Sept. 17, 1940. A. M. ZUCKERMAN 2,214,983

PLATE CLAMP

Filed Feb. 21, 1938 2 Sheets-Sheet 1

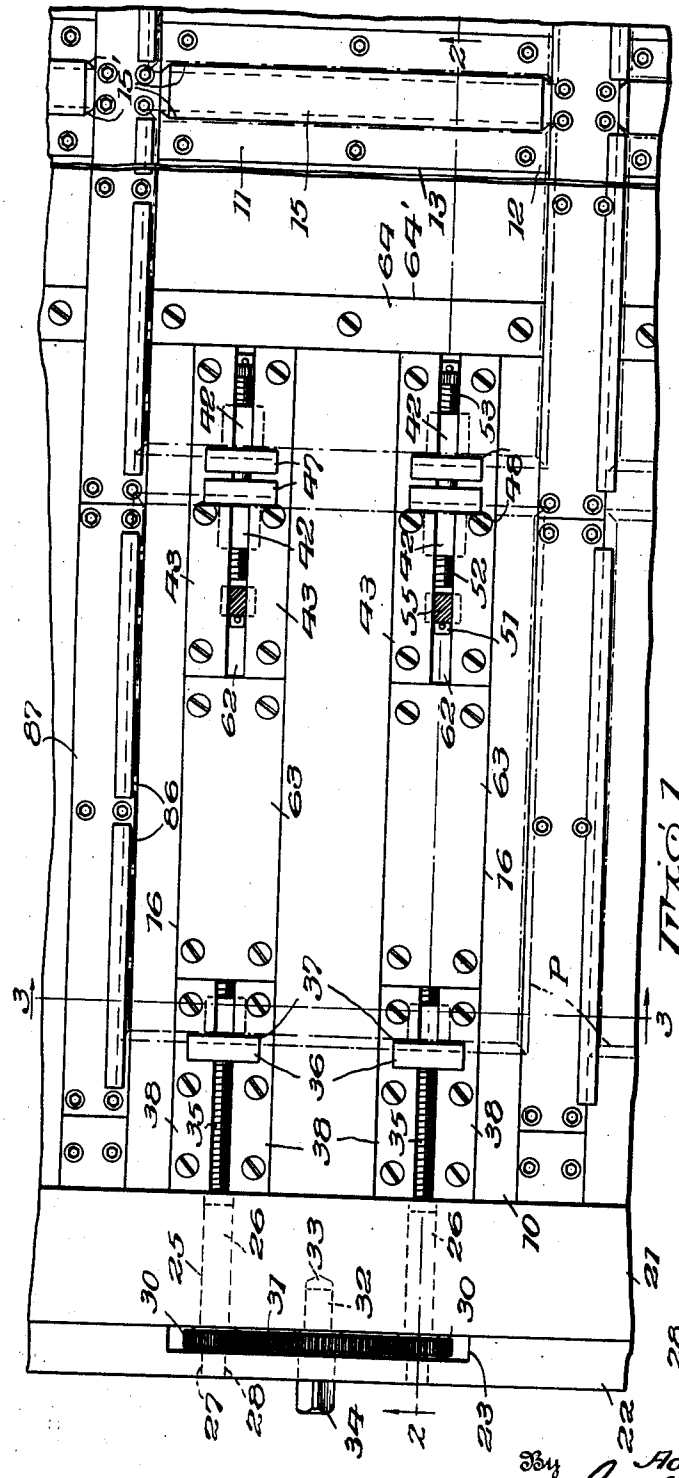


Fig. 1.

