July 6, 1937. A. LUNDQUIST 2,086,231

PLATE CLAMP FOR PRINTING MACHINES

Filed Dec. 1, 1933 3 Sheets-Sheet 1

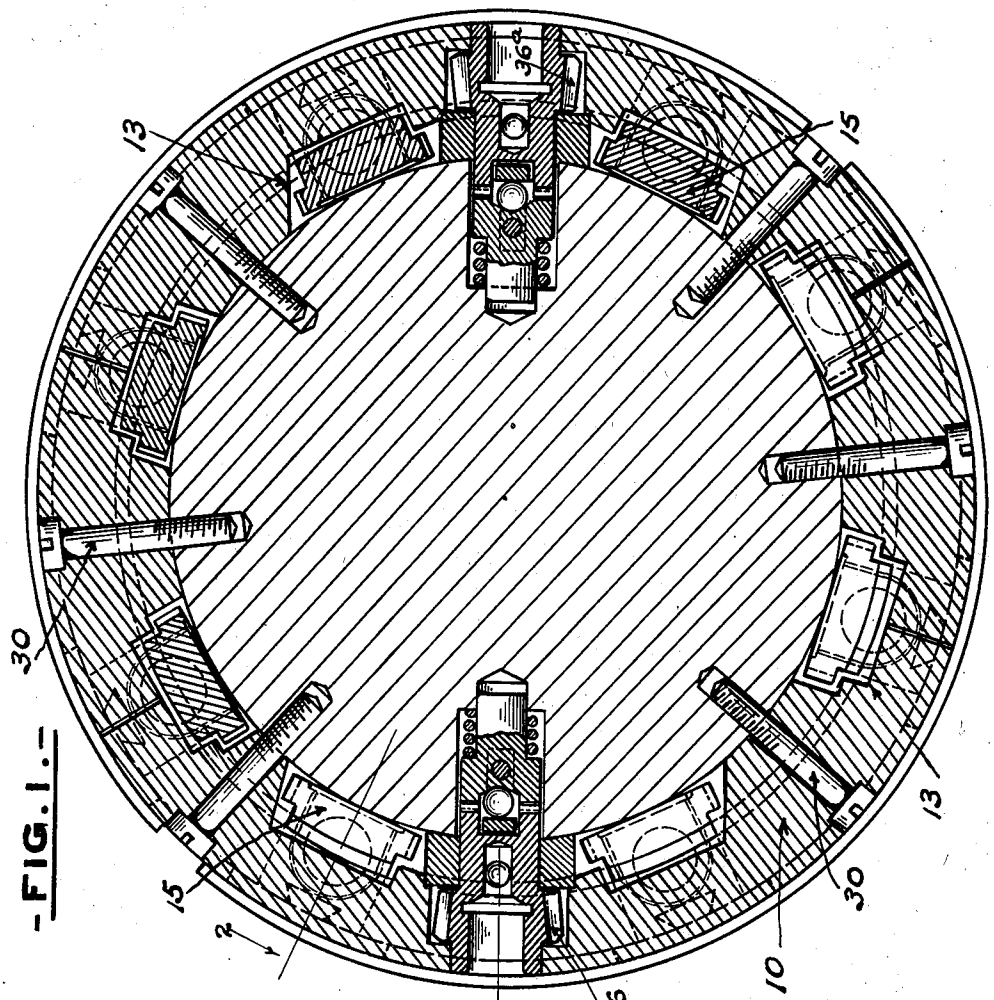


FIG. 1.

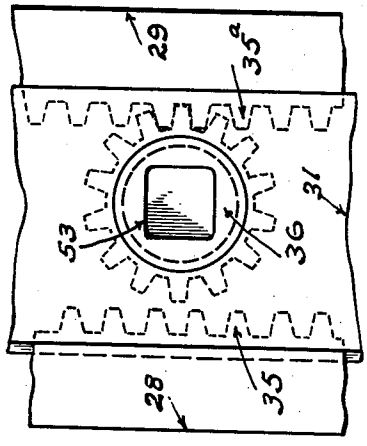


FIG. 7.

