

Sept. 30, 1947.

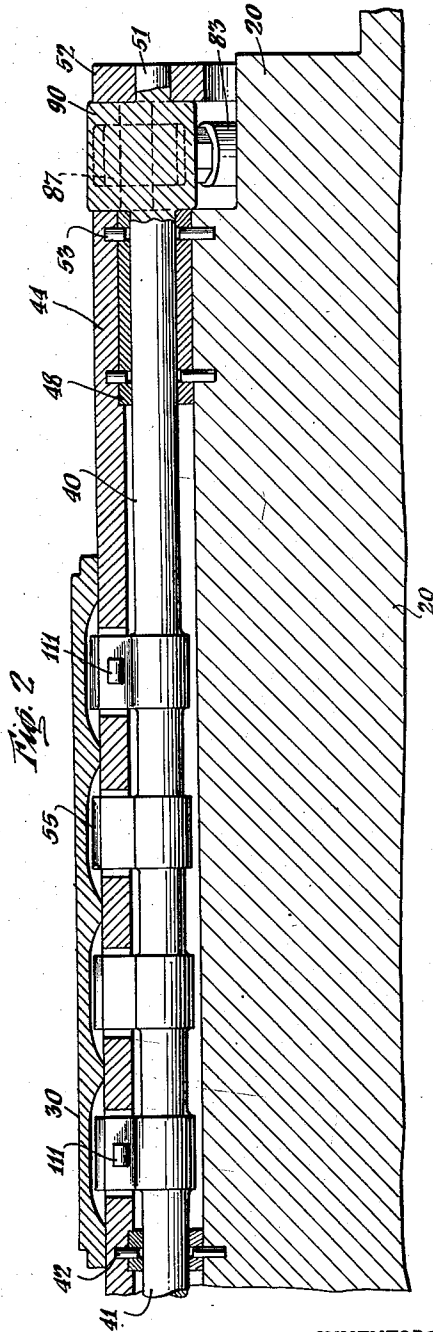
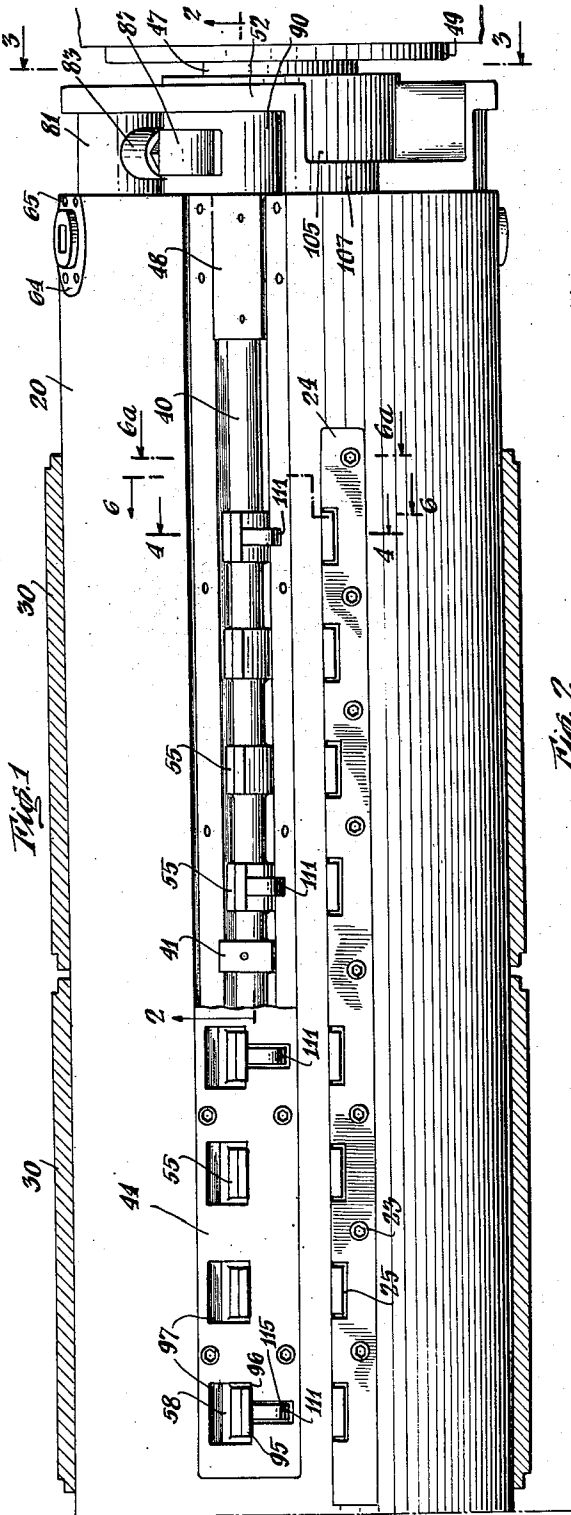
C. S. CRAFTS ET AL

2,428,263

TORSIONALLY OPERABLE PLATE CLAMP

Filed July 28, 1945

3 Sheets-Sheet 1



INVENTORS
WILLARD M. POLLOCK
C. S. CRAFTS

BY

Robert H. Durham

ATTORNEY

Sept. 30, 1947.

