Nov. 15, 1955 W. B. PAYNE 2,723,621

PRINTING APPARATUS

Filed June 17, 1952 2 Sheets-Sheet 1

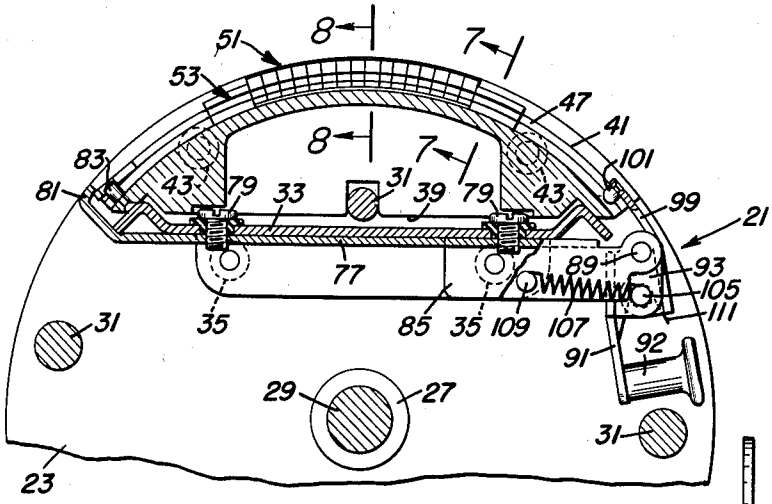


FIG. 1.

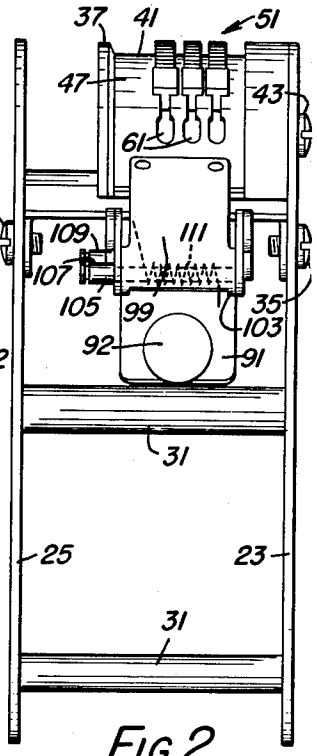


FIG. 2.

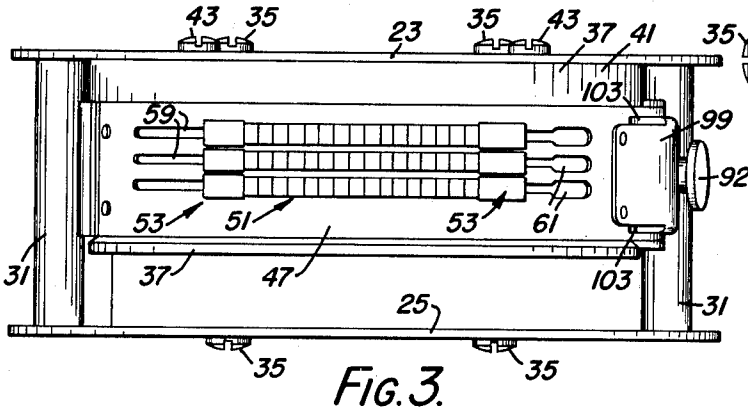


FIG. 3.