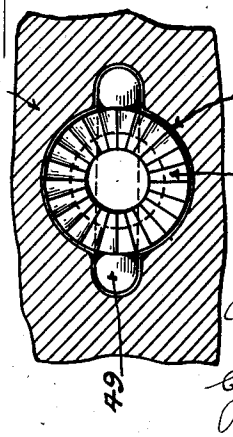


FIG. 8.

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PLATE CLAMP FOR PRINTING MACHINES

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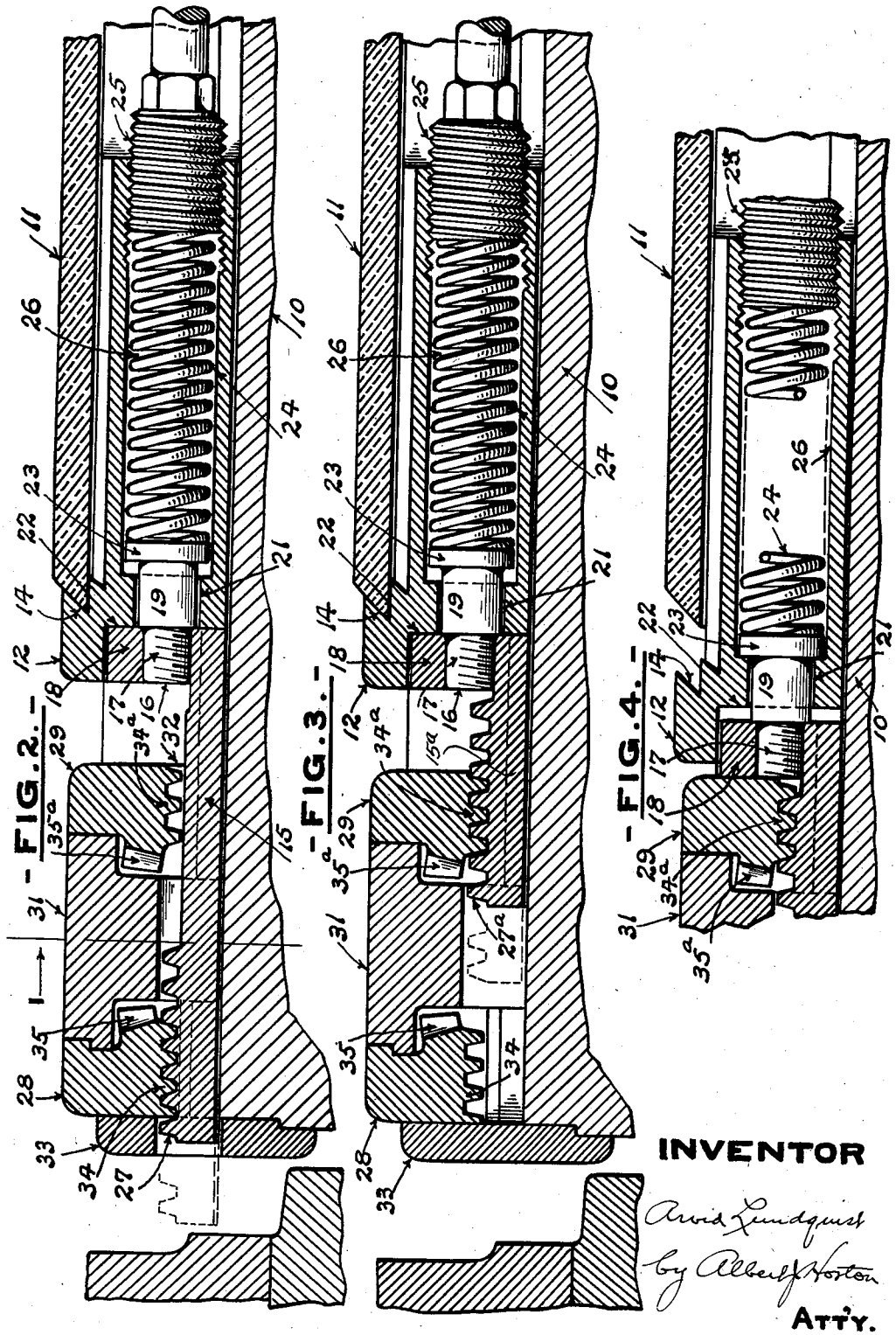


FIG. 2.