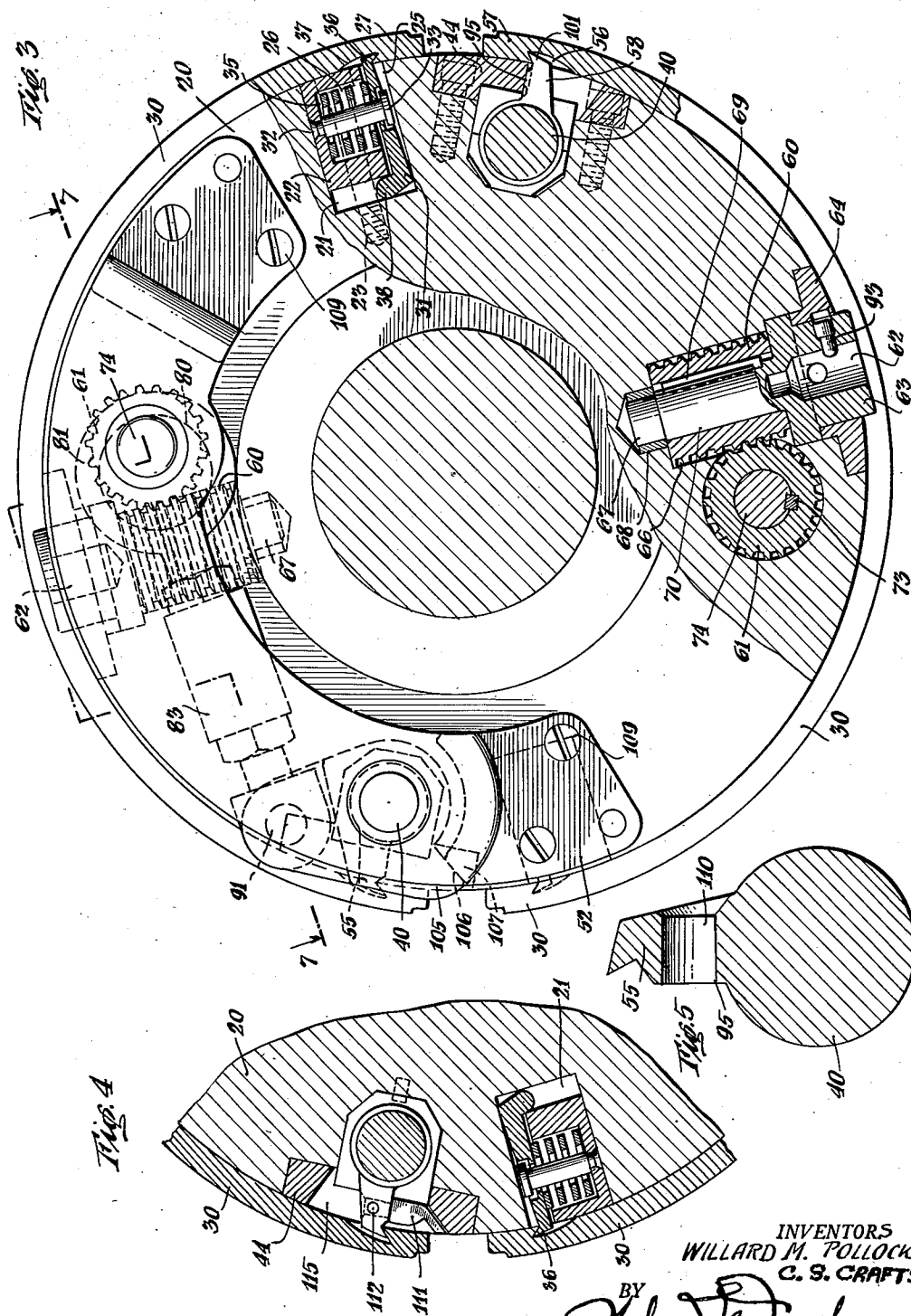
C. S. CRAFTS ET AL

2,428,263

TORSIONALLY OPERABLE PLATE CLAMP

Filed July 28, 1945

3 Sheets-Sheet 2



INVENTORS
WILLARD M. POLLOCK
C. S. CRAFTS

BY

Robert H. Durham

ATTORNEY

Sept. 30, 1947.

