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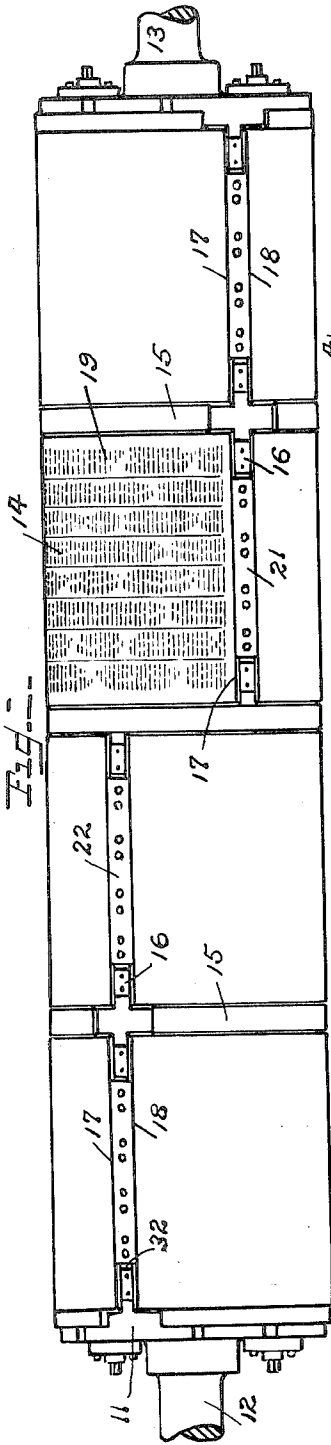
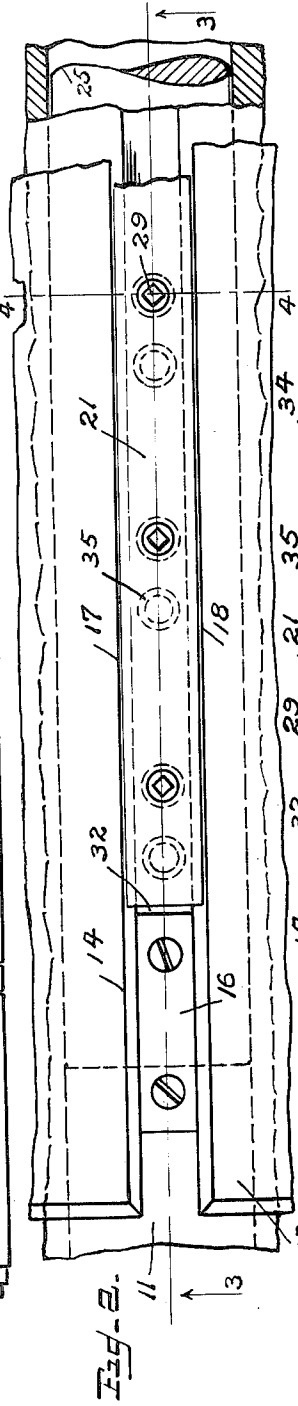
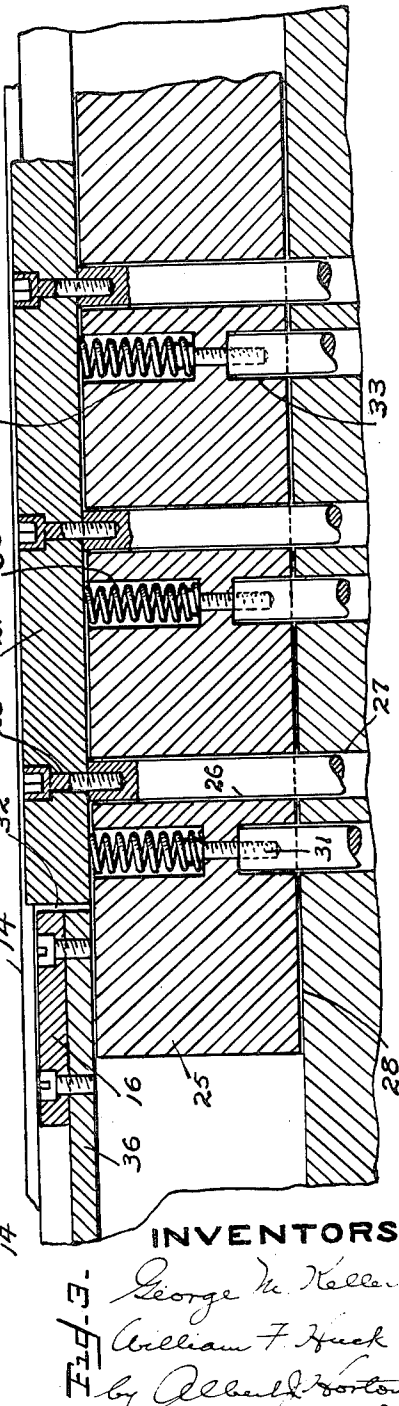
G. M. KELLER ET AL