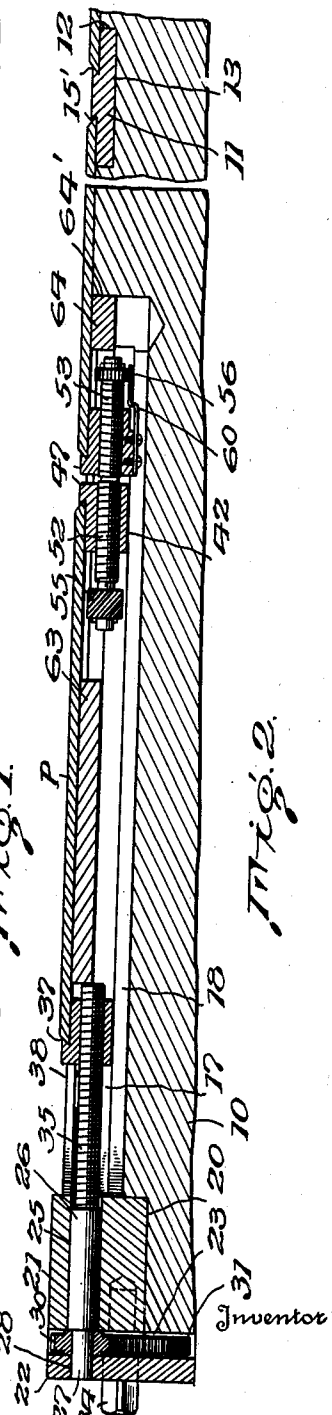


Fig. 2.

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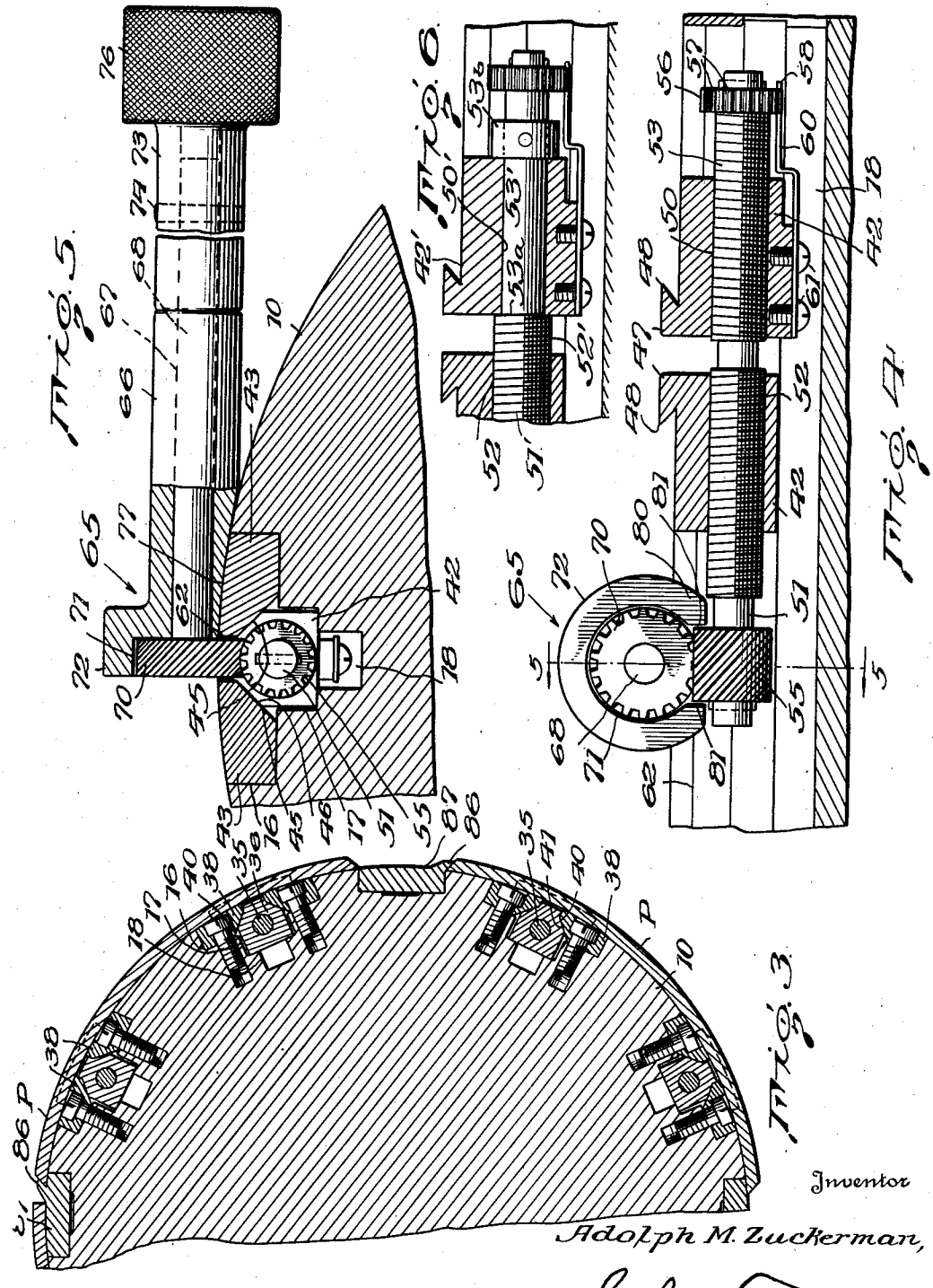