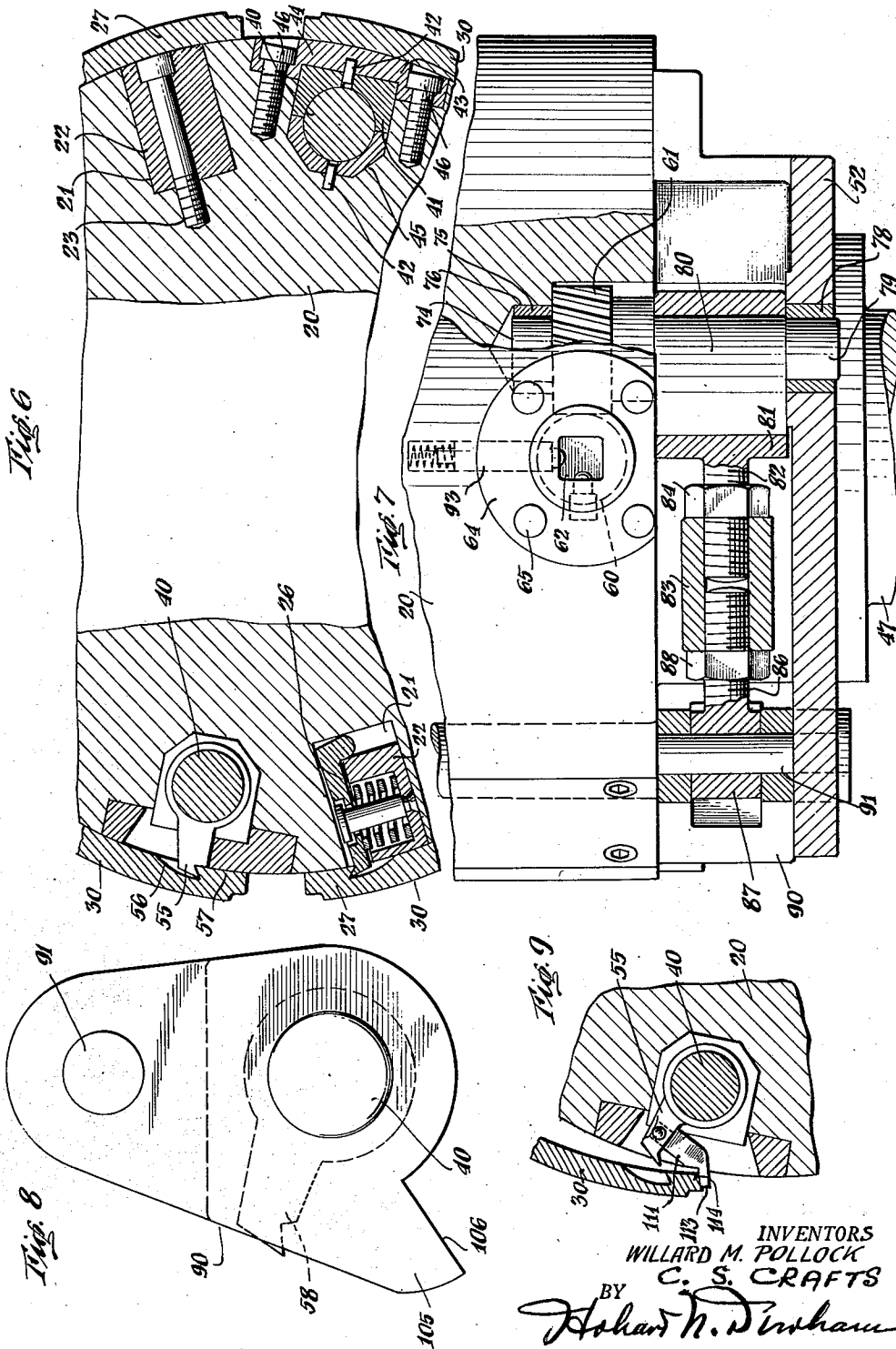
C. S. CRAFTS ET AL

2,428,263

TORSIONALLY OPERABLE PLATE CLAMP

Filed July 28, 1945

3 Sheets-Sheet 3



INVENTORS
WILLARD M. POLLOCK
C. S. CRAFTS

BY
Robert N. Dinham

ATTORNEY

UNITED STATES PATENT OFFICE

2,428,263

TORSIONALLY OPERABLE PLATE CLAMP

Curtis S. Crafts, Oak Park, and Willard M. Pollock, Glen Ellyn, Ill., assignors to The Goss Printing Press Company, Chicago, Ill., a corporation of Illinois

Application July 28, 1945, Serial No. 607,610

14 Claims. (Cl. 101—378)

1

This invention relates to rotary printing presses and more particularly to means for such printing presses for exerting circumferential tension on a stereotype or other printing plate carried by a plate cylinder.

