Oct. 6, 1964 R. K. NORTON 3,151,553

PLATE CYLINDER WITH PLATE CLAMPS

Filed April 11, 1961 3 Sheets-Sheet 1

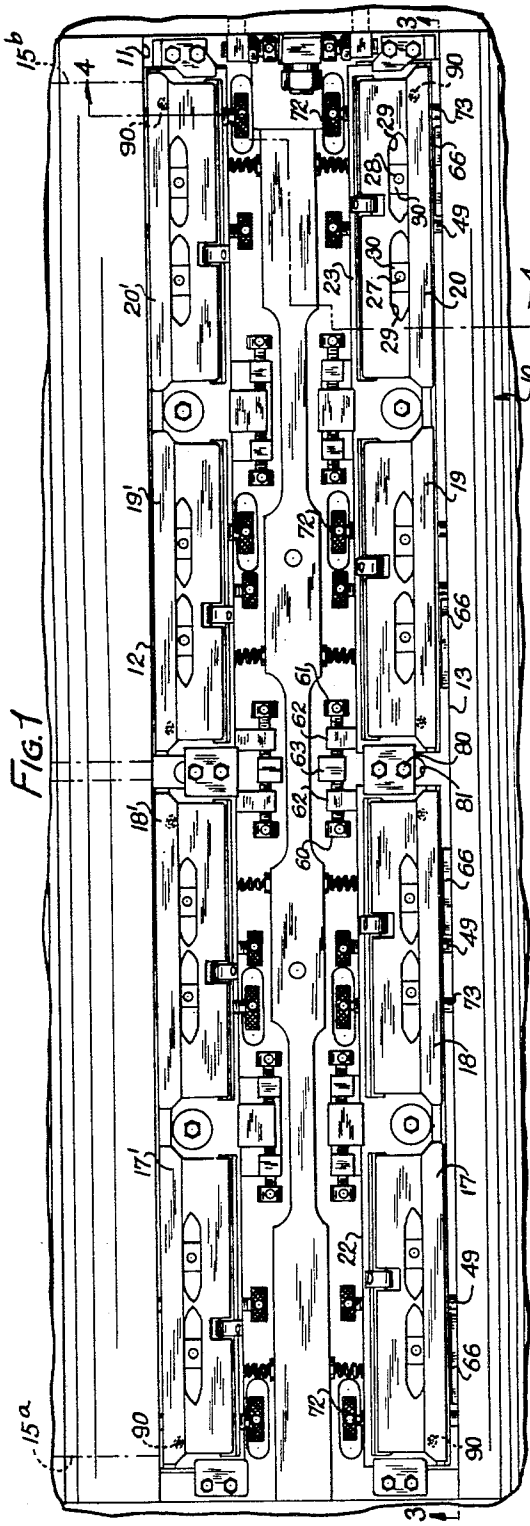

FIG. 1

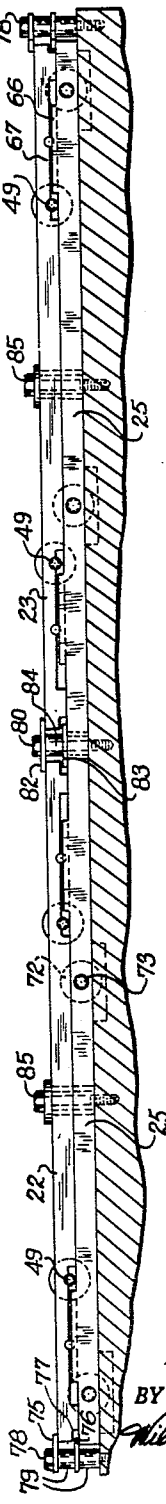

FIG. 3

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PLATE CYLINDER WITH PLATE CLAMPS