2,179,508

PLATE CLAMP FOR PRINTING MACHINES

Filed Aug. 21, 1937

4 Sheets-Sheet 1



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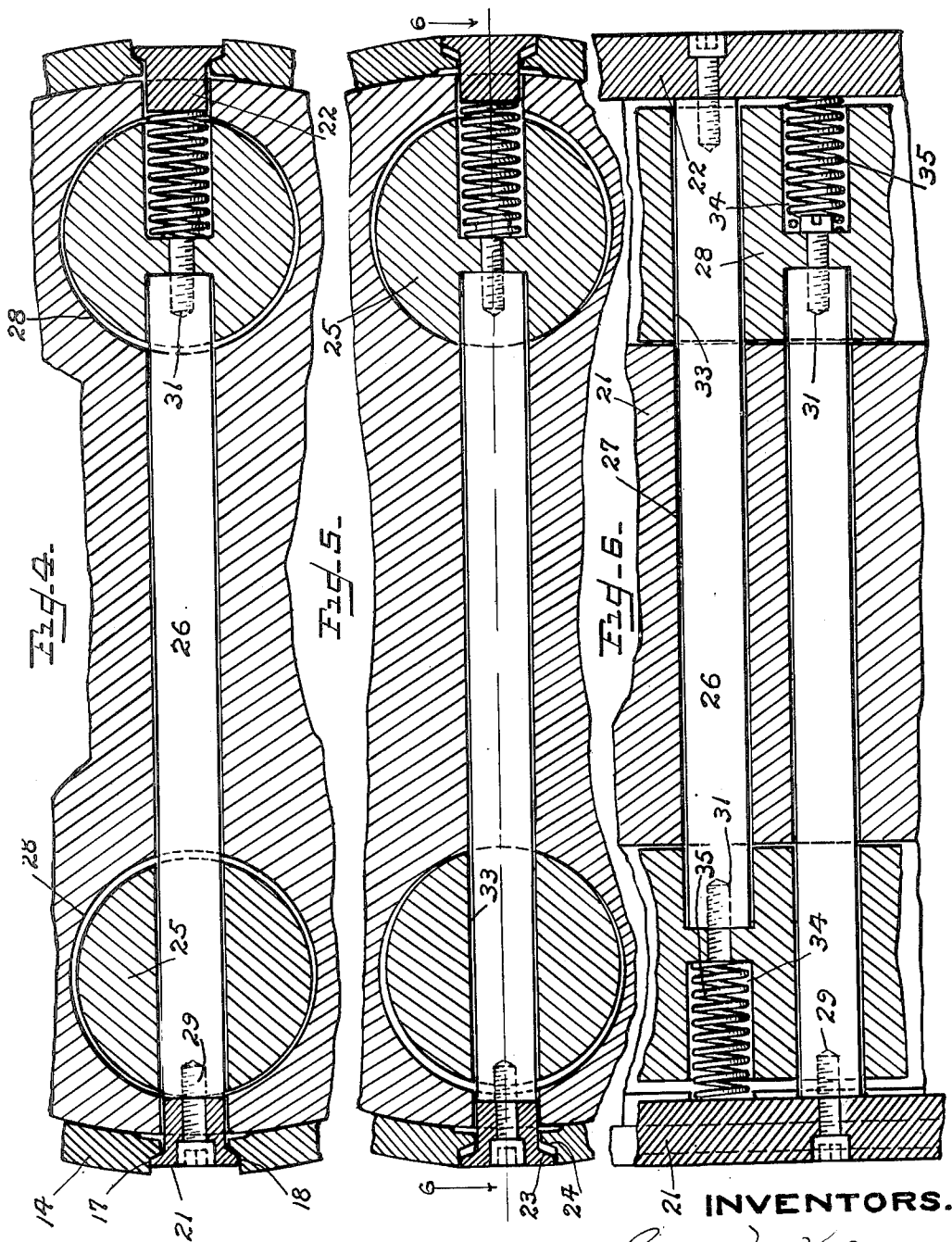
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4 Sheets-Sheet 2



