Dec. 23, 1930. W. M. KELLY 1,786,116

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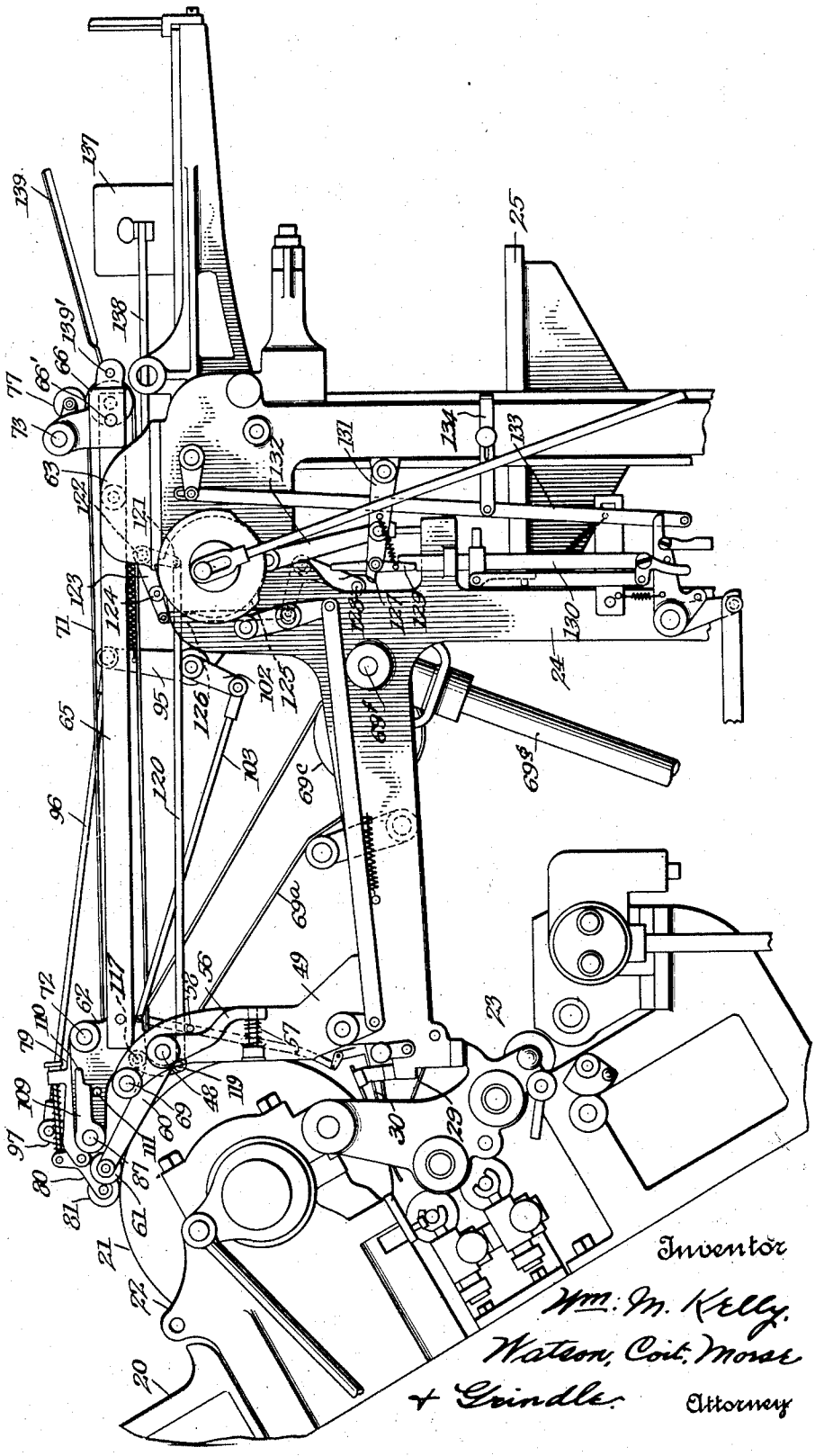


Fig. 1.

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Fig. 2.