FIG. 3.

FIG. 4.

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PLATE CLAMP FOR PRINTING MACHINES

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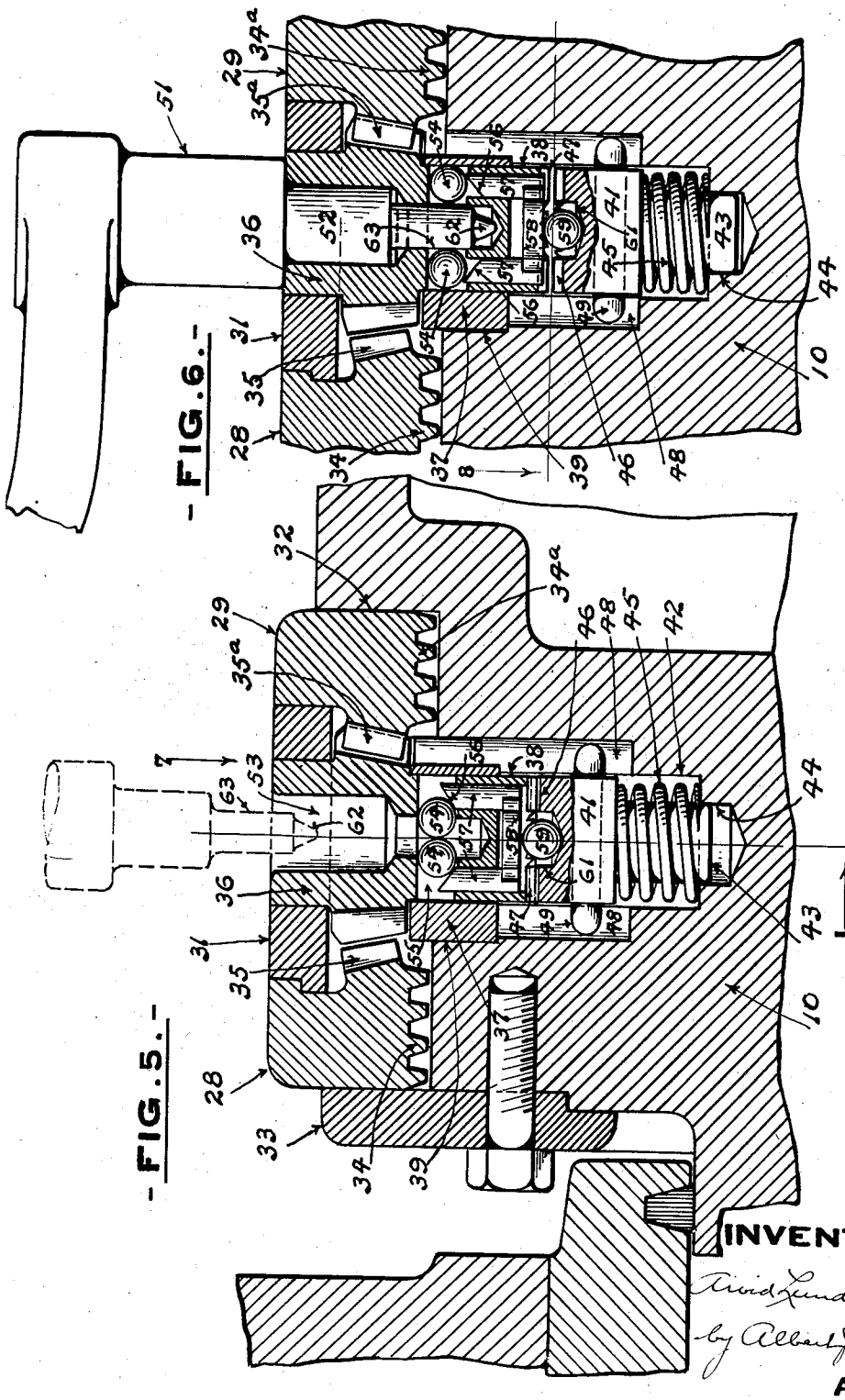


FIG. 6.

