

July 2, 1963

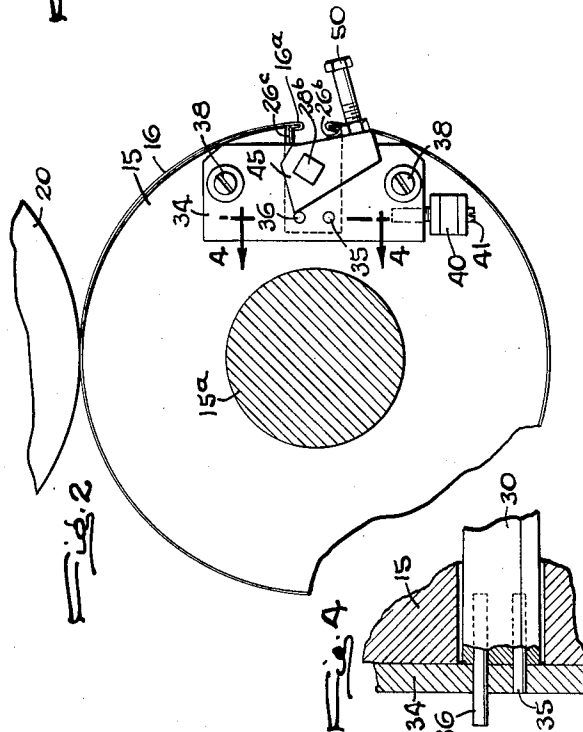
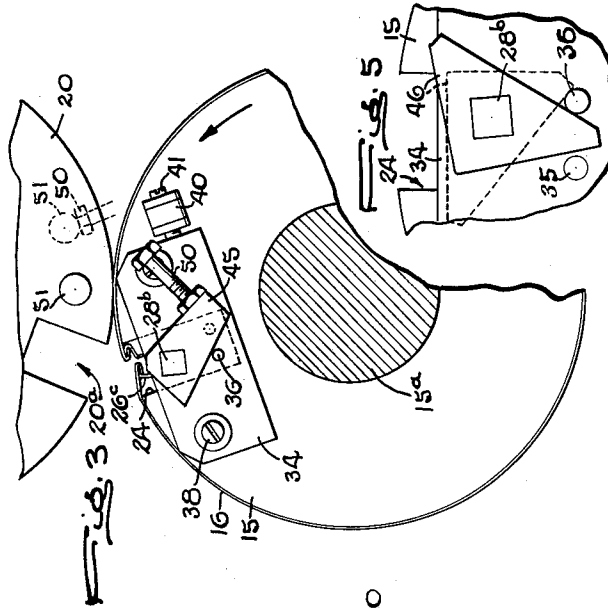
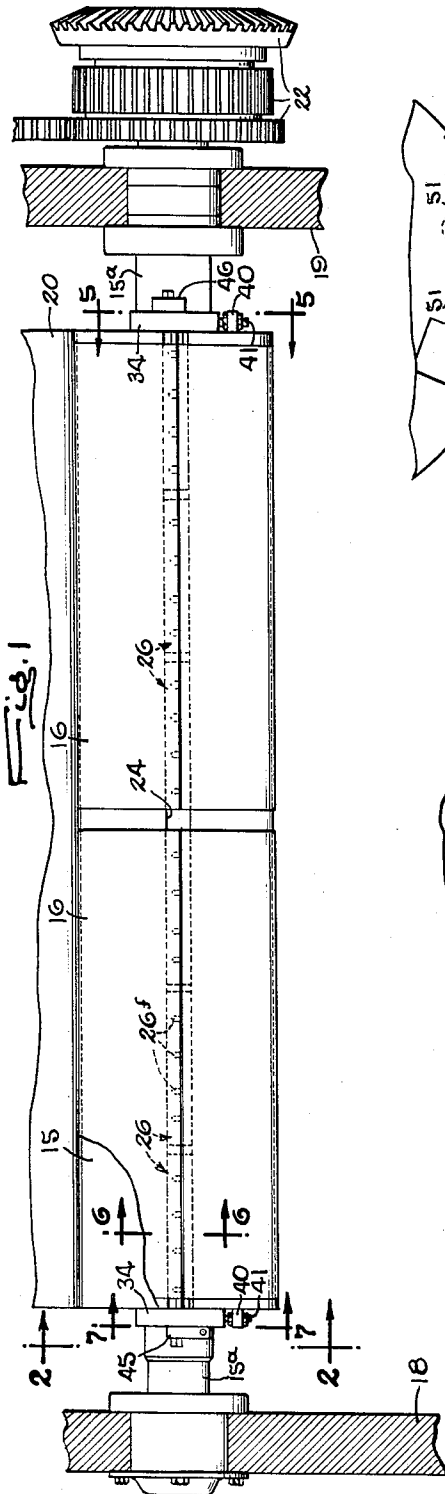
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3,095,811