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

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

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

Of the drawings:

Figure 1 is a side view of a plate cylinder of a rotary printing press according to one embodiment of this invention;

Figure 2 is an enlarged fragmentary cross section taken on the line 2—2 of Figure 1;

Figure 3 is an enlarged fragmentary sectional view taken on line 3—3 of Figure 1;

Figure 4 is an enlarged fragmentary sectional view taken on the line 4—4 of Figure 1;

Figure 5 is a detailed enlarged cross section of an engaging hook of the apparatus of Figure 1;

Figure 6 is an enlarged fragmentary sectional view on the line 6—6 of Figure 1;

Figure 7 is a fragmentary sectional view on the line 7—7 of Figure 3;

Figure 8 is an enlarged detailed view of operating parts of the apparatus of Figure 1; and,

Figure 9 is a detailed sectional view of the plate knock-off mechanism of the apparatus of Figure 1.

With high-speed printing presses it has been found desirable to hold a printing plate in position on the plate cylinders by means exerting circumferential tension on the plate. With such high-speed printing presses, there is a tendency for the plates to deform, and be damaged, due to the continuous and successive pressure waves exerted on them in the printing operation and the effect of centrifugal force.

All of these factors are compensated for to some extent by so mounting the plate upon the cylinder that it is secured at its leading and trailing edges and a resilient tension is applied to one of the edges. However, the effects of such factors

2

are not entirely eliminated by such means and accordingly it is the principal object of the present invention to provide new and improved means whereby to compensate for, and substantially eliminate, such deleterious factors as mentioned above, in a printing press.

Another object is to provide a plate cylinder for a printing press where a resilient circumferential tension is exerted on the trailing or leading edge of the plate attached thereto, while a torsion shaft exerts force on the plate against the predetermined pull of said resilient means.

Another object of the invention is to provide a plate cylinder for a printing press where a resilient circumferential tension is exerted on one end of the plate attached thereto, while a torsion shaft exerts force on the plate against the predetermined pull of said resilient means.

Another object of the invention is to provide a plate cylinder for a printing press in which a plate carried thereby is circumferentially resiliently held thereon between a resilient holding means and a torsion means.

A further object of the invention is to provide new and improved means for mounting a plate on a cylinder of a printing press under circumferential tension by means including a torsion member, with means to eject the plate from the cylinder when the torsion and tension means are released.

Generally, the invention comprises providing resilient means along one edge of each printing plate to resiliently grip the plate, for example spring urged hooks in suitable recesses on the inside edge of the plate, and a torsion locking means to grip the other edge of the plate and torsionally urge it against the resilient means, the torsion means being sufficiently loaded to prevent its displacement during printing.

The torsion mechanism is urged against a stop or a plurality of stops with sufficient force applied by the operating shaft to bring into alignment a number of hooks or like engaging members for gripping the plate, which members are arranged substantially helically around the shaft in its unloaded or normally unstressed condition. The shaft exerts a torsional force on the hooks and thus tensions the plate on the cylinder between its holding means, this force being greater than the resistance of the plates on the cylinder and the pull of the resilient hooks so that the shaft hooks seat fully against their stops insuring alinement of the plate.

It will be understood that the foregoing general description and the following detailed de-

scription as well are exemplary and explanatory of the invention but are not restrictive thereof.

Referring now to the drawings, the plate cylinder 20 of the high-speed printing press is provided with a longitudinally arranged recess 21, as shown in Figures 1 and 3, the recess being partially filled by a bar 22, secured by bolts 23 to the plate cylinder 20. A top portion 24 (Figure 6) formed integrally therewith has openings 25, opening into and communicating with recesses 26 in the bar 22.

The plate 22 with top 24 form a compartment wherein is mounted a unitary assembly for exerting spring tension on the trailing edge 27 of the stereotype plate 30. As particularly shown in Figures 3 and 6, this assembly includes a hook plate 31 retained by pins 32 in bar 22, the free end of pins 32 loosely engaging with the hook plate 31, heads 33 on pins 32 being somewhat larger than the holes through which pins 32 pass. Mounted in each recess 26 and encircling each pin 32 is a compression spring 35 being against the inside of the recess and against hook plate 31.

