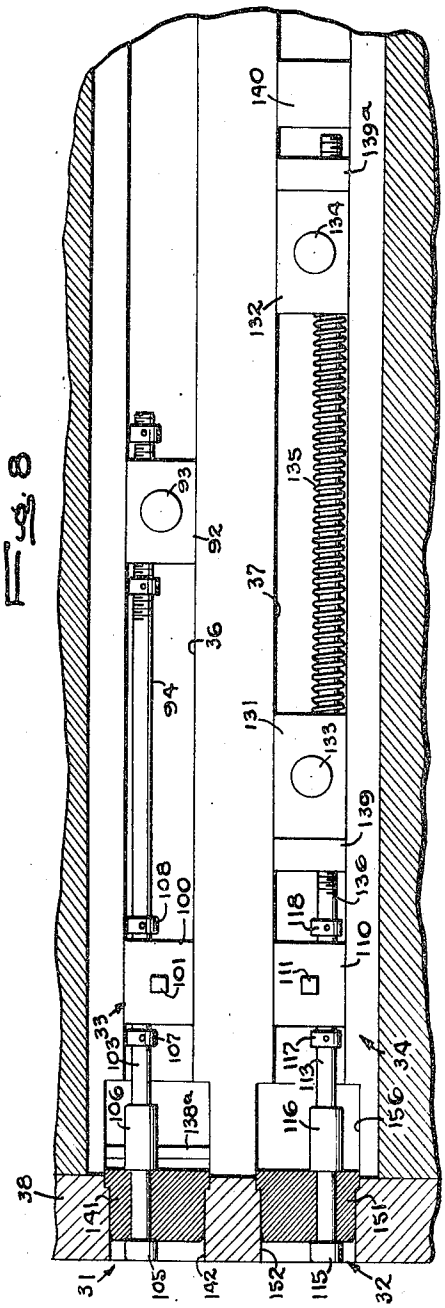


Fig. 8

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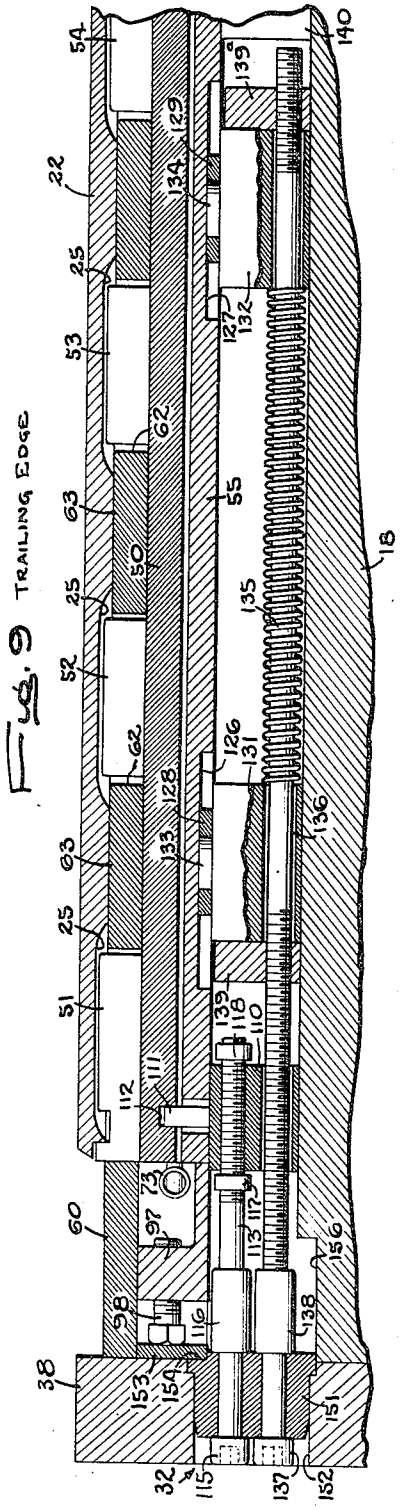