TENSION LOCKUP FOR THIN PRINTING PLATES

Filed March 7, 1960

4 Sheets-Sheet 1



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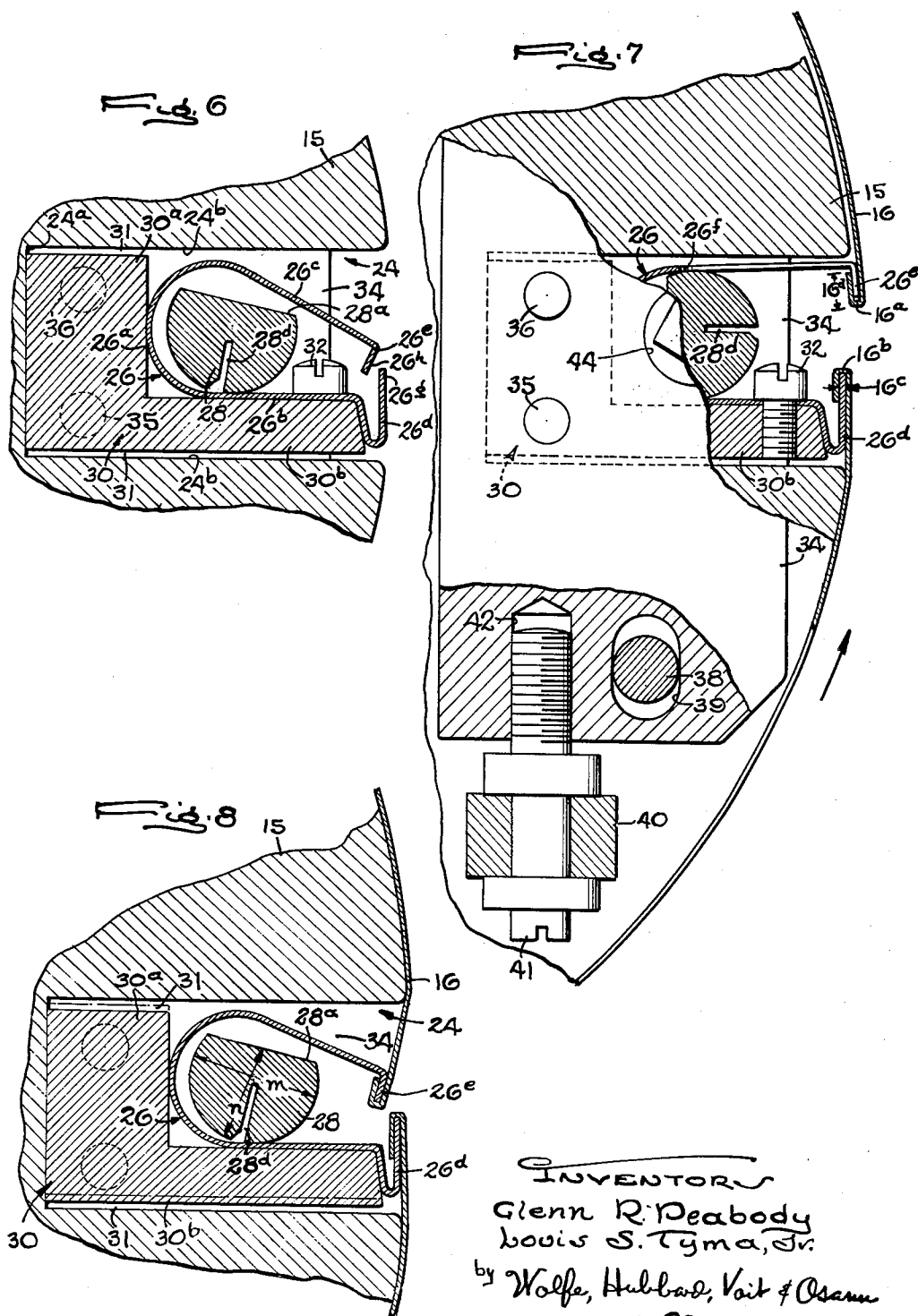
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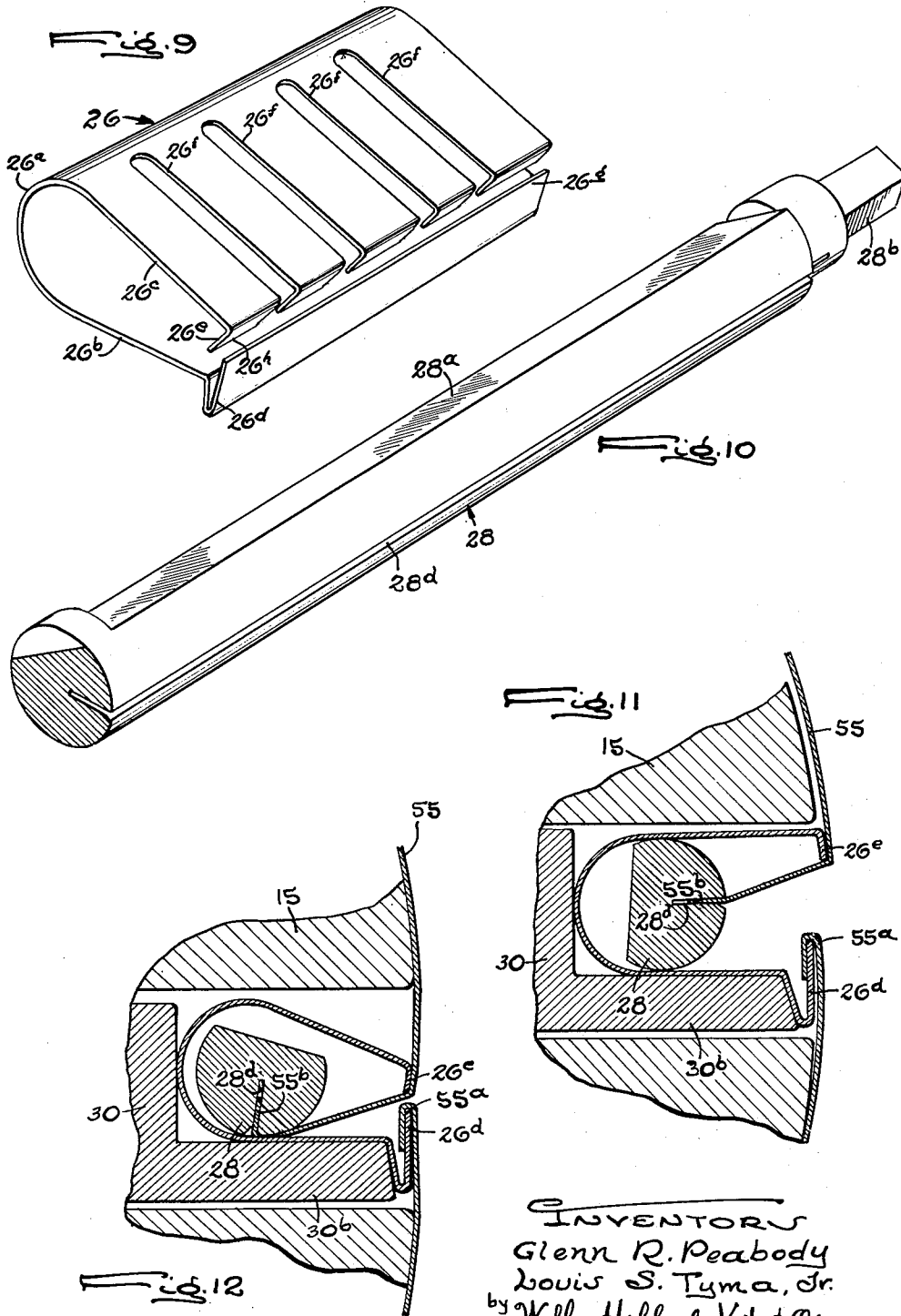
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TENSION LOCKUP FOR THIN PRINTING PLATES