The outer end of hook plate 26 projects outwardly beyond the top portion 24 and through the recess 25 therein and terminates in a hook member 36 adapted to engage suitable recess 37 in the trailing edge 27 of the plate 30. The other end of hook plate 31 is rounded as at 38 and projects into the space between recess 21 and bar 22. By reason of rounded end 38 of hook plate 31, hook member 36 has a limited pivotal movement and is pressed strong circumferentially of the cylinder by spring 35, thus engaging plate 30 in a resilient manner.

In prior application Serial No. 512,530, filed December 2, 1943, there is disclosed a similar form of mechanism to that described above for resiliently holding one edge of the plate against a circumferential force to be applied thereto by torsion means.

In accordance with the present invention, one edge of plate 30 is adapted to be torsionally circumferentially urged against the described spring tension means at the other edge in a novel and improved manner.

To this end, a torsion shaft 40 extends longitudinally of the plate cylinder 20, and as shown in Figure 1, a single torsion shaft 40 may be utilized for a plurality of side-by-side printing plates 30. Shaft 40 is suitably supported in bearings 41 located in suitable recesses in cylinder 20, the bearings being held in place by pins 42 (Figure 6) with the outer bearings 43 secured by cover plates 44 in the recesses 45, cover plates 44 being fastened to the cylinder 20 by screw bolts 46.

A further long support bearing 48 carries shaft 40 at its one end, this being the end at which mechanism is supplied to turn torsion shaft 40 as herein described. The end of shaft 40 terminates in a head 90 with a projecting bearing 51 mounted in a bearing bracket 52 secured to cylinder 20. The other end of shaft 40 is suitably journaled in a recess near the center of the cylinder 20.

Rotation of cylinder 20 is by shaft 47 in bearing 49 shown at one end only of Figure 1.

Bearing 48 is held in place in a recess in the cylinder 20 in a similar manner to bearings 41 as by pins 53.

In making the torsion shaft 40 it is machined under torsion so that the hooks 55 carried by, and formed preferably integrally with, the shaft 40 are positioned along a helix instead of being in a straight line, on the finished unstressed

shaft. Preferably, to accomplish this, the maximum torsional deflection of load of the hooks 55 is calculated, which is an amount greater than the actual requirement of operation conditions, and the machining of the fingers or hooks 55 is then done with such a torsional load imposed on shaft 40.

In actual use of shaft 40, means are provided for locking up a plate on the cylinder by rotating shaft 40 and hooks 55 into position in grooves or recesses 56 in one edge 57 of plate 30 and thereafter to stretch plate 30 circumferentially by further rotation of shaft 40 against the resilient urge of hooks 36 in the recesses 37 of the other edge 27 of plate 30.

It is an important feature of this invention that the torsion shaft 40 is torsionally loaded as the hooks 55 are moved to be tightly seated in their recesses 56 and locking up is accomplished under a torsional load successively applied to the hooks 55 and ending at that end of shaft 40 at which the torsional load is applied, so that each of the hooks is stressed to a greater extent by the shaft than by the plate recess 56 alone, and the load applied by each hook is distributed between a stop and the plate. As the torque of shaft 40 in locked-up position exceeds the pull of the hooks 36 and the friction of the plate 30 on the cylinder 20, the hooks 55 are firmly seated in their recesses or against their stops and are correctly aligned axially of the cylinder, preventing a skew movement of the plate 30 on the cylinder 20.

To this end, the hook 55 farthest away from the means for applying torsional load, identified as hook 58 in Figures 1, 3 and 8, is positioned as hereinafter brought out to a positive stop, so that upon rotation of shaft 40 and as the maximum tension is exerted by any hook 55 on the plate recess 56, hook 58 will contact its stop and the shaft 40 will be torsionally stressed to bring the hooks 55 into alignment from their helical placement. The torsional movement of the shaft proceeds from the extreme end commencing with hook 58, and the hooks will tension the plate 30 around the cylinder 20 by engagement in the recesses 56.

Normally, only each hook 55 is provided with a stop to accomplish the desired result, but in some cases stops for some of the intermediate hooks may be omitted.

Another stop is preferably positioned at the load applying point, although the stop is not always necessary and the maximum travel of the lock-up mechanism may be utilized to accomplish this second stop of movement as hereinafter described.

