Oct. 22, 1946. A. BRAUNWORTH 2,409,830

PRINTING PLATE CLAMPING MECHANISM

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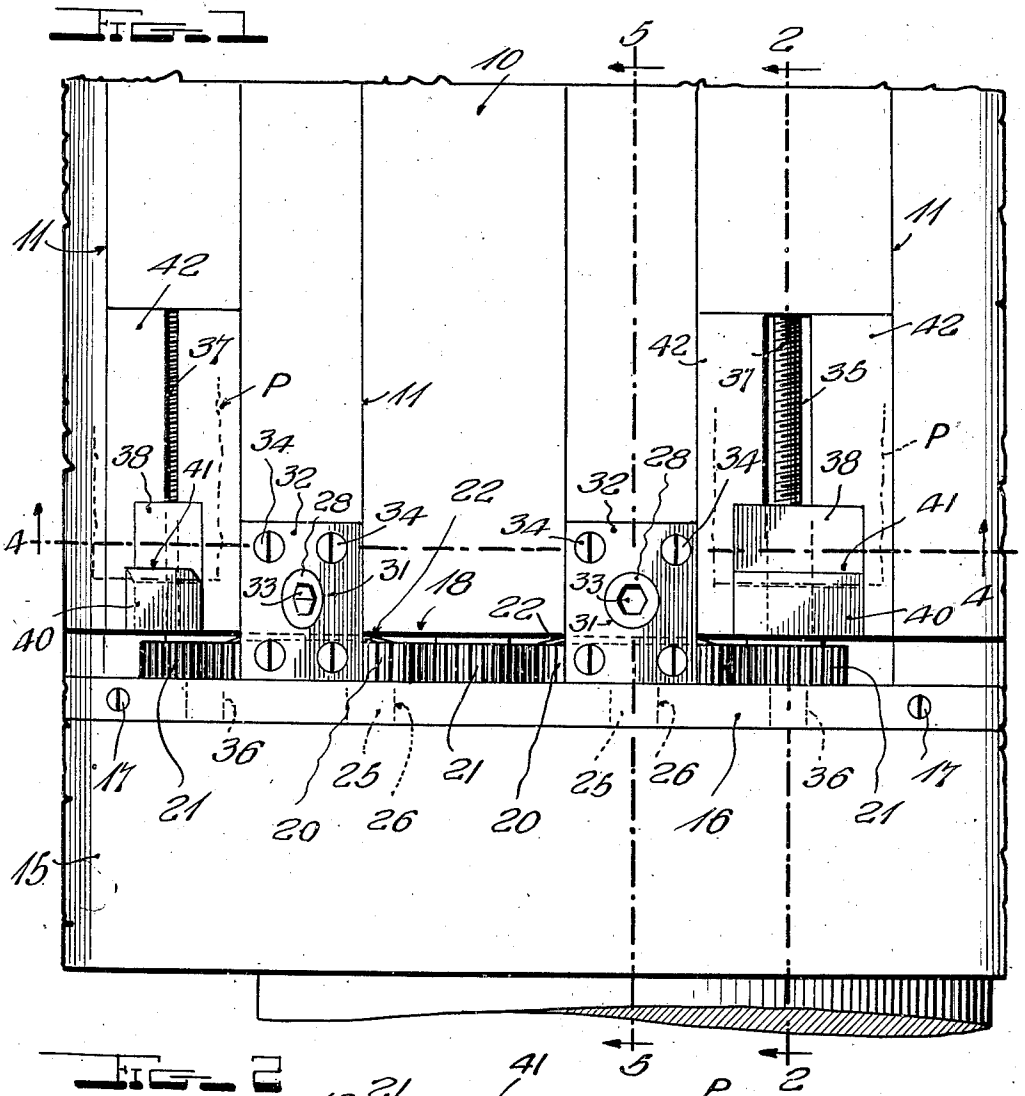
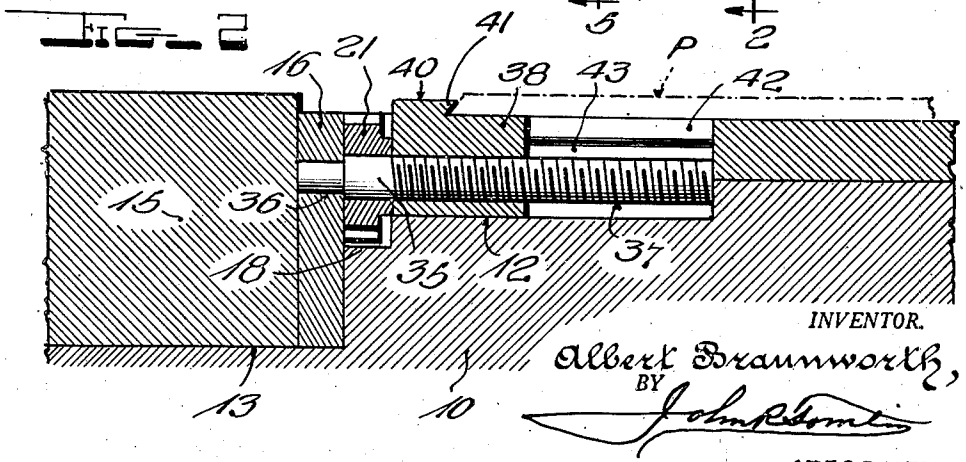