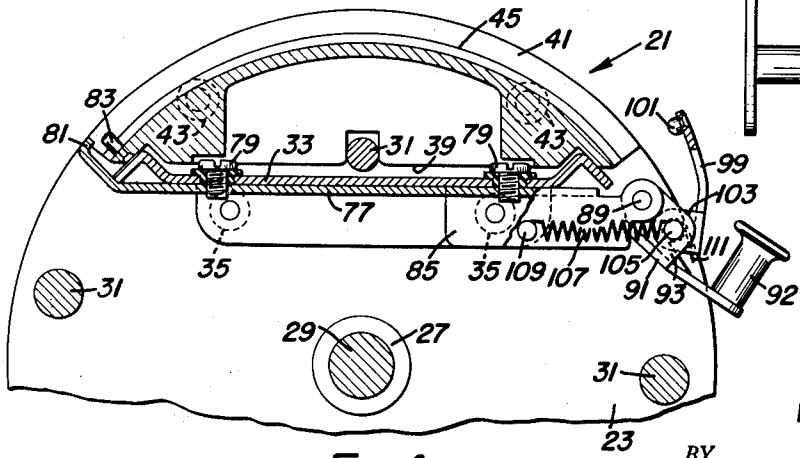


FIG. 4.

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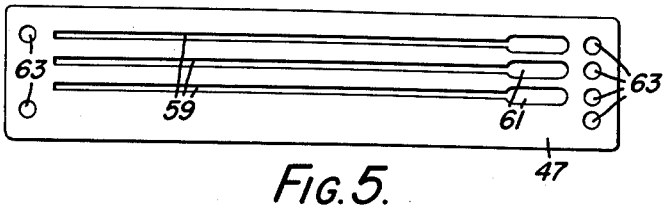


FIG. 5.

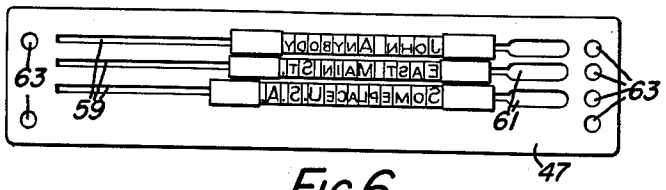


FIG. 6.

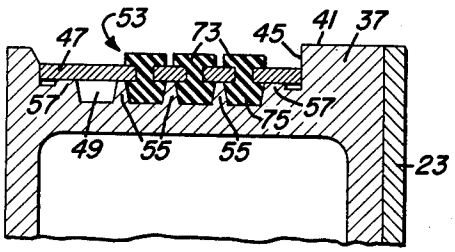


FIG. 7.

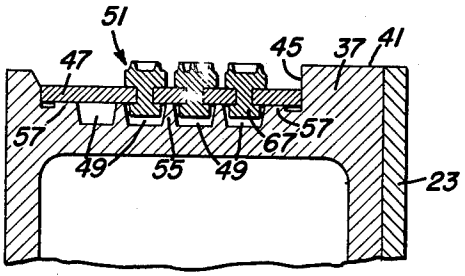


FIG. 8.

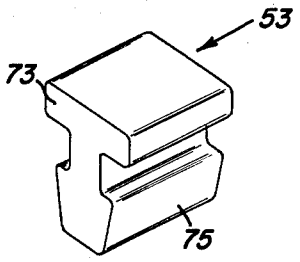


FIG. 9.

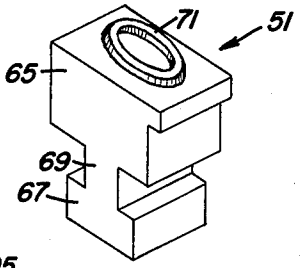


FIG. 10.

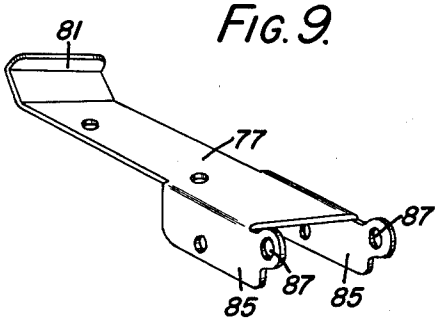


FIG. 11.

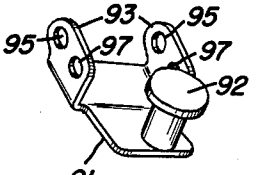


FIG. 12.

