May 15, 1956 G. R. BRODIE 2,745,344

FLEXIBLE SHEET SECURING DEVICE FOR PRINTING ROLLERS

Filed March 2, 1955 3 Sheets-Sheet 1

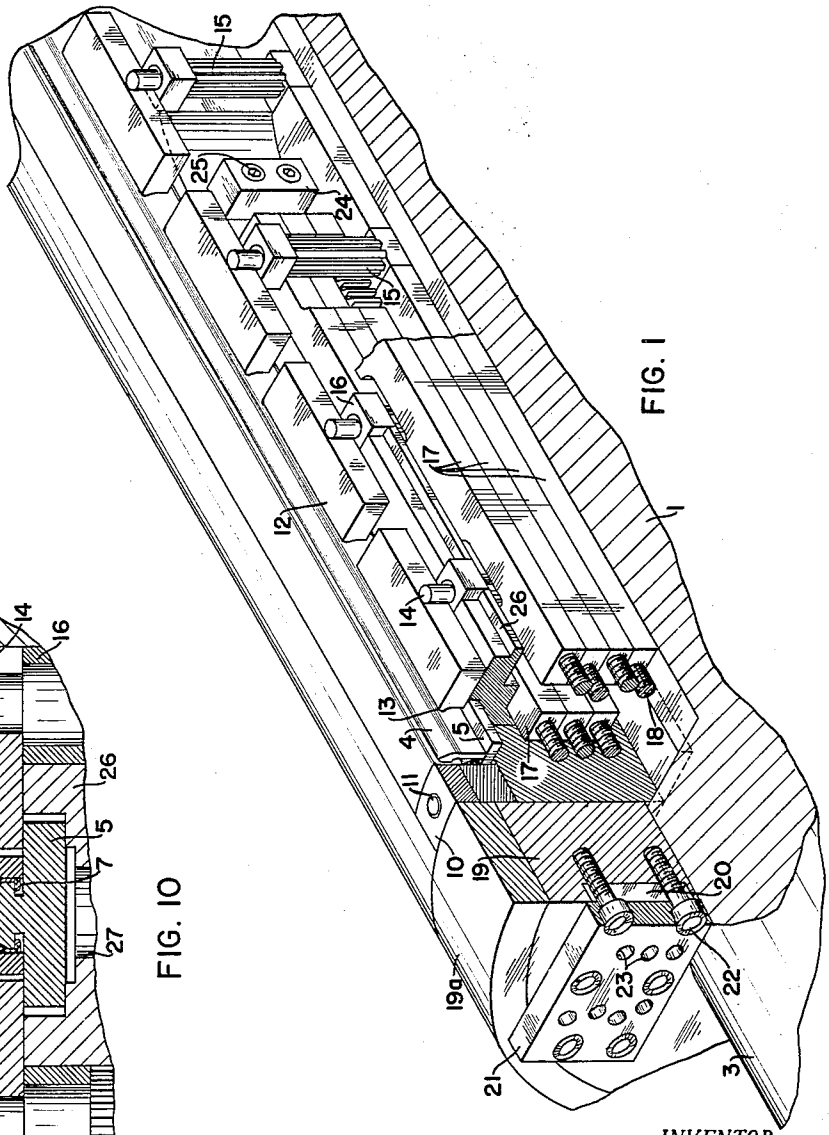


FIG. 1

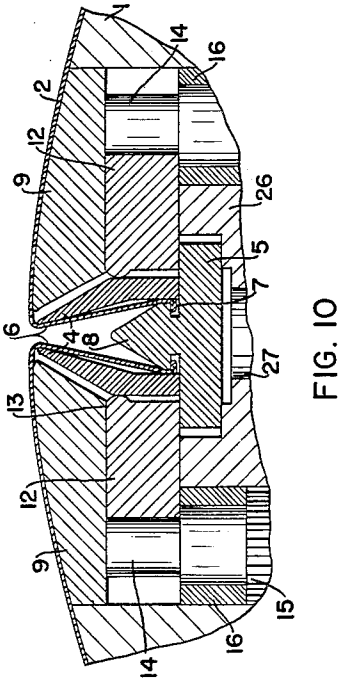


FIG. 10

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FLEXIBLE SHEET SECURING DEVICE FOR PRINTING ROLLERS

Filed March 2, 1955 3 Sheets-Sheet 2

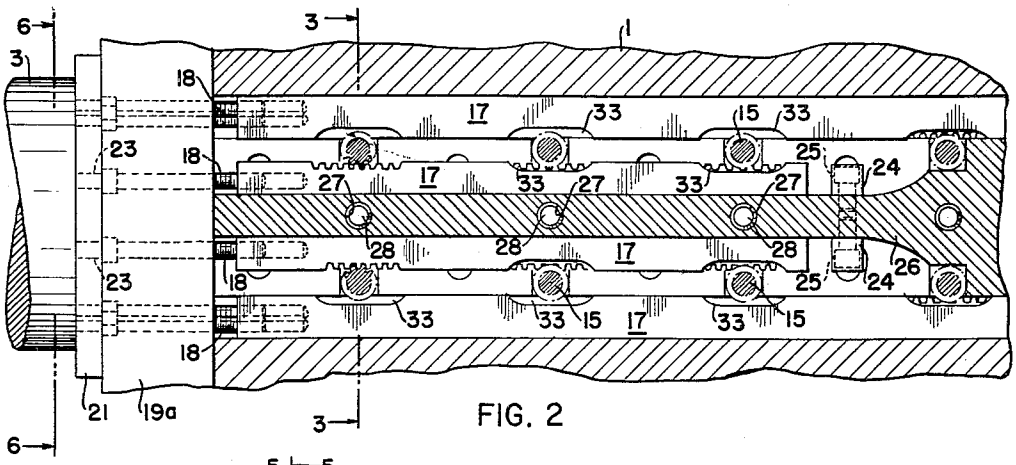


FIG. 2

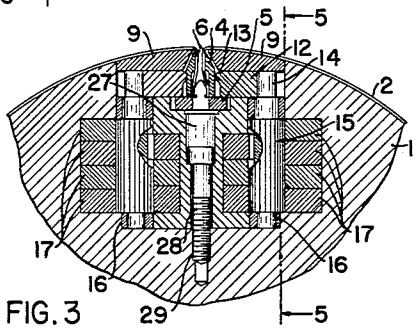


FIG. 3

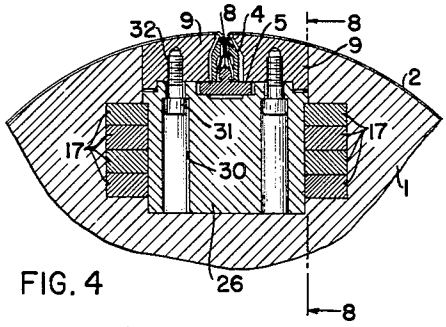


FIG. 4

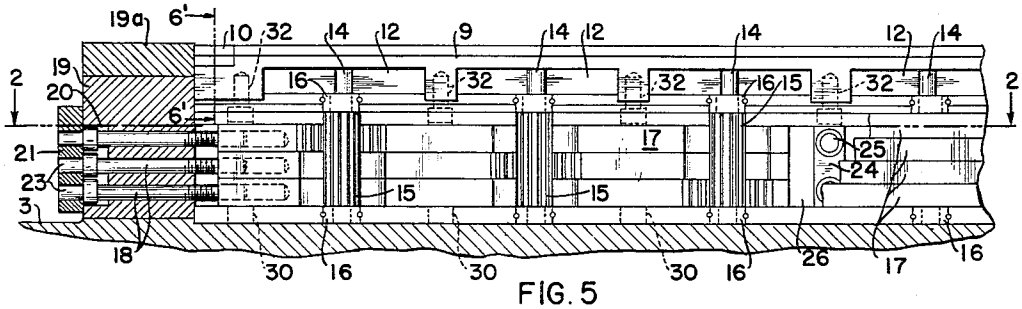


FIG. 5

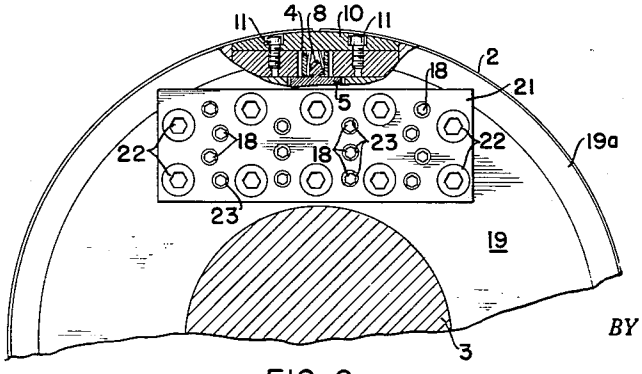


FIG. 6

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FLEXIBLE SHEET SECURING DEVICE FOR PRINTING ROLLERS

Filed March 2, 1955 3 Sheets-Sheet 3

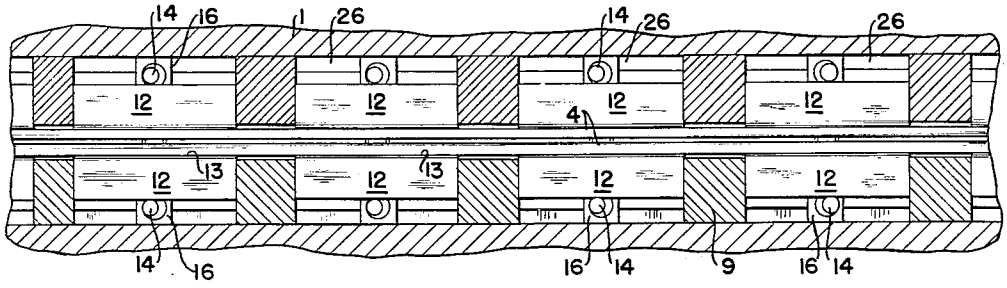


FIG. 7

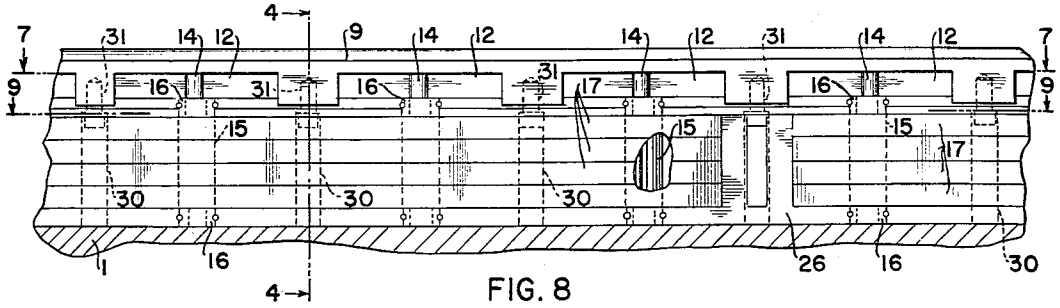