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4 Sheets-Sheet 3



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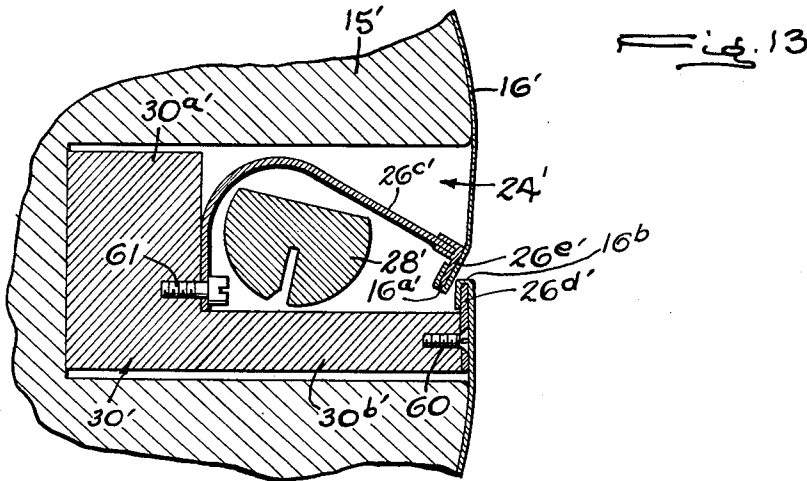
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TENSION LOCKUP FOR THIN PRINTING PLATES

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4 Sheets-Sheet 4



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3,095,811

TENSION LOCKUP FOR THIN PRINTING PLATES
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11 Claims. (Cl. 101-415.1)

The present invention relates in general to the mounting or lockup of printing plates on printing cylinders, and, in particular, to the tensioned mounting of thin printing plates so that they will smoothly conform to the surface of the cylinder.

In prior lockups for thin printing plates, there have been two general types of systems for tensioning. These may be generally designated as "static" and "dynamic" tensioning arrangements. In "static" tensioning, the plate is pulled against the cylinder surface by a reel rod, movable bar, or the like which thereafter is fixed in position. If the plate should stretch or shrink after being locked up, it may slacken on the cylinder on the one hand, or it may be tensioned beyond the point of rupture on the other hand.

The "dynamic" tensioning arrangements utilize some yieldable, resilient elements, such as springs, to exert the tensioning force on the plate, so that if the latter stretches or shrinks the spring expands or contracts to maintain approximately the same tensioning force. However, the "dynamic" tensioning arrangements have in the past been complex and expensive, employing means such as clamping jaws to engage the edges of a plate, the jaws in turn being movably mounted in the cylinder for adjustment, but engaged by biasing springs or the like.

It is the general aim of the invention to bring forth a novel dynamic tension lockup for thin printing plates which is characterized by extreme simplicity, economy and ruggedness of construction, yet also by reliability in operation and convenience of plate application or removal.

More particularly, it is an object to provide such a tension lockup arrangement in which the number of movable parts is reduced to a minimum by making dynamic tension-creating elements directly engage the printing plate.

A related object is to achieve a very simple mechanism for opening and closing spring elements which directly engage a printing plate, so as to afford application or removal of the plate to or from a cylinder.

Another object of the invention is to provide a tension lockup with a spring element carried by a cylinder and directly engageable with the thin printing plate, and further characterized by the provision for registering the position of the plate on the cylinder both with circumferential and skewing adjustments.

It is a further object of the invention to facilitate the application of thin printing plates to a cylinder and the tensioning of such plates on the cylinder, the tensioning elements being activated automatically when the plate is being held by an associated cylinder in a position to assure positive engagement with the plate.

Still another object is to provide a tension lockup which readily accepts and properly tensions widely different kinds of flexible printing plates which have different physical properties, for example, metal and paper plates.

It is also an important object of the invention to provide a new and advantageous flexible printing plate, the same being of simple construction and adapted for reliable and convenient tensioning by lockup means of the type herein disclosed.

Other objects and advantages will become apparent as the following description proceeds, taken in conjunction with the accompanying drawings, in which:

FIGURE 1 is an elevational view showing plates at-

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tached to a plate cylinder in accordance with the practice of the present invention;

FIGS. 2 and 3 are end elevations, partially in section, taken substantially along the line 2-2 in FIG. 1 and respectively showing the plate-engaging elements in their plate unlocking and locking positions;

FIG. 4 is a fragmentary detail view taken in section substantially along the line 4-4 in FIG. 2;

FIG. 5 is a fragmentary detail view taken substantially along the line 5-5 in FIG. 1 and showing the rotational limits of an actuating shaft;

FIG. 6 is a fragmentary detail view taken in section substantially along the line 6-6 in FIG. 1 and showing the lockup components relaxed in the absence of a printing plate;

FIG. 7 is a progressively broken away section taken generally along the line 7-7 in FIG. 1, and showing the spring means in the "unlocked" condition for the application or removal of a printing plate;

FIG. 8 is similar to FIG. 7, but is further broken away in section and shows the lockup elements in "locked" engagement with a printing plate;

FIG. 9 is a perspective view of one section of the lock-up spring on an enlarged scale;

FIG. 10 is a perspective view of one-half of the spring-actuating member or cam shaft;

FIGS. 11 and 12 are sectional views similar to FIGS. 7 and 8, but respectively illustrate the mechanism unlocked and locked in relation to a paper printing plate; and

FIG. 13 is similar to FIG. 8, but illustrates an alternative embodiment of the invention.

