

March 26, 1935.

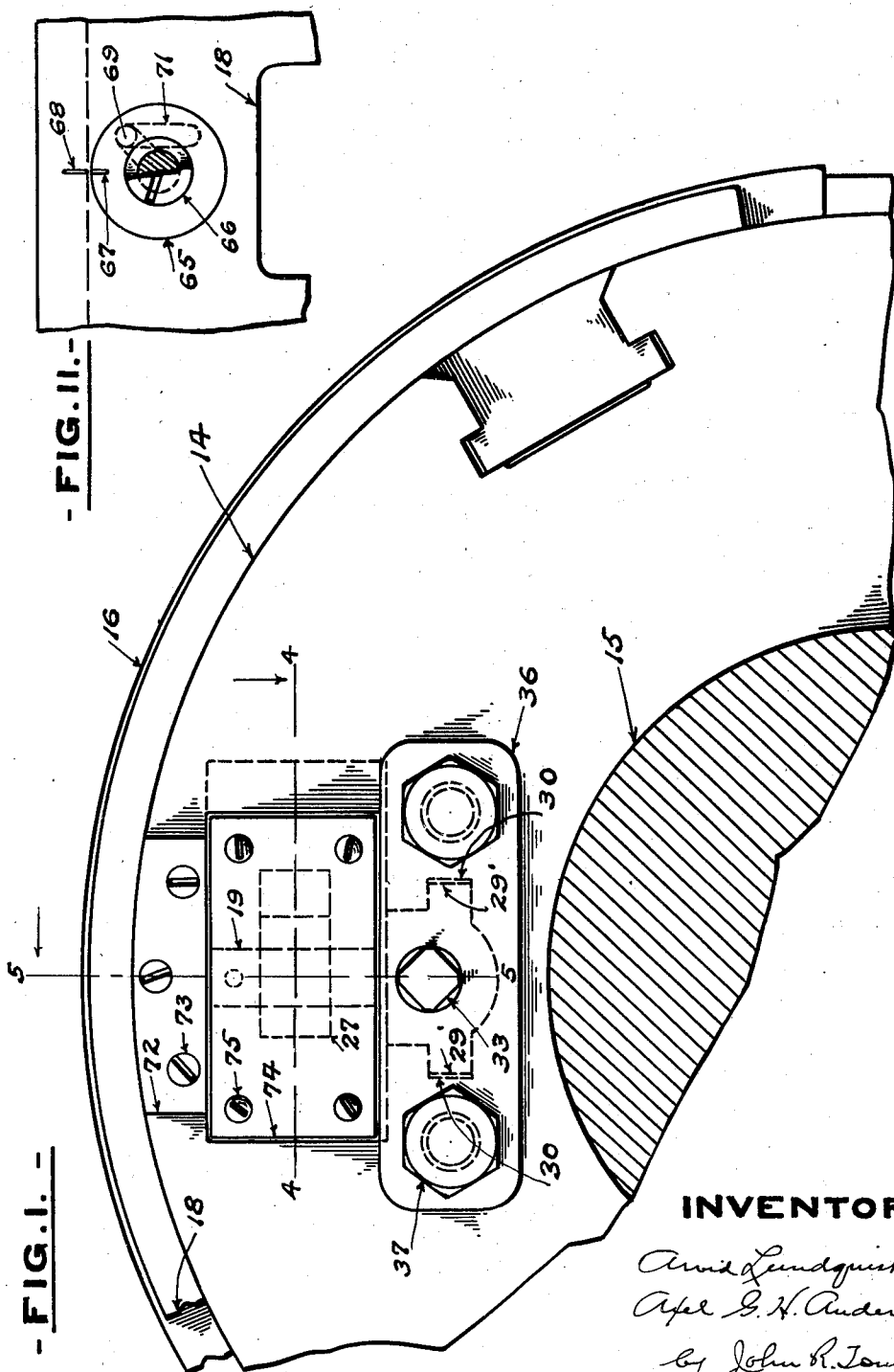
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1,995,994