FIG. 8

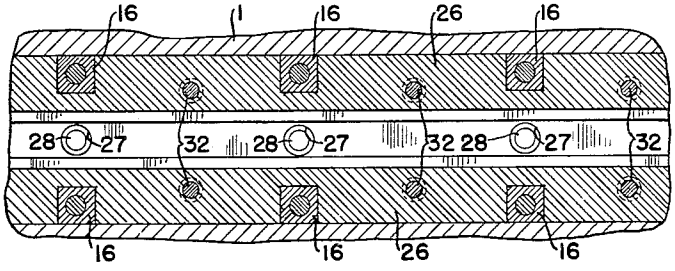


FIG. 9

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FLEXIBLE SHEET SECURING DEVICE FOR PRINTING ROLLERS

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Application March 2, 1955, Serial No. 491,720

7 Claims. (Cl. 101—415.1)

This invention relates to improvements in rotary printing presses, and more particularly such presses adapted to the use of printing plates consisting of relatively thin metal, plastic, or fiber sheets, which are fitted around the periphery of the plate cylinder and each end of the plate firmly held in position thereon by a clamping device, known as a plate lock-up.

The invention provides improved lock-up means for adjusting and clamping the plates in position on the plate cylinder.

In multi-color printing, for instance, it is essential that each plate be precisely positioned on the plate cylinder in order to obtain exact register of each plate on the web. Frequently, it is found that the image is not quite accurately positioned on the plate, and it then becomes necessary to twist or cant the plate slightly with respect to the plate cylinder in order to bring the printed image into precise register with that of the other plates.

It is also important that the plate fit snugly and be securely held in position about the plate cylinder, in order to prevent any buckling of the plate. Further it is highly desirable that the width of the lock-up be as small as practicable, since high quality printing has not been obtained over that portion of the periphery of the cylinder occupied by the clamping device, and it is, of course, desired to minimize the non-printing area of the plate.