Filed April 11, 1961 3 Sheets-Sheet 2

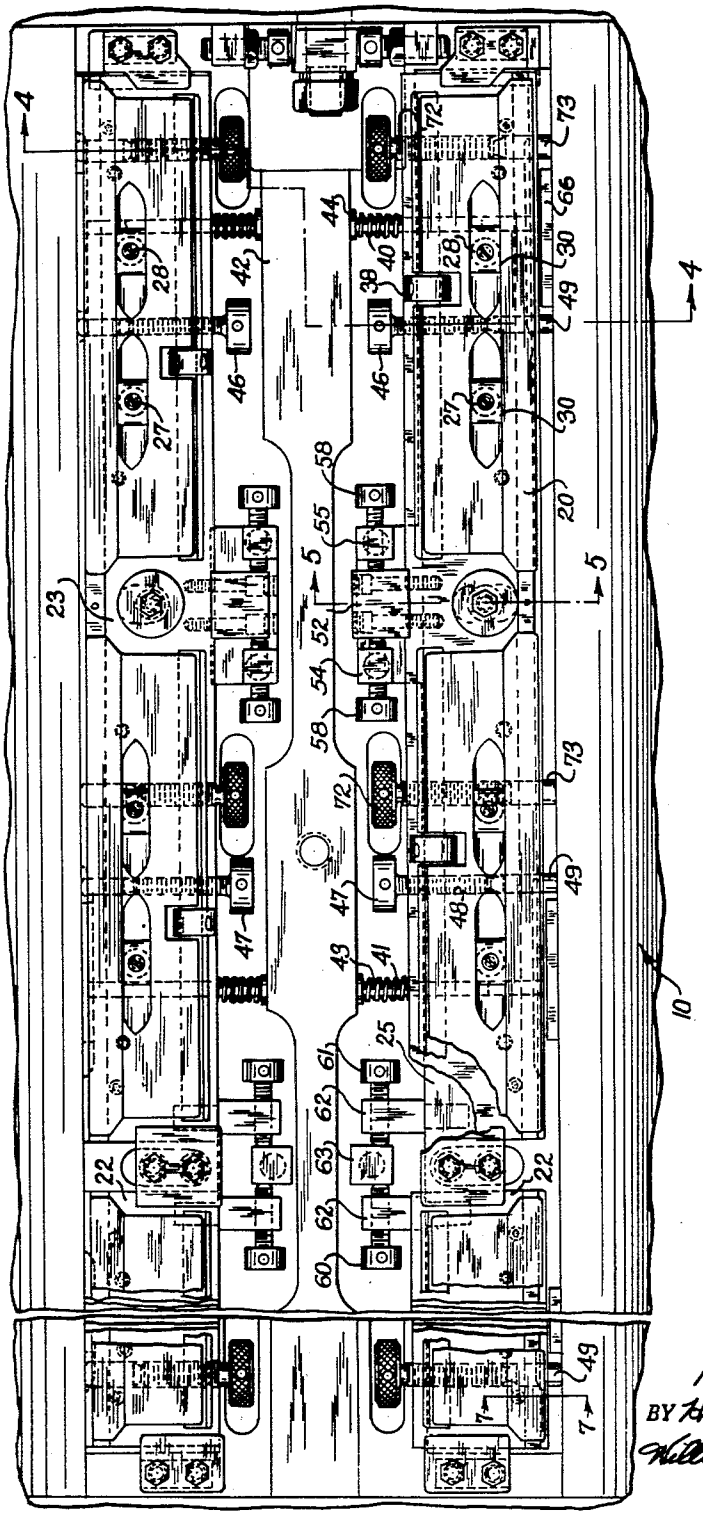

FIG. 2

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PLATE CYLINDER WITH PLATE CLAMPS

Filed April 11, 1961 3 Sheets-Sheet 3

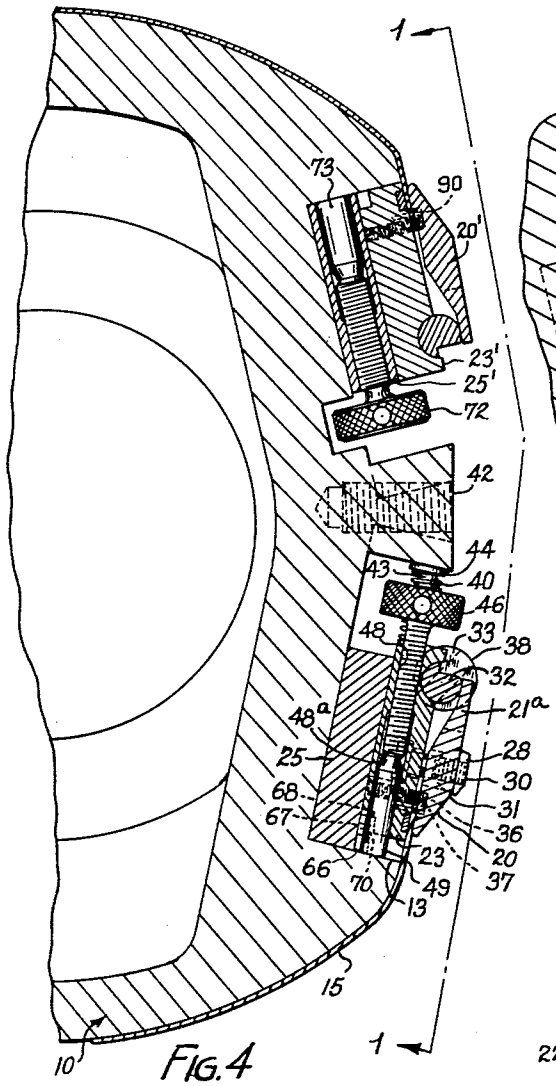

FIG. 4

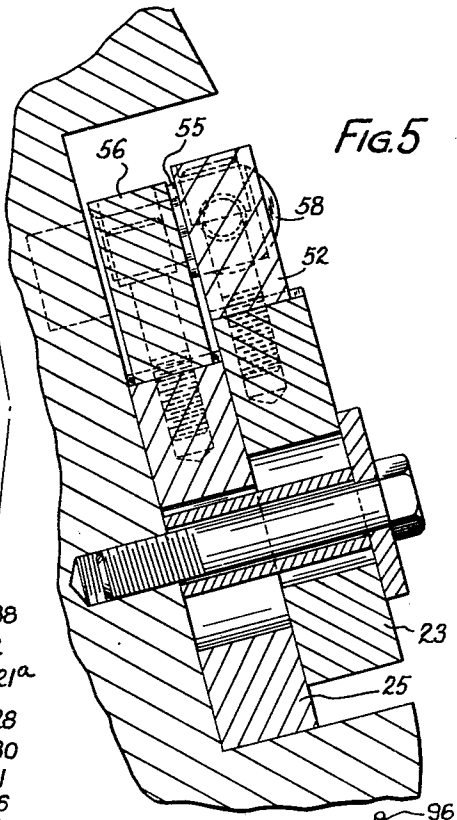

FIG. 5

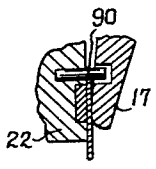

FIG. 7

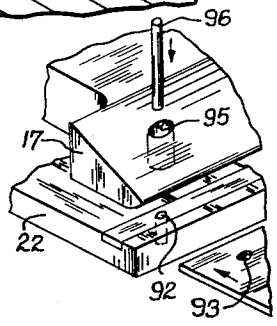

FIG. 8

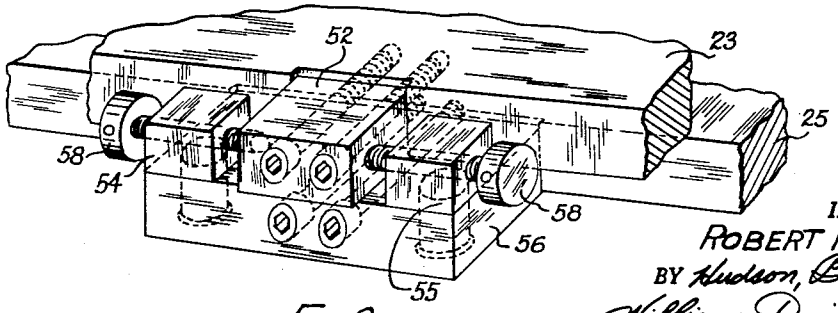

FIG. 6

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3,151,553

PLATE CYLINDER WITH PLATE CLAMPS

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Filed Apr. 11, 1961, Ser. No. 102,276
20 Claims. (Cl. 101—415.1)

The present invention relates to a plate cylinder for a printing press, and, more particularly, to such a cylinder having plate clamps for clamping a plurality of flexible plates thereto.

Certain types of printing presses use a flexible plate which extends around the periphery of a plate cylinder and is clamped to the plate cylinder by plate clamps which are disposed in an axially extending gap in the periphery of the plate cylinder. Under certain conditions it is desirable to be able to mount a plurality of plates, for example, two plates, on the plate cylinder in side-by-side relationship, and at other times it is desirable to be able to mount a single plate on the plate cylinder which extends the width of the cylinder.