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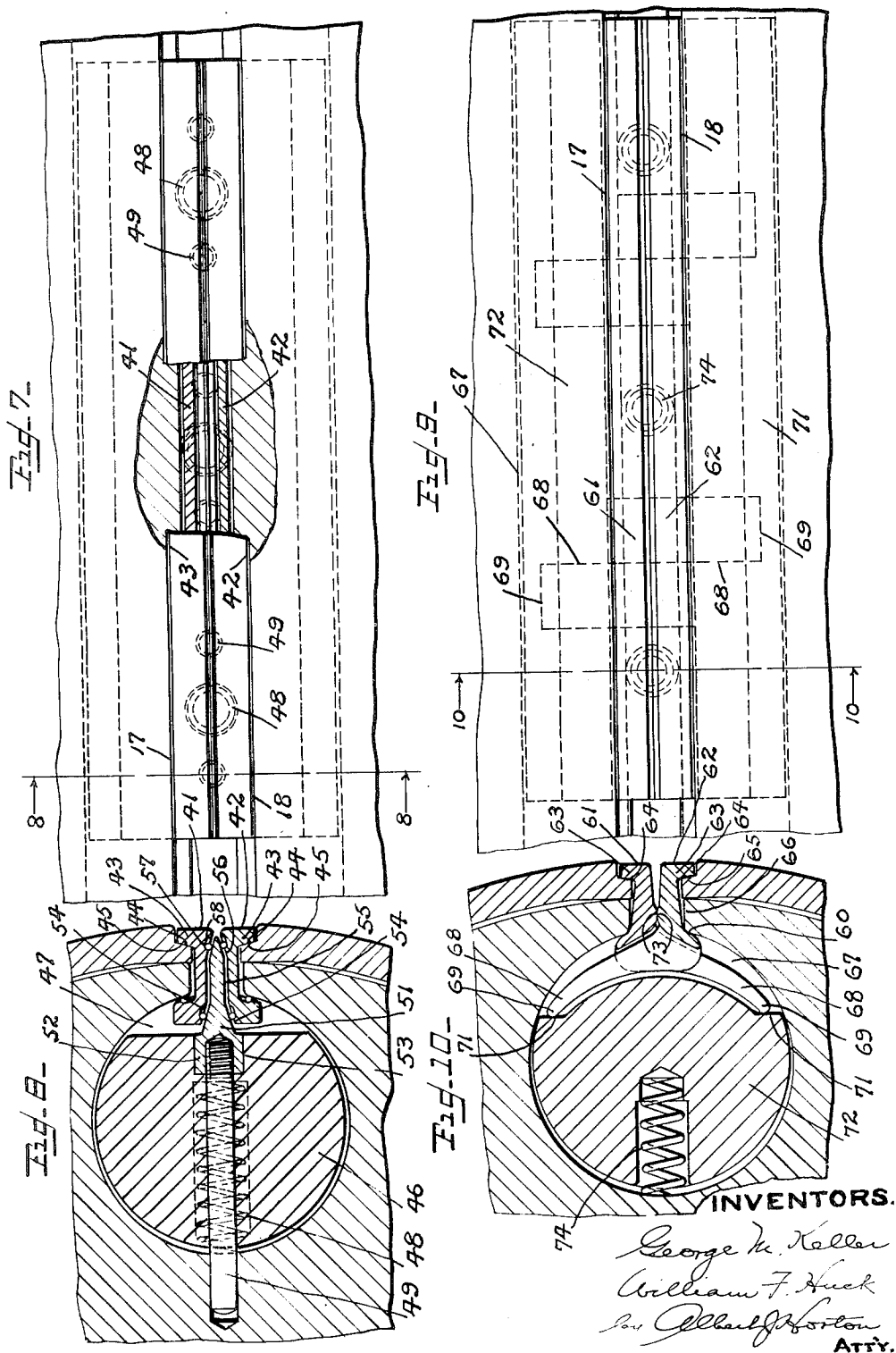
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