FIG. 2



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FIG. 3

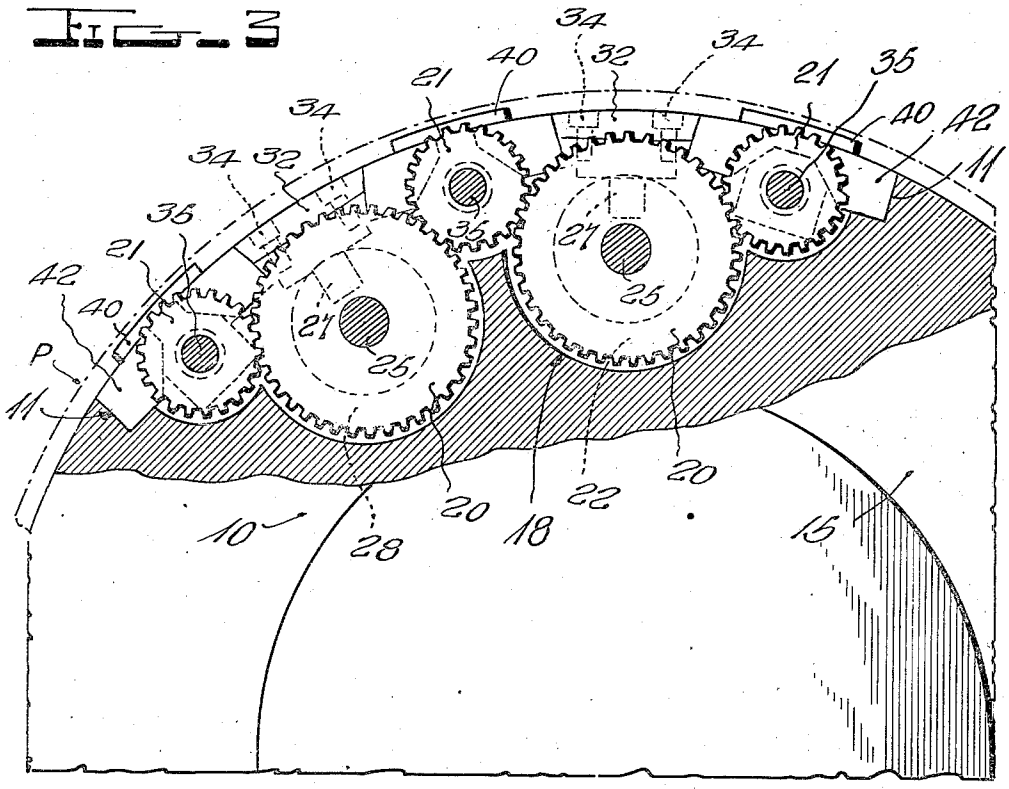
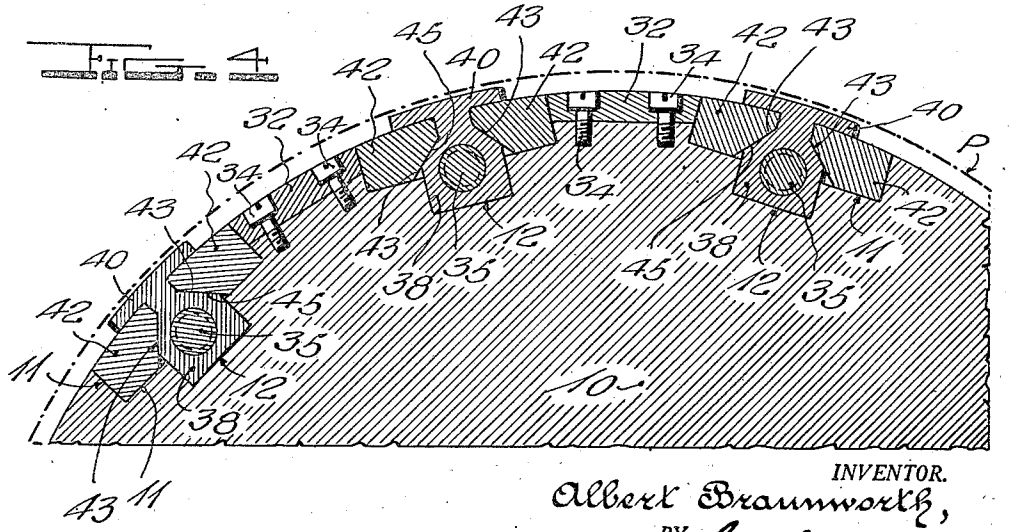