While the invention has been shown and will be described in some detail with reference to a particular embodiment thereof, there is no intention that it thus be limited to such detail. On the contrary, it is intended here to embrace all modifications, alternatives, and equivalents falling within the spirit and scope of the invention as defined by the appended claims.

Referring now to FIG. 1, a printing cylinder 15 mounting side-by-side printing plates 16 is journaled for rotation in frame members 18, 19 and is closely spaced to a second or blanket cylinder 20. Each of the printing plates 16 is formed, for example, from a generally rectangular sheet of a very thin, flexible metal such as aluminum. The thickness of these metal printing plates is on the order of 0.0065 inch to 0.015 inch, such plates being extremely flexible yet possessing relatively great tensile strength. Other plate constructions, such as plastic backed by a thin metal sheet may, of course, be employed.

Although the invention is not limited to offset or planographic printing, it finds advantageous use in that particular field and will be described by way of example in the environment of an offset printing installation. In keeping with well known planographic printing techniques which need not be detailed here, the image to be printed is applied to the surface of the printing plates 16 and the plates treated in a manner such that ink will not adhere to the blank areas but will adhere to the image areas. An inking device (not shown) applies ink to the surface of the plate, and those portions or image areas of the plate to which the ink adheres transfer ink to a rubber blanket or the like on the blanket cylinder 20. In this offset printing process, the ink is then transferred from the blanket to the paper web (not shown) to be printed.

The metal printing plates 16 are, in keeping with one feature of the invention, specially formed to cooperate with the tension lockup mechanism to be described. As illustrated best by FIGS. 7 and 8, the opposite edges of the plates 16 are both turned back away from the image side of the plate and through an angle of 180° so as to form U-shaped channels 16a, 16b. Although the U-shaped

channels in the opposed edges of the plates 16 may be constituted by smoothly curved reverse bends, it is preferable, as illustrated in FIGS. 7 and 8, that there be two successive bends of approximately 90°, thereby forming a channel which has a width dimension 16c of approximately 0.015 inch, and which in depth 16d is approximately ¼ inch. These channels 16a and 16b, formed by bending back the opposite edges of the very thin aluminum plates 16, have been found to withstand relatively great forces applied to them through lockup elements in order to tension the plate 16 firmly against the surface of the cylinder 15. The total length of the plate 16, after the channels are formed therein, is made only slightly less than the circumference of the cylinder 15, as indicated best by FIG. 8 which shows the plate under tension.

The plate mounting cylinder 15 is provided with shaft portions 15a at either end, such shaft portions being received in suitable bearings carried by the frame members 18 and 19. Drive gearing 22 may be disposed at one end to rotationally drive the cylinder 15 during printing runs.

To provide the tension lockup mechanism embodying the features of the present invention, the body of cylinder 15 is formed with a longitudinal slot 24 (FIG. 6) in the surface thereof. This slot extends the full length of the cylinder body and is defined by a floor 24a (which is disposed substantially along a chord of the circular cross section of the cylinder) and by two side walls 24b which extend perpendicularly from the floor 24a to the mouth of the slot 24 at the surface of the cylinder. It is a relatively straightforward machining operation to cut the slot 24 into the metal cylinder 15. To give some idea of the relative sizes of the cylinder and the slot, one embodiment of the invention has been built and successfully tested with a cylinder body of 7½ inches in diameter, and in which the slot 24 is made ¾ inch wide and 1¾ inches deep.

In keeping with an important aspect of the invention, a series of spring elements 26 are disposed within the slot 24 and so formed as to directly engage the opposed channels 16a, 16b of the printing plates 16, and thus to tension such plates and pull them into smooth conformity against the cylinder surface. As seen best in FIGS. 6-9, each spring element 26 is an integral or one-piece assembly generally U-shaped in cross section having a bight portion 26a and opposed arm portions 26b and 26c which terminate in jaws or nibs 26d and 26e. The spring element 26 may be formed from sheet stock of annealed spring steel. In one embodiment, this sheet stock is 0.015 inch thick. The spring element 26 is formed so that the side portions 26c, 26b and the nibs 26d, 26e are normally closely spaced relative to one another and are separated only by applying considerable force thereto. When so separated, the resiliency of the spring element 26 creates a bias which tends to return the nibs 26e, 26d toward one another, that is, tends to return them toward the relaxed position generally illustrated in FIGS. 6 and 9.

While the details of the construction of the spring element 26 may vary, that here shown has a plurality of spaced slots 26f cut out of the arm portion 26c. These slots serve to equalize the biasing force, and also facilitate the insertion of mounting screws through the opposite arm portion 26b in a manner to be described below. The nib 26d will be referred to hereinafter as the stationary nib and this is formed with a reverse bend so as to present a tip 26g which extends substantially at 90° to the arm portion 26b. The opposite or movable nib 26e is simply bent, in the present instance, at 90° to the arm 26c, thus presenting a tip 26h which is adapted to enter one of the channels 16a, 16b in a printing plate 16.

Although there may be no functional difference if a single spring element 26 is made sufficiently long to extend the entire length of the cylinder 15, the spring element 26 is, in the present instance, formed by a plurality of sections each of which is individually mounted within the cylinder slot in end-to-end relation with the other such sections thereby forming, in effect, one long spring

element. Manufacturing of the spring 26 is simplified by making it in sections.