In many printing runs, the image on the plate cylinder includes parts where different numbers of copies are to be run, e.g., when one part of the run is a calendar and another part an imprint which is to be changed several times for the particular calendar. If a single plate on a cylinder were used to print and imprint a calendar, first the calendar part would have to be printed by one plate and the calendar rerun with separate plates to do the imprinting. Similarly, when two separate items are to be printed simultaneously, with one item requiring a larger number of copies than the other, if the cylinder were adapted to take only a single plate, two separate runs would have to be made or the two images made on a single plate and the larger number of required copies run for both images. If, however, the plate were made in two pieces or sections, the section corresponding to the part of the image requiring the smaller number of copies can be removed after the smaller number of copies has been run and that plate section replaced by a plate section carrying a different image to be run. Alternatively, it can be appreciated that two plates could be made, one plate with the image requiring the larger number of copies and a first image portion requiring a smaller number of copies, and the second plate with the image requiring the larger number of copies and a second image portion requiring a lesser number of copies. This, however, requires the extra expense of a second full-size plate.

It is also desirable to be able to mount plate sections or partial plates on the plate cylinder, since sometimes the making of a full-size plate is considerably more expensive than the making of two half-size plates, even though the same number of copies of each plate section is to be run.

While printing presses have been provided wherein a plurality of plate sections have been mounted in side-by-side relationship on a plate cylinder, the plate clamping means has not proved entirely satisfactory for mounting and clamping either a plurality of plate sections or a single full-size plate interchangeably.

It is an important object of the present invention to provide a new and improved plate cylinder having clamping units for clamping either a single full-size flexible plate thereon, or a plurality of part-size plate sections, with the plate clamping means being so constructed and arranged that the plate sections can be tensioned individually by adjusting individual plate clamping units for clamping the sections, or the plate clamping units can be adjusted as a unit to clamp a single full-size plate to the plate cylinder.

It is a further object of the present invention to provide a new and improved plate clamping means for the cylinder

of a printing press in which an elongated carrier member carries a plurality of clamping units and is movable to adjust the clamping units away from an adjacent axially extending side of the cylinder gap to tension a full-size plate, and in which the plate clamping units are individually adjustable with respect to the elongated carrier member so that the units can be used to tension individual plate sections clamped by the corresponding unit, with the carrier member and plate clamping units preferably having registering means for registering the plate clamping units with respect to the carrier member when the units are to be moved together to tension a single plate.

Still another object of the present invention is to provide a new and improved plate cylinder having plate clamping means for clamping a single full-size plate to the cylinder or for clamping individual part-size plates to the cylinder, with the plate clamping means being so constructed and arranged that the full-size plate and the part-size plates can be tensioned individually and side-registered individually.

Yet another object of the present invention is to provide a plate cylinder having an axially extending peripheral gap therein and which has a plurality of plate clamping units along each side of the gap for clamping a plurality of plates to the cylinder with each unit comprising a bar extending lengthwise of the gap with the ends of each bar being adjustable individually toward and away from the adjacent side of the gap to cock the bar and the plate clamping units being carried by a carrier bar which is adjustable to adjust the plate clamping units as a single entity, the ends of the carrier bar being adjustable individully toward and away from the side of the gap to cock the carrier bar.

Further objects and advantages of the present invention will be apparent from the following detailed description of the preferred embodiment thereof made with reference to the accompanying drawings forming a part of the present specification and in which:

FIG. 1 is an elevational view of the periphery of a cylinder looking at the cylinder gap;

FIG. 2 is an enlarged fragmentary view of a part of FIG. 1;

FIG. 3 is a sectional view taken approximately along line 3—3 of FIG. 1 and looking in the direction of the arrow with parts omitted;

FIG. 4 is a sectional view taken approximately along line 4—4 of FIG. 1;

FIG. 5 is a sectional view taken approximately along line 5—5 of FIG. 2 and looking in the direction of the arrow;

FIG. 6 is a fragmentary detail perspective view of a part of the plate clamping mechanism shown in the other figures;

FIG. 7 is a fragmentary sectional view taken approximately along line 7—7 of FIG. 2; and

FIG. 8 is a fragmentary perspective view of a modified form of plate clamp and plate aligning structures.

In accordance with the present invention, the plate cylinder of a printing press is provided with plate clamping means which is disposed in an axial gap in the periphery of the cylinder and which is adapted to clamp a full-size plate or a plurality of part-size plates to the cylinder. The plate clamping means includes a plurality of plate clamps spaced along the length of the gap adjacent each axially extending side of the gap with the plate clamps, at least along one side of the gap and preferably along both sides of the gap, including clamping units for clamping respective part-size plates to the plate cylinder, with the clamping units being individually adjustable toward and away from the adjacent side to tension the plate clamped thereby. The individual adjustable clamping units along a side are also adjustable as a unit toward and away from

the adjacent side, and, in the preferred embodiment, the individual clamping units are carried by an elongated carrier member which extends for substantially the full length of the gap and which can be moved toward and away from the adjacent side of the gap to simultaneously adjust the plate clamping units thereon when the plate clamps are utilized to clamp a single plate to the cylinder.

The individual plate clamping units are supported so that they can be individually adjusted axially of the gap to effect side registration of a part-size plate clamped by the unit. In the preferred embodiment, the respective plate clamping units each comprise a plurality of clamp members and a clamp bar which are adapted to receive the plate to be clamped therebetween. The clamp bar is mounted on the elongated carrier member of the preferred embodiment for adjustment lengthwise of the carrier member, i.e. axially of the cylinder, by adjusting means which also interconnects the carrier member and clamp bar for movement as a unit axially of the cylinder. The elongated carrier member is supported in the gap for lengthwise movement, and mechanism is provided for adjusting the carrier member axially with respect to the cylinder to simultaneously adjust the individual plate clamping units to side-register a full-size plate clamped by the plate clamping units on the carrier member.

Preferably the clamp bars are mounted on their respective carrier member so that each end portion can be adjusted individually toward and away from the adjacent side of the gap so that the clamp bars may be cocked and each carrier member is similarly adjustable so that it may be cocked in the cylinder gap.