Fig. 5.

Fig. 6.

Fig. 4.

Fig. 3.

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PLATE CLAMP

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9 Claims. (Cl. 101—378)

This invention relates to printing plate clamps and more particularly to clamps of the type employed to secure a plurality of rigid printing plates in accurate predetermined position on the plate support or plate cylinder of a printing machine.

In printing practice, where stereotype or similar plates are employed, the plates are clamped on the plate supports or cylinders by means of clips which overhang the edges of the plates and by which the plates are clamped against a suitable abutment, so that they are rigidly held in position during the printing operation. In printing certain products the printing is usually effected on printing machines in which the plate supports are cylinders capacitated to carry a number of plates widthwise or in the direction of the axis of the cylinder. Between two adjacent plates are formed what are usually termed margin spaces, that is, spaces in which no printing is effected, so that the desired margin between the pages is produced, and, at times, it is desirable to provide margin spaces of different widths. The modern tendency is to print the largest possible area from the plates clamped or secured to the plate or form cylinder, consequently it is highly desirable that the margin space between adjacent plates be reduced to the minimum. Heretofore the reduction of this margin space was hampered by the construction and arrangement of the clips employed, so that when the clips were adjusted to the limit of their adjustable movement a relatively wide marginal space still remained thereby reducing the area available for printing matter.

An object of this invention is to provide an improved plate clamp having intermediate clips which engage the edges of adjacent plates, and which are readily movable to provide the desired margin space between these plates, and which clips are constructed and arranged to provide margins of minimum dimensions, thus liberating the greatest possible area of the printing cylinder for printing matter.

Another object of this invention is to provide a plate clamp having clips for engaging the edges of adjacent plates and which clips are readily movable to and from each other to provide margin spaces between adjacent plates of predetermined dimensions, the clips being moved by a suitable tool constructed and arranged to engage and operate a component of the clip structure.

A further object of this invention is to provide a plate clamp having clips for engaging the edges of adjacent plates, the clips being simultaneously movable by a rotary member to and from each other to provide variable margin spaces between the plates, the rotary member being operated by a portable manually-operable tool and held against unintentional rotation by a yieldable detent.

A more specific object of this invention is to provide an improved plate clamp for clamping a plurality of plates on a plate support or cylinder, the clamp including clips for engaging the edges of adjacent plates, a screw having right and left hand threads operably engaging the clips to move them relative to each other, a gear carried by the screw, a portable manually operable tool constructed and arranged to operably engage the gear of the screw to rotate the screw to thereby move the clips to and from each other in accordance with the direction of rotation of the manually operable tool, a tooth member carried by the screw, and a yieldable detent operably engaging the tooth member to hold the screw against unintentional rotation.