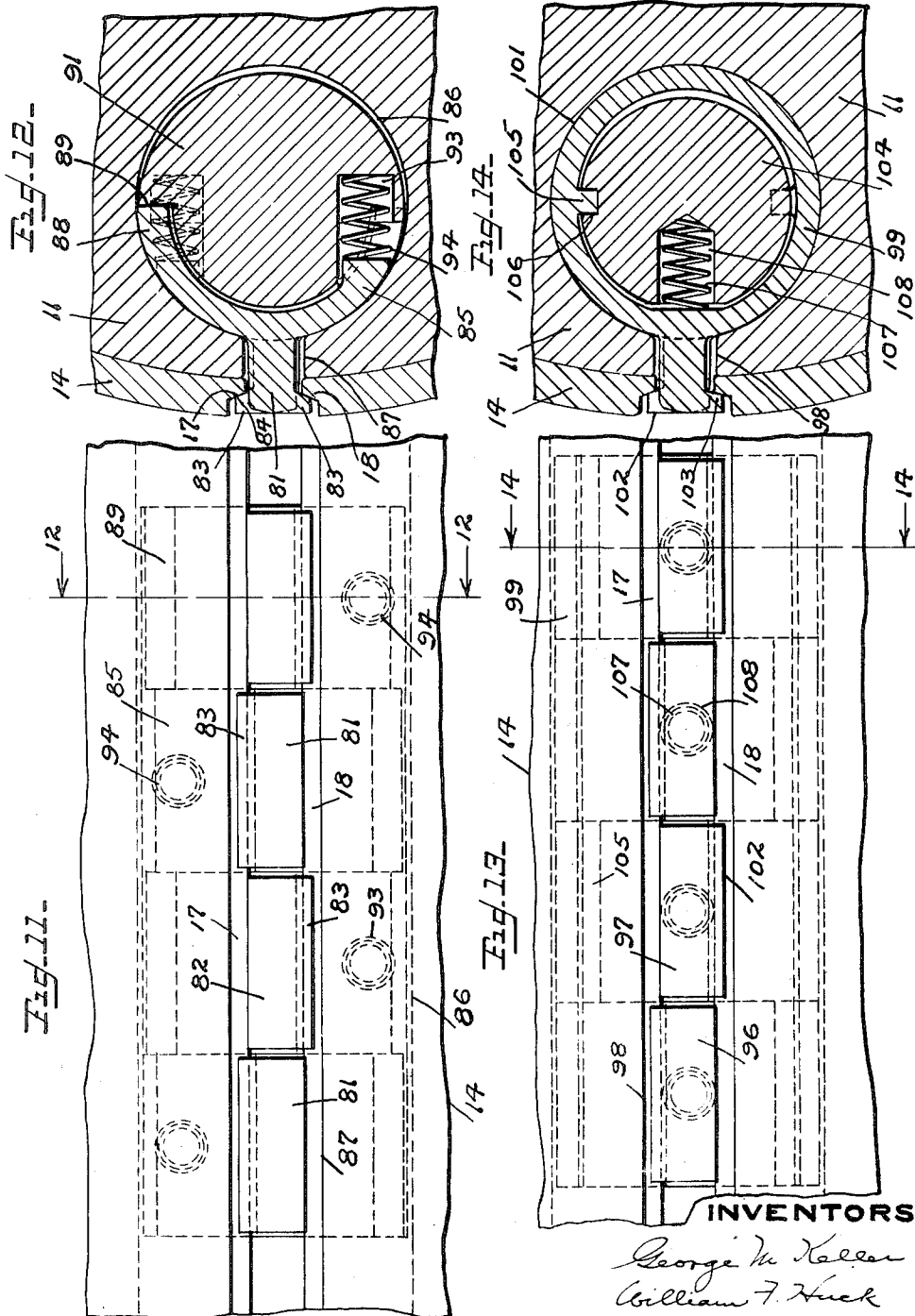
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UNITED STATES PATENT OFFICE