FIG. 5.

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UNITED STATES PATENT OFFICE

2,086,231

PLATE CLAMP FOR PRINTING MACHINES

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Application December 1, 1933, Serial No. 700,575

24 Claims. (Cl. 101—378)

This invention relates to a plate clamping mechanism for rotary printing machines and more particularly to an improved form of clamping mechanism which employs a smooth acting internal screw to actuate the clamping mechanism.

Various types of plate clamping mechanisms have been devised to lock printing plates upon a cylinder. In the present invention an improved arrangement has been provided, whereby clamping members are moved to a plate locking or unlocking position by means of an internal screw threaded ring which surrounds the cylinder and is rotated by a manually actuated tool. Teeth formed on clamp actuating members engage the screw thread of the ring and each member is simultaneously moved when the ring is rotated.

A further feature comprises a pinion gear drive for said ring and a means for locking the pinion in a set position after the actuating tool has been removed.

A still further object is the provision of an improved clamp actuating member which cooperates with a spring follow-up means to provide a positive metal to metal contact when the plate clamps are in a clamping position and utilizing a stored spring pressure of the spring follow-up means only when the clamp actuating members become loose as the result of machine vibration for example.

The invention further consists of certain other novel arrangements and combinations which will be fully described in connection with the accompanying drawings and the novel features pointed out in the claims hereunto annexed.

The preferred embodiment of the invention is illustrated in the accompanying drawings wherein;

Figure 1 is a cross sectional view through a plate cylinder along the line 1 of Figures 2 and 5;

Figure 2 is a vertical longitudinal section taken along the line 2 of Figure 1, showing one plate clamping member in clamped engagement with a printing plate and actuated by the outer ring;

Figure 3 is a vertical longitudinal section similar to Figure 2, showing another plate clamping member and actuated by the inner ring;

Figure 4 is a detail vertical section similar to Figure 3, showing a plate clamp in an unlocked position;

Figure 5 is a vertical section taken along the line 5 of Figure 1, showing a plate actuating mechanism in a locked position;

Figure 6 is a view similar to Figure 5, but showing a plate clamp actuating mechanism in an unlocked position with a tool in a position to actuate the plate clamps;

Figure 7 is a plan detail view looking in the direction of the arrow 7 of Figure 5; and

Figure 8 is a plan section taken along the line 8 of Figure 6, showing a pinion locking member.

Referring to the drawings, 10 indicates a plate cylinder, upon the periphery of which are mounted the usual form of semi-cylindrical stereotype plates 11. Plate clamping members 12 are slidingly mounted within longitudinal grooves or ways 13 in the peripheral surface of the plate cylinder 10 and are provided with beveled clamp engaging jaws 14, which are adapted to be moved into clamped engagement with beveled edges on the plates 11.

A plate clamp actuating bar 15 is maintained in yieldable engagement with the clamping member 12 by means of a stud 16, which has a screw threaded portion 17 screwed into a vertically disposed end 18 of the clamp actuating bar 15, and a shank portion 19 in sliding engagement with an opening 21, through a wall 22, in the clamping member 12. A head 23 is provided at the end of the shank 19 and is positioned so as to allow a longitudinal movement of the stud within the opening 21.