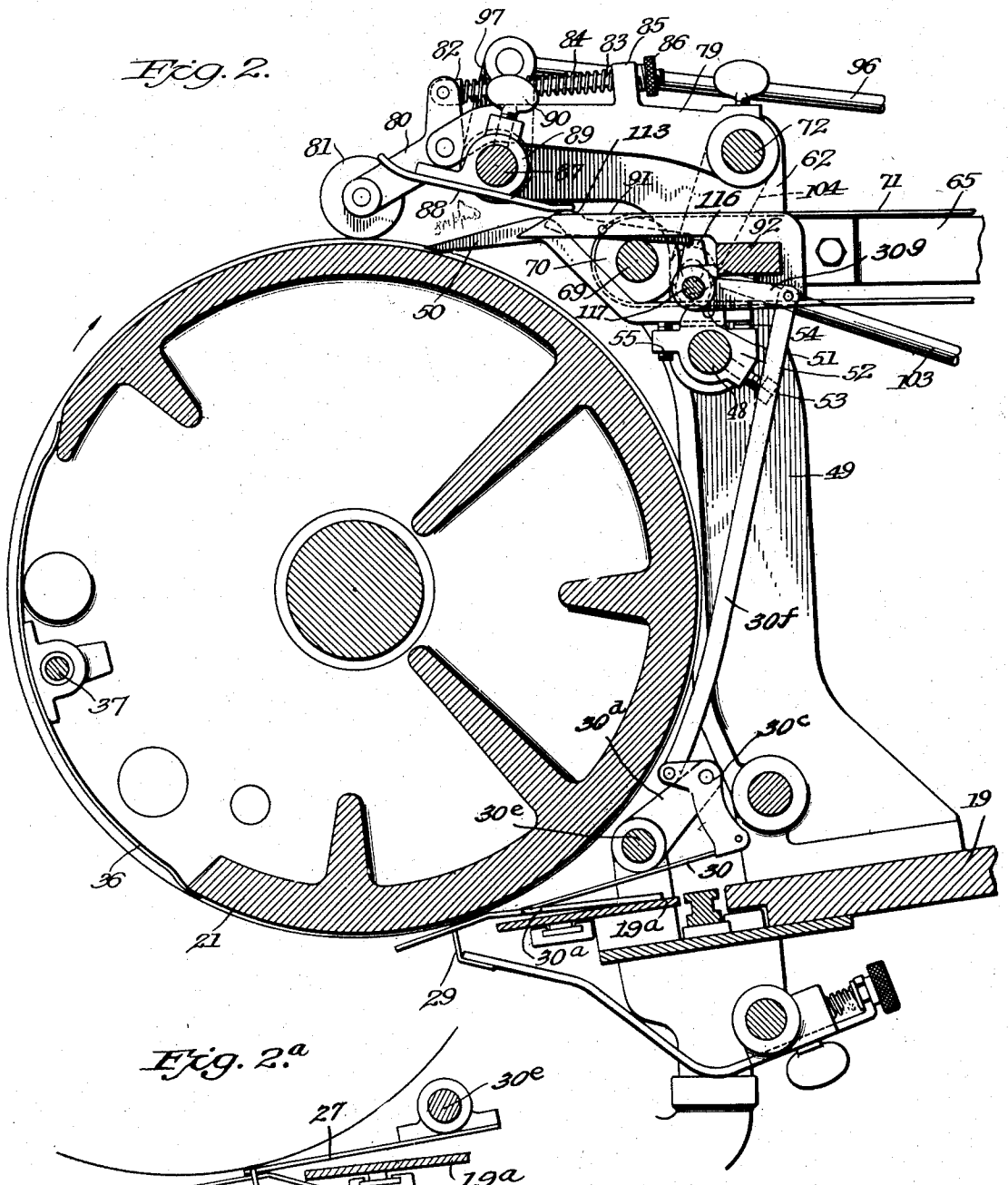


Fig. 2a.