PLATE CLAMP FOR PRINTING MACHINES

Filed Oct. 8, 1931

4 Sheets-Sheet 1



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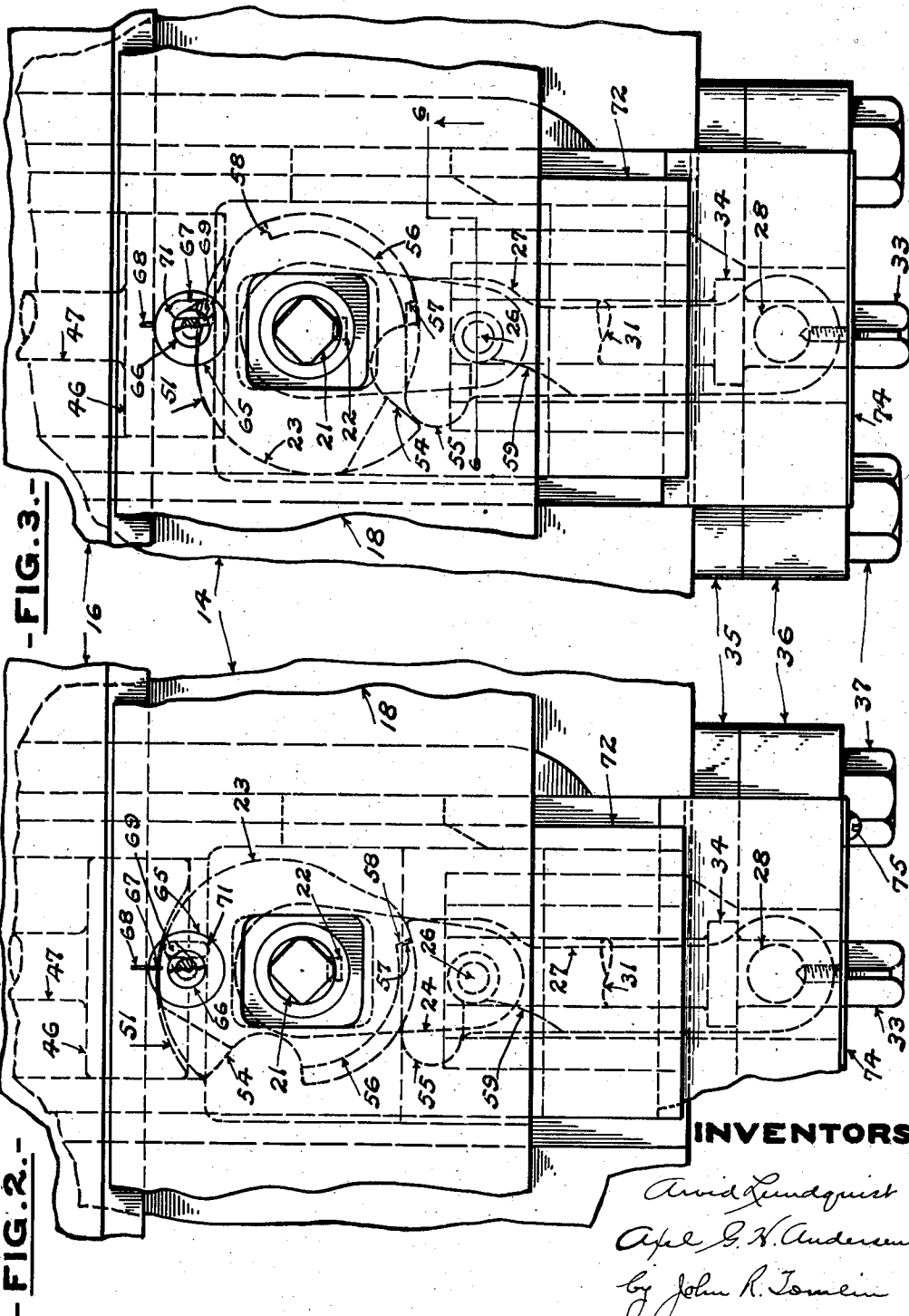
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- FIG. 2.-