Means are provided for rotating shaft 40 to accomplish engagement of the hooks 55 and 58 with the recesses 56 in the plate 30. To this end, as specifically shown in Figure 3 and Figure 7, a spiral gear 60 meshes with a spiral pinion 61, gears 60 and 61 being normal to each other. Gear 60 forms the driving gear and is rotated by a suitable wrench (not shown) with a square end which is inserted into the square aperture 62 within a socket shaft 63 fast to gear 60. Socket shaft 63 is mounted within the plate cylinder by a bearing 64 fastened to the cylinder by screws 65. The gear 60 is mounted within the recess 66 in cylinder 20 by means of a bearing end 67 of shaft 63 in a bearing 68. Thus, by rotating spiral gear 60 in either direction with the square ended wrench, pinion 61 will be rotated.

Pinion 61 is feathered at 73 on a shaft 74 which shaft is mounted at one end in a bearing 75 in a

recess 76 within the body of cylinder 20. The other end of shaft 74 is mounted by a reduced section 79 in a bearing 78 carried by bracket 52.

Formed as a part of shaft 74 to move therewith under influence of pinion 61 is an eccentric 80 on which is pivotally held within shackle 81, formed as an eye bolt with a depending screw threaded section 82. Section 82 is screwed within a threaded collar 83 and is held in place at a predetermined position by a lock nut 84.

At its other end, collar 83 has screwed therein a threaded section 86 of an eye bolt 87, the section 86 also being held in predetermined position by a lock nut 88. Eye bolt 87 is pivotally mounted within the confines of a forked arm 90 by a pivot pin 91. Arm 90 is the operating member for rotating shaft 40 under influence of rotation of pinion 61, since pinion 61 rotates shaft 74 and thus the eccentric 80, which in turn moves the link formed by shackle 81, collar 83, and eye bolt 87, longitudinally in one or the other direction and this link to rock arm 90. Since arm 90 is fixedly attached to shaft 40 at its operating end or is formed integrally therewith, movements caused by the wrench in socket 62 result in rotating of shaft 40 to swing the hooks 55 and 58 toward or away from engaging position with respect to recesses 56.

As more clearly shown in Figure 3, the arrangement of eccentric 80, the link formed by shackle 81, collar 83 and eye bolt 87, and the arm 90, is such that the maximum force is attained when the plate 30 is fully locked up on cylinder 20, namely, that, in the final lock-up position of Figure 3 the arm 90 and the above mentioned link are substantially at right angles while the eccentric 80 is at dead center position, with the hooks 55 fully engaged in their slots 56 in the inside face of plate 30 and against their stops.

In order to make sure that the wrench is operated to either full engagement or complete disengagement, a spring pressed plunger 93 is provided within the socket 62, as shown in Figure 7, this operating conventionally with a suitable slot on the operating wrench.

While the mechanism above described has made reference to only one shaft 40, it is obvious that two of such mechanisms circumferentially of the cylinder will be provided when conventionally applying two plates circumferentially onto the cylinder. Also, as shown in Figure 1, it is contemplated that one shaft 40 will lock-up two side-by-side plates 30, with the one mechanism with or without more than one hook 55 formed as hook 58.

As shown in Figures 1 and 3, fins 95 are formed on each hook 55 so they contact with surface 96 of the cut-outs 97 to cover plate 100 through which hooks 55 pass when the shaft 40 is rotated to place the hooks 55 in engaging position and, as shaft 40 is rotated the contact of several fins 95 with surfaces 96 form a stop against which shaft 40 is progressively torsionally stressed under continued rotation. Since hook 58 is the most forward of all the hooks 55 in the helical formation previously described, as the shaft 40 is twisted, hooks 55 will progressively come toward and into full clamping engagement with their recesses 56, starting at the end remote from the torsion operating end at bearing 48, with their fins 95 in contact with surfaces 96.

Hook 58 will be so machined and associated with the mechanism that, in the contact or stop position clearly shown in righthand section of Figure 3, the hook part 101 will be in contact

with its recess 58 and with stop 96, and as the other hooks 55 come into line under continued rotation of shaft 40 the same engagement will progressively take place until all of the hooks 55 and 58 are in locking position and in their recesses 56.

While the maximum travel of the hooks 55 relative to the hook 58 will result in an automatic stopping of rotation of the shaft 40 by prevention of further possible turning of the wrench in socket 62, it is a further feature of the invention to provide a positive stop to limit this movement. To this end, there is mounted on shaft 40 to move therewith the thick forging 90, shown in detail in Figure 8, which forging is integral with extension 91 of shaft 40, as shown in Figure 7. Forging 90 has a depending lip 105 having a straight contact edge 106 which is adapted to strike a stop member 107 on bracket 52 and formed preferably integral therewith (Figures 1 and 3).