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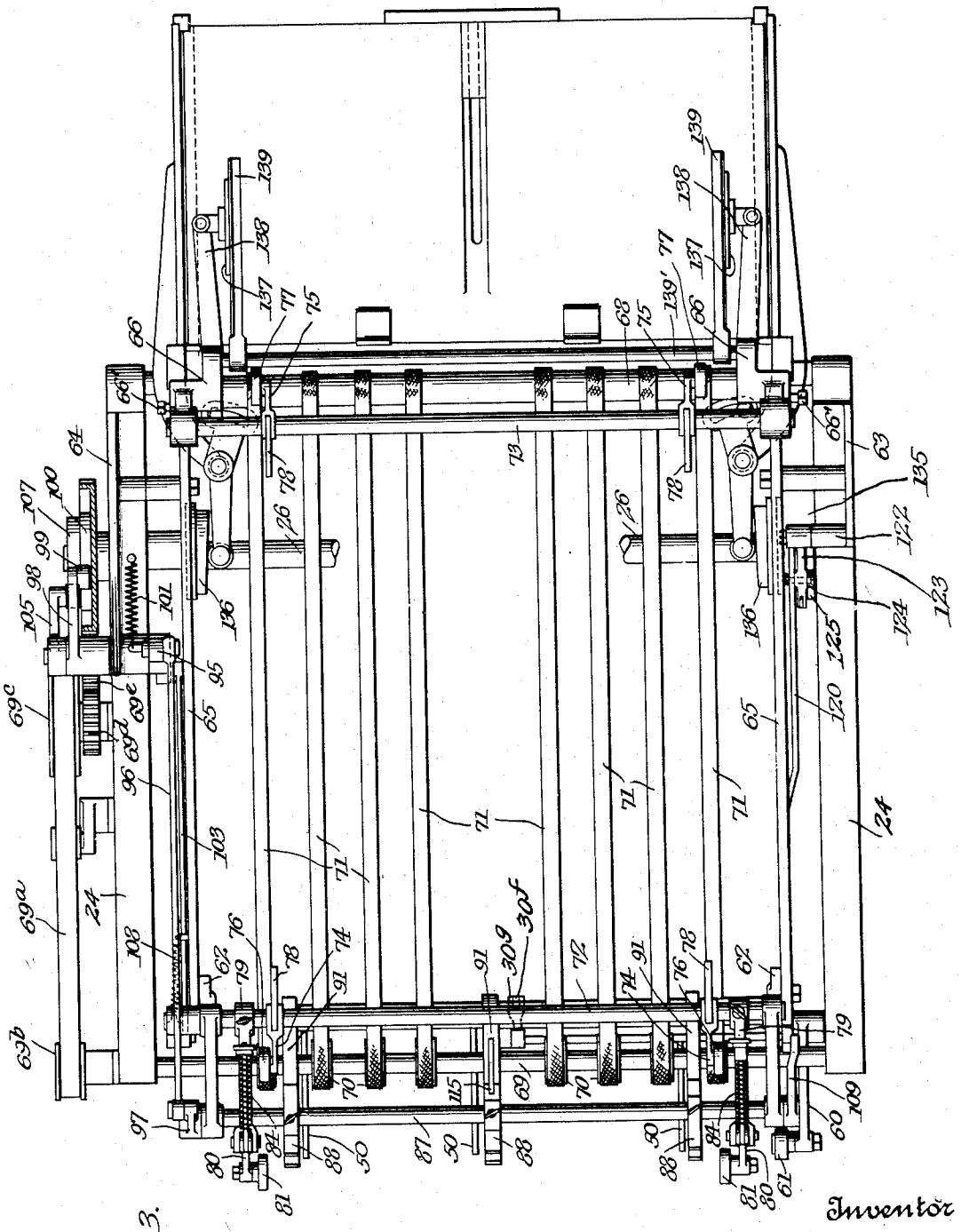


FIG. 3.

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Fig. 4.