In the preferred embodiment, each clamp bar and the carrier bar have cooperating abutment means which limit movement of the clamp bar with respect to the carrier bar in a direction toward the adjacent side of the gap, but which allows the clamp bar to be moved relative to the carrier bar in a direction away from the adjacent side of the gap. When the abutment means on the clamp bar is in engagement with the cooperating abutment means on the carrier bar, the plate clamp carried by the plate bar is registered with respect to the carrier bar and, if the carrier bar is moved away from the adjacent side of the gap, the clamp bar will move therewith whereby the plate clamping units can be registered with respect to the carrier bar and the carrier bar moved to tension a plate clamped by the plate clamps.

Referring to the drawings, a fragmentary part of a plate cylinder for a printing press is shown in FIG. 1 and is designated by the reference numeral 10. The plate cylinder has a conventional, axially extending gap 11 in the periphery thereof and the gap 11 has a leading side 12 and a trailing side 13. The plate cylinder 10 is of the type onto which a flexible image-carrying plate of the etched type is to be clamped, and the flexible plate is shown in section in FIG. 4 and is designated by the reference numeral 15. A plurality of plate sections 15*a*, 15*b* are indicated in dot-dash lines in FIG. 1. The plate which is applied to the cylinder extends about the cylinder and is clamped at its opposite ends, which ends terminate adjacent the leading and trailing sides of the gap by plate clamping means disposed in the gap 11.

The plate clamping means for clamping a plate to the cylinder 10 comprises, in the illustrated and preferred embodiment, four plate clamps placed axially along the leading side 12 and four oppositely disposed plate clamps disposed axially along the trailing side 13 of the gap 11. The plate clamps along the trailing side 13 have been given the reference numerals 17, 18, 19 and 20, respectively, proceeding from left to right as the plate clamps are viewed in FIG. 1, and the corresponding plate clamps adjacent the leading side 12 have been given the same reference numeral with a prime applied thereto. The leading edge of a plate is clamped by the plate clamps 17′–20′, while the trailing edge of a plate is clamped by the plate clamps 17–20.

The plate clamps 17, 18 cooperate with a clamp bar 22 disposed below the clamps 17, 18, while the plate clamps 19, 20 cooperate with a clamp bar 23 disposed therebeneath. Similarly, plate clamps 17′, 18′ cooperate with a clamp bar 22′ and plate clamps 19′, 20′ cooperate with a clamp bar 23′. For the sake of description, the sides of the plate clamps and clamp bars adjacent the nearer side of the gap will be considered as the forward sides of these parts, and the sides thereof nearer the center of the gap will be considered as the rearward sides. As is best shown in FIG. 3, the clamp bars 22, 23 are supported by an elongated carrier member or bar 25 which extends for substantially the length of the gap 11 and the bars 22′, 23′ are supported on a corresponding carrier bar 25′.

As is best shown in FIG. 2 and FIG. 4, the plate clamp 20 is rockably supported on the clamp bar 23 and is rockable between an open position and a closed position in which it is adapted to clamp a plate against the clamp bar 23. A pair of studs 27, 28 extend upwardly from the clamp bar 23 through enlarged openings 29 in the plate clamp 20. The studs 27, 28 each have a nut 30 thereon which has an arcuate or curved underside which is curved along an axis extending parallel to the clamp bar 23. The arcuate underside of the nuts 30 are designated by the reference numeral 31. The plate clamp 20 has arcuate recesses which receive the nuts 30, and the undersides of the nuts form rocking surfaces for the plate clamp 20. The plate clamp 20 has a portion 21*a* extending rearwardly from the studs 27, 28 in a direction toward the center part of the gap 11 and over an actuating rod 32 disposed along the rear edge of the clamp bar 23. The rod 32 is rockably received in a semicircular groove opening into the top of the clamp bar 23. The actuating rod 32 is generally circular in cross section with a cutout portion 33 adapted to receive the rear edge of the plate clamp 20 when the actuating rod 32 is rotated to position the cutout immediately under the rear edge of the plate clamp. When the rod 32 is disposed to receive the rear edge of the plate clamp 20 in the cutout 33, a spring 36, which is positioned in a receiving bore in the clamp bar 23 and extends outwardly therefrom, as viewed in FIG. 4, to be received in a spring seat 37 formed in the underside of the plate clamp 20 forwardly of the studs 27, 28, opens the clamp. When the actuating rod 32 is rotated to the position shown in FIG. 4, the plate clamp 20 is actuated against the bias of the spring to a clamped position. The actuating rod has a collar 38 thereon which is bored to receive a wrench or tool for rotating the actuating rod 32.

The clamp bar 23 is mounted on the carrier bar 25 for sliding movement relative to the carrier bar and is movable toward and away from the adjacent side 13 of the gap 11. The clamp bar 23 carries with it the plate clamp 20 and also the plate clamp 19 and in FIG. 4, the clamp bar 23 is shown displaced away from the side 13 and the carrier bar 25. The clamp bar 23 is spring urged toward the side 13 by springs 40, 41 which act on the bar adjacent the opposite end portions thereof, the springs 40, 41 being interposed between the rear side of the clamp bar 23 and an intermediate, axially extending wall 42 of the gap 11. The springs 40, 41 are each disposed about a guide rod 43 which has a head 44 that abuts the wall 42 and an end portion which is received in a respective bore in the clamp bar 23, the receiving bores for the rods 43 extending in the direction of movement of the clamp bar 23 toward and away from the side 13 of the gap. The springs 40, 41 act to urge the clamp bar 23 toward engagement with the side 13 of the axial gap 11.

The clamp bar 23 is movable away from the side 13 in opposition to the action of the springs 40, 41 by means of screws 46, 47. The screws 46, 47 thread into receiving bores 48 in the clamp bar 23, the receiving bores 48 extending parallel to the direction of movement of the clamp bar toward and away from the side 13. The bores 48

are counterbored at 48*a* at their forward ends and open into the forward side of the clamp bar 23 and each counterbore 48*a* slidably receives a pin 49 that extends outwardly of the bore into engagement with the side 13 of the gap. By turning the screws 46, 47, the inner ends of the screws bear on the pins 49 and cause the clamp bar 23 to move away from the side 13 of the gap as the screws are threaded into the receiving bores 48. Thus, the screws 46, 47 may be operated to tension a plate clamped between the plate clamps 19 and 20 and clamp bar 23. The described parts for adjusting the clamp bar 23 have corresponding parts for effecting the adjustment of each of the clamp bars 22, 22' and 23' and these parts have been given the same reference numerals as the parts for adjusting the clamp bar 23.