It is also an object of this invention to provide a plate clamp of generally improved construction whereby the device will be simple, durable and inexpensive in construction, as well as convenient, practical, serviceable and efficient in its use.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts, and in the details of construction hereinafter described and claimed, it being understood that various changes in form, proportion, and minor details of construction may be made within the scope of the claims without departing from the spirit or sacrificing any advantages of the invention.

For a complete disclosure of the invention a detailed description of it will now be given in connection with the accompanying drawings forming a part of the specification, wherein:

Figure 1 is a fragmental elevational view depicting one end of a plate cylinder or support to which a plurality of printing plates are secured by the improved plate clamping means,

Figure 2 is a fragmental longitudinal sectional view taken on the line 2—2 of Figure 1,

Figure 3 is a fragmental transverse sectional view taken on the line 3—3 of Figure 1,

Figure 4 is an enlarged detailed longitudinal sectional view depicting the improved adjustable clips and showing the portable tool as applied to the clip operating screw,

Figure 5 is an enlarged detailed transverse sectional view taken on the line 5—5 of Figure 4, parts appearing in elevation, and

Figure 6 is a fragmental longitudinal detailed sectional view depicting a modified form of clip adjusting mechanism.

Referring to the drawings in which similar reference characters designate corresponding parts, there is depicted a plate cylinder or a plate support 10 arranged to support a plurality of printing plates P. A center ring 11 of conventional construction extends circumferentially around the intermediate portion of the plate or form cylinder periphery, and this ring is preferably formed of segments 12 which are suitably secured to the cylinder 10 and received within annular grooves 13 formed in the peripheral portion of the plate cylinder 10. The intermediate portion of each center ring segment 13 is provided with an upstanding rib 15 having opposed overhanging or dove-tailed lips 15' to engage the beveled arcuate inner edges of the inner or central plates P, as best seen in Figures 1 and 2.

Longitudinally-extending recesses 16 are formed in the peripheral portion of the plate cylinder adjacent each end thereof, and longitudinally extending grooves 17 and 18 extend inwardly from the recess 16 and communicate therewith. Each groove 18 is stepped or positioned inwardly from a groove 17, and each groove 17, in turn, is stepped or positioned inwardly from a recess 16, and these grooves 17 and 18 and recesses 16 operably receive plate locking components to be hereinafter disclosed. An annular recess 20 is formed at each end of the plate cylinder 10 and receives therein an annular bearer 21 of conventional construction. Although only one end of the plate cylinder has been depicted in the drawings, it is to be understood that both ends of the cylinder may be similarly constructed and arranged. An annular plate or keeper 22 is suitably secured to each end of the cylinder 10 adjacent the cylinder periphery, and this plate abuts the outer terminal of the bearer 21, as best seen in Figures 1 and 2. Arcuate recesses 23 are formed in the plate 22 for the reception of operating gears to be hereinafter described. Longitudinally-extending bores 25 are formed in the bearer 21 for the reception of clip screw rods 26. The outer terminal of each rod 26 is reduced, as indicated at 27, and is received within a bearing aperture 28 formed in the plate 22. A pinion 30 is rigidly secured to the reduced portion 27 of each screw rod 26 and is received within the arcuate recess 23 formed in the plate 22. Two screw rods 26 are preferably provided for each longitudinal or axial row of plates P, and, in order to simultaneously rotate both screw rods, a gear 31 is positioned in the recess 23 and meshes with the pinions 30, and this gear is rigidly secured to a stub shaft 32 rotatably received in a bearing bore 33 formed in the bearer 21. The outer terminal of the stub shaft 32 is enlarged to provide a wrench-engaging head 34, so that a suitable wrench, not shown, may be employed to rotate the gear 31 and pinions 30 to simultaneously rotate the clip screw rods 26. Each clip screw rod 26 is provided with an inwardly extending threaded portion or screw 35 which is threadedly received within the body portion of an end clip 36, and each end clip 36 is provided with an overhanging or dove-tailed lip 37 to engage the outer arcuate beveled edge of the outermost plate P in each longitudinal or axial row of plates. Each clip 36 is mounted for longitudinal sliding movement in a groove 17, and it is retained therein by opposed caps or bars 38 which are suitably secured to the cylinder 10 and received within the recesses 16 and are provided with beveled surfaces 40 which engage the beveled surfaces 41 formed at the outer portion of each end clip body 36, as best seen in Figure 3, to thus slidably retain the end clip body 36 within the grooves 17. Inasmuch as the clip screw rods 26 are held against longitudinal movement, it is manifest that rotation of the rods 26 and end screws 35 will cause the end clips 36 to move longitudinally within the grooves 17, and the direction of movement of the clips being determined by the direction of rotation of the screws 35.