Fig. 9 TRAILING EDGE

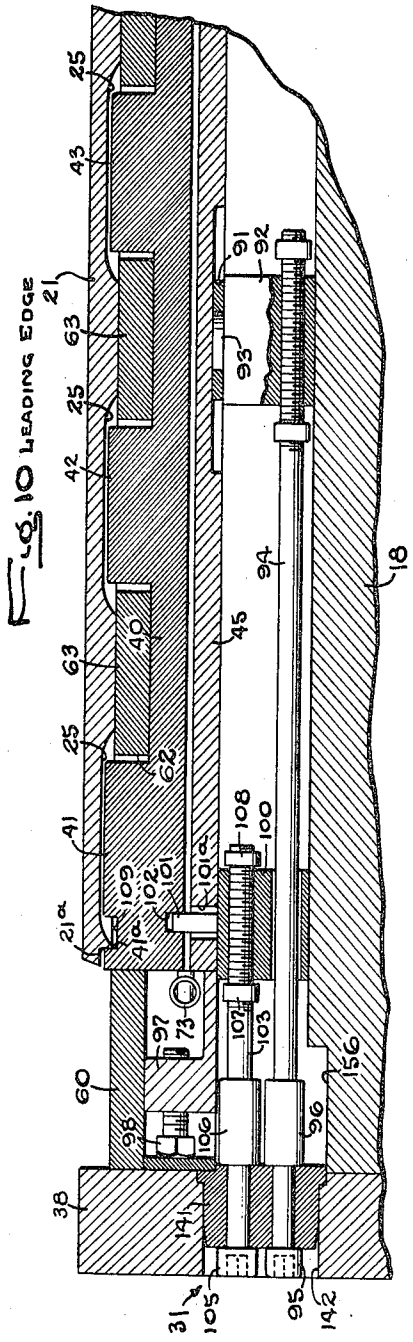


Fig. 10 LEADING EDGE

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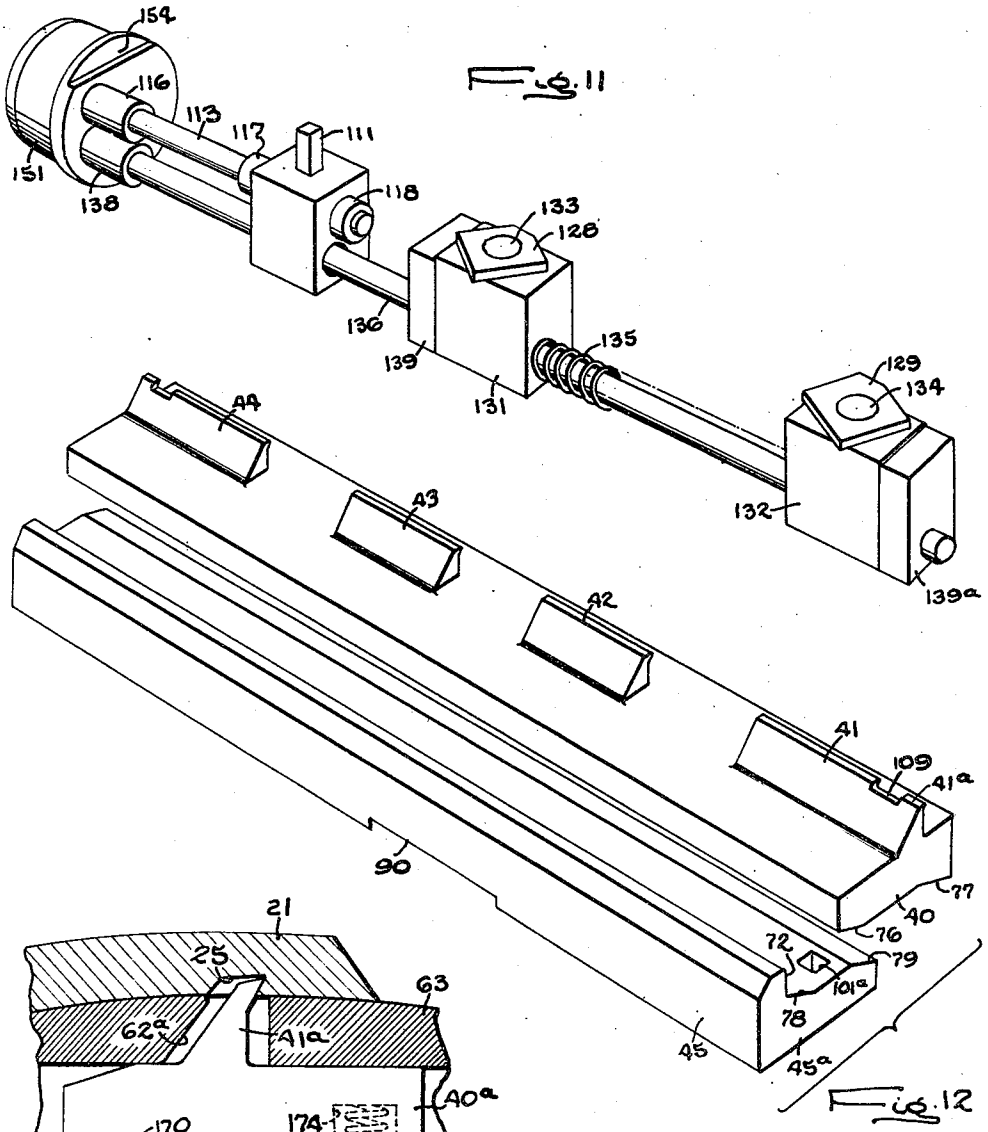



Fig. 11

Fig. 12




Fig. 15

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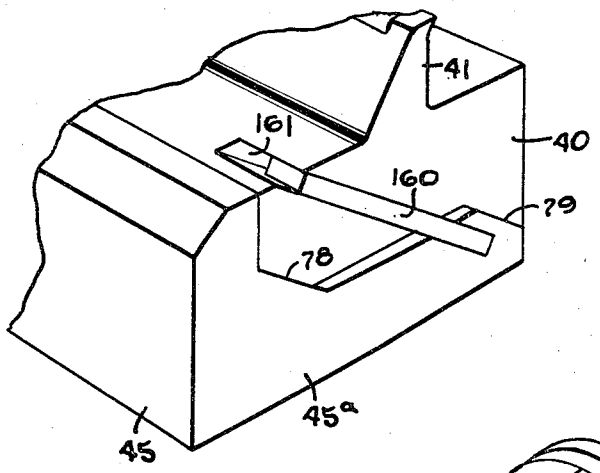