A heavy compression spring 24 is compressed between the end of the cap 23 and the end of an adjustable screw 25, within a recess 26, and is adapted to normally maintain the end 18 of the clamp actuating bar in a spaced relation to the wall 22, when the plates are in an unlocked condition such as shown in Figure 4. When the plate clamp actuating bar 15 is moved to a plate clamping position, such as from the position shown in Figure 4 to the position shown in Figure 3, the clamp 12 will move in advance of said actuating bar 15 until the said clamp engages the plate 11, whereupon a follow-up spring pressure is applied, as the actuating bar 15 is advanced to contact engagement with the clamp 12.

A connection is thus made between the clamp 12 and the actuating bar 15, which as the bar 15 is moved forward, yields after the clamp 12 engages the plate 11. When the end of the clamp actuating bar engages the wall 22, the pressure is direct. In the construction as herein discussed, and shown in Figure 1, four clamps simultaneously engage the edge of the plate and are operated by a single mechanism. It will be observed that with this construction, any variation in the plate length resulting in the engagement of one of the bars 15 coming in contact with its clamp wall in advance of the engagement of the

other bars with their corresponding clamps will result in proper clamping of the plate due to the pressure exerted by the springs acting on any clamp or clamps which may not be in actual engagement with their corresponding bars, and should the clamps become embedded in the plate during a long run of the machine, the springs will provide a follow-up pressure which will hold the clamps in close engagement with the plate.

The several clamping members provided around the periphery of the plate cylinder are clearly shown in Figure 1, and are divided into two groups, one group for each semi-cylindrical plate. The clamp actuating bars 15 are also divided into two individual groups and each group is actuated independently of the other to move the corresponding clamping members into or away from a plate clamping position. It will be observed when referring to Figures 2 and 3 that the clamp actuating bar 15, in Figure 2, extends to the end of the plate cylinder and that a clamp actuating bar 15*a* in Figure 3 is very much shorter than the bar 15. Each bar 15 and 15*a* is provided with gear teeth 27 and 27*a* respectively.

Two rings or ring gears 28 and 29 are arranged over one end of the cylinder 10 as shown in Figures 2 and 3 on each side of a spacer collar 31, which collar is divided into segments for convenience in assembling same, each segment being secured to the cylinder 10 by screws 30, as clearly shown in Figure 1. The inner ring 29 abuts against a shoulder 32 on the cylinder and the outer ring 28 abuts against an end plate 33, which is secured to the end of the cylinder 10. Each ring 28, 29 is mounted so as to rotate freely around the cylinder and each has an internal screw thread 34, 34*a* respectively, which mesh with teeth 27 and 27*a* of the clamp actuating blocks corresponding therewith, the threads 34 on the outer ring meshing with the teeth 27 on the clamp actuating bar 15 and the threads 34*a* meshing with the teeth 27*a* on the clamp actuating bar 15*a*. Each ring 28, 29 is also provided with gear teeth 35, 35*a* respectively, which thus converts same into a form of bevel gear.

Referring to Figures 5 and 6, the means for rotating the rings 28 and 29 will now be described. A bevel pinion 36 meshes with the gear teeth 35*a* on the ring 29 and is rotatably mounted in the spacer collar 31. A lower projecting end or extended hub portion 38 of said pinion is rotatably mounted within a sleeve 37, said sleeve being mounted in a recess 39 within the cylinder 10. A plunger 41 is slidably mounted beneath the lower end 38 of the pinion gear 36 within a recess 42 and has a reduced end 43 which is also slidably mounted in a recess 44. A compression spring 45, positioned around the reduced end 43 of the plunger, will force the plunger upward and hold a ratchet toothed face on the upper end 46 of the plunger in clutched engagement with a similar ratchet toothed face 47 on the lower end 38 of the pinion 36. Slots 48, 48 are cut into the cylinder 10 adjacent the recess 42, within which the projecting ends of a pin 49 are guided, said pin being mounted in the head of the plunger 41.

With the parts in the position shown in Figure 5, the pinion 36 is positively locked against any rotation, due to the clutched engagement of the ratchet toothed faces 46 and 47 of the plunger 41 and the lower end 38 of the pinion, and also due to the engagement of the ends of a pin 49 with slots 48 in the end 38 which prevent the plunger from rotating. Such positions will correspond with either a locked or an unlocked plate position.