It will be understood that, while the structure for mounting the plate clamp 19 on the clamp bar 23 has not been described, it is, in the illustrated embodiment, the same as the structure for mounting plate clamp 20 on the clamp bar 23 and, therefore, will not be repeated. The parts for mounting the plate clamp 19 on the clamp bar 23 which have been given a reference numeral have been given the same reference numeral as the parts for mounting the plate clamp 20 on the clamp bar 23, and, similarly, this has been done in the case of the mountings for the plate clamps 17, 18. The parts for mounting the plate clamps 17'–20' and their respective clamp bars are also, in the illustrated embodiment, the same as the parts for mounting the clamp 20 on the clamp bar 23 and have been given the same reference numerals as the corresponding parts for mounting the clamp 20 on the clamp bar 23.

According to one feature of the present invention, the clamp bar 23 is supported on the carrier bar 25 for adjustment lengthwise of the bar, i.e., parallel to the axis of the plate cylinder 10, to effect side registration of a plate section clamped by the plate clamps 19 and 20. To this end, the clamp bar 23 has a block 52 which extends rearwardly from the rear edge of the clamp bar 23 at the central portion thereof, and is disposed between spaced posts 54, 55 extending upwardly from a base 56 secured to the carrier bar 25 and underlying the block 52. The block 52 and the base 56 are adapted to move relative to each other when relative movement toward and away from the side 13 occurs between the clamp bar 23 and the carrier bar 25. A screw 58 threads into and through each post 54, 55 and into engagement with the adjacent side of the block 52 to limit movement of the clamp bar 23 lengthwise of the carrier bar 25 and to interconnect the carrier bar 25 and the clamp bar 23 for movement as a unit in a direction parallel to the length of the carrier bar 25. The screws 58 are operable to adjust the clamp bar 23 lengthwise relative to the carrier bar 25.

The clamp bar 22 is interconnected with the carrier bar 25 in the same manner as the clamp bar 23, so that the clamp bar 22 and the carrier bar 25 will move as a unit when the carrier bar 25 is shifted lengthwise and so that the clamp bar 22 may be adjusted lengthwise along the carrier bar 25. Accordingly, the parts interconnecting the clamp bar 22 and the carrier bar 25 have been given the same reference numerals as the corresponding parts interconnecting the clamp bar 23 and the carrier bar 25. This is also true with respect to the clamp bars 22', 23' and the carrier bar 25'.

The carrier bar 25 is adjustable lengthwise in the gap 11 by operating screws 60, 61 which thread into spaced projections 62 extending rearwardly from the rear edge of the carrier bar 25 adjacent the central portion thereof. The screws 60, 61 extend parallel to the length of the carrier bar 25 and thread through the projections 62 into engagement with the opposite sides of a post 63 rising outwardly from the bottom of the gap 11 and disposed between the projections 62. The screws cooperate with the post 63 to locate the carrier bar 25 lengthwise in the gap 11 and permit the carrier bar 25 to be moved toward and away from the side 13 of the gap.

It will be noted that the carrier bar 25 has a plurality of lips 66, one adjacent each of the plate clamps 17–20, which extend outwardly from the outer forward edge of the carrier bar 25. The clamp bars 22, 23 are cut out at their forward edge on the side adjacent the carrier bar 25 to provide cutouts 67 for receiving the lips 66, and when the clamp bar 22 and the clamp bar 23 are in their forwardmost position with the forward side of the clamp bar 23 against the side 13 of the gap, the cutouts 67 each have a side 68 which engages the adjacent side 70 of the adjacent lip 66 to provide abutment means which will cause the clamp bars 22, 23 to move with the carrier bar 25 as the carrier bar 25 is shifted away from the side 13 of the gap 11. The connection provided by the lips 66 and the cutouts 67, however, permits the clamp bars 22, 23 to be moved away from the side 13 of the gap 11 without moving the carrier bar 25.

The carrier bar 25 is adjustable away from the side 13 of the gap 11 by operating screws 72 which thread into receiving bores in the carrier bar 25 that extend perpendicular to the side 13 and which open into the forward edge of the carrier bar 25. The bores are counterbored at their forward ends to receive pins 73 which extend outwardly of the bores and engage the side 13 and, when the screws are threaded into their receiving bores, the inner ends thereof engage the inner ends of the pins and cause the carrier bar 25 to move away from the side 13. The screws for the carrier bar 25 are shown in FIG. 1 and FIG. 2, and the detail of the screw construction is similar to that shown in FIG. 4 for shifting the carrier bar 25', the parts for mounting and shifting the carrier bar 25' being a duplicate of those for the carrier bar 25 and have been given corresponding reference numerals.

When clamp bars 22, 23 are in their forwardmost position on the carrier bar 25, the springs 40 will act through the abutment means provided by the sides 68 and 70 of the cutouts 67 and lips 66 of the clamp bars 22, 23 and carrier bar 25 to urge the carrier bar toward the side 13 of the gap. Consequently, when the screws 72 are operated to shift the carrier bar 25 and clamp plates 22, 23 as a unit away from the side 13 of the gap, this is accomplished against the action of springs 40; and when the screws are operated to actuate the carrier bar toward the side 13, the springs 40 will act through the clamp bars 22, 23 to aid the return of the carrier bar 25.

From the foregoing, it can be seen that the plate clamps along one side of the gap may be adjusted as a unit by adjusting the corresponding carrier bar 25 or 25', or any individual plate clamp unit including the clamp bar and the plate clamps thereon can be adjusted individually. After adjustment, it is desirable that the carrier bars and clamp bars be locked in their adjusted positions. To this end, a plurality of locking screws and locking plates are provided for clamping the carrier bars and clamp bars against movement relative to the plate cylinder 10. Referring to FIG. 3, it will be noted that a pair of guide and hold-down plates 75, 76 are disposed adjacent the left-hand end of the carrier bar 25. The guide plate 75 engages the outer side of the clamp bar 22, while the guide plate 76 engages the outer side of the carrier bar 25, the clamp bar 22 being provided with a cutout 77 along the underside of its left-hand end to receive the guide plate 76. Two screws 78 pass through the plates 75, 76 and thread into the bottom of the gap 11 adjacent the left-hand end of the carrier bar 25, as the latter is viewed in FIG. 3, and the guide plates are spaced on the locking screws by bushings 79. Similar screws and guide and hold-down plates are provided adjacent the right-hand end of the carrier bar 25 and the clamp bar 23, as the latter are viewed in FIG. 3, and have been given the same reference numerals as the screws and guide plates adjacent the left-hand end of the bars. Similarly, a pair of hold-down screws 80 are disposed between the clamp bars 22, 23 and pass through an elongated open-