It has heretofore been customary to weld the respective ends of the printing plate to clamp bars extending the width of the plate and which are adapted to fit into a slot in the periphery of the plate cylinder parallel to its axis. These slots have been provided with movable clamping jaws of considerable width extending along each side thereof, adapted to clamp the bars in position, and operated by means of screws extending through the periphery of the cylinder along each side of the slot. Access to these screws has been through holes cut through the plate adjacent its respective ends. This arrangement has necessitated the leaving of a gap of considerable width between the ends of the plate and a further non-printing area of considerable width extending along each side of the gap.

One marked advantage, obtained in accordance with the present invention, is that the width of the gap between the edges of the plate is materially reduced. A further advantage is that the necessity of welding the ends of the plate to clamp bars is entirely avoided. A still further advantage is that it is no longer necessary to provide openings through the plate to give access to the adjustment screws operating the jaws. The non-printing area of the plate is thereby reduced to a minimum.

Other advantages of my improved plate lock-up will appear from the following description thereof, with reference to the accompanying drawings which represent a particularly advantageous embodiment of the invention, and of which—

Fig. 1 is a perspective view of one end-quarter of the plate cylinder with the lock-up in position, broken away in part and parts removed for clarity,

Fig. 2 is a longitudinal horizontal sectional view of the end quarter of Fig. 1 along the line 2—2 of Fig. 5,

Fig. 3 is a transverse sectional view along the line 3—3 of Fig. 2,

Fig. 4 is a transverse sectional view along the line 4—4 of Fig. 8,

Fig. 5 is a longitudinal vertical sectional view along the line 5—5 of Fig. 3,

Fig. 6 is a fragmentary end view of the plate cylinder along the line 6—6 of Fig. 2, partly broken away to show a transverse section of the lock-up along the line 6'—6' of Fig. 5,

Fig. 7 is a longitudinal horizontal sectional view along the line 7—7 of Fig. 8 showing a middle quarter of the lock-up,

Fig. 8 is a longitudinal vertical sectional view along the line 8—8 of Fig. 4,

Fig. 9 is a longitudinal horizontal sectional view along the line 9—9 of Fig. 8, and

Fig. 10 is an enlarged fragmentary view of the clamping arrangement of Fig. 3.

The two end-quarters of the lock-up device are similar. Likewise, the two middle-quarters are similar. Therefore, it is only necessary to describe in detail one end-quarter and one middle-quarter of the lock-up. It will be understood that the drawings are not necessarily to precise scale.

In the drawings the plate cylinder is fragmentarily represented at 1 and the printing plate thereon is indicated at 2. The plate cylinder is rotatably supported at each end by shaft 3. A slot is milled into the periphery of the cylinder, parallel to its axis and extending the entire width of the cylinder to be covered by the printing plate, to receive the lock-up device, which is also coextensive with the width of the printing plate to be secured thereby to the cylinder.

The lock-up device consists essentially of cooperating clamping jaws 4 and the cooperating clamping member 5, each of which extends over the entire length of the lock-up, and means presently to be described for operating and adjusting the clamping jaws. The clamping jaws 4 and clamping member 5 are of uniform configuration throughout their length and are adapted to be moved sideways with respect to other members of the lock-up device. Means are provided at intervals along their length for effecting such movement.

The plate to be secured to the periphery of the plate cylinder need not be permanently fastened in any way to the clamping jaws 4, nor to the clamping member 5.

However, before applying the plate to the cylinder, its ends are bent, substantially as shown at 6 in Fig. 10 of the drawings to facilitate the securing of the ends.

In applying the plate, the jaws 4 are loosened, by means presently to be described, so as to permit the insertion of the respective bent ends of the plate between the jaws and the lug, or upward extension of the clamping member 5, and into the respective groove 7 extending along the base at each side of the lug 8. After the ends of the plates have been so inserted, the clamping jaws 4 are moved together, by means presently to be described, so as to clamp the plate ends between the lug 8 and the lower portion of the respective jaws 4.

The clamping jaws 4 are tapered at their outer ends, thereby reducing to a minimum the peripheral surface of the plate cylinder occupied thereby. These jaws are with advantage so proportioned that they may be sep-

arately inserted into the slot provided therefor through the slot between the stationary face plates **9** which extend along each side of the jaws, flush with the periphery of the plate cylinder, and are cut down at each end so that they fit under and are secured to the lock-up assembly at each end, beyond the side edges of the plate, by means of a plate **10** and machine screws **11**, as more clearly shown in Fig. 6 of the drawings.