To provide means selectively to spread or relax the nibs 26e and 26d relative to one another, a camming shaft 28 is located between and embraced by the spring arms 26b, 26c. One-half of this camming shaft 28 is illustrated in FIG. 10. Generally stated, it is required of the shaft 28 only that it be selectively movable between two positions, e.g., rotatable about its longitudinal axis between two angular positions, and that it have two different effective widths interposed between the spring arm portions when it is in the two positions. As shown in the present instance, the shaft 28 is generally circular in cross section but formed with a machined flat 28a lying along a chord of its circular cross section. With this construction, the shaft 28 has a first relatively large width *m* (FIG. 8) formed by the full diameter thereof, and a second, narrower width *n* established by the chord surface 28a and the opposite side of the shaft. The dimensional sizing of the shaft 28 is so chosen that when in the angular position illustrated by FIGS. 6 and 8 it is substantially free of the spring arm 26c, thereby permitting the latter to be relaxed in its normal position. Rotated to the angular position illustrated by FIG. 7, however, the shaft 28 engages the arm 26c and spreads it against the resilient biasing force which is exerted by the spring 26 in tending to move the nibs 26e, 26d toward one another.

To mount the spring elements 26 and the actuating shaft 28 in the cylinder slot 24 with the spring nibs 26e, 26d disposed at the mouth of the slot and adjacent the surface of the cylinder, a simple structural arrangement is employed which also affords circumferential and skewing adjustments in the final position of the plate relative to the cylinder surface. As here shown, an elongated block 30 which is substantially equal in length to the length of the body of cylinder 15 is disposed within the slot 24. This block 30 is, in the present instance, L-shaped in cross section having a base 30a which is somewhat narrower than the width of the slot 24, thus leaving clearance spaces 31 (FIG. 6). Rising from the base 30a of the block 30 is a back portion 30b which terminates near the mouth of the slot 24. The spring elements 26 are firmly fixed to the block 30 by suitable fastening elements which are here shown as a plurality of cap screws 32 inserted through openings formed in the arm 26b and threaded into tapped openings in the back portion 30b. With the spring element 26 so fixed to the block 30, the doubled-back nib 26d has its lower portion resting on and reinforced by the upper surface of the back portion 30b. It will be apparent that the arm 26b and the nib 26d are substantially stationary relative to the block 30. Thus, rotation of the shaft 28 to spread or relax the nibs 26d, 26e will serve to move the latter nib between the two positions illustrated in FIGS. 6 and 7. The shaft 28 is held substantially captive within the spring 26, but is journaled for rotation at its opposite ends in a manner which will now be described.

To secure the L-shaped block 30 in the cylinder slot 24 and yet permit adjustments in the position of that block, the latter is attached to plates 34 adjustably disposed at the opposite ends of the cylinder 15. As shown best in FIGS. 2-4 and 7, the L-shaped block 30 at its ends carries two studs or dowel pins 35, 36 which fit tightly into holes in the plates 34. The end plates 34 are, in turn, adjustably secured to the cylinder by appropriate bolts 38 threaded into tapped holes in the ends of the cylinder, and passed through elongated openings or slots 39 (FIG. 7) in the plates. Rigidly fixed to the ends of the cylinder 15 are collars 40 which rotatably journal adjusting screws 41 extending for threaded engagement into tapped openings 42 in the plates 34 (FIG. 7).

With this arrangement, the adjusting screws 41 at the opposite ends of the cylinder 15 may be turned to move the end plates 34 back and forth along a chord of the circular cross section of the cylinder. If the screws are

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turned equal amounts, the end plates 34 will move equal distances and move the opposite ends of the L-shaped block or bar 30 transversely and equally within the slot 24, thus shifting both the spring nibs 26d, 26e along the surface of the cylinder 15, and changing the circumferential adjustment or register position of any printing plate which is held by those spring nibs. However, if the adjusting screws 41 at the opposite ends of the cylinder 15 are turned by different amounts, then the opposite ends of the block 30 will be differentially adjusted transversely of the slot 24, thereby skewing the elongated spring elements 26 relative to the longitudinal axis of the cylinder. This, in turn, will skewingly adjust the position of a printing plate relative to the cylinder axis.

To support the spring-actuating shaft 28 within the spring elements 26 so that it may be rotated between two angular positions, the end plates 34 are provided with circular openings 44 (FIG. 7) through which the shaft 28 projects and in which that shaft is journaled. At its extreme ends, the shaft 28 is provided with square or rectangular portions 28b (FIG. 10), on which shaft control members 45 and 46 are engaged. As shown best in FIGS. 2, 3 and 5, the opposite squared end portions 28b of the shaft 28 are respectively received in squared openings cut in the members 45 and 46. These control members 45 and 46 may take a variety of forms, and in the present instance are shown respectively as trapezoidal and triangular shaped metal plates. They provide means for rotating the shaft 28 between its two angular limit positions.

For this latter purpose, one of the two pins 35 and 36 which connect the L-shaped bar 30 to the end plates 34 is made long enough to extend considerably beyond the surface of the plate 34. As shown in FIG. 4, the pin 36 projects beyond the surface of the plate 34 and thus serves as a stop to limit rotation of the shaft control member 45 and the shaft 28. The control member or plate 45 may be rotated between the two positions shown in FIGS. 2 and 3, thereby rocking the shaft 28 from the position shown in FIG. 7 to that shown in FIG. 8, the plate 45 engaging the pin 36 in both positions.

Similarly, the triangularly shaped control member or plate 46 cooperates with the longer stop pin 36 at the other end of the cylinder 15. As illustrated in FIG. 5, as the shaft 28 rotates between the two positions illustrated by FIGS. 7 and 8, two corners of the triangular plate 46 engage the pin 36 to limit rotation of the shaft.

This limiting of the shaft rotation has two purposes. First, it makes certain that the shaft 28 is always turned in a counterclockwise direction to spread the spring nibs 26d, 26e. Turning of the shaft counterclockwise from the position shown in FIG. 6 to the position shown in FIG. 7 has been found to eliminate possible damage to the spring 26 which might otherwise result from clockwise rotation. Secondly, the limiting of shaft rotation between two angular positions facilitates lockup of paper plates, as will be described below.