- FIG. 3.-

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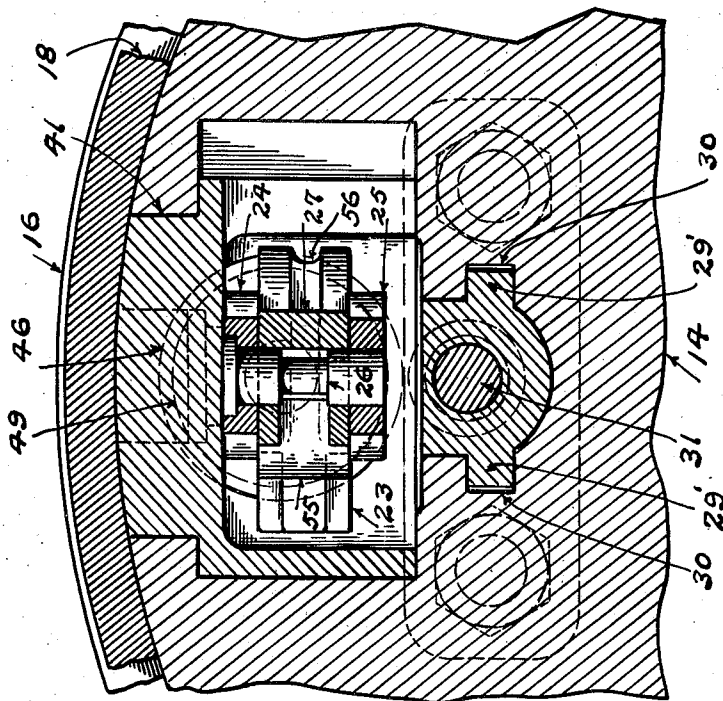
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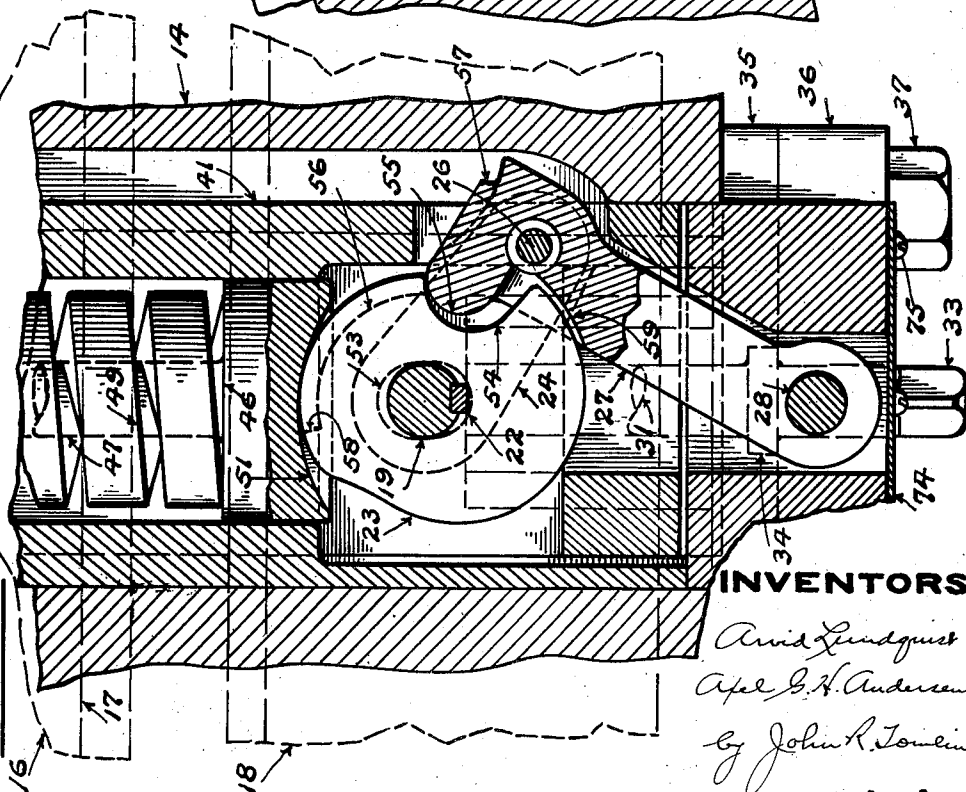
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- FIG. 6. -