2,179,508

PLATE CLAMP FOR PRINTING MACHINES

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18 Claims. (Cl. 101—378)

This invention relates to plate clamping means for printing and like machines, and more particularly to a plate clamping mechanism which includes a margin bar, arranged for use in securely clamping the straight edge of a curved printing plate to a form cylinder of a printing machine.

The plate clamping means of this invention is particularly adapted and arranged to engage the straight edge of a curved plate upon a form cylinder of a printing machine and hold it tightly thereagainst to prevent this plate edge from bowing upwardly away from the cylinder, due to centrifugal force developed when the cylinder is rotated or other cause. The clamping means of this invention includes a margin bar arranged on the cylinder to engage the straight edge of a curved printing plate, and means associated with this bar and actuated by centrifugal force developed by the rotative movement of the cylinder, to cause this bar to press against, and clamp, the plate to the cylinder by a pressure, which increases in proportion to the speed of rotation of the cylinder.

One object of this invention is to provide an improved plate clamping means of the above nature.

Another object is to provide in combination with a curved plate receiving cylinder, means actuated by centrifugal force developed when the cylinder is rotated, to securely hold a straight edge of the curved plate against the cylinder.

It is also an object of this invention to provide a plate clamping means 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.

The preferred embodiment of this invention is illustrated in the accompanying drawings, wherein:

Figure 1 is a face view of a form cylinder of a printing machine, with plate clamping means embodying the features and principles of this invention associated therewith;

Figure 2 is an enlarged plan view of one end of a pair of printing plates and the margin bar constituting a part of the clamping means of this invention disposed between the straight edges thereof;

Figure 3 is a longitudinal section taken on line 3—3 of Figure 2;

Figure 4 is a cross sectional view taken on line 4—4 of Figure 2 and showing the position of the parts when the cylinder is rapidly rotating;

Figure 5 is a cross sectional view similar to Figure 4 but showing the position of the parts when the cylinder is not rotating;

Figure 6 is a sectional view taken on line 6—6 of Figure 5;

Figure 7 is an enlarged plan view of one end of a pair of printing plates and a somewhat modified form of margin bar constituting a part of the clamping means disposed between the straight edges thereof;

Figure 8 is a cross sectional view taken on line 8—8 of Figure 7;

Figure 9 is an enlarged plan view of another modified form of margin bar disposed between the straight edges of a pair of printing plates;

Figure 10 is a cross sectional view taken on line 10—10 of Figure 9;

Figure 11 is an enlarged plan view of another modified form;

Figure 12 is a sectional view taken on line 12—12 of Figure 11;

Figure 13 is an enlarged plan view of still another modified form; and

Figure 14 is a sectional view taken on line 14—14 of Figure 13.

The features and principles of this invention being especially adapted for association with the form cylinder of a printing machine, the drawings illustrate a form cylinder 11 having shaft ends 12 and 13 extending from its ends whereby it may be journaled in suitable supports (not shown) and be rotated to perform its usual function in combination with the other mechanisms of a printing machine. The cylinder 11 is adapted to have a plurality of curved printing plates 14 mounted thereon and is provided with the usual curved edge clamping and locating members 15 and straight edge locating blocks 16. The plates 14 generally extend peripherally about the cylinder 11 and have the straight edges 17 and 18 of one plate slightly spaced from, and in opposed relation to, the straight edges 17 and 18 of another plate, the opposing edges of both plates being in abutment with the edge locating blocks 16.

The clamping members 15 impose a cross pressure upon the plates 14 and the rapid rotation of the cylinder 11 develops centrifugal force, both of which forces tend to bulge the center of the plate 14 away from the cylinder. This bulging

tendency is greatest at the straight edges 17 and 18 of the plates 14 for the central portions 19 are inherently stiffened by their arcuate formation. This invention provides means to counteract this bulging tendency by the provision of margin bars 21 and 22, each having a shoulder 23 adapted to overlie a corresponding shoulder 24 formed on the straight edges 17 and 18 of the plate 14. Herein the margin bars 21 and 22 are shown provided with oppositely directed shoulders 23 whereby the shoulders 24 on the opposed edges 17 and 18 of adjacent plates 14 will be simultaneously engaged.

The margin bars 21 and 22 extend lengthwise of the cylinder 11 along the straight edges 17 and 18 of the plates 14 and are each secured to a cylindrical weight 25, by means of a plurality of tie rods 26 which freely pass through openings 27 formed in the cylinder 11. Each of the weights 25 is preferably disposed in an opening 28 formed in, and extending lengthwise of, the cylinder 11 and which is preferably disposed adjacent the periphery of the cylinder 11 and diametrically opposite the margin bar connected thereto. The openings 27 are preferably radially directed through the cylinder and are slightly larger in diameter than the rods 26 to permit a small amount of free movement for the margin bar in any direction. Likewise, the openings 28 are larger in diameter than the weights 25 to permit transverse movement of the weights therein. The bars 21 and 22 are connected to the rods 26 by screws 29 and the weights 25 are connected to the rods 26 by screws 31.

Herein the weights 25 are shown somewhat longer than the margin bars 21 and 22, and these bars are shown somewhat shorter than a groove 32 provided in the cylinder 11 to receive them. The margin bars 21 and 22 in this instance are T shaped in cross-section, the body portion being disposed in the groove 32 and the arm portions forming the oppositely directed shoulders 23.

The groove 32 in which one of the bars 21 and 22 is disposed, is shown in communication with the openings in which the weight 25, connected to the opposite margin bar, is disposed. The tie rods 26 connecting one bar with its associated weight are shown passing through openings 33, formed in the weight connected with the opposite bar.