It is quite feasible for the press operator manually to rotate the shaft 28 by means of a wrench applied to the squared ends 28b or by the end control members 45 or 46 in order to change the angular position of the shaft 28 and spread or release the spring nibs 26d, 26e when applying or removing a printing plate. However, it is desirable to make the spring element 26 "close" to tension a printing plate just before the leading side 24b of the slot 24 passes the point of tangency with the associated cylinder 20, so that the blanket cylinder 20 is firmly holding the entire trailing edge of the printing plate down against the surface of the cylinder 15. For this purpose, provision is made automatically to release the spring element 26e when the cylinder 15 has a particular angular position at which the cooperating cylinder 20 is holding the printing plate in position for engagement between the spring element and the channel of the printing plate.

To produce automatic rotation of the shaft 28 and

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resulting release or "lockup" of spring element 26 from its plate unlocking position to its locking position (from the position shown in FIG. 7 to the position shown in FIG. 8), means are provided to angularly deflect shaft control member 45 when the cylinders 15 and 20 are in a certain relative angular position. In the present instant, a projection in the form of a bolt 50 is disposed on the shaft control plate 45, and a stud or projection 51 is mounted on the end of the cooperating cylinder 20 (FIG. 3). If the shaft 28 and the control plate 45 are in the angular position corresponding to FIGS. 2 and 7, then the head of the bolt 50 will be disposed in the path of the projection 51 as the cylinders 15 and 20 rotate in the directions indicated by arrows in FIG. 3. Just before the leading side of the slot 24 coincides with the side of a similar slot 20a in the blanket cylinder 20, and when the trailing end of the plate is still engaged by the adjacent cylinder 20, the projection 51 hits and deflects the bolt 50. Thus, when the cylinder 20 is holding the trailing edge of a plate firmly against the surface of the cylinder 15, the bolt 50 is deflected so that the control plate 45 and the shaft 28 rotate clockwise (as viewed in FIG. 3) with a snap-action and return the opened spring jaws to the closed position shown in FIG. 8, thus locking up the plate.

With the foregoing in mind, the exemplary procedure for automatically or manually applying or removing a printing plate to the cylinder 15 may now be described.

First, the cylinder 15 is rotated to an angular position in which the mouth of the slot 24 is readily accessible to the press operator. The operator then hooks the leading channel 16b of the printing plate 16 over the tip 26g of the fixed spring nib 26d. The plate is held firmly against this nib while the cylinder 15 is rotated a full turn in a counterclockwise direction as viewed in FIG. 2. Prior to engagement of the trailing end of the printing plate with the movable spring nib 26e and subsequent to rotation of the cylinder 15 to wrap the plate onto the cylinder surface, the shaft 28 is rotated to the position illustrated in FIG. 7, thereby spreading the spring nibs 26d, 26e against the biasing spring force. After this, the channel 16a at the other end of the plate 16 can be placed over the movable spring nib 26e. Then, the cylinder 15 is further rotated until the projection 51 strikes the bolt 50 (as shown in dotted lines by FIG. 3), and the shaft 28 by this arrangement returns to the position illustrated in FIG. 8, in which the spring nib 26e is resiliently biased into the channel 16a, taking up the slack in the plate 16 and tensioning it around the surface of the cylinder 15. This automatically triggered engagement of the spring 26 occurs when the adjacent cylinder 20 is holding the trailing end of the plate, over the whole cylinder length, firmly in position to be engaged by the nib 26e.

If it is desired, the automatic release of the spring 26 can be omitted by removing the bolt 50, and the control plate 45 simply rotated by hand from an unlocked to a locked position to rotate the shaft 28 from unlocked to locked positions or vice versa. This can also be done by means of a wrench engaging the squared ends 28b of shaft 28, which extends beyond plates 45 and 46. Before a printing plate has been placed in tension on the cylinder 15, the position of the block 30 both transversely and skewingly within the slot 24 may be adjusted by turning the adjustment screws 41 either equally or differentially. In this manner, the circumferential or skewed registered position of the printing plate can be changed and corrected.

To remove the printing plate 16 after a printing run, it is only necessary to stop the cylinder 15 at a point where the lockup mechanism is accessible to the operator. The operator then manually turns either of the control plates 45 or 46 to rotate the shaft from the position shown in FIG. 8 to that shown in FIG. 7, thereby removing the spring tension from the plate 16. The trailing chan-

nel 16a of the plate 16 is then lifted off of the spring nib 26e. Since the pressure of the cooperating blanket 20 will be off at this time, the operator can simply shift the plate around the cylinder until the channel 16b is also disengaged from the spring nib 26d, and then the whole plate 16 removed from the cylinder 15.

While the present lockup device as described thus far serves with a relatively simple and rugged combination of parts to tension relatively strong plates, e.g., metal or metal-backed plates, on a printing cylinder, there may be in some instances a need to utilize the same printing cylinders and press with plates of considerably different physical characteristics, e.g., lower tensile strength. For example, paper printing plates are considerably less expensive than metal plates, and may be used for short runs, i.e., up to about 10,000 impressions. These paper plates are on the order of 0.0125 inch in thickness and their tensile strength is obviously less than that of thin metal plates.

In order to adapt the present cylinder 15 and lockup mechanism to accept paper plates under lesser tension than that created by the spring element 26, there is provided in the spring-actuating shaft 28 a longitudinal slot 28d cut generally radially into the shaft and located so that it opens toward the mouth of the slot 24 when the shaft 28 is at that angular position in which it spreads the spring jaws 26d, 26e (FIG. 7). This is the only additional structural feature which is required to convert the present lockup mechanism for successful operation with paper printing plates.