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United States Patent Office 2,723,621 Patented Nov. 15, 1955

2,723,621

PRINTING APPARATUS

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Application June 17, 1952, Serial No. 293,940

9 Claims. (Cl. 101—377)

This invention relates to printing apparatus, and more particularly to apparatus of the office equipment type for printing suitable legends on checks and other business forms.

It has been common practice in such machines to use as the printing member either an embossed plate, or a plate or segment having the type cast in the desired order and arrangement, or to use movable type arranged and rearranged in the desired order. However, all of these constructions are quite expensive and, in the case of an embossed plate serving as the printing member, there has been the further disadvantage that the impression obtained from such plates has not been as sharp as that obtainable with individual type members. Moreover, such plates have been expensive to manufacture which further added to the cost of printing with embossed plates.

Although type cast on a plate produces a satisfactory impression, the expense of obtaining such a cast plate is so high that this construction has not been wholly satisfactory for the smaller printing machines such as those used in offices and banks for printing legends on checks and other business forms.

The third construction in which individual movable type are used produces sharp impressions and does not require the use of an expensive embossing or type casting machine, as in the case of the other two constructions. However, a printing machine adapted for use with individual movable type is more expensive in that movable type necessitates special means for holding the same in position on the printing cylinder and such means have been generally complicated, or expensive or otherwise disadvantageous.

One object of my invention is, therefore, to provide an improved printing apparatus having simpler and more economical principles of construction and operation.

Another object is to provide a printing apparatus having the above advantages which is adapted to use movable type.

Another object is to provide a printing apparatus having an improved and more economical means for holding the movable type in the desired position on the printing cylinder.

A further object is to provide an improved line lock for holding the type in desired adjusted position and for preventing movement thereof during the printing operation.

Still a further object is to provide a printing apparatus having the above advantages and requiring a minimum of parts which may be readily and economically manufactured and assembled.

To these and other ends the invention resides in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Fig. 1 is a fragmentary sectional elevation of a printing apparatus embodying the present invention;

Fig. 2 is a fragmentary end elevation of the printing apparatus shown in Fig. 1;

Fig. 3 is a top plan view of the printing apparatus as shown in Figs. 1 and 2;

Fig. 4 is a sectional elevation of the printing apparatus as shown in Fig. 1 but with the type plate removed and clamping mechanism in its released position;

Fig. 5 is a top plan view of the type plate;

Fig. 6 is a similar view of the type plate, but showing type in position thereon;

Fig. 7 is a sectional elevation substantially along the line 7—7 in Fig. 1;

Fig. 8 is a sectional elevation substantially along the line 8—8 in Fig. 1;

Fig. 9 is an enlarged perspective view of a line lock;

Fig. 10 is an enlarged perspective view of a type element;

Fig. 11 is a perspective view of a part of the clamping mechanism removed for purposes of clarity, and

Fig. 12 is a perspective view of a lever, comprising part of the clamping mechanism, removed for purposes of clarity.

The preferred embodiment of the invention, herein disclosed by way of illustration, comprises a printing member or cylinder shown generally at **21** (Fig. 1). Printing cylinder **21** and the associated mechanism for rotating the same (not shown) is similar in various respects to that disclosed in my Patent No. 2,586,560, dated February 19, 1952. Cylinder **21** comprises a pair of spaced plates **23** and **25** (Fig. 2), each having a bushing **27** mounted on a transversely extending shaft **29** (Fig. 1). These plates are further connected by tie rods or pins **31** and a bridging plate **33** which is fastened to plates **23** and **25** by screws **35** (Fig. 2) for supporting the impression or type-holding means to be presently described.