ing 81 in the carrier bar 25 to thread into the bottom of the cylinder gap 11. The hold-down screws 80 pass through guide and hold-down plates 82, 83 spaced by a bushing 84. The guide plate 82 overlies the outermost sides of the clamp bars 22, 23, while the guide plate 83, which may be a washer, is adjacent the top of the carrier bar 25, and the adjacent ends of the clamp bars 22, 23 are cut out to accommodate the guide plate 83. In addition to the screws 78, 80, a hold-down screw 85 is provided between the plate clamps 17, 18, as well as between the plate clamps 19, 20, and the screws 85 are received in openings in the adjacent clamp bar and the carrier bar and pass through these openings to thread into the bottom of the gap. The openings for receiving the screws 85 are oversized openings which accommodate the adjusting movement of the bars, and the screws have washers under their heads which extend over and engage the outermost side of the adjacent clamp bar. Similar backing screws and plates are used with the clamp bars 22', 23' and the carrier bar 25'.

In use, the plate clamps 17, 18 and the corresponding clamps 17', 18', may be used to clamp one plate section to the plate cylinder, while the clamps 19, 20 and the corresponding clamps 19', 20', may be used to clamp a second plate section to the cylinder, as indicated in dot-dash lines in FIG. 1. The leading edge of a plate section mounted on the cylinder by clamps 17', 18' and 17, 18 is clamped between clamps 17', 18', and the trailing edge is clamped between the plate clamps 17, 18. The plate section can then be tensioned by adjusting the screws 46, 47 for adjusting the carrier bars 22, 22' to move the carrier bars away from the adjacent sides of the gap 11 against the action of the corresponding springs 40. If the plate section is to be side-registered, the screws 58 for adjusting the clamp bars 22, 22' may be operated to shift the bars relative to their carrier bar in a direction parallel to the axis of the cylinder. When a single full-size plate is to be mounted on the cylinder, the leading edge is clamped by the plate clamps 17'–20' along the leading side 12 of the gap 11, while the trailing edge of the plate is clamped by the plate clamps 17–20 disposed along the trailing side 13 of the gap. When a full-size plate is to be clamped and a pin registering system, as described hereinafter, is in use, it is desirable that the plate clamps 17–20 and 17'–20' be registerable in a predetermined position with respect to their carrier bars. To do this, the clamp bars 22, 23, 22', 23' are moved forwardly until the abutments formed by the sides 68 of the cutouts 67 therein engage the abutments formed by the sides 70 of the lips 66, if the clamp bars 22, 23, 22', 23' are not already so positioned. This registers all of the plate clamps to their respective carrier bars. The full-size plate can then be tensioned by operating the screws 72 to cause the carrier bars 25, 25' to move away from the adjacent side of the gap and the full-size plate can be side-registered by operating the screws 60, 61 to shift the carrier bars 25, 25' axially of the gap 11.

The pin registering system, previously referred to, may comprise gauge pins for positioning the leading and trailing edge of the plate. A gauge pin 90 (see FIG. 7) may be fixed in the clamp bar 22 adjacent the left-hand end thereof, as it is viewed in FIGS. 1 and 2, so as to extend upwardly into an over-sized opening in the plate clamp 17. The gauge pin is disposed just forwardly of the studs 27, 28 on the clamp bar 23, and the trailing edge of the plate is positioned against this gauge pin. Similar gauge pins are provided on the bar 23 and on the bars 22', 23' and have been given the same reference numeral. If desired, the gauge pin 90 may be replaced by an opening 92 in the clamp bar 22 which is to be registered with a corresponding opening 93 in the plate, as is shown in FIG. 8. The plate clamp 17 immediately above the clamp bar is provided with an opening 95 which allows a removable gauge pin 96 to be inserted through the opening 93 in a plate disposed between the plate clamp and the clamp bar and into the registered opening in the clamp bar to properly position the plate. The plate clamp then can be actuated to clamp the plate and the gauge pin removed. The openings 92, 93 are such as to receive the pin 96 with a close fit, while the opening 95 is oversized. An advantage of this particular structure is that the plate is accurately registered, but there is no pin to elongate or tear the registered openings in the plate in the event that the clamping units are moved to overtension the plate.

The use of a pin registering sysem on the plate cylinder and plate will generally assure that the leading and trailing edges of the image portion of the plate are parallel to the trailing and leading edges of the plate so that, if the plate is registered to the pins or pin openings on the cylinder, it is only necessary to move the carrier bars 25, 25' toward and away from the adjacent side of the gap while maintaining the bar parallel to the sides of the gap to effect proper tensioning and location of the plate. On cylinders which do not have such a registering system, it is often necessary to be able to cock the carrier bars 25, 25' relative to the adjacent side of the gap to properly tension or locate the plate and the described construction is such that this can be done. The adjusting screw 72 adjacent the left-hand end of the carrier bar 25, as the latter is viewed in FIG. 1, can be adjusted to move that end portion of the carrier bar 25 away from the side of the gap to cock the carrier bar 25. This will carry with it the clamp bars 22, 23. The structure of the post 63 and the screw 61 is such as to accommodate limited angular movement of the bar and it is apparent that additional angular movement could be provided by rounding the ends of the screw 61. Similarly, the clamp bars 22, 22', and 23, 23' can also be cocked with respect to their respective carrier bar. Each end portion of the respective clamp bars can be moved toward and away from the adjacent side of the gap individually of the other end portion to cock the bar by operating the adjusting screw 46 at that particular end portion of the bar. The connections provided by the bases 56 and the projecting blocks 53 will accommodate limited angular movement of the corresponding bars as in the case of the connections provided by the posts 63 and the screws 61. Consequently, if it is desirable to cock one of the clamp bars 22, 23 to properly secure a part-size plate to the plate cylinder, the described construction provides for this type of movement of the clamp bar.

It is to be understood that the adjustment or movement of the individual plate-clamping units or the carrier bar with the plate-clamping units toward and away from the adjacent side of the gap 11 is in plate tension-relieving and plate-tensioning directions.

From the foregoing, it can be seen that the present invention provides a plate cylinder with plate clamping means which allows a single full-size plate to be mounted on the cylinder and tensioned or side-registered, or allows a plurality of plate sections to be mounted on the plate cylinder with each section being capable of being individually tensioned and side-registered.