Fig. 13

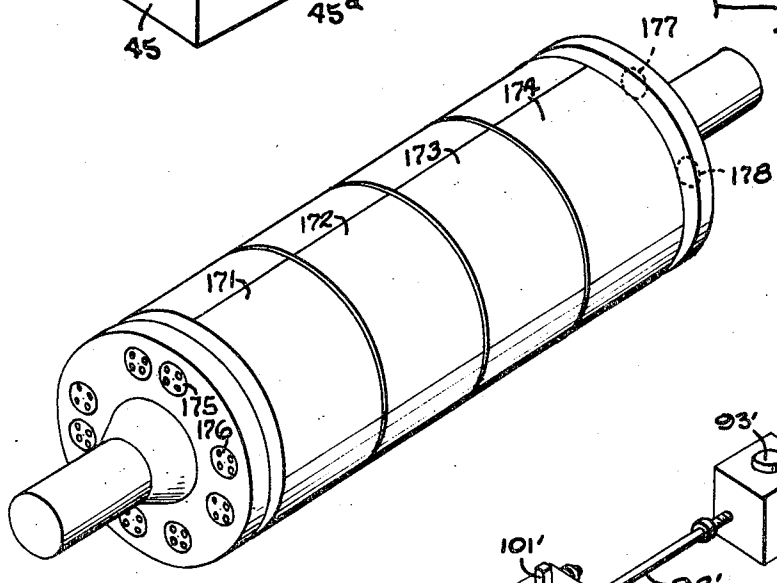



Fig. 14

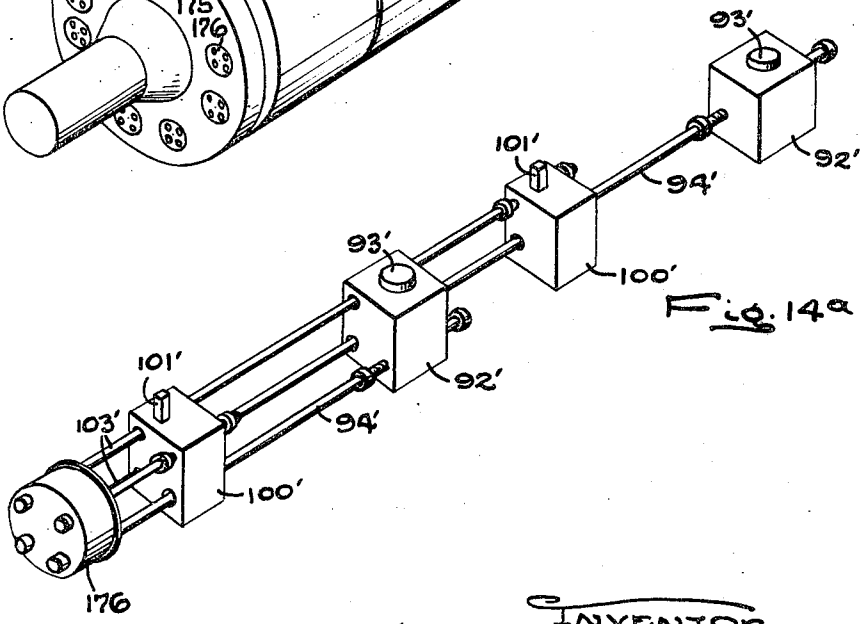



Fig. 14a

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United States Patent Office 2,709,406 Patented May 31, 1955



2,709,406

# TENSION LOCKUP FOR PRINTING PRESS

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Application March 31, 1951, Serial No. 218,638

15 Claims. (Cl. 101—378)

The present invention relates to printing presses, and more particularly to a lockup for positioning and tensioning printing plates on the printing cylinder.

It is an object of the present invention to provide an improved tension lockup which enables the printing plates to be easily and quickly adjusted to a position of accurate register and which causes the plate to be maintained firmly under tension in its adjusted position. It is a related object to provide an improved tension lockup which is applicable to both newspaper color presses and magazine presses, and which enables even the relatively soft electrotype plates to be operated for long runs without necessity for manual take-up or re-adjustment and in which balanced tension is applied to the plate regardless of the degree of skew of the plate on the cylinder.

It is an object of the invention to provide an improved tension lockup plate cylinder which is more flexible in use than prior cylinders, enabling the number of plates around the cylinder to be changed at will without any modification of the cylinder and without modification or special adjustment of the lockup mechanism. It is another object to provide a tension lockup in which adjusting and tensioning are effected by removable sub-assemblies of novel design at the leading and trailing edges of the plate. It is an allied object to provide a plate cylinder in which the direction of rotation may be changed as required for newspaper color work merely by interchanging the adjusting and tensioning subassemblies.

It is a further object to provide a novel tension lockup in which the gripping fingers are translated rather than rotated into engagement with the pockets provided in the plate and in which translation and retraction occur sequentially to submerge the fingers below the surface of the cylinder.

It is an object of the invention in one of its aspects to provide a novel side lay adjustment at each end of the printing plate, which is accurate and positive in operation, which prevents peening of the soft electrotype metal, which is easily accessible, and which provides for independent adjustment at each end of the plate.

It is still another object to provide a plate cylinder tension lockup mechanism which is removable as a compact sub-assembly and which requires minimum machining of either the cylinder or the hardened bearer rings at each end thereof. It is a related object to provide a tension lockup which is simple and inexpensive to construct, which requires practically no maintenance, and which is inherently durable and long-lived.

Other objects and advantages will be apparent upon reference to the specification and to the accompanying drawings in which:

Figure 1 is an end view of a plate cylinder embodying the present invention;

Fig. 1*a* shows a portion of a typical printing plate employed with the tension lockup;



Fig. 2 is a fragmentary view of the surface of the cylinder as viewed along the line 2—2 in Fig. 1;

Fig. 3 is a fragmentary section of the cylinder taken along the line 3—3 in Fig. 2 and showing a plate clamped at its leading and trailing edges;

Fig. 4 is a fragmentary section taken along the line 4—4 in Fig. 2;

Fig. 5 is a fragmentary section taken along the line 5—5 in Fig. 2 and showing a gripping finger in the extended position;

Fig. 6 is a view similar to Fig. 5 but showing the finger retracted below the surface of the cylinder;

Fig. 7 is a fragmentary plan view of adjacent finger bars as viewed along the line 7—7 in Fig. 3;

Fig. 8 is a plan view of the finger bar adjusting and clamping mechanism as viewed along the line 8—8 in Fig. 3;

Fig. 9 is a sectional view showing the finger bar and adjusting mechanism in elevation taken along the line 9—9 in Fig. 7;

Fig. 10 is also a sectional view in elevation taken along the line 10—10 of Fig. 7;

Fig. 11 is a view in perspective of a portion of the mechanism employed for clamping the trailing edge of the plate and adjusting the side lay thereof;

Fig. 12 is an exploded view of a finger bar and its associated cam bar;

Fig. 13 shows the manner in which the finger bar and cam bar may be keyed together;

Fig. 14 is a perspective view of a plate cylinder four plates wide and having provision for adjusting at both ends of the cylinder;

Fig. 14*a* is a perspective view of the adjusting mechanism used in connection with the cylinder shown in Fig. 14;

Fig. 15 shows an alternate construction which may be employed for retracting the fingers.

While the invention is susceptible of various modifications and alternative constructions and uses, I have shown in the drawings and will herein describe in detail only certain preferred embodiments of the invention. It is to be understood, however, that I do not intend to limit the invention by such disclosure, but aim to cover all modifications and alternative constructions and uses falling within the spirit and scope of the invention as expressed in the appended claims.

Turning now to the drawings, Figure 1 shows an end view of a plate cylinder 18 constructed in accordance with the present invention. Such cylinder is journaled on a shaft 20 and carries at its periphery printing plates 21—24. For printing high grade color work such plates will normally be electrotype plates of soft metal, each plate including at its leading and trailing edges a series of milled pockets 25—26, respectively. A portion of a plate is disclosed in Fig. 1*a*, and for further information on plates of this design reference is made to Crafts Patent 2,474,889 which issued on July 5, 1949.