As hereinbefore stated, it is highly desirable in rotary printing machines of the magazine and other types which employ stereotype, electrotype, or similar printing plates to provide means for so securing the plates to the cylinders that small marginal spaces are provided between the plates, and which spaces may be made adjustable in order that plates of different size may be suitably received and located on the peripheral surface of the cylinder. The modern tendency is to crown as much printing matter as possible on the plate cylinder, therefore the provision of means for providing relatively small but adjustable margin spaces between adjacent plates is highly advantageous in the art. To this end two inner clips 42 are slidably received within the grooves 17 at points intermediate the center ring 11 and the outer terminals of the cylinder. The bodies of the inner clips 42 are slidably retained within the grooves 17 by means of caps or bars 43 similar to the caps 38, and the beveled surfaces 45 of these bars slidably engage the beveled surfaces 46 of the inner clip bodies 42, to thus slidably retain the inner clips within the groove 17. At the adjacent terminals of the clip bodies 42 upstanding clip segments 47 are provided having overhanging or dove-tailed lips 48 to engage the arcuate beveled edges of adjacent plates P. By positioning the clip segments 47 at the extreme inner or adjacent terminals of the clip bodies 42, a very narrow margin space may be provided between adjacent plates P. In the preferred arrangement illustrated, each clip body 42 has a threaded aperture 50 extending axially therethrough, and the threads in one clip body 42 and disposed in right hand direction and those in the other clip body disposed in left hand direction. An inner clip screw 51 is provided for each pair of inner clips, and each screw 51 is preferably provided with a left hand threaded portion 52 which threadedly engages the threaded aperture 50 of one of the clip bodies 42 and a right hand threaded portion 53 which threadedly engages the threaded aperture 50 of the other inner clip body 42, as best seen in Figure 4 of the drawings. The threaded portions 52 and 53 of the screw 51 are positioned adjacent the center portion of the screw, and at one terminal of the screw 51 a helical gear 55 is suitably secured to thereby rotate with the screw. To the opposed end of the screw 51 a lock or detent wheel 56 is rigidly secured, and the peripheral portion of the lock wheel 56 is provided with a plurality of axially extending recesses 57 defined between rounded projections or teeth, and the reduced terminal 58 of a detent spring 60 engages the recesses to hold the locked wheel 56 and center clip screw 51 against unintentional rotation, the spring 60 being secured to one of the clip bodies 42 by screws 61 or other suitable securing

devices, as best seen in Figure 4 of the drawings. The spring 60 and its securing members 61 extend below the groove 17 into the groove 18, and the inner clip assembly, including the inner clip screw 51, inner clip bodies 42, clip segments 47, lock wheel 56 and gear 57, is mounted for free longitudinal or axial sliding movement in the groove 17. Access is had to the gear 55 through the axial space or recess 62 provided between the spaced caps or bars 43. A filling-in piece or bridge plate 63 is suitably secured to the cylinder 10 and is received within each recess 16 between the inner clip assembly and the end clip assembly to suitably support the end plates, and ring segments 64 are also secured to the cylinder 10 and are received within circumferential extending recesses 64' formed in the peripheral portion of the plate cylinder 10 at the inner terminals of the longitudinal recesses 16 and grooves 17 and 18.