FIG. 4



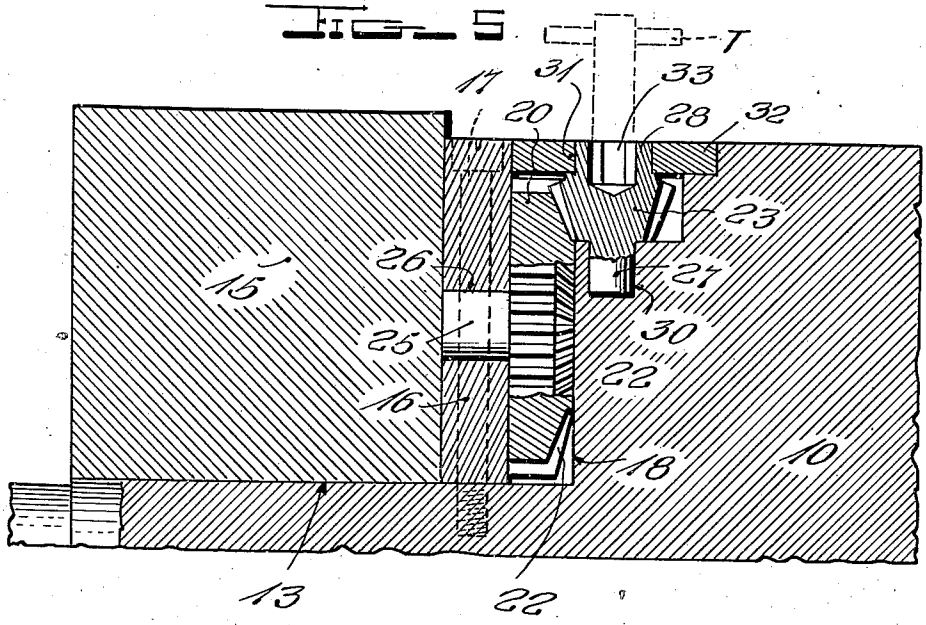
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FIG. 5