Arranged at the leading and trailing edges, respectively, of the plates, are control heads 31, 32. Alined with the control head 31 at the leading edge of the plate is an adjusting mechanism generally indicated at 33 (see Fig. 3) and alined with the control head 32 at the trailing edge of the plate is an adjusting and tensioning mechanism 34. Each of the latter is included in a shallow channel at the surface of the plate cylinder so that there is very little reduction in the stiffness of the cylinder. Thus, the adjusting mechanism 33 is arranged in the groove 36 at the leading edge of the plate 21, while the mechanism 34 at the trailing edge is received in a groove 37. Bearer rings 38 are fastened to each end of the plate cylinder, for example by bolts 39.

For the purpose of gripping the leading edge of the

plate a finger bar 40 is provided having fingers 41—44. The finger bar 40 is supported on and positioned by a cam bar 45. A similar finger bar 50 is employed at the trailing edge of the plate having fingers 51—54 which engage corresponding milled pockets in the plate. A cam bar 55 serves to support and position the finger bar 50. The finger bars at the leading and trailing edges of the adjacent plates are held in place against centrifugal force by means of a longitudinally extending cover plate 60 which is secured by suitable screws 61 (Figs. 2 and 3). The plate has windows 62 (Figs. 9 and 10) through which the fingers on the finger bars project, the windows being separated by bridges 63.

In accordance with the one aspect of the invention, means are provided for causing the fingers to be shifted into and out of engagement with the pockets in the plate with straight-line or translatory movement. In addition means are provided for causing the fingers to be retracted below the surface of the plate cylinder after being withdrawn from the associated pockets. The manner in which this is accomplished will be made clear by reference to Figs. 4–6. Here it will be seen that the finger bar 40 rides on the cam bar 45. Thus, as the cam bar 45 is translated broadwise by its adjusting mechanism 33 (which will later be referred to in greater detail) the fingers 41—44 will undergo similar translating movement. In order that the finger bar 40 and cam bar 45 may move together rigidly as a unit during clamping of the plate, these two parts are provided with abutting surfaces 71, 72, respectively. These surfaces are maintained together during straight-line movement of the fingers by means of a tensile spring 73, the latter being anchored to the two members by suitable posts 74, 75, respectively.

For the purpose of retracting the fingers 41—44 below the surface of the plate after the fingers have backed away from the milled pockets the maximum degree an inclined wedging surface is provided in the path of movement of the finger bar and in addition the finger bar is constructed so as to permit it to yield relative to the member which supports it. The inclined wedging surface in the present embodiment is formed by the rear edge 62*a* of the windows 62 and the back surface of the fingers. Yielding of the finger bar is in the present construction, effected by providing an inclined bearing surface between the finger bar 40 and the cam bar 45, the restoring force being supplied by the spring 73. The inclined bearing surface is divided into two portions located along the respective edges of the finger bar 40. Thus, the finger bar has inclined bearing surfaces 76, 77 mating with the surfaces 78, 79, respectively, on the cam bar. Centered between the bearing surfaces is a clearance space 80 which enables the finger bar and cam bar to move toward one another.

Operation of the retracting mechanism will be apparent upon inspection of Figures 4, 5, and 6. Thus, in Fig. 4 the finger bar 40 is moved into gripping engagement with the plate, and surfaces 71, 72 at the rear edge of the finger bar are solidly "bottomed." Upon backing off the cam bar 45 (by moving it to the left as shown in the figures under discussion), the fingers are withdrawn from the pockets. During such withdrawal the finger bar and cam bar move as a unit, being held together by the spring 73. When fully withdrawn the fingers 41—44 strike the rear or abutting surfaces 62*a* of the window 62. This condition is illustrated in Fig. 5. Upon further withdrawing movement of the cam bar 45 it will be apparent that no further withdrawal of the finger 41 can occur. Consequently, the cam bar and finger bar slide relatively toward one another along the inclined surfaces 76—79. As will be apparent from Fig. 6, this sliding movement is accompanied by a lowering of the finger bar 40 and consequently of the finger 41 connected thereto. When the finger bar 40 reaches its lowermost position the fingers 41—44 thereon are fully retracted or submerged below the surface of the cylinder. The sequence of operations is just reversed when the fingers are moved from their retracted positions into engagement with the pockets. As the mechanism 33 moves the cam bar 45 forwardly (to the right in Figs. 4–6), the finger bar 40 slides upwardly relative to the cam bar along the inclined surfaces, raising the fingers again into the position shown in Fig. 5. The upward movement is caused by the urging effect of the springs 73, one at each end of the finger bar. Further forward movement of the cam bar, and consequently of the finger bar, brings the fingers into engagement with the pockets, which is the position illustrated in Fig. 4.

The advantages of the arrangement will be apparent to one skilled in this art. Translational movement of the fingers is highly desirable, since it insures that the fingers will be seated in substantially the same orientation relative to the contour of the pockets regardless of whether the pockets are spaced "long" or "short" on the plate. This movement also closely approximates peripheral movement along the surface of the plate in contrast with arrangements in which the fingers rotate on a short radius and in which the angular relationship changes rapidly as a function of pocket spacing. As a result, in the present construction the forces existing at the pockets may be exactly predetermined and localization of stress is avoided.

Retraction of the fingers below the surface as permitted by the present construction is accompanied by a number of advantages. In the first place, the fingers are protected since they are under the surface of the plate when not in use. Such retraction further enables adjacent sets of fingers to be completely taken out of operation, thereby enabling a plate of double the length of the normal plate to be employed. Thus in the present embodiment it is obviously possible to use two plates around the cylinder rather than the four plates illustrated in Fig. 1. Under such circumstances the leading and trailing edge mechanisms at the center of the plate would be completely inoperative and the plate would be continuously and solidly seated over its entire undersurface.

The arrangement and path of movement of the gripping fingers are substantially the same at both ends of the plate. The function, however, is somewhat different, as will become clear as the discussion proceeds. Thus, the fingers at the leading edge serve to position the plate about the plate cylinder in a peripheral direction to establish peripheral register while the fingers at the trailing edge of the plate put the plate in tension and provide a resilient take-up.