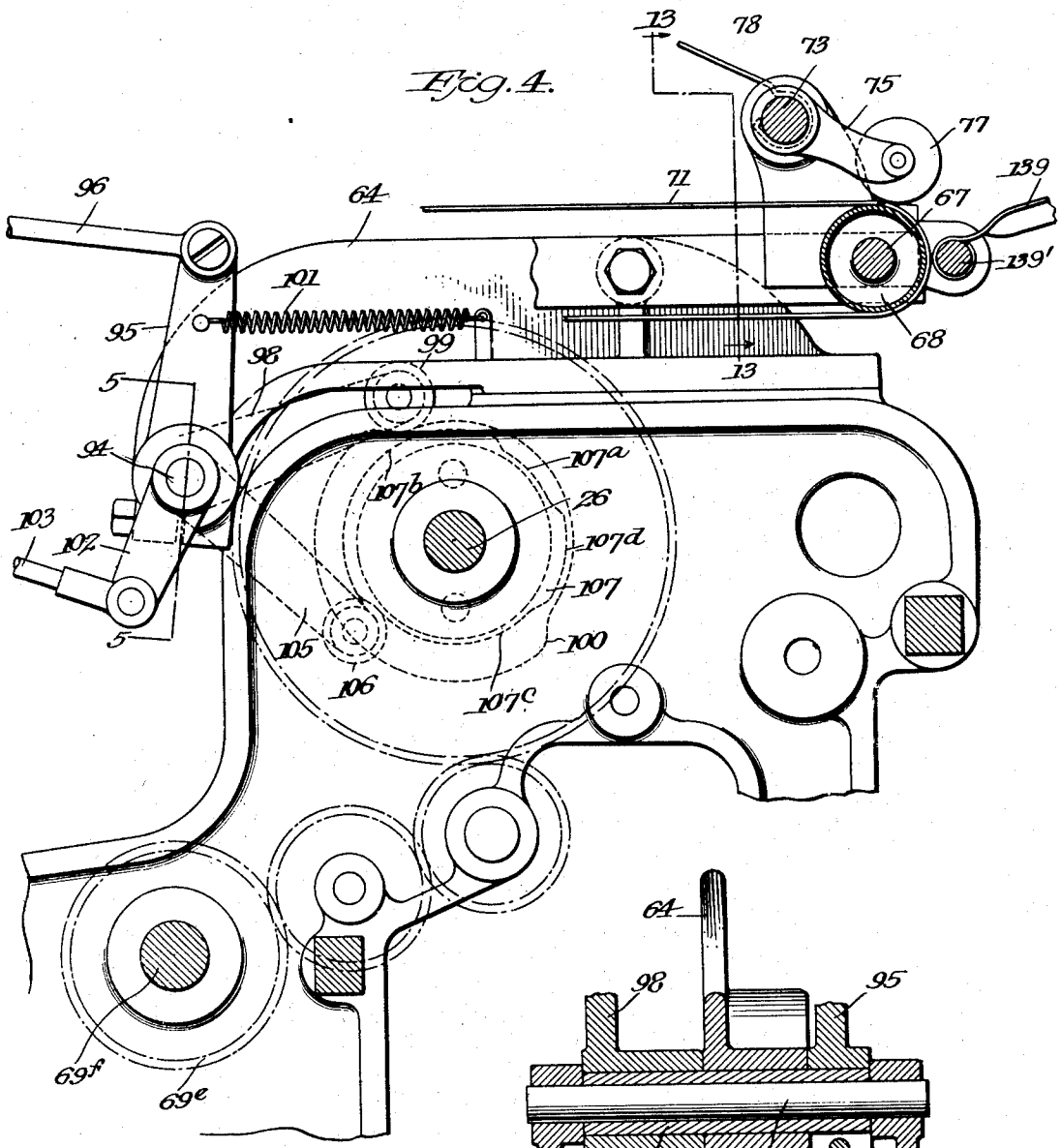
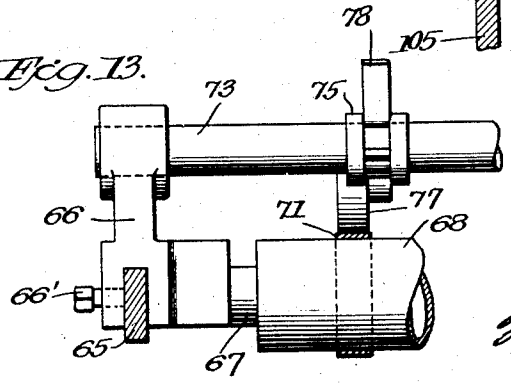


Fig. 5.

Fig. 13.



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Dec. 23, 1930. W. M. KELLY 1,786,116

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Fig. 6.

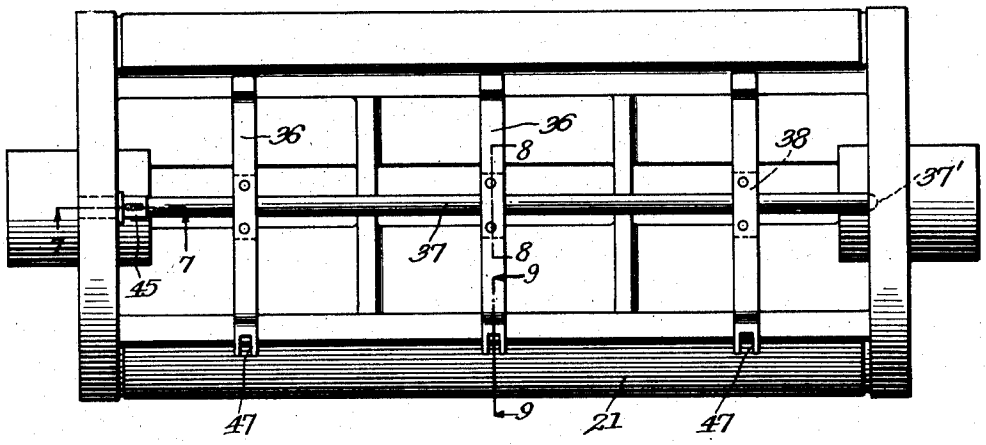
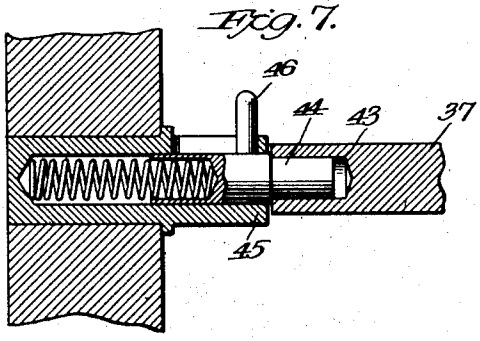


Fig. 7.