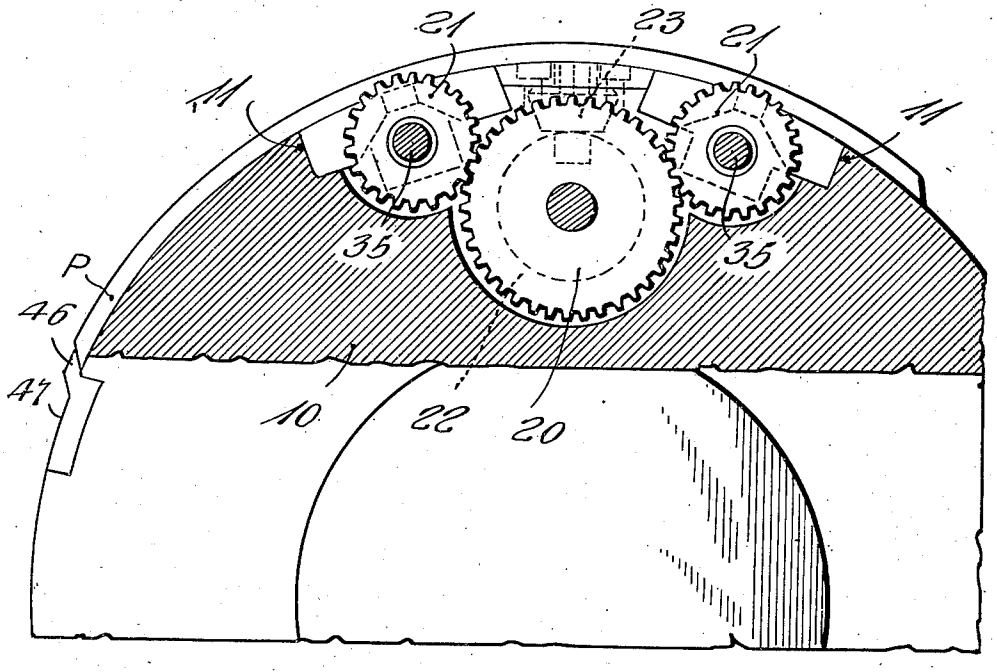


FIG. 6

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FIG. 7

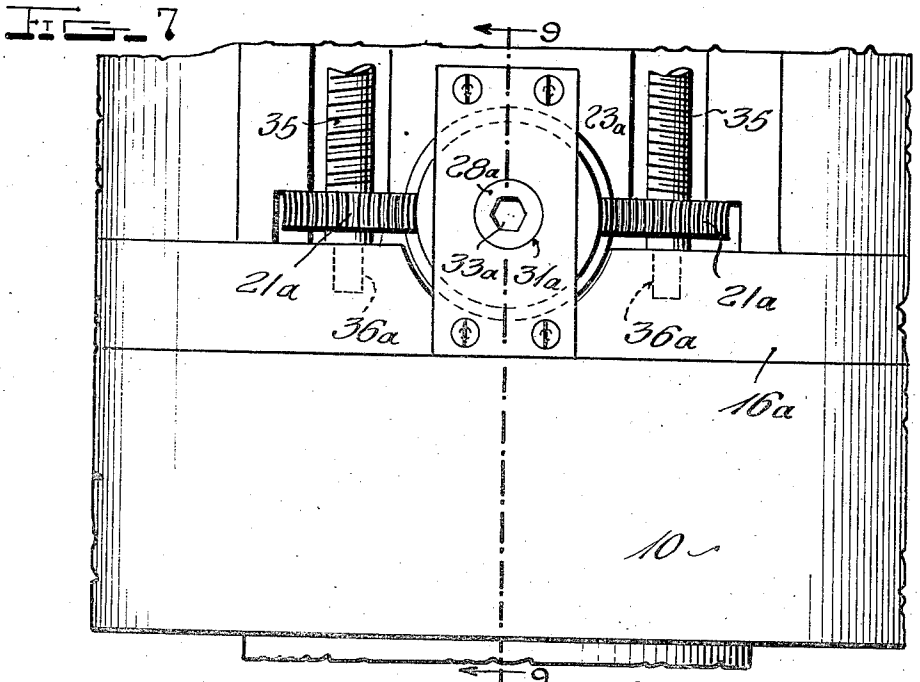


FIG. 8

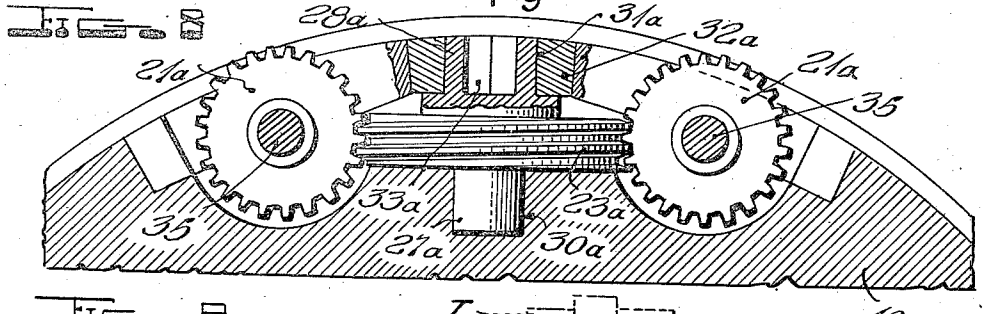
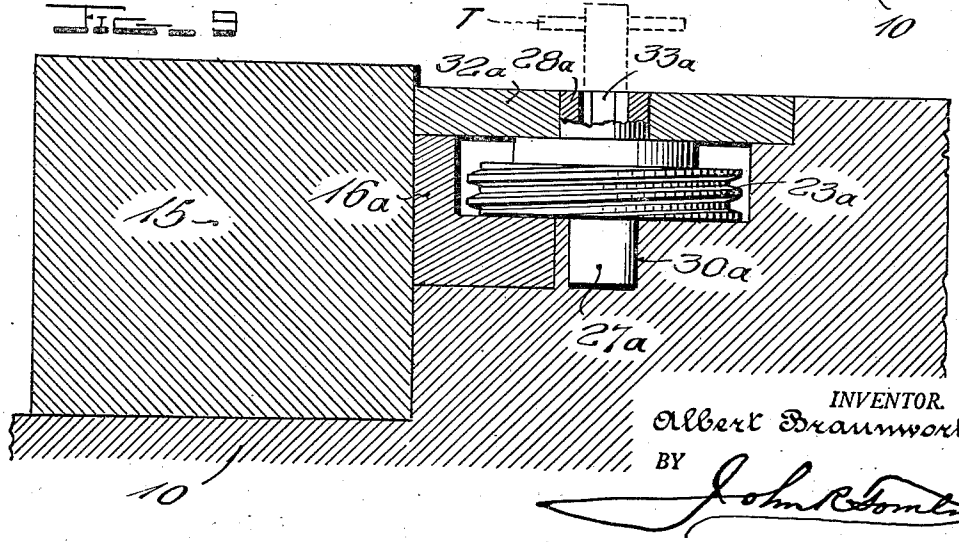


FIG. 9



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UNITED STATES PATENT OFFICE

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PRINTING PLATE CLAMPING MECHANISM

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Application February 16, 1943, Serial No. 476,109

3 Claims. (Cl. 101—378)

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This invention relates to printing plate clamps, and more particularly to clamps of the type employed to secure a plurality of rigid plates on the plate cylinder of a rotary printing machine.

In printing practice, where stereotype or similar plates are employed, the plates are clamped on the plate cylinders of a rotary printing press by means of clips which overhang the bevel 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 cylinders are capacitated to carry a number of plates widthwise or in the direction of the axis of the cylinder. The inner plates are clamped between the conventional center ring and the longitudinally slidable inner clips, and the outer plates are clamped between the inner clips and the conventional end clips.

Each plate cylinder cooperates with an impression cylinder to provide a printing couple, and each cylinder of the couple is provided with conventional bearer rings at its terminals, and these bearers or rings operate in rolling contact in order to maintain the printing components of the plate and impression cylinders in accurate printing relationship.

The end clips are usually moved to and from clamping engagement with the outer edge of the outer plates by rotatable screws or clip rods which threadedly engage the clips. These clip rods are rotated from the end of the plate cylinder by a suitable tool or wrench, and in order to locate the wrench-engaging portion of each clip rod for convenient accessibility, the clip rod extends longitudinally through an aperture formed in the bearer at a location adjacent its outer or peripheral surface.

This arrangement has proven unsatisfactory in commercial use, because the heavy impression pressure imposed on the cooperating rolling bearers sometimes causes them to crack or rupture at locations adjacent the apertures through which the clip rods extend.