While the preferred embodiment of the present invention has been described in considerable detail, it is hereby my intention to cover all constructions, modifications, and arrangements which fall within the ability of those skilled in the art and within the scope and spirit of the present invention.

Having described my invention, what I claim is:

1. A printing press plate cylinder having an axially extending gap in the periphery thereof and plate-clamping means disposed in said gap, said gap having trailing and leading sides extending parallel to the axis of said cylinder and said plate-clamping means comprising a plurality of plate-clamping units spaced from each other along one of said sides and each adapted to grip a plate, each unit having plate-gripping portions separate from the portions of the other units, carrier means supporting said plate-clamp-

ing units in said gap and movable in a first direction to move said plurality of units as a single unit in a plate-tensioning direction, means interconnecting said carrier means and said plate-clamping units for effecting said movement of said units in a plate-tensioning direction with said carrier means, said carrier means supporting said plate-clamping units for individual adjustment to move said portions in plate tension-relieving and plate-tensioning directions relative to said carrier means, adjusting means in said gap connected to the respective ones of said plate-clamping units for individually and independently effecting movement of said plate clamping units in a plate tensioning direction relative to said carrier means and each operable individually and independently of the operation of each of the other units with said carrier means stationary to adjust the position of each of said units relative to said carrier means in said plate tensioning direction, and means connected to said carrier means for adjusting said carrier means in plate tension-relieving and plate-tensioning directions.

2. A printing press plate cylinder having an axially extending gap in the periphery thereof and plate-clamping means disposed in said gap, said gap having trailing and leading sides extending parallel to the axis of said cylinder and said plate-clamping means comprising a plurality of plate-clamping units spaced from each other along one of said sides and adapted to clamp the plate, carrier means supporting said units in said gap and movable to move said units simultaneously in a plate-tensioning direction, said carrier means supporting said units for independent adjustment of said units in plate tension-relieving and plate- tensioning directions relative to said carrier means, means in said gap connected to said units for effecting said independent adjustment, means connected to said carrier means for adjusting said carrier means in plate tension-relieving and plate-tensioning directions, means interconnecting said carrier means and units for effecting movement of said units with said carrier means in a plate-tensioning direction, said carrier means also being supported in said gap for adjusting movement lengthwise of said cylinder, second adjustment means for adjusting said carrier means lengthwise of said cylinder interconnecting said carrier means and cylinder, and connecting means for interconnecting said units and carrier means for lengthwise movement as a unit comprising means for independently adjusting each of said units lengthwise of the cylinder relative to said carrier means.

3. A printing press plate cylinder having an axially extending gap in the periphery thereof and plate clamping means mounted in said gap comprising an elongated member extending lengthwise of said gap adjacent one of the longitudinal sides thereof and a plurality of plate clamping units operatively connected to said member and spaced along said side of said gap, said member being adjustable lengthwise of the cylinder and along a path in plate tension-relieving and plate-tensioning directions with respect to said side, means connecting each of said units to said member for movement therewith when the member is adjusted lengthwise of said cylinder and when adjusted in a plate-tensioning direction with respect to said side and including means for individually adjusting each of said units lengthwise of said elongated member relative to said member and means for individually adjusting each of said units relative to said elongated member and in a plate-tensioning direction with respect to said side, and second adjustment means connected to said member comprising means for adjusting said elongated member lengthwise of said cylinder and means for adjusting said elongated member in a plate-tensioning direction with respect to said one side.

4. A printing press plate cylinder having an axially extending gap in the periphery thereof and plate clamping means disposed in said gap, said gap having trailing and leading sides extending parallel to the axis of said cylinder and said plate clamping means comprising a first elongated member extending lengthwise of the gap adjacent one side thereof, first adjusting means interconnecting said cylinder and member for adjusting said member lengthwise of said gap and parallel to said one side, a plurality of plate clamping units mounted on said member and each including a first clamp member mounted on said elongated member and a second clamp member mounted on said first clamp member for movement therewith, said clamp members of said units being adapted to receive and clamp a plate therebetween, individual means interconnecting each of said first clamp members and said elongated member and each constraining the corresponding first clamp member against movement lengthwise of the cylinder relative to said elongated member and including individual means for adjusting the corresponding first clamp member lengthwise of the cylinder and relative to said elongated member, each of said individual means accommodating movement of the corresponding first clamp member in plate tension-relieving and plate-tensioning directions with respect to said one side, adjusting means in said gap and connected to said first clamp member for individually adjusting said first clamp members in plate tension-relieving and plate-tensioning directions with respect to said one side relative to said elongated member, and means interconnecting said first clamp members and said elongated member for moving said first members and said elongated member as a unit on movement of said elongated member in a plate-tensioning direction with respect to said one side, and means operatively connected to said elongated member for adjusting said elongated member in plate tension-relieving and plate-tensioning directions with respect to said one side.

5. A printing press plate cylinder having an axially extending gap in the periphery thereof and plate-clamping means mounted in said gap comprising an elongated member extending lengthwise of said gap adjacent one of the longitudinal sides thereof and a plurality of individual plate-clamping units each adapted to grip a plate spaced along the said side of said gap and interconnected by said member, first means individual to said units for adjusting said plate-clamping units independently of said plate including means connecting said units and said member for movement as a single unit in one plate adjusting direction and means for selectively effecting individual adjustment of said plate-clamping units one at a time relative to said elongated member in said plate-adjusting direction with said elongated member stationary, and second adjusting means interconnecting said elongated member and said cylinder for adjustment of said member relative to said cylinder to move said plurality of units as a single unit in said plate-adjusting direction.

6. A printing press plate cylinder having an axially extending gap in the periphery thereof and plate-clamping means mounted in said gap comprising an elongated member extending lengthwise of said gap adjacent one of the longitudinal sides thereof and movable relative thereto in directions in which a plate is to be adjusted, a plurality of individual plate-clamping units carried by said member spaced along said side of said gap, each of said units being adapted to grip a plate section, first means individual to said units for adjusting said plate-clamping units independently of said plate including means connecting said units and said member for movement as a single unit in one plate adjusting direction and means for selectively effecting individually adjusting the positions of said units relative to said member with the latter stationary, and second adjusting means interconecting said elongated member and said cylinder for adjustment of said member relative to said cylinder, said second adjusting means including means for adjusting said elongated member axially of said cylinder and means for adjusting said elongated member in a direction to tension a plate clamped by said units.