Each weight 25 is counterbored as at 34 to receive a compression spring 35. The counterbores 34 are herein shown in alignment with the tie rods 26, connected to the respective weight, and the spring 35 is therefore arranged to encircle the head of the screw 31 which is disposed in the counterbore. The springs 35 react between the bottom of the counterbores 34 and the undersurface of the margin bar overlying the respective weight which is connected to the opposite margin bar, whereby the bars 21 and 22 with their associated parts, tie rods 26 and weights 25 may be referred to as being floatingly mounted in the cylinder 11. It will be obvious that, if margin bars are not diametrically opposed, the springs 35 can be arranged to react between the bottoms of the counterbores 34 and any suitable abutment secured to or forming part of the peripheral wall 36 of the cylinder 11, and overlying the weight openings 28.

In the arrangement shown, the springs 35 in one weight 25 reacting against the margin bar connected to the opposite weight tends to create

an equalizing effect whereby the action of the opposite margin bars 21 and 22 will engage the respective plate edges 17 and 18 with substantially equal pressure. Preferably the springs 35 are tensioned only sufficiently to counterbalance the weight of the parts associated therewith and not sufficiently to interfere with the movements of these parts to press the margin bar upon the plate edge to clamp the straight plate edge to the cylinder 11.

The margin bars 21 and 22 are forced against the straight plate edges 17 and 18 due to centrifugal force developed by rotation of the cylinder 11 and acting on the weights 25 to throw them outwardly. Movement of the weights transversely in the openings 28 will, through the tie rods 26, press the margin bar shoulders 23 against the corresponding shoulders 24 on the opposed straight edges 17 and 18 of the plates 14, to clamp these edges tightly to the cylinder 11. Obviously, the faster the cylinder 11 rotates the more centrifugal force is developed and hence the pressure of the margin bars 21 and 22 upon the plate straight edges will be correspondingly increased, thus overbalancing the tendency for these edges to bulge as above described, and maintaining them tightly against the periphery of the cylinder 11.

In the form shown in Figures 7 and 8, the margin bar, disposed between the opposing straight edges 17 and 18 of the plates 14, is constituted by members 41 and 42, each having a flange 43 extending along its outer edge to provide oppositely directed shoulders 44 adapted to overlie the corresponding shoulders 45 formed on the straight edges 17 and 18. The abutting surfaces between the shoulders 44 and 45 are inclined from the plate edges 17 and 18 outwardly toward the periphery whereby when the members 41 and 42 are spread apart the plates 14, at their edges 17 and 18, will be more firmly pressed against the cylinder 11.

The means to spread the members 41 and 42 apart includes a weight 46 disposed in a longitudinally extending opening 47 formed in the cylinder 11 adjacent its periphery and directly below the plate straight edges 17 and 18. The weights 46 are normally pressed radially outwardly by springs 48 and are guided in any radial movements by studs 49 which extend through the weights and into the cylinder 11 from a member spreading bar 51. Each bar 51 has a base 52 seated in a groove 53 formed in the respective weight 46 and extends radially outwardly therefrom between the members 41 and 42. Adjacent the weight 46 the side surfaces of the bar 51 are inclined toward each other as at 54 from the base 52 to an intermediate straight portion 55, the side surfaces of which are parallel, and then the side surfaces are again inclined toward each other as at 56.

Intermediate the inclined side surfaced portions 54 and 56 of the bar 51 and the adjacent members 41 and 42 non-friction members 57, such as hardened steel rods, may be disposed in recesses 58 formed in the members 41 and 42 against which these inclined surfaces act to spread the members 41 and 42, when centrifugal force urges the weights 46 outwardly. The spreading action of the members 41 and 42 tends to force the inclined surfaces 44 of the members 41 and 42, peripherally over the inclined surfaces 45 of the plate edges 17 and 18 respectively, and increasing centrifugal force developed by increasing speed of rotation of the cylinder 11 will increase

ingly clamp the plate edges 17 and 18 against the cylinder.

In the form shown in Figures 9 and 10, the margin bar disposed between the opposing straight edges 17 and 18 of the plates 14 is constituted by a pair of cooperating members 61 and 62, each having a flange 63 extending along its outer edge to provide oppositely directed shoulders 64 adapted to overlie corresponding shoulders 65 formed on the straight edges 17 and 18. As in the previously described form, the abutting surfaces between the shoulders 64 and 65 are inclined so that when the flanges 63 of the members 61 and 62 are spread apart these edges will be more firmly pressed against the cylinder 11.

The members 61 and 62 extend from the flanges 63 into the cylinder 11 through a slot 66, and have their inner edges fulcrumed respectively on the opposing inner edge 60 of the slot 66 where it joins an opening 67 extending longitudinally through the cylinder 11 adjacent its periphery and directly beneath the plate edges 17 and 18. Each of the members 61 and 62 is provided with a finger-like extension or extensions 68, the ends 69 of which are adapted to seat upon a flattened area 71 formed on a weight 72 disposed in the openings 67. A curved fulcrum surface 73 is provided between and on each of the members 61 and 62 whereby when the fingers 68 are spread by the action of the weight 72 being urged outwardly by centrifugal force the flanges 63 will be spread apart. Springs 74 are provided to react between the surface of the openings 67 and the weights 72 to constantly maintain the parts in engagement.