It is, therefore, an object of this invention to provide an improved plate clamping mechanism which is constructed and arranged for plate locking and plate releasing operation from a location inside the bearers of the plate cylinders, and in which the components are operably supported independently of the bearers.

It is also an object of this invention to provide an improved plate clamping mechanism in which a plurality of clamping components are simultaneously actuated for plate clamping and plate releasing movement by a single radially-disposed operating instrumentality or tool from locations inside of the cylinder bearers.

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A specific object of this invention is to provide an improved plate clamping mechanism for clamping relatively rigid printing plates on a printing cylinder having bearers at each end thereof, and which mechanism includes a plurality of plate clips adapted to engage an edge of a printing plate, each clip being movable in a recess in the cylinder by a screw threaded clip rod, a gear secured to each clip rod, a rotatable member meshing with each gear to simultaneously rotate the gears and clip rods upon rotation of the rotatable member, and means for rotating the rotatable member by a radially-disposed tool from a location inside of the cylinder bearers to thereby simultaneously rotate the clip rods to move the plate clips to and from clamping engagement with the plate.

A more specific object of this invention is to provide an improved plate clamping mechanism for clamping relatively rigid printing plates on a printing cylinder having bearers at each end thereof, and which mechanism includes a plurality of plate clips adapted to engage an edge of a printing plate, each clip being movable in a recess in the cylinder by a screw threaded clip rod, a first gear secured on each clip rod, an intermediate gear meshing with the first gears, a bevel gear rotatable with the intermediate gear, a bevel pinion meshing with the bevel gear, and means to rotatably support the clip rods, the intermediate and bevel gears, and the bevel pinion independently of the cylinder bearers.

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 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 plan view depicting a preferred form of the invention;

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

Figure 3 is a fragmental end elevation, parts appearing in section;

Figure 4 is a fragmental transverse sectional view taken on the line 4—4 of Figure 1;

Figure 5 is a fragmental longitudinal sectional view taken on the line 5—5 of Figure 1;

Figure 6 is a fragmental end elevation depicting a modified form of the invention, parts appearing in elevation;

Figure 7 is a fragmental plan view depicting a further modification of the invention;

Figure 8 is an end elevation, parts appearing in section; and

Figure 9 is a fragmental longitudinal sectional view taken on the line 9—9 of Figure 7.

Referring to the drawings, in which similar characters designate corresponding parts, there is depicted a conventional plate cylinder 10 of a printing machine arranged to support a plurality of printing plates P. Longitudinally-extending recesses 11 are formed in the peripheral portion of the plate cylinder 10, and longitudinally-extending grooves 12 (Figure 4) extend inwardly from the recesses 11 and communicate therewith, and these grooves and recesses operatively receive plate-locking components to be hereinafter described.

An annular recess 13 (Figures 2 and 5) is formed in each end of the plate cylinder 10 and receives therein an annular bearer 15 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 are similarly constructed and arranged. Arcuate plates 16 are received within the recess 13 and are secured to the cylinder 10 by radially-disposed screws 17 (Figure 5). Each plate 16 abuts the inner axial terminal of a bearer 15 and forms a support for components to be hereinafter described.

An arcuate circumferentially-extending recess 18 is formed in the cylinder 10 adjacent the plate 16 for the reception of a train of plate clip actuating gears. This train includes two spaced spur gears 20 which mesh with three smaller spur gears 21, and one of the smaller spur gears is positioned intermediate the spur gears 20, and the remaining two gears 21 are located outside of the spur gears 20, as best seen in Figure 3. Each spur gear 20 has a bevel gear 22 (Figure 5) secured thereto or formed integral therewith, and this bevel gear meshes with a bevel pinion 23 which is rotatable about a radially-disposed axis and which provides a driving member for the train, as will be more fully explained hereinafter. Each composite gear 20—22 is rotatably supported on a stub shaft 25 which is rotatably received in a bearing aperture 26 formed in an arcuate plate 16, the aperture and shaft being so disposed that the spur gear 20 and bevel gear 22 rotate about a longitudinally or axially-disposed axis. Each bevel pinion 23 is provided with aligned stub shafts 27 and 28, which are rotatably received in radially-disposed bearing apertures 30 and 31 formed in the cylinder 10 and a bearing or cover plate 32, respectively. The plate 32 is secured to the cylinder 10 by screws 34 (Figure 1) or other suitable securing devices. By this arrangement each bevel pinion 23 is rotatable about an axis which is radially disposed relative to the plate cylinder 10. A rectangular tool-receiving recess or socket 33 is formed in each bevel pinion 23 and its stub shaft 28, and this socket is radially disposed in order to receive a radially-disposed operating tool or wrench T, indicated by dotted lines in Figure 5.