The mechanism for positioning the fingers at the leading edge may be clearly understood by reference to Figs. 7, 8, and 10. In these figures it will be noted that the cam bar 45 includes a diagonal groove 90. The latter is dimensioned snugly to embrace a cam 91 which is mounted on a cam block 92. The cam 91 is preferably mounted for pivoting on a cam post 93 in order to make the cam self-alining within its groove. For the purpose of moving the cam block 92 axially and thereby adjusting the peripheral position of the finger bar, the cam block threadedly engages an adjusting rod 94. Such adjusting rod terminates in a head 95 which is recessed for an adjusting wrench. It is convenient to make the adjusting rod 94 in two portions and a coupling 96 is provided in order to join them together. In operation it will be apparent that rotating the adjusting rod 94 causes the adjusting block 92 to move back and forth in its groove, thereby camming the cam bar and associated finger bar either forwardly or backwardly with respect to the surface of the plate cylinder. Since the cam 91 is free to rotate while supported on the cam block 92 it will be apparent that the cam surfaces may be closely interfitting without danger of binding, thereby permitting the cam bar to assume a skewed position and thereby eliminating "play" in the peripheral adjustment of the plate.

In order to maintain the cam bar in position for the normal range of adjustment, it is guided at its ends by

spacers 97. The ends 45*a* of the cam bar 45 (Fig. 7) are preferably of circular form with a radius of half the length of the bar so that the bar may swivel or skew to a limited degree about its center. The spacers 97 are preferably adjustable in order to adjust the freedom of endwise movement of the cam bar. In the exemplary embodiment the adjustment is effected by stand-off bolts 98, the latter being pinned in place in the spacer after adjustment has been effected.

For the purpose of adjusting the side lay of the leading edge of the plate an exceedingly simple arrangement is employed as shown clearly in Figures 8 and 10. Endwise movement of the finger bar 40 is effected by positioning side lay adjusting block 100. Extending upwardly from the block 100 (Fig. 10) is a side lay adjusting tang 101 which extends through an aperture 101*a* in the cam bar 45 and engages a suitable notch 102 in the finger bar. In order to move the adjusting block 100 back and forth in the cylinder a side lay adjusting rod 103 is provided, the latter being threaded directly into the block 100. The rod 103 terminates in a head 105 having a receptacle for an adjusting wrench similar to the head 95. Here again the adjusting rod is preferably constructed in two parts coupled together by a coupling 106. For the purpose of limiting the range of the side lay adjustment the rod 103 is preferably fitted with collars 107, 108. A range of ⅛" of movement is sufficient for normal printing operations.

In order that the endwise movement of the finger bar 40 might be transmitted positively to the plate 21 the finger bar includes an abutment 41*a*. Such abutment engages an undercut shoulder 21*a* on the plate, which is formed by a milling cutter or the like (see detail of 21*a* in Figs. 1*a*, 4). The abutment 41*a* as shown in the drawings is preferably formed integral with the finger 41, the finger being relieved as indicated at 109 to receive the abutting portion of the plate. The abutting portion of the plate is preferably backed up with sufficient metal to insure adequate strength. In practice it is found that peening does not occur at the abutting surfaces, since there is sufficient friction between the fingers and the pockets under running conditions to overcome any tendency of the plate to move endwise along the cylinder.

Similar means are provided at the trailing edge of the plate for adjusting side lay, as shown in Figures 8 and 9. In these figures the side lay adjusting block 110 is formed with a tang 111 received in an aperture 112. Movement of the block is effected by an adjusting rod 113 terminating in a head 115. A coupling 116 is used just as before and movement of the block is limited by collars 117 and 118.

Attention is next drawn to the means for applying tension to the trailing edge of the plate after the peripheral and side lay adjustments have been completed. In accordance with the present invention resilient take-up of the fingers at the trailing edge of the plate is provided by a single spring. In other respects the arrangement is somewhat similar to that which is described in detail in the copending McWhorter application 112,583 filed August 26, 1949. The mechanism 34 is shown in Figs. 3, 7, 8, 9, and 11. The cam bar at the trailing edge of the plate indicated at 55 includes opposed cam slots 126, 127. The latter are engaged by cams 128, 129, which are pivotally mounted on cam blocks 131, 132 respectively. As in the case of the cam 91 previously discussed, the cams 128, 129 are pivotally mounted with respect to the cam blocks on posts 133, 134.

For the purpose of applying spring pressure against the cam blocks 131, 132, and thereby urging the cam bar and finger bar in a plate-tensioning direction, a spring 135 is provided between the blocks (see especially Figures 8, 9, and 11). This spring is preferably sufficiently strong throughout its range of movement so as to overcome friction and maintain a steady-state tension on the plate under running conditions. Any extension of the plate resulting from settling during the early period of use or elongation as a result of extended use is immediately taken up by the spring 135. The angle of the cam slots is sufficiently "shallow" or gradual so that retrograde movement of the fingers in the plate-releasing direction is prevented, this feature per se being discussed in some detail in the above mentioned McWhorter application. It will be apparent in the present construction that since a single spring acts jointly upon the cam blocks 131, 132, the pressure at the cams must always be balanced. This insures balanced tension being applied to the plate regardless of the amount that the plate may be skewed with respect to the plate cylinder.

For releasing the plate, means are provided for simultaneously squeezing the cam blocks 131, 132 toward one another in order to overcome the compression in the spring 135, and thereby to withdraw the fingers from the pockets in the trailing edge of the plate. In the present embodiment this is accomplished by a rod 136 which threadedly engages travelling nuts 139, 139*a*. The rod 136 does not, however, threadedly engage either of the cam blocks. The rod 136 terminates at the end of the cylinder in a head 137 for engagement by a wrench. As in the case of the rods previously discussed, the rod is in two pieces connected by a coupling 138. In the case of the rod 136 or any of the other rods, friction may be increased, if desired, by use of a leaf spring bearing against the associated coupling. The latter prevents back-up, enabling a ratchet type adjusting wrench to be employed. An example of such spring is to be found at 138*a* in Fig. 8.