In the form shown in Figures 11 and 12, the margin bar is constituted by a plurality of members 81 and 82, each having a flange 83 extending along its outer edge forming a shoulder 84. The members are disposed in juxtaposed position with the flanges 83 oppositely directed whereby the shoulder 84 of one will overlie the straight edge 17 of one plate and the shoulder 84 of the next adjacent one will overlie the straight edge 18 of the other plate. The members 81 and 82 extend into the cylinder 11 and are each secured to a curved plate 85 disposed in a longitudinally extending opening 86 through a slot 87. An edge 88 of each of the plates 85 is adapted to seat upon one of a series of shoulders 89 alternately formed on the sides of a weight 91 disposed in the opening 86 and which is of sufficient length to extend under all of the members 81 and 82. The other edge 92 of each of the plates 85 overlies a hole 93 formed in the side of the weight 91 opposite each of the shoulders 89 and is engaged by a spring 94 seated in the hole 93.

When the cylinder 11 is rotating rapidly, the parts assume the positions shown in Figures 11 and 12, the weight 91 being urged outwardly toward the periphery of the cylinder by centrifugal force. Movement of the weight 91 toward the periphery of the cylinder 11 has moved the curved plates 85 within the opening 86 against the tension of the springs 94 and the shoulders 84 of the flanges 83 have engaged the respective printing plate edges 17 or 18 to securely clamp the plates to the surface of the cylinder 11. When the cylinder comes to rest, the springs 94 will reversely move the curved plates 85 to release the clamping engagement of the shoulders 84 of the flanges 83 with the plate edges 17 and 18.

Referring to the form shown in Figures 13 and 14, members 96 and 97 extend through a slot

98 formed in the cylinder 11 from a sleeve member 99 disposed in a longitudinally extending opening 101 formed in the cylinder 11. Each member 96 and 97 is provided with a flange 102 forming a shoulder 103 which is adapted to overlie the adjacent straight edges 17 and 18 respectively of the printing plates. The members 96 and 97 are arranged in juxtaposed position in the cylinder 11 and have their flanges 102 alternately directed to engage opposing printing plate edges.

A weight 104 extends through all of the sleeve members 99 and is connected to each member by a lug 105 extending inwardly from the internal periphery of the members 99 into a slot 106 provided in the weight. The lugs 105 of the members 99 are disposed on the side of the member opposite to that side toward which the flanges 102 extend and the members 99 are assembled on the weight 104 with the lugs 105 of adjacent members alternately directed, whereby movement of the weight 104 outwardly under the urge of centrifugal force when the cylinder 11 is rotated will cause the alternate sleeve members 99 to oppositely twist and the flanges 102 on the respective members 96 and 97 will therefore clampingly engage the printing plate edges 17 and 18 respectively as shown in Figures 13 and 14. Springs 107 disposed in holes 108 formed in the weight 104 will react between the weight and each of the sleeve members 99 to twist the latter back into their normal position when the cylinder stops rotating.

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 means herein disclosed forms a part of the invention included in this application.

What we claim is:

1. In plate clamping mechanism for the form cylinder of a printing machine adapted to use pre-curved printing plates, a margin bar arranged to operably move radially with respect to the axis of the cylinder, to engage a straight edge of a plate and clamp it to the cylinder, and a weight connected to the margin bar whereby it is moved to clamp the plate when the machine is operated.

2. In plate clamping mechanism for the form cylinder of a printing machine adapted to use curved printing plates, a movable margin bar, and means actuated by centrifugal force to operably move said bar into engagement with an edge of a plate on the cylinder and clamp it to the cylinder.

3. In mechanism for clamping a curved plate to the form cylinder of a printing machine, a movable margin bar extending lengthwise along and over a straight edge of the plate, and centrifugally affected means to move said bar into clamping engagement with the plate straight edge to secure it to the cylinder.

4. In mechanism for clamping a curved plate to the form cylinder of a printing machine, a margin bar extending along and over an edge of the plate, and means actuated by centrifugal force developed by the rotation of said cylinder to cause said bar to engage and clamp the plate to the cylinder by pressure varying with the rotative speed of said cylinder.