The means for holding the type in desired position on cylinder **21** preferably comprises a block or casting **37** having a substantially flat lower face **39** and an arcuate or curved outer face **41** so as to form a segment of the printing cylinder. A pair of screws **43** holds casting **37** against plate **23** and in position on bridging plate **33** as shown in Figs. 1 and 2. The outer surface **41** of casting **37** is formed with a longitudinally extending notch or recess **45** (Fig. 7) which is of sufficient width to receivably hold and position a type holding plate **47** (Figs. 1, 5 and 7) to be hereafter described. The bottom of notch **45** is formed with a series of longitudinally extending notches or grooves **49** for the reception of the lower portion of type and line-locking members shown generally at **51** and **53**, respectively, as presently more fully described. Notches **49** are separated by raised portions or lands **55** which are of the same height as side lands **57** for evenly and uniformly supporting plate **47** as shown in Figs. 7 and 8.

Type plate **47** is preferably formed from a sheet of thin metal, plastic, fabricord, treated fiber sheet material such as vulcanized fiber, or other known or suitable material, and is of sufficient thickness so as to adequately support the type, but yet has sufficient flexibility so that it may be bent from a substantially flat position to an arcuate position substantially conforming to the curvatures of casting **37** as shown in Figs. 1 and 2. Plate **47** is formed with a series of longitudinally extending parallel type-receiving slots or grooves **59** which have an enlarged portion **61** adjacent the right-hand end thereof as viewed in Fig. 5. Plate **47** has a series of openings or holes **63** formed therein adjacent each end thereof as shown in Fig. 5 which aid in holding the plate in arcuate position on casing **37** as hereafter more fully described.

Type members **51** are substantially I-shaped in cross

section and have an upper portion 65 and a narrower lower portion 67 separated by a narrow throat portion 69 as shown in Fig. 10. The upper surface of portion 65 is formed with a raised character 71 as well understood in the art. Slots 59 in type plate 47 are of sufficient width so that their edges closely engage throat portions 69 of the type as shown in Fig. 8 and, in effect, form tracks or guideways for the movement of the type. Enlarged portions 61 are of sufficient width so as to allow the lower but not the upper portions of the type to pass therethrough for increasing the ease of inserting the type in the respective slots 59.

Line-locking members 53 hold type members 51 in desired position along slots 59 and prevent movement of the same during the mounting of the type plate and during the printing operation. Members 53 are preferably formed of rubber or other known and suitable resilient material and have a substantially I-shaped cross section as shown in Fig. 9. The upper portion 73 of lock 53 is substantially flat and somewhat lower than the printing faces of type members 51 as shown in Fig. 1, so as to clear the paper or other material being printed during the printing operation. However, the lower portion 75 of locking member 53 is substantially lower than the lower portion of type members 51 and is adapted to engage the bottom of grooves 49 and to be pressed and laterally extended thereby as the type plate is drawn into arcuate position on casting 37. This lateral projection of locking members 53 firmly forces lower portions 75 against the underside of plate 47, thereby adding to the frictional resistance between members 53 and plate 47, so as to securely hold the type in adjusted position and prevent longitudinal movement of the same during the printing operation. When type plate 47 is released to its substantially flat position, line locks 53, although frictionally engaging the edges of slots 59 so as to prevent accidental movement of the type, may be readily moved along the slots for removal and rearrangement of the type. It is to be noted that the lower portions 75 which lock members 53 are somewhat narrower than the upper portions and are tapered along the sides thereof so as to pass through enlarged end portions 61 of slots 59 for insertion in said slots in the same manner as the type members are inserted.

The means for releasably holding type plate 47 on casting 37 preferably comprises a bracket member 77 which is fastened to bridging member 33 by a pair of screws 79 (Fig. 1). The left-hand end of bracket 67 is somewhat reversely bent to form a retaining lip or flange 81 which, in conjunction with a pair of spaced pins or pegs 83 mounted on casting 37, engage and hold one end of type plate 47 as shown in Fig. 1, and as hereafter more fully described.