For the purpose of limiting the movement of the nuts 139, 139*a*, a suitable collar may be fastened to the end of the shaft 136. I prefer, however, to employ a stop 140 (see Fig. 8) which is engaged by the travelling nut 139*a*. Engagement of the latter with the stop 140 signifies to the operator that the cam blocks have been fully released and that the cams (and consequently the tensioning fingers) are under the control of the spring 135. As discussed in detail in the copending McWhorter application, such arrangement makes it impossible for a press operator to over-stress a printing plate; and the maximum tension at all times is predetermined by the strength of the spring 135.

By way of summary, installation of a plate using the present lockup is exceedingly simple. The plate is merely placed in approximate position on the cylinder and the fingers at the leading edge are then advanced (by turning adjusting head 95) until the desired peripheral register is obtained. Side lay of the leading edge is established by means of the adjusting head 105. Subsequently, the fingers at the trailing edge of the plate are extended until the pockets are loosely engaged. Side lay of the trailing edge is then adjusted by means of the adjusting head 115 to complete the adjustment of plate position. Finally, the adjusting head 137 is turned in a direction such that the cams at the trailing edge of the plate are released for movement by the spring 135. This spring causes even and positive seating of the fingers into the trailing edge pockets, and the plate is now ready for printing.

As mentioned above, it is sufficient simply to cut longitudinal grooves in the cylinder, and to provide cover plate recesses for the reception of the adjusting mechanism. In accordance with one of the more detailed aspects of the invention, means are provided for enabling an adjusting mechanism to be bodily removed as a sub-assembly, as well as simplifying machining of the bearer ring. As shown in Figures 9, 10 and 11, these advantages are obtained by mounting the adjusting heads in a circular insert which is received in an aperture bored in the bearer ring 38, in Fig. 10 the insert 141 being received in a bore 142 provided in the bearer ring. This bore is formed in the bearer ring before the latter is hardened and it is positioned so as to be generally alined with the axially

extending groove. The insert is preferably formed of relatively soft steel which is easily machined. Normally each insert will have two adjusting heads where the plate cylinder is two plates wide and four adjusting heads where the cylinder is four plates wide.

The insert at the trailing edge of the plate is similar in construction and is indicated at **151** in Fig. 9, being received in a bore **152**. In order to prevent the inserts from rotating and moving axially an auxiliary spacer **153** is provided. The latter engages a notch **154** which is milled or otherwise formed in the upper edge of the insert. Such auxiliary spacers, as well as the main spacers **97** are held in place by the cover plate **60**. Clearance is provided behind the insert for receiving the same when it is axially withdrawn, this space being indicated at **156**.

When it is desired to withdraw the adjusting mechanism as a sub-assembly, the cover plates and spacers are first removed. The entire adjusting mechanism is then drawn inwardly away from the bearer ring so that the insert **151** is received in the space **156**, the latter space being sufficiently large so as to permit the adjusting heads to "clear" the bearer ring. The entire mechanism is then merely lifted from the groove in the cylinder and may be replaced by a similar mechanism within a few minutes time by merely reversing the above procedure.

In order to insure that the finger bar **40** and the cam bar **45** remain in contact with one another during retraction of the fingers, they may, if desired, be keyed together. This construction is shown in Fig. 13, the key being indicated at **160**. The upper end of the key, engaging the finger bar **40** is preferably received in a groove **161** which is wider than the key itself. This permits the finger bar **40** to be moved endwise as required for adjustment of side lay. The use of the key **160** is a precautionary measure and need not be employed where it is desired to simplify the mechanism as much as possible.

In the above discussion attention has been on a single plate **20** which occupies the full length of the cylinder **18**, and the adjusting mechanisms associated therewith. It will be understood by one skilled in this art that the plate cylinder normally is several plates wide, a four-plate width generally being found convenient. An example of such a plate cylinder is shown in Fig. 14, the four plates being indicated at **171**, **172**, **173**, **174**. These plates may be arranged substantially edge to edge, leaving clearance only as necessary to adjust the side lay and peripheral register. Consequently, it will be seen that the present lockup is admirably suited for the printing of bleed pages in any and all plate positions. In Fig. 14 plates **171**, **172** are adjusted at positions **175**, **176**, while plates **173**, **174** are adjusted at the other end of the plate cylinder at positions **177**, **178**.

The manner in which the leading edges of two plates side by side may be controlled from a single control head is disclosed in Fig. 14*a*. The corresponding parts required for the additional plate are designated with the same but primed reference numerals as employed above. The adjusting procedure of course is simply repeated for the added plate.

It is apparent from the foregoing that the adjusting mechanism at the leading edge of the plate differs from that at the trailing edge. One might assume from this that it would not be possible to reverse the direction of rotation of the roller of the plate cylinder as required for newspaper color work. It will, however, be apparent from Fig. 14 that reversal of direction is possible by the simple expedient of interchanging the adjusting mechanism "across the corners." Thus, the mechanism at position **176** is exchanged with that at **177** and the mechanism at **175** exchanged with that at **178**. Because of the sub-assembly construction of the lockup, this interchange can be effected in a relatively short time.

While the preferred construction has been disclosed thus far, it will be apparent to one skilled in this art that the invention in its broader aspects is not so limited. Fig. 15 shows an arrangement for coupling together the finger bar and the cam bar, which includes the same basic advantages as the preferred construction but which at the same time is simpler and cheaper. The finger bar indicated at **40***a* is substantially the same as the finger bar **40** previously discussed. Likewise, the cam bar **45***a* is actuated in the same manner as the cam bar **45** referred to above. The difference lies in the fact that the two members are arranged to rock with respect to one another along their "inner" edges (inner with respect to the plate) while their "outer" edges are biased away from one another. In the illustrated embodiment the cam bar **45***a* and the finger bar **40***a* both include longitudinal grooves **170**, **171**, respectively, Mounted between the grooves is a hinge rod **172** which extends the length of the bars. Preferably, the rod **172** is of hardened steel so as to present a fulcrum for the rocking movement. The "outer" edges of the members **41***a*, **45***a* are biased from one another by a small compression spring **173**. The later is received in a bore **174** in the upper member which is preferably somewhat oversized in order to allow for the side lay adjustment.