- FIG. 4. -



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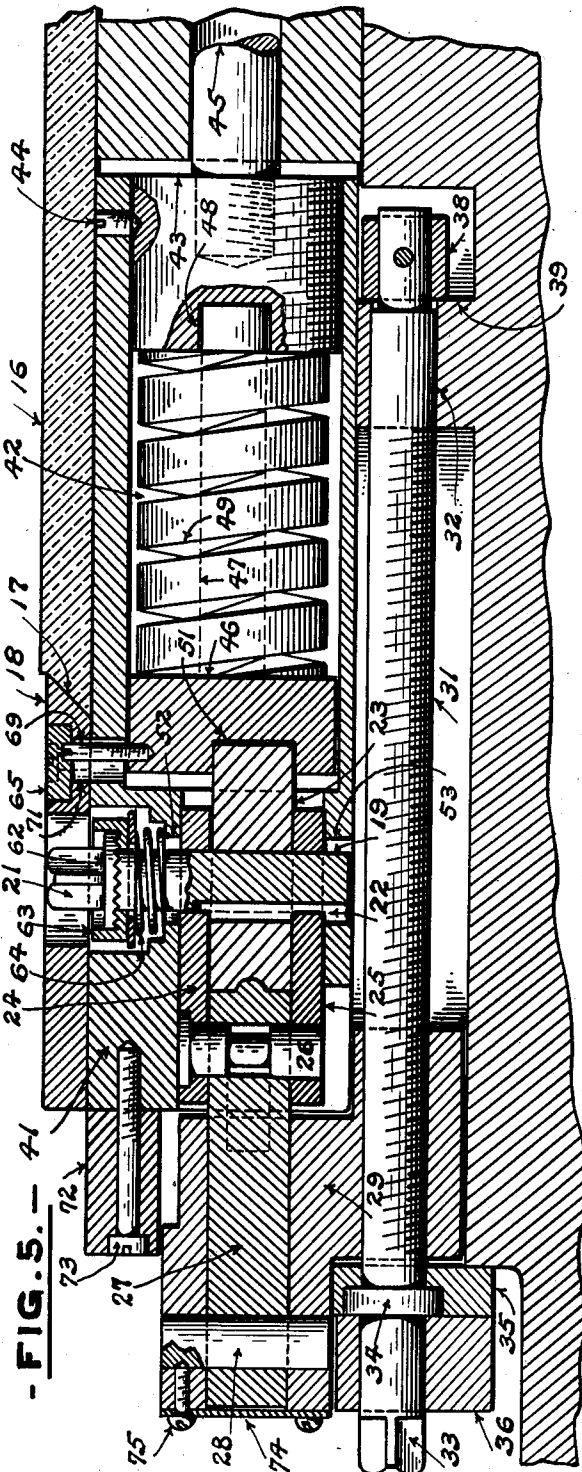
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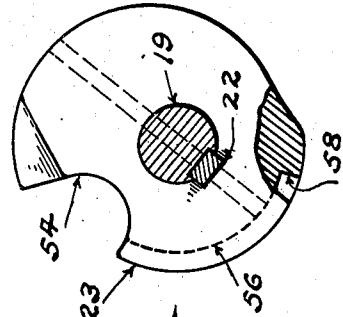
PLATE CLAMP FOR PRINTING MACHINES

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4 Sheets-Sheet 4



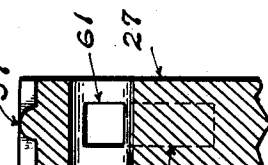
- FIG. 9. -



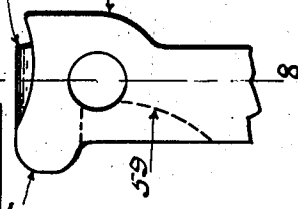
- FIG. 10. -



- FIG. 8. -



- FIG. 7. -



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PLATE CLAMP FOR PRINTING MACHINES

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Application October 8, 1931, Serial No. 567,562

23 Claims. (Cl. 101—378)

The present invention relates to means for securing printing plates to form carrying members of printing machines.

The invention has for its special object, the provision of a clamping mechanism by means of which a plate may be quickly secured to the plate support, and firmly held in position during the operation of the machine.

It is also an object of the invention to provide a plate clamping mechanism 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 the precise embodiment of the invention herein disclosed may be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawings which show the preferred embodiment of the invention, Figure 1 is an end view of a portion of a form cylinder of a printing machine, showing portions of the mechanism that constitute the invention;

Figure 2 is a plan view of the mechanism shown in Figure 1 with the parts in the completely locked position;

Figure 3 is a view similar to Figure 2 with the parts in the partially unlocked position;

Figure 4 is a sectional view of the mechanism as seen on the line 4—4 of Figure 1 and in the direction of the arrow, the parts being shown in the unlocked position.