Bracket 77 is formed with a pair of depending flanges 85 (Figs. 4 and 11) adjacent the right-hand end thereof. Flanges 85 are formed with a pair of aligned openings 87 (Fig. 11) for receiving a pair of rivets 89 (Fig. 4) by means of which a member or lever 91 is mounted thereon. Lever 91 has a handle 92 mounted on one end and a pair of upstanding flanges 93 formed on opposite sides at the other end thereof as shown in Fig. 12. Flanges 93 are formed with a pair of holes or openings 95 and 97. Rivets 89 pass through holes 95 and hold lever 91 on bracket 77 as shown in Fig. 4. A second lever 99 which is slightly curved as shown in Fig. 4 is provided with a pair of depending pegs or fingers 101 at one end thereof and at the other end with a pair of depending flanges 103 which are formed with a pair of aligned openings (not shown) for mounting said lever on a transversely extending rod or shaft 105 (Figs. 1 and 2) which extends through openings 97 in lever 91. Shaft 105 extends outwardly beyond flange 93 as shown in Fig. 2 and is provided with a circumferentially extending notch for engaging one end of a coil compression spring 107 which is fixed at the opposite end thereof to a suitable peg or pin 109 on bracket 77 as shown in Fig. 1. Locking lever 99 which is free for pivotal movement about shaft 105 is moved in a counterclockwise direction as viewed in Figs. 1 and 4 by a coil spring 111 which is coiled around shaft 105 and engages lever 91 at one end thereof and lever 99 at the other end thereof as shown in Figs. 1 and 4. Thus, spring 107 tends to move lever 91 in a clockwise direction to its position shown in Fig. 1 while spring 111 tends to move locking member 99 in a counterclockwise direction relative to lever 91 to its position shown in Fig. 1.

In operation, the clamping means above described is moved to its unlocked or open position shown in Fig. 4 by an outward and upward force on lever 91 which moves to its position shown in Fig. 4 and carries locking lever 99 with it. Lever 99 is then swung in a clockwise direction against the tension of spring 111 and the clamping mechanism is now in unlocked position. A plate 47 having type arranged thereon as shown in Fig. 6 is then placed in position on casting 37 by first slipping one end under left-hand portion 81 of bracket 77 and engaging the corresponding holes 63 with the respective pegs 83 on the left end of casting 37 as shown in Fig. 4. The type plate is then bent downwardly by hand substantially conforming to the curvature of casting 37 and locking lever 99 released for movement in a counterclockwise direction until pins 101 thereon engage the corresponding openings 63 in the adjacent end of the type plate. Lever 91 is then swung in a clockwise direction to its locked position shown in Fig. 1. This movement of lever 91 carries lever 99 with it and moves the same circumferentially along the printing cylinder thereby pulling type plate 47 into tight engagement with the upper surface of casting 37. As shaft 105, about which lever 99 pivots, passes beneath the pivotal center of lever 91 which is the center line of rivets 89, lever 99 exerts its greatest pull on plate 47, and on passing this point lever 91 aided by spring 107 quickly snaps or swings to its extreme clockwise position shown in Fig. 1. Although levers 91 and 99 would remain in locked position without springs 107 and 111, said springs serve as a safeguard against accidental release of the clamping mechanism in that they prevent rattling or loosening of the mechanism by centrifugal force during the printing operation. Springs 107 and 111 also move levers 91 and 99, respectively, to their retracted positions (as shown in Fig. 1) when the type plate is removed, thereby preventing the levers from striking against the machine should printing cylinder 21 be rotated without having a type plate mounted thereon.

When plate 47 is drawn into tight engagement with the outer surface of casting 37, bottom portion 75 of line locks 53 is forced tightly against the bottom of notches 49 thereby laterally pressing or squeezing the locking members and securely clamping the same in slots 59. The bottom portions 69 of type members 51 do not contact the bottom or sides of notches 49 but are supported solely by type plate 47 as shown in Fig. 8. Plate 47 is supported adjacent each side thereof by lands 57 and intermediate slots 49 by lands 55 as shown in Figs. 7 and 8. Although plate 47 is shown with only three slots formed therein, it is to be understood that an additional slot could be added if desired. Slots 59 are located laterally off center so that, when the plate is used with slots 59 in alignment with the right-hand notches 49 as shown in Fig. 7 and the printing does not come at the desired point on the check or other business form, the plate may be removed from the cylinder, the type members removed, and the plate turned end for end or flipped over so that slots 59 will be in alignment with the left-hand three of grooves 49, and then the type reinserted. This laterally shifts the type by the distance between adjacent ones of slots 59. This lateral shifting may also be accomplished without having to remove and reinsert the type by removing the plate from the cylinder and turning it end for end. However, this necessitates turning the material to be printed so that its opposite edge would be fed first as well as shifting the feed guideways