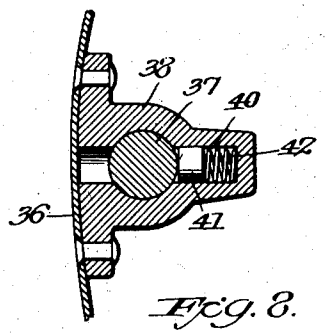


Fig. 8.

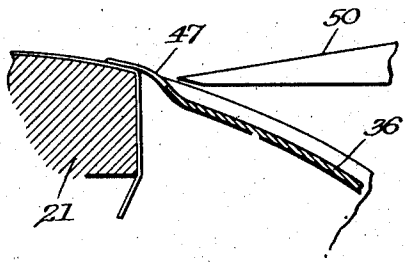


Fig. 9.

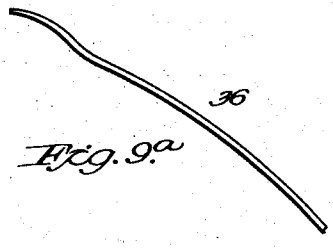


Fig. 9a.

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Filed Dec. 10, 1926 6 Sheets-Sheet 6

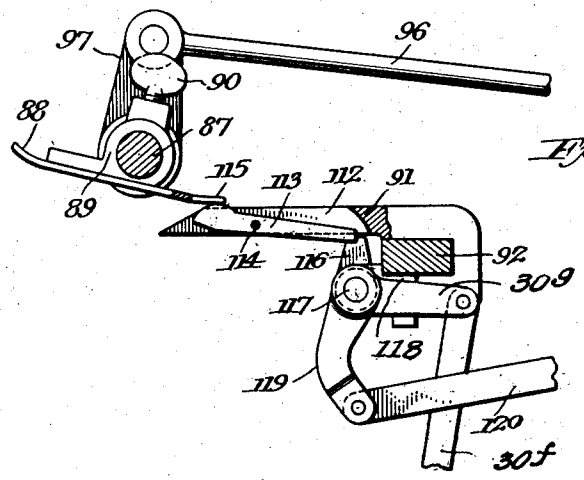


Fig. 10.

Fig. 11.

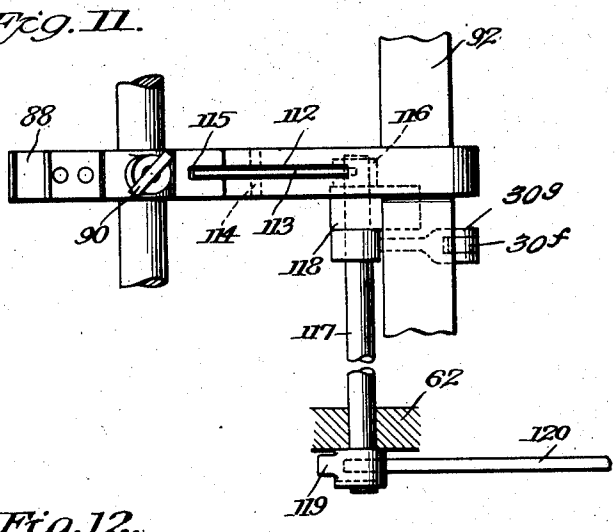
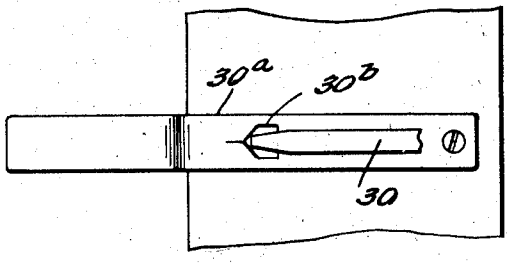


Fig. 12.



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UNITED STATES PATENT OFFICE

WILLIAM M. KELLY, OF WESTFIELD, NEW JERSEY, ASSIGNOR TO AMERICAN TYPE FOUNDERS COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY

PRINTING PRESS

Application filed December 10, 1926. Serial No. 153,990.