Figure 5 is a vertical sectional view of the mechanism as seen on the line 5—5 of Figure 1 and in the direction of the arrow;

Figure 6 is a vertical sectional view of the mechanism as seen on the line 6—6 of Figure 3 and in the direction of the arrow;

Figure 7 is a detailed view showing a portion of the thrust link;

Figure 8 is a sectional view of the thrust link on the line 8—8 of Figure 7 as seen in the direction of the arrow;

Figure 9 is a plan view, partly broken away and partly in section, showing the locking cam;

Figure 10 is an edgewise view of the locking cam as seen in the direction of arrow 10 of Figure 9; and

Figure 11 is a detailed view showing a device

that indicates the relative positions of certain parts of the mechanism when a plate is locked on the support.

Referring to the drawings, 14 indicates a form cylinder of a printing machine that is secured to a shaft 15, suitably supported for rotation by means not shown. A printing plate 16, having a beveled surface 17, is secured to the cylinder by means of a plate clamp 18 that is movable lengthwise on the cylinder so that it may be freed from the plate when desired.

In accordance with the invention, means for moving the clamp and locking it in position may consist of a clamp actuating shaft 19, having a squared head 21, adapted to receive a suitable form of wrench. The shaft 19 is provided with a key 22, whereby it is secured to a cam 23, and toggle arms 24 and 25 are loosely supported on the shaft 19. The toggle arms carry a toggle pin 26 on which a thrust link 27 is pivoted, the other end of the thrust link being pivoted on an abutment pin 28 which is secured to an abutment block 29 that is suitably slotted to provide working space for the movement of the thrust link, as will be hereinafter explained. The abutment block 29 is formed with tongues 29' fitted to slide in grooves 30 formed in the cylinder 14 and is screw threaded to receive an adjusting rod 31, which turns freely in a bore 32. The adjusting rod 31, is squared on one end at 33 to receive a suitable form of wrench, and is formed with a collar 34.

A clamping mechanism comprising an inner plate 35 and an outer plate 36 is bored to permit the rod 31 to turn freely therein but to engage the sides of the collar 34 to lock the rod against rotation. The plates 35 and 36 are secured to the cylinder and clamped together by means of bolts 37, which are screw threaded into the cylinder. A collar 38 is secured to the opposite end of the adjusting rod 31 and engages with a finished surface 39 on the cylinder 14 and acts to resist pull of the abutment block 29.

The plate clamp 18 is secured to a clamp head 41 which is fitted to slide in the cylinder 14. The clamp head is bored to form a spring chamber 42, and a portion of the chamber near the outer end thereof is threaded to receive a screw plug 43 that may be locked in position in the chamber by means of a set screw 44. A rod 45 is secured to the screw plug 43 and may be extended to operate other plate clamps, not shown, in accordance with well known practice.

A plunger 46 is arranged to slide freely in the spring chamber 42 and is provided with a plunger

rod 47 integral therewith. A bore 48 is provided in the screw plug 43 into which the plunger rod 47 is fitted to slide, the bottom of the chamber being adapted to engage with the end of the plug, as shown in Figure 5.

A coil spring 49 is wound about the plunger rod 47 and arranged so that one of its ends abuts against the screw plug 43, and the other end against the plunger 46.

The plunger 46 is grooved at 51 to cooperate with the peripheral surface of the cam 23, and the bottom of the chamber 42 is adapted to provide an abutment for the outer surface of the plunger 46 when the clamp mechanism is moved to the unlocked position. Elongated openings 52 and 53 are provided in the clamp head 41 to permit a limited relative motion therein of the shaft 19 in a direction parallel to the axis of the cylinder.

The cam 23 is cut away as indicated at 54 to provide clearance for an ear 55 formed on the thrust link 27, and is formed with a groove 56 which engages with a rib 57 on the thrust link 27. The end of the groove 56 forms an abutment 58 which engages with the end of the rib 57 to lock the toggle. The thrust link 27 is cut away as indicated at 59 to provide clearance for the projecting portion of the cam 23, as shown in Figure 4, this cut away portion extending through to the hole for the toggle pin 26, in the form of an opening 61, as shown in Figure 8, the pin 26 being also reduced in diameter at the center portion to provide clearance for the movement of the cam when the plate clamp is moved to the full open position.