5. In a printing plate clamping mechanism, a

margin bar adapted to extend along and over an edge of the plate and being arranged to be operably moved into engagement with the plate edge and to clamp it to a cylinder of a printing machine, means actuated by centrifugal force developed by the rotation of the cylinder to so move the bar, and means to move said bar out of engagement with said edge.

6. In a printing plate clamping mechanism, a margin bar adapted to extend along and over an edge of the plate and mounted adjacent the plate edge to be operably moved into engagement with the plate edge and to clamp it to a cylinder of a printing machine, and a weight connected to said bar and actuated by centrifugal force to so move said margin bar.

7. In a printing plate clamping mechanism, a rotatable cylinder, a margin bar arranged to overlie a straight edge of a printing plate on said cylinder, and a weight carried by said cylinder to be acted upon by centrifugal force developed by the rotative movement of said cylinder to move said bar into engagement with the edge of said printing plate and clamp it to said cylinder.

8. In a printing plate clamping mechanism for securing printing plates to a rotatable form cylinder of a printing machine, a margin bar adapted to overlie a straight edge of the printing plate, and a weight connected to said bar and movable by centrifugal force to cause said bar to clamp the plate edge to the cylinder.

9. In a clamping mechanism for securing printing plates to a rotatable form cylinder of a printing machine, a movable margin bar adapted to overlie an edge of the printing plate, and a weight operably connected to said bar and carried by said cylinder to be affected by centrifugal force due to the rotative movement of the cylinder to cause said bar to clamp the plate to the cylinder.

10. In a mechanism for securing a curved plate upon a rotatable form cylinder of a printing machine, a margin bar mounted on the cylinder to overlie and moved toward an edge of the plate, and a radially movable weight carried by the cylinder and connected to said bar to move the bar into clamping engagement with the plate edge when the cylinder is rotated.

11. In a plate clamping mechanism for securing a curved plate upon a rotatable form cylinder of a printing machine, a margin bar mounted on the cylinder to overlie and move toward an edge of the plate, a weight carried by the cylinder and connected to said bar to move the bar into clamping engagement with the plate edge when the cylinder is rotated, and resilient means to release the bar from clamping engagement with the plate edge when the cylinder is at rest.

12. In a plate clamping mechanism for securing curved plates upon a rotatable form cylinder of a printing machine, an inwardly movable margin bar disposed between opposing plate edges and being adapted to overlie each edge, a weight carried by the cylinder and arranged to move

outwardly when the cylinder rotates, and a connection between said bar and said weight to cause movement of said bar into engagement with said plate edges to clamp them to said cylinder when the weight is so moved.

13. In combination, a rotatable cylinder having a curved plate thereon, and a floating centrifugal force actuated mechanism carried by said cylinder including a movable member overlying an edge of said plate to engage and clamp it to the cylinder, when the cylinder is rotated.

14. In a plate clamping mechanism for securing a pair of substantially semi-cylindrical curved plates to a rotatable form cylinder of a printing machine, movable margin bars carried by the cylinder adjacent to and overlying adjacent straight edges of the plates, a centrifugally movable weight connected to each bar and being disposed adjacent the other bar, whereby centrifugal force developed by the rotation of said cylinder will cause said bars to engage the respective plate edges adjacent thereto.

15. In a plate clamping mechanism for securing a pair of substantially semi-cylindrical plates to a rotatable form cylinder of a printing machine, movable margin bars carried by the cylinder adjacent to and overlying opposite straight edges of the plates, centrifugally movable weights carried by the cylinder each connected to one bar and disposed adjacent the other bar, whereby centrifugal force developed by the rotation of said cylinder will cause said bars to engage the plate edges adjacent thereto, and a spring acting against each weight to hold said bars out of engagement with the plate edges, when the cylinder is at rest.

16. In mechanism to clamp a plate to a cylinder, a margin bar adapted to extend along and over an edge of the plate and being arranged to be moved radially with respect to the cylinder into engagement with the plate edge to clamp it to the cylinder, and means actuated by centrifugal force developed by the rotation of the cylinder to so move the bar.

17. In mechanism to clamp a plate to a cylinder, a margin bar adapted to extend along and over an edge of the plate and being arranged to be moved peripherally with respect to the cylinder into engagement with the plate edge to clamp it to the cylinder, and means actuated by centrifugal force developed by rotation of the cylinder to so move the bar.

18. In mechanism to clamp the opposing edges of plates to a cylinder, a member adapted to extend along and over each edge and being arranged to be moved peripherally with respect to the cylinder into engagement with the respective plate edge to clamp it to the cylinder, and means actuated by centrifugal force developed by the rotation of the cylinder to simultaneously move said members.

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