7. A printing press plate cylinder as defined in claim 5 wherein said first adjusting means comprises means for in-

dividually adjusting each of said plate-clamping portions in plate tension-relieving and plate-tensioning directions with respect to said one side.

8. A printing press plate cylinder having an axially extending gap in the periphery thereof and plate clamping means in said gap adjacent one axially extending side thereof comprising an elongated member extending axially of said gap adjacent said one side and adjustable transversely of said gap; a plurality of plate clamping units distributed along said one side and carried by said elongated member; each of said units comprising a clamp member mounted on said elongated member for adjustment transversely of said elongated member, a clamp jaw carried by said clamp member for translatory movement therewith as a unit, spring means operatively connected between said cylinder and said clamp member and urging said clamp member transversely of said elongated member and toward said side, an abutment on said elongated member facing away from said side and engaged by a part on said clamp member when said clamp member and elongated member are in a predetermined position to transmit movement of said clamp member toward said side to said elongated member and movement of said elongated member away from said side to said clamp member, and first adjusting means for adjusting said clamp member relative to said elongated member in a direction away from said side and transversely of said elongated member and against said spring; and means connected to said elongated member for adjusting said elongated member away from said side.

9. A printing press plate cylinder as defined in claim 8 wherein said first adjusting means for each plate-clamping unit comprises a screw threaded into the clamp member of the unit and adapted to apply a force against said side to move the clamp member away from said side.

10. A printing press plate cylinder as defined in claim 8 and further including means interconnecting said clamp members and said elongated member for movement as a unit lengthwise of said elongated member and including individual adjusting means for individually adjusting said clamp members lengthwise of the elongated member, and means interconnecting said cylinder and elongated member for adjusting said elongated member in a lengthwise direction relative to said cylinder.

11. A printing press plate cylinder as defined in claim 9 and further including means interconnecting said clamp members and said elongated member for movement as a unit lengthwise of said elongated member and including individual adjusting means for individually adjusting said clamp members lengthwise of the elongated member, and means interconnecting said cylinder and elongated member for adjusting said elongated member in a lengthwise direction relative to said cylinder.

12. A printing press plate cylinder having an axially extending gap in the periphery thereof and plate clamping means in said gap adjacent one axially extending side thereof comprising an elongated carrier bar extending lengthwise of said gap adjacent said one side and supported for adjustment relative to said cylinder, a plurality of plate clamping units distributed along and carried by said carrier bar, each of said units comprising a clamp bar mounted on said carrier bar for sliding movement relative thereto and a clamp jaw mounted on each clamp bar for movement as a unit therewith and movable relative thereto to receive and clamp a plate, individual adjusting means operatively connected to each end portion of said carrier bar for adjusting the end portion away from said one side to move the end portion angularly about the other end portion of the carrier bar, connecting means interconnecting said clamp bars and said carrier bar to move as a unit on movement of said carrier bar away from said one side, and individual adjusting means connected to each end portion of said clamp bars for adjusting the corresponding end portion away from said side relative to said carrier bar and to move the corresponding end portion angularly about the other end portion of the corresponding clamp bar.

13. A printing press plate cylinder as defined in claim 12 wherein a plurality of clamp jaws are mounted on each clamp bar.

14. A printing press plate cylinder as defined in claim 12 wherein biasing means urges said clamp bars toward said one side and each of said individual adjusting means for said clamp bars comprises a screw threaded into the corresponding clamp bar and adapted to apply a force to said one side to move the clamp bar away from said one side and said connecting means comprising abutments on said carrier bar facing away from said one side and cooperating abutments on said clamp bars facing said one side.

15. A printing press plate cylinder as defined in claim 12 wherein means interconnects said cylinder and said carrier bar and constrains the latter against lengthwise movement in said gap and includes means for adjusting said carrier bar lengthwise of said gap and accommodating the angular movement thereof, and means interconnects each of said clamp bars and said carrier bar and constrains the clamp bars and carrier bar to move lengthwise of said gap as a unit and includes adjusting means for adjusting said clamp bars individually relative to said carrier bar and lengthwise of said gap and accommodating angular movement of said clamp bars relative to said carrier bar.

16. A printing press plate cylinder as defined in claim 15 wherein a plurality of clamp jaws are mounted on each clamp bar.

17. A printing press plate cylinder having an axially extending gap in the periphery thereof and a plate clamping means in said gap adjacent each axially extending side thereof and each plate clamping means comprising: an elongated carrier bar extending lengthwise of said gap and supported for adjustment relative to said cylinder, a plurality of plate clamping units distributed along and carried by the carrier bar, each of the units comprising a clamp bar mounted on the carrier bar for sliding movement relative thereto and a clamp jaw mounted on each clamp bar of the unit for unitary movement therewith and movable relative thereto to receive and clamp a plate, individual adjusting means operatively connected to each end portion of the carrier bar for adjusting the end portion away from the adjacent side of the gap to move the end portion angularly about the other end portion of the carrier bar, connecting means interconnecting the clamp bars and the carrier bar to move as a unit on movement of the carrier bar away from the adjacent side, and individual adjusting means connected to each end portion of the clamp bars for adjusting the corresponding end portion away from the adjacent side of the gap and relative to the carrier bar and to move the corresponding end portion angularly about the other end portion of the corresponding clamp bar.

18. A printing press plate cylinder as defined in claim 17 wherein a plurality of clamp jaws are mounted on each clamp bar.

19. A printing press plate cylinder having an axially extending gap in the periphery thereof and plate-clamping means mounted in said gap comprising a plurality of individual plate-clamping units having plate-clamping portions adapted to grip a plate separate from each other and spaced lengthwise of said gap adjacent one of the longitudinal sides thereof, and adjusting means for adjusting said units independently of said plate including means for adjusting said plurality of units in a plate-tensioning direction as a single unit and individual means for effecting adjustment of said clamping units individually and independently of each other in a plate-tensioning direction.

20. A printing press plate cylinder having an axially extending gap in the periphery thereof and plate-clamping means mounted in said gap comprising a plurality of individual plate-clamping units spaced lengthwise of said

gap adjacent one of the longitudinal sides thereof, adjusting means for adjusting said units including means for adjusting said plurality of units as a single unit in a plate-tensioning direction and individual means for adjusting said clamping units individually and independently of each other in a plate-tensioning direction, and means for adjusting said plate-clamping units simultaneously lengthwise of said gap and individual means for individually adjusting said plate-clamping units individually and independently of each other lengthwise of said gap.

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