In the embodiment of the invention shown, a locking device adapted to resist rotation of the shaft 19 is provided and comprises a notched collar 62 secured to the pin 19, and a cupped locking washer 63 having a notched inner surface is adapted to engage with the collar 62, and is biased toward engagement with the collar by a spring 64. It will be seen that when a suitably formed wrench is placed on the squared head 21 to rotate the shaft 19, that the locking washer will be pressed down and disengaged from the notched collar 62, permitting the shaft 19 to be turned freely, and when the wrench is removed, the notched surfaces are engaged and prevent the turning of the shaft.

An indicating device is provided, the function of which will be hereinafter explained, and preferably comprises a dial 65 that is rotatably supported in a recess in the plate clamp 18 by means of a screw 66, and provided with an index mark 67 that under some conditions, is in alignment with a similar mark 68 on the plate clamp. The dial 65 is rotated by means of a pin 69 secured to the plunger 46, a slot 71 being provided in the clamp head 41 to permit motion of the pin 69 as the plunger 46 is moved relative to the clamp head 41. A guard 72 is secured to the clamp head 41 by means of a screw 73 and a cover plate 74 is secured to the abutment block 29 by means of the screws 75.

In operation, assuming the parts to be in the unlocked position as shown in Figure 4, turning the shaft 19 in a clockwise direction will result in turning the cam 23 into engagement with the ear 55 and moving the clamp head 41 with the plate clamp 18 toward the plate. As the distance between the shaft 19 and the abutment pin 28 is thus increased, the toggle mechanism comprising toggle arms 24 and 25 and the thrust link 27 will move to the position shown in Figure

3, in which the shaft 19, the toggle pin 26 and the abutment pin 28 are substantially in alignment, but the pin 26 is preferably slightly to the left, as shown in Figure 3, thus locking the toggle. Further rotation of the shaft 19 moves the cam 23 from the position shown in Figure 3 to that shown in Figure 2, during which time, the spiral portion of the cam face acts on the plunger 46 to compress the spring 49, and the abutment 58 on the cam 23 being in engagement with the end of the rib 57, the toggle mechanism cannot be opened until the cam is rotated counter clockwise to release it. It will thus be seen that the initial motion of the shaft 19 closes the toggle and moves the plate clamp into engagement with the plate and the continued motion compresses the spring 49 and puts a spring tension on the clamp which will permit it to move still further to tighten the plate should there be any tendency of the clamp to embed itself into the plate or for the plate to otherwise become loose.

Stereotype plates are made of a relatively soft metal and it has been found that on long runs, they will sometimes become loose and hence it is desirable to provide a follow-up motion in the plate clamps which will tend to keep the clamps tight. The mechanism herein disclosed provides a means for quickly moving the plate clamp into engagement with the plate, tightening the clamp and thereafter building up a spring follow-up pressure which will keep the clamp tight should there be a tendency for the plate to become loose.

By turning the adjusting rod 31, it is possible to shift the position of the abutment block 29 and adjust the locking mechanism to accommodate plates of different widths.

In loosening the plate clamp from the plate, the shaft 19 is turned counterclockwise, the initial motion acting to rotate the cam 23, permitting the plunger 46 to recede, the motion being continued until the parts are in the relative position shown in Figure 3. Further rotation of the cam then causes the projecting portion of the cam surface adjacent to the cut-away portion 54 to engage the ear 55 of the thrust link 27 and open the toggle, final motion of the cam acting to withdraw the plate clamp by direct pressure of the cam against the back of the ear 55.

The indicating dial 65 is operated by motion of the plunger 46 relative to the plate clamp 18 and is preferably so arranged that when the parts are in the position shown in Figure 5, the index mark 67 on the dial will register with the index mark 68 on the clamp, thus indicating that the plunger 46 has been moved forward in the clamp head 41, the requisite distance to insure that should the printing plate loosen, the clamp head and the clamp will move forward under the pressure of the spring 49 a sufficient distance to insure maintaining pressure of the clamp against the plate. It will be understood that the plunger 46 is maintained in a fixed position by the toggle mechanism and the cam, and the spring 49 is constantly urging the clamp head 41 to the right, as seen in Figure 5, to maintain pressure on the plate.