In operation the finger indicated at **41***a* normally engages the pocket in the plate. However, upon movement of the cam bar **45***a* to the left under the urging of the cam, the finger is translated away from its seated position, thereby releasing the plate. Continued movement of the cam bar causes interference to take place between the finger and the cover plate **60**. This results in compression of the spring **173** and a gradual retraction of the finger to a point slightly below the level of the cylinder. This sequence of movements is, of course, simply reversed when the cam bar **45***a* is moved to the left in the plate-tensioning direction.

I claim as my invention:

1. In a tension lockup for engaging pockets at the ends of a printing plate for holding the same on a plate cylinder the combination comprising finger bar means having a pocket-engaging finger extending upwardly therefrom, means for translating said finger bar means through a limited range of adjusting movement so that the finger thereon is moved with substantially peripheral movement relative to the surface of the cylinder and into and out of engagement with said pocket, and means including a camming surface arranged in the path of movement of the finger bar means and engaged by the latter upon predetermined retracting movement thereof for camming said finger bar forcefully downward so that upon continued movement of said translating means said finger is sequentially (1) retracted from said pockets and (2) cammed downwardly to a point below the surface level of the cylinder for removal of the plate.

2. In a tension lockup for engaging pockets at the ends of a printing plate for holding the same on a plate cylinder the combination comprising a finger bar having pocket-engaging fingers extending upwardly therefrom, means for moving the finger bar through a limited range of adjusting movement in which the fingers are engaged with and withdrawn from the pockets, means on said plate cylinder and including an inclined abutment for forcefully camming the finger bar downwardly into said plate cylinder after the fingers have been disengaged from said pockets, and yieldable means associated with said finger bar for permitting the finger bar to be cammed downwardly against the form of bias thereof upon engagement with said inclined abutment for retraction of the fingers below the surface level of the plate cylinder.

3. In a tension lockup for engaging pockets at the ends of a printing plate for holding the same on a plate cylinder the combination comprising a finger bar having pocket-engaging fingers extending upwardly therefrom, means for moving the finger bar through a limited range of adjusting movement in which the fingers are engaged

with and disengaged from the pockets, a cover plate on said plate cylinder and including an inclined abutment arranged in the path of disengaging movement of the fingers for camming the finger bar downwardly into said plate cylinder after the fingers have been disengaged from said pockets, and yieldable means including a spring associated with said finger bar for permitting the finger bar to be cammed downwardly against the force of bias thereof upon engagement of said fingers with the cover plate for retraction of the fingers below the surface level of the plate cylinder.

4. In a tension lockup for engaging pockets at the end of a printing plate for holding the same on a plate cylinder the combination comprising a finger bar having pocket-engaging fingers extending upwardly therefrom, a supporting member for said finger bar, said cylinder having a flat surface for mounting said supporting member, manually operable means for shifting said supporting member on said flat surface between a position in which the fingers are engaged with said pockets and a position in which the fingers are disengaged therefrom, said cylinder having a cam surface in the path of movement of the finger bar for camming the fingers downwardly as a result of continued movement of the supporting member in the disengaging direction, said supporting member and said finger bar having an inclined surface between them which is so arranged as to cause said finger bar to slide downwardly on said supporting member upon downward camming of said finger bar to a point where the fingers thereon are retracted below the surface level of the plate cylinder, and means including a spring for urging the finger bar upwardly relative to said supporting member.

5. In a tension lockup plate cylinder for a printing press for use with a plate having pockets at the leading and trailing edges for placing the plate in tension the combination comprising a cylinder, means for engaging and positioning the leading edge of the plate on said cylinder, a finger bar mounted in said cylinder and having upwardly extending fingers for engaging registering pockets in the trailing edge of said plate, means including a cam member at each end of said finger bar for moving the finger bar broadwise, a single spring interposed between said cam members and acting jointly thereon for urging the finger bar in a pocket-engaging direction on said cylinder, the cam angle of said cam members being such as to prevent retrograde movement of the fingers under the tensile force built up in the plate during the printing operation, and manual means for simultaneously moving said cam members against the force of said spring in order to effect withdrawal of the fingers in the pockets at the trailing edge of the plate.

6. In a tension lockup plate cylinder for a printing press for use with a plate having pockets at the leading and trailing edges for placing the plate in tension the combination comprising a cylinder, means for engaging and positioning the leading edge of the plate on said cylinder, a finger bar mounted on said plate cylinder having upwardly extending fingers for engaging registering pockets in the trailing edge of said plate, means including a cam member at each end of said finger bar for moving the finger bar broadwise, a single spring interposed between said cam members for acting jointly thereon for urging the finger bar in a pocket-engaging direction on said cylinder, the cam angle of said cam members being such as to prevent retrograde movement of the fingers under the tensile force built up on the plate during the printing operation, manually adjustable stops associated with each of said cam members, manual means for moving said stops between a first limit of movement in which the cam members are moved in such a direction as to compress said spring and withdraw the fingers from the pockets in the plate and a second limit of movement in which the stops are fully withdrawn from said cam members to free the latter for pocket-engaging movement under the urging of said spring.



7. In a tension lockup plate cylinder for a printing press for use with a plate having pockets at the leading and trailing edges for placing the plate in tension the combination comprising a cylinder, means for engaging and positioning the leading edge of the plate on said cylinder, a finger bar mounted in said plate cylinder having upwardly extending fingers for engaging registering pockets in the trailing edge of said plate, a cam bar for supporting said finger bar for bodily movement of the latter, means including a cam block at each end of said cam bar, said cam bar having cam surfaces on the under side thereof for engagement by said cam blocks, a single spring mounted between said cam blocks for pressing the same away from one another, said cam surfaces being oppositely directed so that expansion of said spring and outward movement of said blocks causes the fingers on the finger bar to be moved into engagement with the pockets in said plate, traveling nuts positioned adjacent each of said cam blocks respectively, and manually rotatable means including a thread rod for engaging said nuts for moving the cam blocks toward one another against the compressive force of the spring for effecting withdrawal of the fingers from the pockets in the plate.