In order to rotate the inner clip screw 51 to thereby move the inner clips to and from each other, an operating tool 65 is provided which is best shown in Figures 4 and 5, and this tool includes a tubular body 66 having a bore 67 extending axially therethrough to rotatably receive therein a shaft 68 having a helical gear 70 rigidly secured to one terminal thereof or formed integral therewith, which gear is received in an enlarged annular recess 71 formed in a head 72 carried by the tubular member 66. The shaft 68 extends outwardly beyond the tubular member 66, and this shaft is keyed or otherwise rigidly secured to a sleeve 73, as indicated at 74. The sleeve 73 is provided with an enlarged knurled manipulating head 76, and by simply rotating the knurled head 76 rotary motion is imparted to the helical gear 70 through the interposed sleeve 73 and shaft 67. The tubular member 66 is provided with an arcuate seat or saddle portion 77, which is shaped to accurately conform to the peripheral surface of the cylinder 10. The gear 70 is of such width as to be rotatably received within the recess or space 62 provided betwen the spaced caps or bars 43 to permit the gear 70 to operably mesh with the helical gear 55, and when the gears 70 and 55 are in mesh relation, a portion 80 of the enlarged head 71 is also received within the space or recess 62 defined between the bars 43, and it is cut away, as indicated at 81 in Figure 4, to fit over the axial terminals of the gear 55 to thereby aid in holding the gears 55 and 70 in meshing relation so that the inner clip screw 51 may be rotated through the instrumentality of the operating tool 65 to adjust the clips to and from each other in accordance with the printing requirement.

In operation, a plurality of arcuate plates P are positioned on the peripheral portion of the plate or form cylinder 10 with the beveled edges of the innermost plates engaging the beveled locking lips 15' of the center ring 13. The plates are located in longitudinal or axial rows by positioning one straight beveled edge of each plate P against the upstanding lip 86 of axially alined margin bars 87 of usual construction, as best shown in Figures 1 and 3. The outer edge of the outermost plate P of each axial row of plates is engaged by the locking lips 37 of the end clips 36, and the adjacent edges of the inner and outer plates are engaged by the locking lips 48 of the inner clip segments 47. Prior to positioning the end plates on the cylinder 10, the manipulating tool 65 is positioned with its saddle or arcuate seat 77 resting against the peripheral portion of the cylinder 10 and with the helical gear 70 and a portion 80 of the enlarged gear housing or head 72 extending into the recess 62 formed between the caps or bars 43, thus positioning the helical gear 70 to mesh with the helical gear 55. In this position the manipulating tool 65 is disposed tangentially with relation to the plate cylinder 10, and the operator, by holding the tubular member 66 and head 72 with one hand, and turning the knurled manipulating head 76 with the other hand, rotates the inner clip screw 51, thus causing its right and left hand threaded portions 52 and 53 to move the clip segments 47 to and from each other in accordance with the direction of rotation of the manipulating head 76. With this arrangement, a margin space of required dimension may be provided, and, inasmuch as the gear 55 is positioned outside of the inner clip bodies 42, the clip segments 47 may be moved inwardly to abutting relation, thus providing a margin space of minimum dimension, thereby liberating a great portion of the printing cylinder for printing matter. After the inner clips have been adjusted to provide the required margin space between the adjacent plates P, the manipulating tool 65 is removed and then the end plates are positioned on the cylinder ready for the "locking up" operation. A suitable wrench or other tool of conventional construction, not shown, is then moved to engagement with the wrench-engaging head 34 to rotate the gear 31, which, in turn, rotates the pinions 30. Rotation of the pinions 30 cause the end clip screws 35 to rotate so that their threads by operable engagement with the threaded apertures of the clip bodies 36 move the clips inwardly with their locking lips 37 in engagement with the outer beveled edge of the outermost plate. Continued locking movement causes the end clips to force the end plates P against the outside inner clip segments 47, and then the inside inner clip segments 47 force the inner plates P against the center ring clips 15', thereby locking both plates on the peripheral surface of the cylinder with the required margin space provided between the adjacent outer and inner plates. By this arrangement, the inner clips can be quickly and conveniently adjusted with relation to each other to provide the required margin space, and after adjustment will remain locked in required position. Furthermore, by arranging the inner clip assembly so that its operating and locking instrumentalities are positioned on the screw 51 outside of the inner clips 42, the clip segments 47 may be moved towards each other to abutting relation so that the smallest possible margin space is provided, thus leaving the maximum cylinder surface available for printing matter.