Should there be any variation in the length of the plates, this would be indicated by the position of the index marks on the dial and correction could be made by adjusting the rod 31.

What we claim is:

1. In a printing machine, a plate support, a printing plate on the support, a plate clamp on 75-

the support, a clamp head secured to the plate clamp, a clamp actuating mechanism adapted to move the clamp on the support, a spring operably connected between the actuating mechanism and the clamp head, and an indicating device operably connected to the clamp head and arranged to indicate the position of the actuating mechanism relative to the clamp.

2. In a printing machine, a plate support, a printing plate on the support, a plate clamp on the support, a clamp actuating member, a first means operably connected to the actuating member adapted to move the clamp toward the plate at a relatively high speed on an initial movement of the actuating member, and a second means operably connected to the rotatable member adapted to continue the motion of the clamp to clamping engagement with the plate at a slower speed on further movement of the rotatable member.

3. In a printing machine, a plate support, a printing plate on the support, a plate clamp on the support, a clamp actuating member, a toggle mechanism operably connected to the actuating member adapted to move the clamp toward the plate at a relatively high speed on initial movement of the actuating member, a cam adapted to move the clamp to clamping engagement with the plate at a slower speed on further movement of said member, and a spring associated with the said toggle and cam and arranged to maintain pressure of the clamp even though the plate yields.

4. In a printing machine, a plate support, a printing plate on the support, a plate clamp on the support, a rotatable clamp actuating member, a first means operably connected to the actuating member adapted to move the clamp toward the plate at a relatively high speed on initial movement of the actuating member, a second means operably connected to the rotatable member adapted to continue the motion of the clamp to clamping engagement with the plate at a slower speed on further movement of the rotatable member, and a spring associated with the said second means and arranged to maintain pressure of the clamp even though the plate yields.

5. In a printing machine, a plate support adapted to receive a printing plate, a plate clamp movable into and out of engagement with the plate, a first spring abutment secured to the plate clamp, a spring, a second spring abutment, a cam in engagement with the second spring abutment, means to rotate the cam, and a toggle mechanism operatively connected to said means and secured to the support.

6. In a printing machine, a plate support adapted to receive a printing plate, a plate clamp movable into and out of engagement with the plate, a first spring abutment secured to the clamp, a spring, a second spring abutment, a cam in engagement with the second spring abutment, means to rotate the cam, and a toggle mechanism operatively connected to said means and adjustably secured to the support.

7. In a printing machine, a plate support adapted to receive a printing plate, a plate clamp movable into and out of engagement with the plate, a toggle device secured to the support and operable to impart a relatively rapid motion to the plate clamp to move it into engagement with the plate, a cam connected to the toggle device and to the plate clamp and operable to impart a relatively slow motion to the plate clamp to secure

the plate in position, and a means for operating the toggle and the cam.

8. In a printing machine, a plate support adapted to receive a printing plate, a plate clamp movable into and out of engagement with the plate, an abutment secured to the support, a toggle mechanism pivotally secured to the abutment, a cam rotatable with respect to the toggle mechanism, a plunger engaging the cam, and a spring in engagement with the plunger and adapted to exert a thrust to hold the clamp into engagement with the plate.

9. In a printing machine, a plate support adapted to receive a printing plate, a plate clamp movable into and out of engagement with the plate, an abutment adjustably secured to the support, a toggle mechanism pivotally secured to the abutment, a cam rotatable with respect to the toggle mechanism, a plunger engaging the cam, a spring in engagement with the plunger and adapted to exert a thrust to hold the clamp into engagement with the plate, and means for adjusting the position of the abutment to clamp plates of various sizes.

10. In a printing machine, a plate support adapted to receive a printing plate, a plate clamp movable into and out of engagement with the plate, an abutment adjustably secured to the support, a toggle mechanism pivotally secured to the abutment, a cam rotatable with respect to the toggle mechanism, a plunger engaging the cam, a spring in engagement with the plunger and adapted to exert a thrust to hold the clamp into engagement with the plate, means for adjusting the position of the abutment to clamp plates of various sizes, and a means for operating the toggle and rotating the cam.