In Figure 1 it will be observed that two pinions 36, 36*a* are provided, each being the same in structure but arranged in driving relation so that one will drive the ring 28 and the other will drive the ring 29.

When it is desirable to move the plate clamps 12 into or out of clamped engagement with the plates 11, a tool, having a square shank 52, is inserted into a similarly shaped socket 53 in the pinion 36 and when rotated, will cause the pinion to rotate one of the rings 29 or 30.

Means is provided to release the clutched ratchet portions 46 and 47 at the lower end of the pinion and the upper end of the plunger when the tool is inserted in the pinion. Said means comprises two balls 54, 54 which are guided within a slot 55, cut through the lower end 38 of the pinion 36, and engage beveled ends 56, 56 of two pins 57, 57 said pins being slidably mounted in the lower end 38 of the pinion 36 and having their beveled ends 56, 56 projecting into the slot 55. A hardened steel plate 58 is also secured to the lower ends of the pins 57, 57 and is slidable therewith. Another ball 59 is loosely mounted within a recess 61 in the upper end of the plunger 41 directly beneath the plate 58.

As the tool 51 is inserted in the pinion 36, a cone pointed end 62, at the end of a neck 63 and below the shank 52, will wedge between the balls 54 to separate same and to permit said neck portion 63 to be moved into engagement with the balls and thus force same to the position shown in Figure 6. During the outward movement of the balls 54, they will cam the pins 57, 57 downward and thus cause the plate 58 at the end thereof to engage and force the ball 59 downward, which action will cause the plunger 41 to be moved therewith and thereby release the ratchet teeth 46 on the plunger from their clutched engagement with the teeth 47 on the lower end 38 of the pinion 36. Having been released in this manner, the pinion is then free to be rotated.

The general operation considered in conjunction with Figures 3 and 5 is as follows:

After having placed the plates 11 in position on the plate cylinder 10, the operator will insert an actuating tool in the socket 53 of the pinion 36, whereupon the said gear is free to be rotated. Upon the rotation of same, the engagement of the gear teeth 35*a* on the ring 29 with the pinion, will cause the ring to be rotated. Therefore since the teeth 27*a* on the clamp actuating bars 15*a* mesh with the screw 34*a*, the said clamp actuating bars will be moved forward and will push the plate clamp 12 with its yieldable spring connection ahead of it. After the clamp engages the plate, the movement of the bar 15*a* is still continued to apply a yieldable clamping pressure through the spring 24.

A smooth sliding movement is thereby applied to the clamps and actuating bars, an individual spring follow-up pressure is applied to the clamps and the arrangement of the parts provides a generally smooth and symmetrical outer appearance with no parts projecting beyond the exterior of the cylinder.

While the invention has been shown and described in its preferred form, it will be understood that certain changes and variations may be made in the specific structure provided for carrying out the invention, without however departing from the spirit of the invention as defined in the appended claims.

What I claim is:

1. The combination with a plate holding cylinder having longitudinally movable plate clamps, of an internal screw, a clamp actuating member in operative engagement with said screw, and a manually actuated drive to rotate said screw.

2. The combination with a plate holding cylinder having longitudinally movable plate clamps, of a ring having an internal screw thereon coaxial with said cylinder, clamp actuating members in operative engagement with said screw, and manually actuated means for rotating said ring, whereby the plate clamps are simultaneously moved to or from a plate clamping position.

3. The combination with a plate holding cylinder having longitudinally movable plate clamps, of a ring having an internal screw thereon coaxial with said cylinder, clamp actuating members in operative engagement with said screw, a manually actuated means to rotate said ring, and means to lock the plate clamps in a plate clamping position.