The present invention relates to printing presses and more particularly to sheet feeding and delivery mechanism therefor.

The principal object of the present invention is to provide a sheet delivery mechanism for high speed oscillating or single revolution cylinder presses, which is certain and accurate in operation, and which will remove the printed sheets from the press without tearing or otherwise mutilating them notwithstanding a very high speed of operation.

The invention is illustrated in connection with a press comprising a bed reciprocating in an inclined plane and a cylinder in front of the bed operably connected thereto for making one complete oscillation for each up and down reciprocation of the bed, and having sheet feeding mechanism adapted to feed sheets singly to the cylinder at the lower side. The sheet delivery mechanism according to this invention is adapted to take the sheets from the upper side of the cylinder and convey them to a suitable receiving table, the cylinder having its printing stroke with the upstroke of the bed and the delivery mechanism receiving the front edge of the sheet as the cylinder approaches the end of its printing stroke and operating to hold it against movement during the return or non-printing stroke, so that the sheet is delivered by the next or printing stroke of the cylinder. This press operates at a very high speed and consequently the sheets become highly charged with electricity because of the friction to which they are subjected in passing through the feeder and press. With other types of deliveries, these static charges are so pronounced, particularly in the summer time, that the adherence of the sheet to the cylinder is sufficient often to provide such resistance, when stripping the sheet from the cylinder, that it is torn in two. The principal object of the present invention is to provide a sheet delivery that overcomes this difficulty.

According to the present invention, a sheet after receiving its impression on the upstroke of the bed has its front edge stripped from the cylinder and projected between stationary grippers which then close on said edge and remain closed during the entire return or non-printing stroke, the sheet so held consequently remaining stationary during this stroke and in contact with the cylinder; then at the commencement of the printing stroke, these grippers open and during the printing stroke the sheet is projected, because of its adherence to the cylinder, through the grippers onto continuously running tapes which convey it to the delivery table. Thus the present invention utilizes the printing stroke of the cylinder to positively project the sheet just previously printed onto the delivery tapes or other suitable sheet conveying mechanism. The static developed by the friction between the sheet and cylinder on the return or non-printing stroke is not strong enough to cause the sheet to adhere sufficiently to tear it or otherwise injure it, the relative movement between the sheet and cylinder being only about half of that occurring in the operation of sheet delivery mechanisms where the sheet is pulled off during the reverse movement of the cylinder, since in the present delivery the sheet is held stationary while the cylinder is rotating, whereas in the former deliveries the sheet is positively pulled from the cylinder while the cylinder is rotating in the opposite direction to such pulling movement. What static is developed in the operation of the mechanism of the present invention is beneficially utilized in causing the sheet to adhere to the cylinder and be positively projected by the rotation thereof onto the sheet forwarding mechanism.

Another object of the present invention is to provide sheet detector mechanism associated with the delivery mechanism which cooperates with detector mechanism associated with the sheet feeding devices, whereby failure to deliver a sheet from the cylinder, or to deliver a sheet properly, will be detected as well as failure to feed a sheet to the cylinder. The delivery mechanism of the present invention operates with such accuracy and certainty that it is a rare occurrence indeed that a sheet after passing the feed detector will fail to be delivered from the cylinder or to be delivered in a proper man-

ner. However, the present invention provides a delivery detector to take care of such a contingency.

Other objects and features of novelty of the invention will be apparent from the description and drawings, in which:

Figure 1 is a fragmentary side elevation of a press, showing sheet delivery mechanism and associated devices embodying the present improvements;

Figure 2 is a longitudinal vertical section through the impression cylinder and through the forward portions of the associated sheet feeding and delivery mechanism;

Figure 2ª is a fragmentary vertical section taken on a plane at one side of the plane of Fig. 2, showing a pair of top and bottom guide tongues and the sheet stop associated therewith.

Figure 3 is a plan view of the delivery mechanism;

Figure 4 is a central vertical section taken on the same plane as Fig. 2, through the rear portion of the delivery mechanism;

Figure 5 is a detail sectional view on the line 5—5 of Fig. 4;

Figure 6 is an elevation of the impression cylinder;

Figures 7, 8 and 9 are detail sections on the lines 7—7, 8—8, and 9—9, respectively, of Fig. 6;

Figure 9ª is a side view of an end portion of the spring fingers associated with the impression cylinder;

Figure 10 is a vertical section through the delivery detector mechanism;

Figure 11 is a plan view of the detector mechanism;

Figure 12 is a fragmentary plan view of the feeder detector; and

Figure 13 is a fragmentary sectional view taken on line 13—13 of Fig. 4.