Thus, as forging 90 moves with shaft 40 under rotation of gear 60, it ultimately contacts stop 107 and positively prevents further stress of shaft 40.

Bracket 52 is attached to the end of cylinder 20 in a strong manner to serve as the medium of support of the bearings for the various shafts hereinbefore described, and for the purpose of stop 107 as by stud bolts 109.

In apparatus of the kind described, one of the difficulties encountered is to lift or raise a plate from the cylinder after use, namely after the plate has been stressed around the cylinder by such torsion operated hooks 55 and tension hooks 36. In order to overcome this, the present invention also provides plate lifting means automatically operable upon retraction of hooks 55 from their recesses 56.

To this end, certain of the hooks 55 have a cross-bore 110 therein (Figure 5) into which is inserted a plate lifter 111. Plate lifters 111 are held in place in their bores by riveting over the end of the pin 112 (Figure 4) and are placed in as many of hooks 55 as is necessary to lift a plate from the cylinder. The forward end of each plate lifter 111 is hook shaped as at 113, and when the hooks 55 are retracted sufficiently they will cause engagement of end 113 with the plate edge as at 114 to lift the plate 30 from the cylinder 20 as shown in Figure 9.

In Figure 1, there are shown two plate lifters 111 for the extreme ends of each plate 30 and cover plate 44 is slotted at 115 to accommodate the movements of the plate lifters 111. In operation plate lifters 111 are moved from the locked position of hooks 55, shown in Figure 4, to the retracted position, shown in Figure 9, where further retracting movements of the hook 55 will cause lifting of the edge of plate 30 by hook action of end 113.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What is claimed is:

1. In a rotary printing press, the combination of a plate cylinder for supporting a printing plate, resilient means acting on one straight edge of the plate to exert resilient tension thereon, movable means including a torsional shaft extending longitudinally of the cylinder on which is mounted a plurality of hooks for exerting a pull on the other straight edge of the plate against the

7

resiliency of said resilient means, and operating means for stressing said shaft with a predetermined torsional force, said operating means including at least one stop against which said shaft is torsionally stressed after said hooks are brought into engagement with the said other edge of the plate.

2. In a rotary printing press, a plate cylinder for exerting circumferential tension on a plate, comprising resilient means for exerting tension on one straight edge of the plate, a torsion shaft extending longitudinally of the cylinder, projections carried by the torsion shaft and engageable with the plate, means for turning the torsion shaft about its axis, and at least one stop in the path of movement of said projections against which the torsion shaft can be stressed during engagement of said projections with the plate.

3. In a rotary printing press, the combination of a plate cylinder for exerting circumferential tension on a plate, resilient means for exerting tension on one edge of the plate, movable means including a torsion shaft extending longitudinally of the plate for exerting tension on the other edge of the plate against the tension of said resilient means, an actuating member fixed to one end of said torsion shaft, means for oscillating said member in a plane substantially perpendicular to the axis of the torsion shaft and at least one stop in the path of movement of said torsion shaft against which it can be torsionally stressed.

4. In a rotary printing press, the combination of a plate cylinder for exerting circumferential tension on a plate, resilient means for exerting tension on one edge of the plate, means including a torsion shaft extending longitudinally of the plate for exerting tension on the other edge of the plate against the tension of said resilient means, an actuating member fixed to one end of said torsion shaft, turnable means including an eccentric for oscillating said actuating member in a plane substantially perpendicular to the axis of the torsion shaft, for turning said torsion shaft back and forth about its axis, and at least one stop in the path of movement of said shaft against which said shaft may be torsionally stressed when moved in one direction.

5. In a rotary printing press, having a plate cylinder for carrying a printing plate, means for exerting circumferential tension on a plate, comprising in combination resilient means for exerting tension on one edge of the plate, a torsion shaft extending longitudinally of the cylinder, outwardly extending hooks carried by the torsion shaft and engageable with the back of the plate, each of said hooks being angularly displaced with respect to the other hooks, means for turning the torsion shaft, and a stop in the path of the hook in leading position as the hooks are moved toward engaging position with the plate against which said shaft is torsionally deflected until the hooks are moved from their angular arrangement into alignment.

6. In a rotary printing press, a plate cylinder for exerting circumferential tension on a plate, comprising resilient means for exerting tension on one straight edge of the plate, means, including a torsion shaft provided with outwardly extending hooks for engaging the other straight edge of the plate, said hooks being displaced out of their final position when the shaft is in initial position and not under torsion, and at least one stop associated with said shaft against which said

8

shaft is deflected by torsion to bring the hooks into accurate final position.