The lower portions of the face plates **9** are cut away at intervals along their length to receive pusher bars **12**, positioned at intervals at each side of the clamping jaws and provided with shoulders **13** adapted to bear against the jaws at point intermediate the height of the jaws.

These pusher bars **12** are adapted to be forced against the respective jaws by means of eccentrically mounted cams **14** formed by extensions of the supporting shafts of pinions **15**.

The shafts of pinions **15** are rotatably mounted at each end in bearings **16**, and are adapted to be rotated by means of one of the parallel racks **17**, which extend through the interior of the lock-up parallel to the axis of the plate cylinder.

The respective racks **17** are in turn adapted to be moved longitudinally by means of socket-head capscrews, for instance of the Allen cap-screw type, **18**, which are threaded into the ends of the respective racks **17**. As more clearly shown in Figs. 1 and 5 of the drawings, bearer rings **19** are shrunken onto each end of the shaft **3** and close the respective ends of the longitudinal slot containing the racks. Advantageously, the inner portion of the bearer rings is constructed of soft steel to facilitate boring and an outer, primary bearer ring **19***a* of hardened steel is shrunken onto the inner ring so as to minimize wear. The bearer ring **19** is recessed and drilled at **20** to receive the socket cap-screws **18**, and the screws are held against longitudinal movement by means of end plate **21** secured to the outer face of bearer ring **19** by means of socket-head screws **22**. Access to the socket heads of screws **18** is through openings **23** extending through the end plate **21**.

The number and spacing of the pusher bars is subject to considerable variation. In the particular lockup device shown in the drawings there are 28 pusher bars in all, 14 being spaced at equal intervals along each side of the clamping jaws. Accordingly, there are 28 pinions and 28 racks for actuating the respective pusher bars. The 14 pusher bars in one half of the cylinder are actuated by racks which are in turn actuated by cap-screws positioned at that end of the cylinder. The three pairs of pusher bars nearest the end of the cylinder are controlled by the six screws appearing in two vertical rows of three each in Fig. 6 of the drawing, and the next four pairs of pusher bars are controlled by the eight cap-screws appearing in the two outer rows of four screws each.

The racks for controlling the first three pairs of pusher bars extend only about one-fourth of the length of the lock-up and stop blocks **24** secured to the frame of the lock-up by means of socket-head screws **25** are provided, the racks for controlling the next four pairs of pusher bars will terminate somewhat short of the middle of the lock-up so as not to interfere with racks for controlling the pusher bars of the next quarter of the lock-up.

A particularly desirable aspect of this invention is the ease with which the lock-up can be assembled and secured in position in the plate cylinder. The method of assembly is more clearly shown by Figs. 3 and 4 of the drawings. The main body of the lock-up is the member **26** which extends over the entire length of the lock-up. This member **26** is cut away, to a greater or less extent, as indicated in the drawings, to provide space for the respective racks and pinions. At intervals, the member **26** is also drilled, as indicated at **27**, for receiving socket-head screws **28**, which are threaded as indicated at **29** into the body of the plate cylinder to secure the lock-up thereto.

The member **26** is also drilled at intervals, as shown in Fig. 4 of the drawings at **30**, for receiving socket-head screws **31** which are threaded into the face plates **9** as indicated at **32**, thus securing the face plates to the member **26**. The clamping member **5** is likewise drilled at intervals to coincide with the screw holes **27** to provide access to those screws, through the slot between the face plates **9**, prior to the insertion of the clamping jaws **4**.

Gear teeth may be provided on only those portions of the racks adjacent the pinions. As shown in Fig. 2, the racks are recessed, as indicated at **33**, adjacent non-coacting pinions.

The lock-up may be assembled as follows, prior to insertion in the receiving slot of the plate cylinder. The clamping member **5** is first placed in the groove provided therefor in the upper surface of the member **26**. The face plates **9** are then secured to member **26** by means of the screws **32**, to which there is access through the holes **30**. The four outside racks are then inserted in the recesses provided in the body of the plate cylinder on either side of the longitudinal slot extending therethrough. The pusher bars, pinions and inside racks are then placed in their respective positions in the lock-up assembly.

The screws **28** having previously been inserted in the holes **27** of member **26**, the lock-up assembly is now ready for insertion in the longitudinal groove of the plate cylinder, and is secured in position by means of said screws, access to which can be had through the groove between the face plates **9** and the holes extending through the clamping member **5**. Thereafter, the clamping jaws **4** may be separately inserted through the slot between the face plates.