In the embodiment of the invention illustrated, the frame of the press is shown at 20, and 21 indicates the impression cylinder which is journaled in housings 22 bolted to the press frame. The inking mechanism 23 is mounted below the cylinder.

The sheet feeding and delivering mechanism is carried by a frame 24 which is mounted so as to be manually movable towards and away from the press without disturbing the operating connections between the press and said mechanism.

The sheets are supported on a table 25 and are fed therefrom by pneumatic mechanism including suction wheels (not shown) carried by a shaft 26, and are forwarded over the feed board 19 (Fig. 2) by continuously operating tapes (not shown) and projected between top and bottom guide tongues 27 and 28 against front stops 29, actuating in their passage the feeder detector finger 30.

Referring to Figs. 2 and 6, it will be observed that the cylinder is formed of a single casting having a cylindrical portion which extends through an arc of about 300°. The cut away portion of the cylinder may be bridged by three spring fingers 36 each of which is centrally supported on a rod 37 in such a manner that the fingers may be individually adjusted along the rod as required.

Fig. 8 clearly shows the manner of mounting the fingers. It will be observed that each finger is riveted to the curved face of a head 38 which is transversely bored for the passage of rod 37, and is formed at right angles to the bore with a socket 40 in which is mounted a plunger 41 pressed by a spring 42 against rod 37. The fingers 36 are thus frictionally mounted on rod 37 so that they can be manually slid along the rod to any desired position of adjustment, their frictional engagement with the rod being sufficient to hold them in adjusted position. Rod 37 is removably mounted in order that the fingers may be removed when adjusting the packing. For this purpose one extremity of the rod has formed therewith a rounded projection 37′ fitting a socket in one of the cylinder discs and the other end has an axial socket 43 (Fig. 7) receiving the reduced end of a spring pressed pin 44 reciprocably mounted in a barrel 45 secured in the other cylinder disc, the barrel having a longitudinal slot for the passage of a finger piece 46 fixed to the pin. There is a slight clearance between the ends of rod 37 and barrel 45, so that when the pin is retracted from the socket the rod can be removed.

The ends of fingers 36 which overlap that edge of the cylinder over which the cylinder gripper fingers operate are notched as shown at 47 and are ground very thin. From Fig. 9ª, which shows this end of one of the fingers detached, it will be observed that the end portion is reversely curved, the outer curvature being on a substantially smaller radius than the cylinder radius. The result is that when the finger is applied on the cylinder packing, its extremity will tend to embed in the packing and will thus present no impediment to the passage of sheets to the grippers. The notched or bifurcated ends of fingers 36 are adapted to be entered by the stripper fingers, hereinafter described, when the cylinder approaches the end of its printing stroke, the notched form of the fingers serving to provide a slight space between the edge of the sheet and the cylinder packing where said edge passes over the fingers, this space being sufficient for the entry of the stripper fingers.

The delivery strippers associated with the cylinder at the upper side thereof to strip the front edge of the sheet from the cylinder and direct it to gripper mechanism hereinafter described, when the cylinder approaches the end of its printing stroke, are secured on a shaft 48 rotatably mounted in front brackets

49 carried by frame 24. There are three of these strippers shown. Each stripper 50 is pivoted at 51 between ears upstanding from a collar 52 (Fig. 2) adjustably secured on shaft 48 by a set screw 53. The tail end of the stripper is pressed upwardly by a spring 54, while on the other side of the pivot 51 a screw 55 limits the downward movement of the stripper. By operating screw 55 the stripper can be accurately adjusted with respect to the cylinder. The strippers are thus mounted for lateral adjustment and also for adjustment in a vertical plane. When the strippers are adjusted laterally, if the spring fingers 36 are used, it is of course necessary to adjust them so that the ends of the strippers will always be in a position to enter between the bifurcated ends of these fingers when the press is operating.

On each end of shaft 48 is fixed an arm 56 yieldingly held by a spring 57 against a stop pin 58. Secured to shaft 48 inside the front brackets 49 is an arm 60 on the free end of which is a roller 61 riding on the periphery of cylinder 21. Thus when the cylinder 21 is moved to impression off position, the engagement of roller 61 with the cylinder rotates shaft 48 against the action of spring 57, preserving the spaced relation of the strippers to the cylinder; the purpose of this, of course, being to prevent the strippers from coming in contact with the packing.