7. In a rotary printing press having a plate cylinder for supporting one and more than one plate, means exerting circumferential tension on a plate including in combination gripping means engaging the one edge of the plate, movable means carried by the cylinder for engaging the other edge of the plate, including a turnable shaft, at least one stop against which said shaft is torsionally deflected to stress said movable means, and a further stop for limiting the maximum torsional deflection of said shaft.

8. In a rotary printing press, a plate cylinder for exerting circumferential tension on a plate, comprising resilient means for exerting tension on the trailing edge of the plate, means including a torsion shaft provided with outwardly extending hooks for engaging the leading edge of the plate, said hooks being displaced out of their final position when the shaft is in initial position and not under torsion, at least one stop associated with said shaft against which said shaft is deflected by torsion to bring the hooks into accurate final position, some of said hooks having plate lifting means thereon adapted to raise the plate edge from the cylinder as the hooks are retracted from final position back to initial position.

9. In a rotary printing press, a plate cylinder for exerting circumferential tension on a plate, comprising resilient means for exerting tension on one edge of the plate, means, including a shaft provided with outwardly extending hooks for engaging the other edge of the plate, means for rocking said shaft in opposite directions to tension the plate about the cylinder or alternatively to unlock the plate from the cylinder, some of said hooks having plate lifting means thereon adapted to raise the plate edge from the cylinder as the hooks are retracted from final position back to initial position, each of said plate lifting means having a hooked end acting to embrace the plate edge and displace the plate from the cylinder as the hooks carrying the plate lifting means are retracted to initial position.

10. In a rotary printing press, the combination of a plate cylinder for supporting a printing plate, resilient means including spring urged hooks acting on one edge of the plate to exert resilient tension thereon, movable means including a torsional shaft extending longitudinally of the cylinder on which is mounted a plurality of hooks for exerting a pull on the leading edge of the plate against the resiliency of said resilient means, and operating means for stressing said shaft with a predetermined torsional force, said operating means including at least one stop against which said shaft is torsionally stressed as said hooks are brought toward and into engagement with the leading edge of the plate, and a further stop member placed in the path of movement of said operating means to limit the engaging force of said movable means with the edge of the plate.

11. In a rotary printing press, a plate cylinder for exerting circumferential tension on a plate, comprising resilient means for exerting tension on one edge of the plate, a torsion shaft extending longitudinally of the cylinder, projections carried by the torsion shaft and engageable with the plate, and means for turning the torsion shaft about its axis, a stop in the path of movement at least one of said projections against which the torsion shaft can be stressed,

9

and another stop limiting the amount of turning of said shaft about its axis.

12. In a rotary printing press, the combination of a plate cylinder for exerting circumferential tension on a plate, resilient means for exerting tension on one edge of the plate, movable means including a torsion shaft extending longitudinally of the plate for exerting tension on the other edge of the plate against the tension of said resilient means, an actuating member fixed to one end of said torsion shaft, means for oscillating said member in a plane substantially perpendicular to the axis of the torsion shaft, and a plurality of stops in the path of movement of said torsional shaft between which said shaft is torsionally deflected a predetermined amount.

13. In a rotary printing press, the combination of a plate cylinder for supporting a printing plate, resilient means acting on one edge of the plate to exert resilient tension thereon, movable means including a torsional shaft extending longitudinally of the cylinder on which is mounted a plurality of hooks for exerting a pull on the other edge of the plate against the resiliency of said resilient means, an arm connected to said shaft, an eccentric, and a link connecting the arm and eccentric, whereby said eccentric can cause said hooks to exert a pull on the leading edge of the plate to lock-up the plate, and operating means for stressing said shaft with a predetermined torsional force, said operating means including at least one stop against which

10

said shaft is torsionally stressed as said hooks are brought toward and into engagement with the leading edge of the plate, the connection and association between said eccentric, arm link and hooks being such that the link and arm form substantially a right angle when the eccentric is dead center and when said hooks have the plate in final locked up position.

14. In a rotary printing press, the combination of a plate cylinder for supporting a printing plate, resilient means acting on one straight edge of the plate to exert resilient tension thereon, movable means including a torsional shaft extending longitudinally of the cylinder, a plurality of hooks mounted on said shaft exerting a tension on the other edge of said plate, and stops mounted in said cylinder against which the shaft is torsionally stressed to a loading greater than the load impressed on the shaft by said plate and the load applied by each hook is distributed between a stop and the plate.

CURTIS S. CRAFTS.
WILLARD M. POLLOCK.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,774,777	Wood	Sept. 2, 1930