for the material. The type, of course, may be positioned at any desired point along slots **59**.

It is to be understood that the type may be inked either by means of an inking fountain or by means of the ribbon-inking method shown in my said patent, or by other known and suitable means.

Thus it will be seen that my invention provides an inexpensive printing apparatus which allows the use of standard, readily obtainable, movable type elements without the necessity of complicated and expensive type holding devices. That is, my flexible type plate may be readily formed of metal or suitable plastic material and conventional type readily inserted thereon or removed therefrom without the use of special tools or equipment. The type plate accurately supports and positions the type during the printing operation and my improved line-locking members which are easily inserted or withdrawn from type slots **59** securely engage the ends of the lines of type as shown in Fig. 1 and prevent longitudinal movement of the type along the slots as the plate is being clamped in position and during the printing operation.

The clamping mechanism for the type plate provides an easily operated, positive means for holding the plate firmly in place on casting **37** substantially conforming to the curvature of the casting. Due to the circumferential pulling action and double pivotal movement of lever **99** relative to the cylinder, the clamping mechanism is self-locking and will hold the type plate in position even if springs **107** and **111** should fail. Springs **107** and **111** act to hold the clamping mechanism in locked position and upon removal of the type plate, cause levers **91** and **99** to quickly move to their retracted positions within the outline contour of the cylinder as shown in Fig. 1, so that the printing cylinder may be rotated without the clamping mechanism striking against or engaging the printing apparatus.

A further advantage of my apparatus is that it may be readily added to existing office printing machines such as that shown in my said patent without expensive or time-consuming alteration therein. The apparatus requires but a few parts which may be readily manufactured and assembled and which are of rugged construction so that, when assembled, the mechanism will continue to operate for extended periods without further attention or repair.

It will thus be seen that the invention accomplishes its objects and while it has been herein disclosed by reference to the details of a preferred embodiment, it is to be understood that such disclosure is intended in an illustrative, rather than a limiting sense, as it is contemplated that various modifications in the construction and arrangement of the parts will readily occur to those skilled in the art, within the spirit of the invention and the scope of the appended claims.

I claim:

1. A printing device comprising a rotatable cylinder, a type plate having a series of type-receiving slots, said slots having an enlarged portion adjacent one end thereof for insertion of movable type, means for releasably holding said plate on said cylinder in arcuate position substantially conforming to the curvature of said cylinder, and resilient line-locking members extending below the bottom of said type plate and type in position to be engaged and pressed by contact with said cylinder for holding the type against movement along said slots.

2. A printing device comprising a rotatable cylinder, a flexible type plate having a series of type-receiving slots, said slots having an enlarged portion adjacent one end thereof for insertion of movable type, means for releasably holding said plate on said cylinder in arcuate position substantially conforming to the curvature of said cylinder, and resilient line-locking members extending below the bottom of said type plate and type in position to be engaged and pressed by contact with said cylinder for holding the type against movement along said slots.

3. A printing device comprising a rotatable cylinder, a flexible type plate having a series of type-receiving slots, said slots having an enlarged portion adjacent one end thereof for insertion of movable type, a rubber line-locking member having opposite sides channeled to engage the edges of said type-receiving slots and having its bottom extending below the bottom of said type plate and the type in position to be engaged and laterally pressed by said cylinder for holding the type against movement along said slots, and means for releasably holding said plate on said cylinder in arcuate position substantially conforming to the curvature of said cylinder.