The respective ends of the face plates are then secured by means of plates **10** and screws **11**. Screws **18** are then inserted and threaded into the respective racks and the end plates **21** are then secured to the ends of the plate cylinder by means of cap screws **22**.

In securing the printing plate to the plate cylinder, the ends of the plate are first bent, as shown in Fig. 10, and inserted between the clamping jaws as previously described. The ends of the plate are then clamped in that position by forcing the pusher bars against the sides of the clamping jaws, by turning the respective adjustment screws **18**.

The outer bend at the extreme ends of the plate are preferably reinforced by a double thickness of the sheet as shown in Fig. 10. These bends project into the grooves at the base of lug **8** and are securely held therein by the respective jaws **4**. By this means both ends of the plate are positively secured against slipping outwardly, with respect to the clamping jaws, as lock-up forces are exerted, and the plate is held snugly against the circumference of the cylinder at the point where the plate is bent to enter the lock-up. Thus any rising or bulging of the plate at these bent points, which might result in a bump on either side of the gap, is positively avoided.

After the plates have been thus placed in position, they are adjusted and tightened about the cylinder, and canted thereon if necessary, by appropriate backing-off or pressing forward of the appropriate pusher bars bearing at intervals against opposite sides of the clamping jaws. During such canting operation, as previously noted, the ends of the plate remain securely held between the lower ends of the respective jaws and the clamping member **5** so as to avoid slippage between the ends of the plate and the jaws.

By reason of the fact that the face plates **9** are flush with the surface of the plate cylinder and are securely held in position at all times, the peripheral surfaces of the cylinder which they occupy are not distinguishable, with respect to printing quality, from the other peripheral surface of the cylinder. Further, the plate is readily bent flat at the outer ends of the jaws, thus minimizing irregularities along the sides of the gap between them. Occupying only a very small peripheral area of the cylinder, the non-

printing area along each side of the gap is reduced to a minimum.

Further, by reason of the fact that the pusher bars bear against the respective clamping jaws at points intermediate their height, the jaws may be forced together at their outer ends while the ends of the plate are securely held by the lower ends of the clamping jaws. By this means the gap between the ends of the plate at the periphery of the cylinder may be reduced to a minimum.

Also, sufficient clearance is provided so that the jaws and clamping member 5 may be moved side-ways with respect to the groove between the face plates and by shifting these clamping members in one direction at one end of the cylinder and in the other direction at the other end of the cylinder, a maximum or any intermediate amount of canting of the printing plate can be obtained.

The extent to which the clamping members may be moved sideways will depend, of course, upon the amount of clearance provided and also the eccentricity of the cams 14. An eccentricity of about 1/16", with a corresponding clearance, is usually sufficient in most conditions encountered.

One advantage of my improved lock-up is that the plate, when being clamped on the cylinder, is pulled from both ends, thus making it possible to tighten a stainless steel plate, for instance, around the cylinder. A further advantage is that the pull across the width of the plate is variable and is exerted at numerous points. Thus, if the bend in the plate is not straight, or if the plate is somewhat bulged, the plate can nevertheless be pulled up snugly on the cylinder by appropriately varying the pull at the various sections along the end of the plate. It is particularly advantageous that the clamping jaws 4 be long and willowy, so that they can be caused to conform to the outer bends in the plate instead of forcing the bend in the plate to conform to the clamping jaws as the plate is being tightened.

While I have described in detail a particularly advantageous embodiment of the invention, it will be understood that the invention, in its broader aspect, is not restricted to the precise arrangement shown, but that various modifications and equivalents will be suggested by my disclosure and may be employed within the scope of the invention.

For instance, equivalent means may be employed for forcing the pusher bars against the clamping jaws and for actuating those means. Also the invention, in its broader aspect, is not restricted to the particular arrangement shown for assembling the lock-up and for securing the lock-up in the plate cylinder.

I claim:

1. A lock-up for clamping a printing plate to a plate cylinder of a rotary printing press, comprising a pair of cooperating clamping jaws co-extensive with the width of the printing plate, having upper edges tapering toward each other and terminating substantially flush with the peripheral surface of the cylinder, a lug positioned between the lower ends of the clamping jaws and adapted to cooperate therewith in clamping the respective ends of the plate, pusher bars positioned at intervals along each side of the pair of clamping jaws and adapted to bear thereon at a point intermediate the height of the jaws, means associated with each pusher bar adapted to force the pusher bar and the associated clamping jaw toward the cooperating jaw and means actuated from one end of the lock-up, and extending longitudinally through the cylinder for actuating the pusher bar forcing means.