In Figure 6 a slightly modified form of the clip arrangement is disclosed, in which a screw 51' is provided having a threaded portion 52' which threadedly engages the axial aperture 50 formed in one of the clip bodies 42. The opposed clip body 42' is provided with an unthreaded axial aperture 50' for the reception of a reduced cylindrical portion 53' of the screw 51'. An annular shoulder 53a is defined between the cylindrical portion 53' and the inner terminal of the threaded portion 52' of the screw 51 to abut the inner terminal of the clip body 42'. A sleeve 53b is pinned or otherwise suitably secured to the cylindrical portion 53', and

one terminal abuts the outer terminal of the clip body 42' to thereby secure the screw 51' in swiveled relation to the clip body 42'.

The remaining cooperating components of the clip arrangement are similar to those hereinbefore disclosed, and it is manifest that when the screw 51 is rotated that the clip bodies 42, 42' and their arcuate segments 47 will move to and from each other in the manner hereinbefore disclosed.

It is to be understood that any preferred number of plates may be placed axially on the plate cylinder 10 and in arrangements where more than two plates are located to one side of a fixed clip ring then an additional inner clip assembly is interposed between the additional plate. The construction, operation and arrangement, however, of the additional inner clip assembly is similar to the arrangement hereinbefore disclosed.

It will be understood that the invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and it is therefore desired that the present embodiment be considered in all respects as illustrative and not restrictive, and it will be further understood that each and every novel feature and combination present in or possessed by the mechanism herein disclosed forms a part of the invention included in this application.

Having thus described my invention, what I claim as new and useful is:

1. In a printing plate clamp, the combination of a plate cylinder having an axially-extending groove formed therein adjacent its peripheral plate-supporting surface, two intermediate clips slidably received within the groove, opposed bars rigidly supported by the cylinder and the outer surfaces of the bars forming continuations of the peripheral plate-supporting surface of the plate cylinder, the bars engaging the clips to slidably retain them in the groove and the adjacent edges of the bars being located adjacent each other to define a slot therebetween, clip segments projecting outwardly from the clips through the said slot to engage the edges of the plates, a rotatable member operably engaging the clips, and a helical gear carried by the rotatable member and located adjacent the said groove and adapted to be operated by a tool which has a rotatable component which extends through the slot to rotate the said rotatable member and thereby move the said clips relative to each other.

2. In a printing plate clamp, the combination of a plate cylinder having an axially-extending recess formed in the peripheral portion thereof, an axially-extending groove formed in the cylinder and extending radially inwardly from the said recess, two intermediate clips slidably received within the groove, opposed bars rigidly supported by the cylinder in the said recess and the outer surfaces of the bars forming continuations of the peripheral plate-supporting surface of the plate cylinder, the bars engaging the clips to slidably retain them in the groove and the adjacent edges of the bars being located adjacent each other to define a slot therebetween, clip segments projecting outwardly from the clips through the said slot to engage the edges of the plates, a rotatable member operably engaging the clips, and a helical gear carried by the rotatable member and located adjacent the said groove and adapted to be operated by a tool which has a narrow rotatable component which extends through the slot to rotate the said rotatable member and thereby move the said clips relative to each other.