Referring now to FIGS. 11 and 12, the cylinder 15 and associated lockup mechanism are there shown as mounting and locking up a paper plate 55. The leading edge of this plate is bent back upon itself through 180° to form a U-shaped channel 55a about $\frac{3}{16}$ inch deep, the latter being adapted to hook over and engage the stationary spring nib 26d in the same manner as the metal plate channel 16b, previously described. In addition, in order to tension the paper plate 55 on the surface of the cylinder 15 without exerting a rupturing force thereon, the paper plate 55 is made somewhat longer than the metal plate 16, and its trailing edge is formed with a tab 55b which is bent inwardly or away from the image surface through an angle of only about 90°. With this arrangement, the channel 55a may be first hooked over the stationary spring nib 26d, and the spring jaws then spread apart by setting the shaft 28 to the angular position shown in FIG. 11. The plate 55 may then be wrapped around the surface of the cylinder 15 in the same manner as previously described for metal plates and the intumed tab 55b at the opposite end of the plate inserted through the slot 24 and into the shaft slot 28d. As the shaft 28 is next rotated from its unlocking to its locking position (i.e., from the position shown in FIG. 11 to that shown in FIG. 12), the paper plate 55 will be tensioned both by a slight wrapping around the shaft 28 and by the movement of the nib 26e toward the stationary nib 26d. Thus, the paper plate is placed under firm tension and held tightly on the surface of the cylinder 15.

In the foregoing description, it has been assumed that a single thin plate wraps about the whole surface of a cylinder and is engaged at its opposite edges with the stationary and movable tips of a single lockup assembly. It is to be understood, however, that the invention may be practiced with equal advantage when two or more printing plates, each extending only partially around the surface of the cylinder, are to be mounted on a single cylinder. It is only necessary to duplicate the slot 24 and the locking elements therein at a plurality of locations angularly spaced about the cylinder periphery. The opposite edges of each plate are then respectively engaged with the stationary nib of a first lockup assembly and with the movable nib of a second assembly angularly spaced on the cylinder from the first.

FIG. 13 is similar to FIG. 8 but illustrates an alternative construction in which the two plate-engaging nibs or jaws are not formed on a one-piece spring element. In FIG. 13 the same reference characters as employed in the preceding figures are used to designate like parts, but with a distinguishing prime symbol added. In this construction, the stationary nib 26d' is formed as a flat strip fixed, by suitable means such as screws 60 directly to the upper surface of the L-shaped block 30' which is disposed in the slot 24' of the cylinder 15'. The nib 26d' is thus disposed adjacent the surface of the cylinder and is adapted to enter and engage the channel 16b' in the plate 16'. The movable nib 26e' is fixed, by appropriate means such as welding (not shown), to the upper end of a spring plate or arm 26c' which has its lower portion fastened, as by screws 61, to the base 30a' of the block 30'. When relaxed as shown in FIG. 13, the spring arm tends to move the nib 26e' to a position adjacent the nib 26d', the biasing action tensioning the plate 16' which has its channel 16a' slipped over and engaged with the nib 26e'. The two nibs may be spread apart, however, by rotation of the cam shaft 28' to bring its full diameter to bear between the arm 26c' and the back portion 30b' of the block 30'. With this arrangement, the operation and advantages are substantially the same as those previously described, although the back portion 30b' in effect forms one arm (corresponding to the arm 26b in FIG. 6) of a composite spring element, and the base 30a' of the block in effect forms the bight portion (corresponding to the bight 26a in FIG. 6) of a composite spring element.

We claim as our invention:

1. In combination, a printing cylinder having a longitudinal slot in the surface thereof, a thin printing plate adapted to be conformed to and supported by the surface of said cylinder, said plate having channels formed along its opposite edges, an elongated spring of generally U-shaped cross section having a bight disposed in the lower portion of said slot defining arm portions and having nibs adjacent the surface of said cylinder, a plurality of fastening elements engaging one arm portion of said spring so as to anchor the spring in said slot with the nibs on said one arm portion being fixed and the nibs on the other arm portion being flexibly supported by the full extent of said bight, said nibs being formed to enter said channels on the opposed edges of said plate as such nibs are moved toward one another, said spring being formed such that said nibs are normally closely spaced from one another and when moved apart are biased toward one another, and a cam shaft embraced by said arm portions of said spring and rotatable to spread or relax said nibs.

2. In combination, a printing cylinder having a longitudinal slot in the surface thereof, a thin, flexible printing plate conformed to and supported on the surface of said cylinder, said plate bent back approximately 180° at its opposite edges to form narrow channels which open in opposite directions when the plate is disposed on said cylinder, an elongated spring of generally U-shaped cross section disposed in said slot with nibs adjacent the entrance to said slot, each of said nibs being disposed inwardly at about 90° from the body of the spring to form opposed tips extending substantially in a direction circumferential of the cylinder, a fastening element engaging said spring near the tips at one end of said U-shape so as to anchor the spring in said slot, said spring being formed such that said tips are normally closely spaced and when spread apart are biased toward one another, said tips being sized to enter respective ones of said channels in said plate and thereby hold the latter under tension on the cylinder surface, and means for spreading said nibs apart when said plate is to be placed on or removed from said cylinder.

3. In combination, a printing cylinder having a longitudinal slot in the surface thereof, a thin, flexible printing plate disposed on the surface of said cylinder, said plate being bent back at its opposite edges to form channels

which open in opposite directions when the plate is disposed on said cylinder, an elongated spring of generally U-shaped cross section disposed in said slot with nibs adjacent the entrance to said slot, a fastening element engaging said spring near the tips at one end of said U-shape so as to anchor the spring in said slot, said spring being formed such that the nibs are normally closely spaced and when spread apart are biased toward one another, said nibs being formed to enter respective ones of said channels in said plate and thereby hold the latter under tension on the cylinder surface, and a cam shaft embraced by said spring and rotatable between two angular positions, said cam shaft having two effective widths to spread or relax said spring when it is in respective ones of said positions.