2. A lock-up for clamping a printing plate to a plate cylinder of a rotary printing press comprising a pair of parallel face plates adapted to fit flush with the peripheral surface of the cylinder, co-extensive with the width of the printing plate and spaced apart to provide a gap for the insertion of the respective ends of the plate, a pair of cooperating clamping jaws co-extensive with the length of the face plates having upper edges tapering toward each other extending through the gap and terminating in relatively thin edges substantially flush with the face plates, a lug positioned between the lower ends of the clamping jaws and adapted to ocooperate therewith in clamping the respective ends of the plate, pusher bars positioned at intervals along each side of the pair of clamping jaws, and adapted to bear thereon at points intermediate the height of the jaws, means associated with each pusher bar adapted to force the bar and the associated clamping jaw toward the cooperating jaw and means actuated from one end of the lock-up and extending longitudinally through the cylinder for actuating the pusher bar forcing means.

3. A lock-up for clamping a printing plate to a plate cylinder of a rotary printing press comprising a pair of parallel face plates adapted to fit flush with the peripheral surface of the cylinder, co-extensive with the width of the printing plate and spaced apart to provide a gap for the insertion of the respective ends of the plate, a pair of cooperating clamping jaws co-extensive with the length of the face plates, having upper edges tapering toward each other extending through the gap and terminating in relatively thin edges substantially flush with the face plates, a lug positioned between the lower ends of the clamping jaws and adapted to cooperate therewith in clamping the respective ends of the plate, pusher bars positioned at intervals along each side of the pair of clamping jaws, and adapted to bear thereon at points intermediate the height of the jaws, a cam associated with each pusher bar and adapted to force the pusher bar and the associated clamping jaw toward the cooperating jaw, and means actuated from one end of the lock-up for actuating the respective cams.

4. A lock-up for clamping a printing plate to a plate cylinder of a rotary printing press comprising a pair of parallel face plates adapted to fit flush with the peripheral surface of the cylinder, co-extensive with the width of the printing plate and spaced apart to provide a gap for the insertion of the respective ends of the plate, a pair of cooperating clamping jaws co-extensive with the length of the face plates, having upper edges tapering toward each other extending through the gap and terminating in relatively thin edges substantially flush with the face plates, a lug positioned between the lower ends of the clamping jaws and adapted to cooperate therewith in clamping the respective ends of the plate, pusher bars positioned at intervals along each side of the pair of clamping jaws, and adapted to bear thereon at points intermediate the height of the jaws, a cam associated with each pusher bar and adapted to force the pusher bar and the associated clamping jaw toward the cooperating jaw, a pinion gear associated with each cam and adapted to actuate said cam, a rack cooperating with each pinion, extending longitudinally of the lock-up, and means extending through an end of the cylinder for actuating the respective racks.

5. A lock-up for clamping a printing plate to a plate cylinder of a rotary printing press comprising a pair of parallel face plates adapted to fit flush with the peripheral surface of the cylinder, co-extensive with the width of the printing plate and spaced apart to provide a gap for the insertion of the respective ends of the plate, a pair of cooperating clamping jaws co-extensive with the length of the face plates, having upper edges tapering toward each other extending through the gap and terminating in relatively thin edges substantially flush with the face plates, a lug positioned between the lower ends of the clamping jaws and adapted to cooperate therewith in clamping the respective ends of the plate, pusher bars positioned at intervals along each side of the pair of clamping jaws and adapted to bear thereon at points intermediate the height of the jaws, a cam associated with each pusher bar and adapted to force the pusher bar and the associated clamping jaw toward the cooperating jaw,

a pinion gear associated with each cam and adapted to actuate said cam, a rack cooperating with each pinion, extending longitudinally of the lock-up, and screws extending longitudinally of the lock-up, and screws extending through the end of the cylinder and threaded into the end of the respective rack for moving the rack longitudinally with respect to the lock-up.

6. The lock-up of claim 1 further characterized by

grooves extending along each side of the lug and adapted to receive the respective ends of the plate, the ends of the plate being held in said grooves by the respective clamping jaws.

7. The lock-up of claim 1 in which the clamping jaws are flexible.

No references cited.