4. A printing device comprising a rotatable cylinder, a type plate having a series of type-receiving slots, means on said cylinder for detachably engaging one end of said type plate, clamping means on said cylinder for releasably holding said plate on said cylinder in arcuate position substantially conforming to the curvature of said cylinder, said clamping means comprising lever means detachably engaging the other end of said type plate and having a movable connection with said cylinder for releasably holding said type plate in position thereon, and resilient means normally urging said lever means to retracted position within the contours of said cylinder when the type plate is removed from said cylinder.

5. A printing device comprising a rotatable cylinder, a flexible type plate having a series of type-receiving slots, means on said cylinder for engaging one end of said type plate, clamping means on said cylinder for releasably holding said plate on said cylinder in arcuate position substantially conforming to the curvature of said cylinder, said clamping means comprising lever means engaging the other end of said type plate and having a connection with said cylinder for movement circumferentially thereof for releasably holding said type plate in position thereon, and resilient means normally urging said lever means to retracted position within the contours of said cylinder when the type plate is removed from said cylinder.

6. A printing device comprising a rotatable cylinder, a type plate having a series of type-receiving slots, said slots having an enlarged portion adjacent one end thereof for insertion of movable type, fixed means on said cylinder for detachably engaging one end of said type plate and self-locking clamping means engaging the other end of said plate for releasably holding said plate on said cylinder in arcuate position substantially conforming to the curvature of said cylinder, said clamping means comprising a lever pivotally mounted on said cylinder for movement relative thereto, a locking lever engaging said other end of said type plate, said locking lever being pivotally mounted on said first lever for movement circumferentially along said cylinder for holding said plate in position thereon, and resilient means for holding said levers in retracted position within the contour of said cylinder when the type plate is removed from said cylinder.

7. A printing device comprising a rotatable cylinder, a type plate having a series of type-receiving slots, said slots having an enlarged portion adjacent one end thereof for insertion of movable type, means on said cylinder for engaging one end of said type plate, self-locking clamping means engaging the other end of said plate for releasably holding said plate on said cylinder in arcuate position substantially conforming to the curvature of said cylinder, said clamping means comprising a lever pivotally mounted on said cylinder for movement relative thereto, a locking lever engaging said other end of said type plate for releasably holding said plate on said cylinder, said locking lever being pivotally mounted on said first lever for movement relative to said first lever and with said first lever relative to said cylinder for movement circumferentially along said cylinder for holding said plate in position thereon, said first lever carrying the pivot of said locking lever past the center of said first lever for locking said levers in clamping position, and resilient means for holding said levers in retracted posi-

tion within the contour of said cylinder when the type plate is removed from said cylinder.

8. A type plate for use with a printing device comprising a plate adapted to be releasably secured on a surface of the printing device, said plate being formed with a longitudinally extending slot for the reception of movable type, and a line-locking member having opposite sides thereof channeled and slidably supported thereby in said slot for positioning at the end of the movable type, said member having a lower portion of resilient material extending below the bottom of said plate and the movable type in position to be engaged by the surface of the printing device, when secured thereon, and pressed into contact with said plate for locking the type against movement along said slot.

9. A type plate for use with a cylindrical printing device, comprising a plate of flexible material adapted to be releasably secured on a grooved cylindrical surface of the printing device in arcuate position conforming to the curvature of the surface, said plate being formed with a series of longitudinally extending slots each having an enlarged portion adjacent one end for the reception of movable type, and a plurality of resilient line-locking members supported in said slots and adapted to be positioned at the ends of the movable type, said members being

channeled at opposite sides thereof to frictionally engage the edges of said slots and to be slidably supported thereby, said members extending below the bottom of the plate and the movable type in position to be engaged by the cylindrical surface within the grooves thereof, when secured thereon, and pressed into frictional contact with said plate and the grooves, with the type spaced from the grooved cylindrical surface, for locking the type against movement along said slots.

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