4. The combination with a plate holding cylinder having longitudinally movable plate clamp actuating bars having toothed portions in and having an internal screw portion thereon, clamp actuating bars having toothed portions in mesh with the internal screw, and manually actuated means to rotate said ring, whereby the plate clamps are simultaneously moved to and from a plate clamping position.

5. The combination with a plate holding cylinder having longitudinally movable plate clamps, of a ring rotatable around the cylinder and having an internal screw thereon, yieldable plate clamp actuating bars adapted to be moved by the rotation of said ring, and a manually actuated means to rotate said ring.

6. The combination with a plate holding cylinder having longitudinally movable plate clamps, of a ring rotatable around the cylinder and having an internal screw portion, yieldable plate clamp actuating bars having toothed portions in mesh with the screw, and manually actuated means to rotate said ring.

7. The combination with a plate holding cylinder having longitudinally movable plate clamps, of a ring gear rotatable around the cylinder and having an internal screw portion, clamp actuating members in operative engagement with said screw, and a manually actuated pinion in mesh with said ring gear.

8. The combination with a plate holding cylinder having longitudinally movable plate clamps, of a ring gear rotatable around the cylinder and having an internal screw portion, clamp actuating members in operative engagement with said screw, a pinion in mesh with said ring gear, and means to lock said pinion against rotation when the plates are clamped.

9. The combination with a plate holding cylinder of plate holding clamps longitudinally movable thereon, bars movable with said clamps and yieldable connections between said bars and clamps, a ring having an internal thread portion positioned around the cylinder and in a driving relation with the bars, and a means for rotating the ring, whereby the bars and clamps are simultaneously movable to and from a plate clamping position.

10. The combination with a plate holding cylinder of plate holding clamps longitudinally movable thereon, a ring rotatable around the cylinder and having an internal screw thereon, bars connected in a driving relation with said screw, yieldable connections between the bars and plate clamps comprising a plurality of springs compressed to normally hold the bars and plate clamps spaced apart and adapted to be further compressed after the plate clamps engage the plate, and means to rotate the rotatable ring, whereby the bars are driven in a forward or a rearward direction.

11. In a device for clamping stereotype plates on a printing cylinder, comprising plate clamps, a ring gear rotatable around the cylinder having an internal screw threaded portion, a clamp actuating member in operative relation with said screw thread, and a manually actuated pinion to rotate said ring gear.

12. The combination with a plate holding cylinder having longitudinally movable plate clamps thereon, of clamp actuating bars, means for simultaneously moving said bars to a plate clamping position, a spring follow-up connection between said bars and clamps which is yieldable to permit each bar to move into direct contact with the plate clamp, and to maintain a continuous spring pressure upon the plate clamp if any separation between a bar and clamp should occur.

13. In a mechanism for clamping printing plates upon a cylinder, a peripherally movable operating member, longitudinally movable clamp actuating members, plate clamps simultaneously movable with said clamp actuating members, and yieldable means interposed between the said clamp actuating members and the clamps, whereby said clamping members are adapted to be moved into direct contact with the clamps under normal plate clamping conditions.

14. In a mechanism for clamping printing plates upon a cylinder, a peripherally movable member, clamp actuating bars longitudinally movable along said cylinder, plate clamps simultaneously movable with said bars, and spring tensioning means interposed between the bars and the clamps, whereby said clamping members are adapted to be moved into direct contact with the clamps under normal plate clamping conditions.

15. The combination with a plate holding cylinder having longitudinally movable plate clamps, of a ring having a screw on a cylindrical surface thereof coaxial with the cylinder, clamp actuating members in operative engagement with the screw, and means for rotating said ring, whereby the plate clamps are simultaneously moved to or from a plate clamping position.

16. In a device for clamping plates to a printing cylinder, a movable plate clamp, a slidably mounted member to move said clamp into clamping engagement with a plate, a rotatable ring, means comprising threads on one and teeth on the other, connecting said member with said ring, whereby rotation of said ring will actuate said clamp moving member to move said clamp, a rotatable member drivingly connected to said ring to rotate the same, and an operating member removably engageable with said rotatable member and operable to actuate the same when engaged therewith to rotate the ring.