11. In a printing machine, a plate support adapted to receive a printing plate, a plate clamp movable into and out of engagement with the plate, an abutment adjustably secured to the support, a toggle mechanism pivotally secured to the abutment, a cam rotatable with respect to the toggle mechanism, a plunger engaging the cam, a spring in engagement with the plunger and adapted to exert a thrust to hold the clamp into engagement with the plate, means for adjusting the position of the abutment to clamp plates of various sizes, a shaft for rotating the cam and operating the toggle, and means for locking the shaft against rotation.

12. In a printing machine, a plate support adapted to receive a printing plate, a plate clamp movable into and out of engagement with the plate, an abutment secured to the support, a toggle mechanism having one member pivotally secured to the abutment and another member secured to a shaft, a cam rotatable on the shaft, a plunger engaging the cam, a spring in engagement with the plunger and adapted to exert a thrust to hold the clamp into engagement with the plate, and an indicating device adapted to show the position of the plunger relative to the clamp.

13. In a printing machine, a plate support adapted to receive a printing plate, a plate clamp movable into and out of engagement with the plate, an actuating mechanism including a toggle and a cam operable to move the clamp, and a spring interposed between the actuating mechanism and the clamp and arranged to maintain pressure of the clamp against the plate if the plate yields.

14. In a printing machine a plate support adapted to receive a printing plate, a plate clamp movable into and out of engagement with the

plate, a shaft rotatable by a tool to move the clamp, means interposed between the shaft and the clamp and arranged to maintain pressure of the clamp against the plate if the plate yields, and means cooperating with the tool and acting automatically to lock the shaft against rotation when the tool is removed and to unlock the shaft when engaged by the tool.

15. In a printing machine, a plate support adapted to receive a printing plate, an abutment secured to the support, a toggle mechanism pivotally secured to the abutment, a cam cooperating with the toggle mechanism, and a plate clamp movable into engagement with the plate by the combined action of the toggle mechanism and the cam.

16. In a printing machine, a plate support adapted to receive a printing plate, an abutment secured to the support, a toggle mechanism pivotally secured to the abutment, an actuating shaft, a cam secured to the shaft and cooperating with the toggle mechanism, and a plate clamp movable into engagement with the plate by the rotation of the actuating shaft.

17. In a printing machine, a plate support adapted to receive a printing plate, an abutment secured to the support, a toggle mechanism pivotally secured to the abutment, a cam cooperating with the toggle mechanism, a plate clamp movable into engagement with the plate by the combined action of the toggle mechanism and the cam, and means adapted to maintain pressure of the clamp on the plate if the plate yields.

18. The combination with a printing cylinder having a printing plate thereon, of a plate clip longitudinally slidable on the cylinder, means for projecting the clip to engage and lock said printing plate on the printing cylinder, and an indicator slidable with the said plate clip which will indicate by its position the locking engagement of the plate clip with the said printing plate.

19. The combination with a printing cylinder having a printing plate thereon, of a plate clip slidable on the cylinder, means for moving the clip into engagement with the plate and for exerting a spring thrust to the clip, and means for visually indicating by its position that the spring thrust has been exerted to the clip.

20. The combination with a printing cylinder having a printing plate thereon, of a plate clip slidable on the cylinder, means for moving the clip to locking engagement with the plate and for exerting a spring thrust to the clip after it has engaged the plate, and an indicator visually indicating that the spring thrust has been exerted to the clip.

21. The combination with a printing cylinder having a printing plate thereon, of a plate clip slidable on the cylinder, clip operating means which by an initial movement moves the clip into locking engagement with the plate and by a subsequent overmotion exerts a spring thrust to the clip, and an indicator operated by the overmotion to indicate by its position that the clip has been moved into locking engagement with the plate and the spring thrust exerted hereon.

22. The combination with a printing cylinder having a printing plate thereon, of a plate clip slidable on the cylinder, means for moving the clip into engagement with the plate and for exerting a spring thrust to the clip, and means for visually indicating by its position the degree of spring thrust exerted to the clip.

23. The combination with a printing cylinder having a printing plate thereon, of a plate clip slidable on the cylinder, means for moving the clip into engagement with the plate and for exerting a spring thrust to the clip, and means for visually indicating by its position that a predetermined spring thrust has been exerted to the clip.

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