Each spur gear 21 is secured to a clip rod 35 (Figure 2) that has a reduced portion formed at its outer end which is rotatably received in a bearing aperture 36 formed in the arcuate plate 16. Each clip rod 35 is provided with an inwardly extending threaded portion or screw 37 which is threadedly received within a threaded aperture formed in the body portion of an end clip 38. Each end clip 38 is provided with an upstanding clip segment 40 having an overhanging dovetailed lip 41 to engage the outer arcuate bevel edge of the outermost plate P in each longitudinal or axial row of plates, in conformity with the usual practice. Each clip 38 is mounted for longitudinal sliding movement in a groove 12, and it is retained therein by opposed caps or bars 42 (Figures 1 and 4) which are suitably secured to the cylinder 10 and received within the recesses 11. The caps 42 are provided with bevel surfaces 43, which engage bevel surfaces 45 formed at the outer portion of each plate clip body 38, as best seen in Figure 4, to thus slidably retain each clip body 38 within its groove 12. Inasmuch as the clip rods 35 are held against longitudinal movement, it is manifest that rotation of the clip rods 35 will cause the plate clips 38 to move longitudinally within the groove 12, and the direction of movement of the clips being determined by the direction of rotation of the clip rods.

The plates P are circumferentially located on the plate supporting surface of the cylinder 10 by the engagement of the lateral or longitudinally-extending edge of each plate with a bevel lip 46 (Figure 6) upstanding from a conventional margin bar 47. The usual arrangement for assembling plates on a plate cylinder, which arrangement is well understood by those skilled in the art, is to locate the inner plates, not shown, adjacent the center of the cylinder, and the inner edges of the inner plates abut a conventional center ring, not shown. The inner edges of the outer plates P are engaged by conventional inner plate clips, not shown, which also engage the outer edges of the inner plates. By this arrangement, longitudinal inward movement of the end plate clips 38 causes the inner and outer plates to be securely clamped to the plate cylinder, in conformity with the usual practice.

In operation, when it is desired to secure the plates to the cylinder, a suitable wrench or tool T (Figure 5) is positioned in either of the wrench-receiving sockets 33 (Figure 1) according to which socket is the more conveniently located, and by simply turning the wrench the engaged bevel pinion 23 (Figure 5) is rotated. The rotation of this bevel pinion rotates the meshing bevel gear 22 and its spur gear 20, which, in turn, rotates all of the gears in the train, and, consequently, rotates the clip rods 35. The rotation of the clip rods causes the upstanding clip segments 40 (Figure 2) to engage the outer beveled edge of the outer plate P, and thereby force the plates into engagement with their locking clips to thus securely clamp the plates to the cylinder surface.

From the foregoing it is manifest that an efficient, convenient and quick-acting plate clamping mechanism has been provided which is entirely independent of the bearers 15, consequently permitting the bearers to present their maximum strength to resist the usual heavy im-

pression pressure, thereby avoiding frequent failure of the bearers in commercial use.

A modified form of the invention is depicted in Figure 6, in which form the components for rotating the clip rods **35** are identical with those heretofore disclosed, except that only two clip rods are employed, and these rods are rotated by spaced gears **21** which are, in turn, actuated from a single wrench socket **33** through an operably interposed bevel pinion **23**, bevel gear **22** and spur gear **20**.