17. In a device for clamping plates to a printing cylinder, a movable plate clamp, a slidably mounted member to move said clamp into clamping engagement with a plate, a rotatable ring, means comprising threads on one and teeth on the other, connecting said member with said ring,

whereby rotation of said ring will actuate said clamp moving member to move said clamp, a rotatable member drivingly connected to said ring to rotate the same, releasable locking means to prevent rotation of said ring by said rotatable member, and an operating member for said rotatable member; said operating member being removably engageable with said locking means and with said operating member and operable to actuate both when engaged therewith, to release the former and to rotate the latter.

18. In a device for clamping a stereotype plate on a printing cylinder, a plate clamp, a clamp actuating member, a ring gear rotatable to cause said member to actuate said clamp, said member and said ring gear having a plurality of cooperating teeth and threads to operably connect the same, a driving pinion to rotate said ring gear, and a manually actuated member removably engageable with said pinion to rotate the same when engaged therewith.

19. In a device for clamping a stereotype plate on a printing cylinder, a plate clamp, a clamp actuating member, a ring gear rotatable to cause said member to actuate said clamp, said member and said ring gear having cooperating teeth and threads to operably connect the same, a driving pinion to rotate said ring gear, a releasable locking means operable when in locked position to prevent ring gear rotation by said pinion, said locking means including an axially slidable member mounted on the axis and in the hub of said pinion, non-rotatable means to engage said member to lock it against rotation, and a manually actuated member removably engageable with said locking means and with said pinion to release the former and actuate the latter when in engaged relation with both.

20. Mechanism for clamping a stereotype plate to a printing cylinder, comprising a longitudinally movable plate clamp, a slidable clamp actuating member, means including cooperating rotatable members to slide said member to move said clamp into and out of plate clamping position, one of said rotatable members being threadingly connected to said member, releasable locking means for one of said rotatable members to prevent operation thereof to move said clamp, and an operating member for releasing said locking means and to move the lockable rotatable member.

21. Mechanism for clamping a stereotype plate to a printing cylinder, comprising a longitudinally movable plate clamp, a slidable clamp actuating member, means including cooperating rotatable members to slide said member to move said clamp into and out of plate clamping position, one of said rotatable members being threadingly connected to said member, and a member removably engageable with one of said rotatable members to actuate the same when engaged therewith.

22. In a device for clamping a plate to a cylinder, a movable plate clamp, means to move the clamp into plate clamping position including a slidably mounted member, a rotatable ring, cooperating teeth and threads between said member and said ring whereby rotation of said ring will move said member and a rotatable pinion adapted to rotate said ring, said pinion having a hub portion, an axially slidable member on said hub portion, a non-rotatable part, and releasable cooperating means between said slidable member and said part to lock said pinion to said part.

23. In a device for clamping a plate to a cylinder, a movable plate clamp, means to move the clamp into plate clamping position including a slidably mounted member, a rotatable ring, cooperating teeth and threads between said member and said ring whereby rotation of said ring will move said member and a rotatable pinion, said pinion having a hub portion, an axially slidable member on said hub portion, a non-rotatable part, and releasable cooperating means between said axially slidable member and said part to lock said pinion to said part, and an operating member removably engageable with said pinion and operably engageable with said member to release said locking means and rotate said pinion.

24. In a device for clamping a plate to a cylinder, a movable plate clamp, means to move the clamp into plate clamping position including a slidably mounted member, a rotatable ring, cooperating teeth and threads between said member and said ring whereby rotation of said ring will move said member and a rotatable pinion, said pinion having a hub portion, said hub portion journaled in said cylinder, an axially slidable member in said hub portion, a part mounted in said cylinder, means to retain said part against rotation, cooperating means between said axially slidable member and said part to releasably connect the same to lock said pinion to said part, and an operating member removably engageable with said pinion to rotate the same, said operating member when in pinion operating position being adapted to release said part from locking connection with said axially slidable member.

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