8. In a tension lockup cylinder for a printing plate having pockets at the leading and trailing edges thereof for placing the plate in tension as well as axially-facing edge surfaces for adjusting the side lay of the plate, a side lay adjusting mechanism comprising, in combination, a leading edge finger bar and a trailing edge finger bar positioned to engage the pockets at the respective edges of said plate, each of said finger bars being mounted in said cylinder for limited movement both broadwise and endwise, fingers on said finger bars for engaging the pockets at the edge of said plate, each of said finger bars including upwardly extending abutments for engaging the axially facing edge surfaces on said plate, means associated with each of said finger bars and including traveling nuts for engaging said finger bars for endwise adjusting movement thereof, and means for separate manual adjustment of said traveling nuts for separate adjustment of side lay at each end of said plate.

9. In a tension lockup plate cylinder for engaging pockets at the end of a printing plate the combination comprising a cylinder body having a longitudinal groove therein, a finger bar having pocket-engaging finger extending upwardly therefrom, a cam bar extending lengthwise of said finger bar for supporting the same, means including a manually operable cam in said groove for moving the cam bar and the finger bar thereon bodily between a position in which the fingers are engaged with said pockets and a position in which the fingers are completely withdrawn therefrom, means for guiding the finger bar downwardly as a result of continued movement of the finger bar in the withdrawing direction, and a side lay adjusting mechanism in said groove, said side lay adjusting mechanism including a traveling nut and a manually rotatable rod for adjusting the position of the nut in the groove, a tang extending upwardly from said nut into engagement with said finger bar for moving the same endwise, said cam bar having an enlarged aperture therein for admission of said tang to permit side lay adjustment of said finger bar without disturbing the adjustment of said cam bar.

10. In a tension lockup device for a printing plate having pockets at the leading and trailing edges thereof for placing the plate in tension as well as axially-facing edge surfaces for adjusting the side lay of the plate, a tension lockup mechanism comprising a plate cylinder, a finger bar having upwardly extending fingers mounted in said cylinder for limited movement both peripherally and axially with respect to said cylinder, a cam bar underlying said finger bar and supporting the same, said cam bar having cam surfaces on the underside thereof, cam members for engaging said cam surfaces to effect peripheral movement of the finger bar and to move the fingers there-

on into and out of engagement with the pockets on said plate, manual means for moving said cam members, said finger bar having side lay abutments at the ends thereof for engaging the axially facing edge surfaces on the plate, a travelling nut in said groove, means including a tang extending upwardly from said nut for engaging the underside of said finger bar, and manual means including a threaded rod for positioning the travelling nut in said groove thereby adjusting the side lay of said plate.

11. A plate cylinder for tensioning lockup of printing plates having pockets at the leading and trailing edges thereof, comprising, in combination, a cylinder body having longitudinal grooves at the leading and trailing edges respectively of each printing plate, a tension lockup mechanism in each of said grooves, said tension lockup mechanism including a finger bar and adjusting means for engaging the finger bar at its underside for limited adjusting movement thereof, hardened bearer rings at each end of said cylinder body having apertures therein alined with each of said grooves, control heads snugly received in each of said apertures, and a plurality of adjusting rods extending through each of said control heads for manual control of the adjusting means from the end of the cylinder.

12. A plate cylinder for tensioning lockup of printing plates having pockets at the leading and trailing edges thereof, comprising, in combination, a cylinder body having longitudinal grooves at the leading and trailing edges respectively of each printing plate, a tension lockup mechanism in each of said grooves, said tension lockup mechanism including a finger bar having fingers and adjusting means for engaging the finger bar at its underside for limited adjusting movement thereof, removable cover plates overlying said finger bar and having apertures for the projection of said fingers, hardened bearer rings at each end of said cylinder body having apertures therein alined with each of said grooves, control heads snugly received in each of said apertures, adjusting rods extending through said control heads for actuating the adjusting means from the end of the cylinder, said cylinder being relieved to permit the retraction of said control heads inwardly on said cylinder and out of engagement with said bearer ring so that upon removing said cover plates the adjusting head and associated rods and mechanism may be bodily removed as a unit for bench service.

13. A tension lockup for engaging pockets at the end of a printing plate comprising, in combination, a plate cylinder having a longitudinal groove in the surface thereof, a cover plate for said groove having spaced apertures, a finger bar in said groove having pocket-engaging fingers extending upwardly therefrom in register with the apertures in said cover plate, means for moving said finger bar through a limited range of adjusting movement so that the fingers thereon are moved into and out of engagement with said pockets, abutting surfaces along the rear edges of said apertures to limit the rearward movement of said fingers respectively, and means operative upon said fingers striking the abutting surfaces for positively retracting said fingers downwardly below the surface level of the cover plate.

14. In a tension lockup for engaging pockets at the end of a printing plate for holding the same on a plate cylinder, the combination comprising a finger bar having pocket-engaging fingers extending upwardly therefrom, a supporting member for said finger bar, manually operable means for shifting said supporting member between a position in which the fingers are engaged with said pockets and a position in which the fingers are disengaged therefrom, said cylinder having a cam surface in the path of movement of the finger bar for camming the fingers downwardly as a result of continued movement of the supporting member in the disengaging direction, said supporting member and said finger bar having an inclined surface between them which is so arranged as to cause said finger bar to slide downwardly on said supporting member upon downward camming of said finger bar to cause the fingers thereon to be retracted below the surface level of the plate cylinder, means for maintaining the finger bar and supporting member in contact with one another while permitting relative sliding movement in either direction along said inclined surface, and means for axially shifting said finger bar independently of said support member.

15. In a tension lockup for engaging pockets at the end of a printing plate for holding the same on a plate cylinder, the combination comprising a finger bar having pocket-engaging fingers extending upwardly therefrom, a supporting member for said finger bar, a cover plate having apertures therein for registered reception of said fingers, manually operable means for shifting said supporting member between a position in which the fingers are engaged with said pockets and a position in which the fingers are disengaged therefrom, said cylinder having an abutment in the path of disengaging movement of the finger bar, said supporting member and said finger bar having an inclined surface between them, and a spring connected to said finger bar for pulling downwardly and rearwardly thereon so that upon continued rearward movement of the supporting member, the finger bar is sequentially brought into contact with said abutment and then caused to slide downwardly on said inclined surface for the retraction of said fingers below the surface of said cover plate.

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