4. For use with a printing cylinder having a longitudinal slot in its surface, and a flexible printing plate slightly less in length than the circumference of the cylinder and doubled back at its opposite edges to form channels therealong, that improvement which comprises, in combination, an elongated one-piece spring member of generally U-shaped cross section disposed longitudinally in said cylinder slot with opposed nibs generally in alignment with the cylinder surface, said spring member being constructed so that said nibs are resiliently biased toward one another, said nibs being shaped to enter said channels when said plate is wrapped about the cylinder thereby tensioning the plate, and means for spreading said nibs against the force of the spring bias to afford engagement of the channels therewith when the plate is being put on or removed from the cylinder.

5. For use with a printing cylinder having a longitudinal slot in its surface, and a flexible printing plate slightly less in length than the circumference of the cylinder and doubled back at its opposite edges to form channels therealong, that improvement which comprises, in combination, an elongated spring member of generally U-shaped cross section disposed longitudinally in said cylinder slot with opposed nibs adjacent the cylinder surface, said spring member being constructed so that said nibs are resiliently biased toward one another, said nibs being turned inwardly toward one another to lie generally in alignment with the cylinder surface and shaped to enter said channels when said plate is wrapped about the cylinder thereby tensioning the plate, and a cam member embraced within the arms of said U-shaped spring and movable between two positions to either spread or relax said nibs.

6. In combination, a printing cylinder having a longitudinal slot cut in the surface thereof, a flexible printing plate slightly less in length than the circumference of said cylinder and having channels formed along its opposite edges, a block undersize relative to said slot and disposed for shifting movement therein, a one-piece spring of U-shaped cross section fixed to said block and having nibs adjacent the cylinder surface, said nibs being normally adjacent each other and biased toward one another when separated, said nibs being engageable with said channels to tension said plate on the surface of said cylinder, means carried by said block for spreading and relaxing said nibs to provide for releasing or engaging said nibs with said channels and thus to afford the application or removal of a plate to or from said cylinder, means for anchoring each end of said block to said cylinder while affording adjustment of each such end in a direction transverse to the lengthwise dimension of said slot, so that the position of said plate on the cylinder may be circumferentially and skewingly adjusted.

7. In combination, a printing cylinder having a longitudinal slot cut in the surface thereof, a flexible printing plate supported on the surface of said cylinder and having channels formed along its opposite edges, an elongate block of L-shaped cross section and having a base undersize relative to said slot and disposed for shifting movement therein, a one-piece spring of U-shaped

cross section having two arm portions turned inwardly at their ends to form nibs, means fixing one of said arm portions to said block so that said nibs are adjacent the cylinder surface, said nibs being normally adjacent each other and biased toward one another when separated, said nibs being engageable with said channels to hold and tension said plate on the surface of said cylinder, means disposed between the arm portions of said spring to place said nibs in adjacent or separated positions to hold a plate in circumferential tension or to afford the application or removal of a plate to or from said cylinder, means for anchoring each end of said block to said cylinder while affording adjustment of each such end in a direction transverse to the lengthwise dimension of said slot, so that the position of said plate on the cylinder may be circumferentially and skewingly adjusted.

8. In combination, a printing cylinder having a longitudinal slot cut in the surface thereof, a flexible printing plate slightly less in length than the circumference of said cylinder and having channels formed along its opposite edges, a block undersize relative to said slot and disposed for shifting movement therein, a spring assembly of generally U-shaped cross section carried by said block and having nibs adjacent the cylinder surface, said nibs being normally adjacent each other and biased toward one another when separated, said nibs being engageable with said channels to hold and tension said plate on the surface of said cylinder, means carried by said block for spreading and releasing said nibs to afford the application or removal of a plate to or from said cylinder, a plate at each end of said cylinder and connected to one end of said block, and means for adjusting the position of each said plate in a direction transverse to the lengthwise dimension of said slot, so that the position of said plate on the cylinder may be circumferentially and skewingly adjusted.

9. In a lockup for thin printing plates, the combination comprising first and second cylinders rotatable substantially in surface contact, said first cylinder having a longitudinal slot in its surface, a spring assembly of generally U-shaped cross section disposed in said slot with its nibs adjacent the mouth of the slot, said spring assembly being formed so that the nibs normally are closely spaced and are biased toward one another when separated, a cam shaft embraced by said spring assembly and having two effective diameters so that rotation thereof between two angular positions spreads said nibs or allows them to relax into a normal position, a projection on said second cylinder, and means deflected by said projection when said shaft is in its nib-spreading position to rock said shaft to its nib-relaxing position, said projection and said last-named means being located to effect rocking of said shaft when the said slot is in an angular position just reaching the point of tangency with said second cylinder.

10. In a lockup for holding under tension flexible printing plates having tab ends of the kinds described, the combination comprising a cylinder having a longitudinal slot in its surface, a spring of generally U-shaped cross section disposed in said slot with nibs adjacent the mouth of the slot, said spring being formed so that the nibs normally are closely spaced and are biased toward one another when separated, a cam shaft embraced by said spring and having two effective diameters so that rotation thereof between two angular positions spreads or relaxes said nibs, and said shaft being formed with a longitudinal slot therein adapted to receive a tab end of a printing plate when the shaft is in its nib-spreading position.

11. In a lockup for holding under tension either first, a thin plate turned back at its opposite edges to have U-shaped channels therealong, or second, a thin plate turned back at one end to form a U-shaped channel and turned less than 180° at the other end to form a tab,

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the combination comprising a cylinder having a longitudinal slot formed in its surface, a U-shaped spring assembly disposed in said slot and having nibs adjacent the slot mouth and which are biased toward one another, said nibs being turned inwardly to enter the edge channels of a first plate, a cam shaft rotatably disposed within said spring assembly and having angularly spaced thin and thick cross sectional portions to relax said spring assembly or to spread said nibs apart when such shaft is turned to first or second angular positions, and said shaft having a longitudinal slot therein oriented when said shaft is in said second position to receive the tab of a second plate having its channel engaged with one of said nibs, so that rotation of said shaft tensions the second plate on the cylinder.

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