A further modification of the invention is depicted in Figures 7, 8 and 9, and in this form of the invention, two clip rods **35** are provided, and they are rotated by worm gears **21***a*, which are rigidly secured to the clip rods. The outer terminal of each clip rod **35** is rotatably received within a bearing aperture **36***a* formed in an arcuate plate **16***a*. The worm gears **21***a* mesh with a worm **23***a* which is provided with aligned stub shafts **27***a* and **28***a*, that are rotatably received in radially-disposed bearing apertures **30***a* and **31***a* formed in the cylinder **10***a* and a bearing plate **32***a*, respectively. By this arrangement the worm **23***a* is rotatable about an axis which is radially disposed relative to the plate cylinder **10***a*, and provides a driving member for the gears **21***a*. A rectangular tool-receiving recess or socket **33***a* is formed in the stub shaft **28***a*, and this recess is radially disposed in order to receive a radially-disposed operating tool or wrench T.

This arrangement provides a relatively simple construction in which a worm **23***a* may be operated by a radially-disposed tool at a location inside the cylinder bearer, and this worm rotates the spaced clip rods **35** through worm gears **21***a*, to thus cause the plate clips to move into locking engagement with the outer plates of the plate cylinder.

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 the invention, what is claimed as new and useful, is:

1. In a printing cylinder adapted to support relatively rigid printing plates and having an annular bearer recessed in the cylinder at each end thereof, an arcuate plate recessed in the cylinder against the inner side of each bearer, a bearing plate recessed in the cylinder immediately adjacent an arcuate plate, a plurality of movable clips adapted to engage an edge of a printing plate which is supported on the cylinder, a plurality of clip rods each threadedly engaging a clip and disposed in axial relation to the cylinder and rotatably supported in bearing apertures formed in the arcuate plates, a gear rigidly secured to each clip rod, a drive gear operably connected with the said clip rod gears and having axially alined inner and outer stud shafts rotatably received in cylindrical bearing apertures formed in the printing cylinder and the bearing plate respectively and disposed in radial alinement relative to the printing cylinder, the outer stud shaft having a tool-receiving socket formed therein at the cylinder surface whereby a tool may be inserted into the socket to rotate the gears and clip rods to thereby move the clips axially along the clip rods towards or away from the printing plate.

2. In a printing cylinder adapted to support relatively rigid printing plates and having an annular bearer recessed in the cylinder at each end thereof, an arcuate plate recessed in the cylinder against the inner side of each bearer, a bearing plate recessed in the cylinder immediately adjacent an arcuate plate, a plurality of movable clips adapted to engage an edge of a printing plate which is supported on the cylinder, a plurality of clip rods each threadedly engaging a clip and disposed in axial relation to the cylinder and rotatably supported in bearing apertures formed in the arcuate plates, a first spur gear rigidly secured to each clip rod, a second spur gear meshing with the first spur gears, a first bevel gear rotatable with the second spur gear, a drive bevel gear meshing with the first bevel gear and having axially alined inner and outer stud shafts rotatably received in cylindrical bearing apertures formed in the printing cylinder and the bearing plate respectively and disposed in radial alinement relative to the printing cylinder, the outer stub shaft having a tool-receiving socket formed therein at the cylinder surface whereby a tool may be inserted in the socket to rotate the gears and clip rods to thereby move the clips axially along the clip rods towards and away from the printing plate.

3. In a printing cylinder adapted to support relatively rigid printing plates and having an annular bearer recessed in the cylinder at each end thereof, an arcuate plate recessed in the cylinder against the inner side of each bearer, a bearing plate recessed in the cylinder immediately adjacent an arcuate plate, a plurality of movable clips adapted to engage an edge of a printing plate which is supported on the cylinder, a plurality of clip rods each threadedly engaging a clip and disposed in axial relation to the cylinder and rotatably supported in bearing apertures formed in the arcuate plates, a worm gear rigidly secured to each clip rod, a worm meshing with the worm gears and having axially-alined inner and outer stub shafts rotatably received in cylindrical bearing apertures formed in the printing cylinder and the bearing plate respectively and disposed in radial alinement relative to the printing cylinder, the outer stub shaft having a tool-receiving socket formed therein at the cylinder surface whereby a tool may be inserted into the socket to rotate the worm, worm gears and clip rods to thereby move the clips axially along the clip rods towards and away from the printing plate.

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