3. In a printing plate clamp, the combination of a plate cylinder having an axially-extending groove formed therein adjacent its peripheral plate supporting surface, two intermediate clips slidably received in the groove, opposed bars rigidly supported by the cylinder and the outer surfaces of the bars forming continuations of the peripheral plate-supporting surface of the cylinder, the bars engaging the clips to slidably retain them in the groove and adjacent edges of the bars being located adjacent each other to define a slot therebetween, clip segments projecting outwardly from the clips through the said slot to engage the edges of the plates, a rotatable member operably engaging the clips, and a helical gear carried by the rotatable member and located immediately adjacent the groove and adapted to be operated by a tool which rotatably supports a narrow helical gear which extends through the slot into meshing engagement with the helical gear of the rotatable member to thereby move the clips relative to each other.

4. In a printing plate clamp, the combination of a plate cylinder having an axially-extending groove formed therein adjacent its peripheral plate-supporting surface, two intermediate clips slidably received within the groove, opposed bars rigidly supported by the cylinder and the outer surfaces of the bars forming continuations of the peripheral plate-supporting surface of the plate cylinders, the bars engaging the clips to slidably retain them in the groove and the adjacent edges of the bars being located immediately adjacent each other to define therebetween a relatively narrow slot, clip segments projecting outwardly from the clips through the said slot to engage the edges of the plate, an axially-extending screw threadedly engaging the clips and an axially-extending helical gear carried by the screw and located immediately adjacent the said groove and adapted to be operably engaged by a relatively narrow helical gear which extends through the slot perpendicularly to the screw gear and meshes therewith to rotate the said screw to thereby move the clips relative to each other.

5. In a plate clamping device adapted to secure a printing plate to a form cylinder of a printing machine, the form cylinder having a longitudinal slot formed in its surface, a body member movable in the longitudinal slot and having a plate holding clip overlappingly engaging an edge of the plate, a screw threadingly engaging the body member and movable in the slot with it, the said screw being rotatable to move the body member therealong, and a helical gear secured to the screw and adapted to be engaged while it is in any position throughout the length of its travel in the slot by a driving gear which extends through the slot and has its axis in a plane substantially perpendicular to a plane containing the axis of the screw, whereby the screw may be rotated without hindrance in any portion of its travel.

6. In a printing plate clamp, a plate support having a slot formed therein, a movable plate clip adapted to engage the edge of the plate to secure the plate on the support, a screw threadedly engaging the clip, said screw being rotatable to move the clip therealong, and a helical gear secured to the screw and adapted to be engaged by a member which extends through the slot to rotate the screw.

7. In a printing plate clamp, a plate support

having a slot formed therein, a movable plate clip adapted to engage the edge of the plate to secure the plate on the support, a screw threadedly engaging the clip, said screw being rotatable to move the clip therealong, a helical gear secured to the screw and adapted to be engaged by a member which extends through the slot to rotate the screw, and yieldable means for holding the screw against rotation relative to the clip.

8. In a printing plate clamp, a support for a plurality of printing plates, the support having a slot formed therein, separate cooperable clips located between adjacent plates to engage the edges of the plates to secure them on the support, a screw threadedly engaging the clips, the screw being rotatable to move the clips relative to each other, and a helical gear secured to the screw and adapted to be engaged by a member which extends through the slot to rotate the screw.

9. In a printing plate clamp, a support for a plurality of printing plates, the support having a slot formed therein, two clips located between adjacent plates and having threaded apertures, a screw having right and left hand threads, the right hand threads operably engaging the threaded aperture of one clip and the left hand threads operably engaging the threaded apertures of the other clip, the screw being rotatable to move the clips relative to each other, and a helical gear secured to the screw and adapted to be engaged by a member which extends through the slot to rotate the screw.

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