Journaled on shaft 48 on the inside and adjacent the arm 60 is a pair of brackets 62, and rigidly connecting these brackets, respectively, with two brackets 63 and 64 bolted to the top of frame 24 at each side, are two side bars 65. Adjustably secured on the rear ends of side bars 65 are a pair of brackets 66 which are formed with downwardly opening slots receiving the side bars and provided with set screws 66′ for holding them in any position of adjustment (see particularly Fig. 13). Rotatable in brackets 66 is a transverse shaft 67 carrying a cylindrical shell 68. Journaled in the upper extremities of front brackets 49 is a transverse shaft 69 having fixed thereto a number of pulleys 70, and passing over pulleys 70 and shell 68 are endless tapes 71. Shaft 69 is driven by a belt 69^a which passes over a pulley 69^b fixed on a projecting end of the shaft and over a larger pulley 69^c journaled on frame 24 and having rigid therewith a spur gear 69^d, (Fig. 3), meshing with a gear 69^e. Gear 69^e is on a transverse shaft 69^f connected by bevel gearing (not shown) to an inclined drive shaft 69^g (Fig. 1). Gear 69^e also drives the suction wheel shaft 26 through the gear train shown in dotted lines in Fig. 4.

Rotatable in the upper portions of brackets 62 is a transverse shaft 72, and fixed in the upper ends of brackets 66 is a tie rod 73. Loosely swung on shaft 72 and tie rod 73, respectively, are arms 74 and 75 carrying on their free ends tension rollers 76 and 77 adapted to bear on any selected pair of endless tapes 71 where said tapes pass over the shell and pulleys. The arms 74 and 75 are bifurcated at their pivotal connections with the shaft 72 and tie rod 73, and frictionally encircling said shaft and tie rod between these bifurcations are spring fingers 78, (Fig. 4). which serve to hold the tension rollers in adjusted positions, the projecting fingers also serving as convenient hand holds for adjusting the rollers. It is to be noted that the tension rolls 77 and tape shell 68 are mounted on brackets 66, so that when the latter are adjusted to correct the tension of the tapes, the position of the tension rolls relatively to the shell is not disturbed.

Adjustably secured on shaft 72 inside the brackets 62 are a pair of arms 79 having pivoted on their free ends bell cranks 80 carrying rolls 81 adapted to bear on the margins of a sheet on the impression cylinder. For effecting yielding engagement of these margin rolls with the sheets, the upwardly extending arms of the bell cranks have pivoted thereto the head 82 (Fig. 2) of a rod 83 surrounded by a coil spring 84 which bears at one end against head 82 and at its other end against a perforated lug 85 through which rod 83 passes. The end of rod 83 is threaded and carries a knurled nut 86, by means of which the pressure of rolls 81 on the sheets may be adjusted.

Rotatably mounted in brackets 62 in front of shaft 72 is a shaft 87 carrying three equi-spaced gripper fingers 88. These grippers are adjustably mounted by being attached to collars 89 which may be fixed at selected positions on the shaft by set screws 90. These upper gripper fingers coact with lower gripper fingers 91 which are adjustably secured on a transverse bar 92 bolted at its ends to the brackets 62.

Shafts 72 and 87 are adapted to be oscillated to raise and lower the margin rolls and upper gripper fingers at predetermined times in the operating cycle by means of mechanism which will now be described. Referring particularly to Figs. 4 and 5, rotatably mounted in bracket 64 is a sleeve 93 and rotatable in the latter is a short shaft 94. Fixed on sleeve 93 on one side of bracket 64 is an arm 95 connected by a link 96 to an arm 97 (Figs. 2 and 10) fast on the end of gripper operating shaft 87, and fixed on sleeve 93 at the other side of bracket 64 is an arm 98 carrying a roller 99 riding on a cam 100 fast on the suction wheel shaft 26, a spring 101 holding the roller in contact with the cam. Fast on one end of shaft 94 is an arm 102 connected by a link 103 to an arm 104 (Fig. 2) fast on the margin roll operating shaft 72, and fast on the other end of shaft 94 is an arm 105 carrying a roller 106 engaging a cam 107 also on the suction wheel shaft, a spring

108 (Fig. 3) holding the roller engaged with the cam. The gripper shaft 87 has fixed on one end thereof an arm 109 formed with a finger hold projection 110, (Fig. 1) whereby the grippers may be raised manually whenever desired to release a sheet therefrom. The closing movement of the grippers is limited by engagement of arm 109 with a pin 111 projecting from bracket 62.

The present invention provides delivery sheet detector mechanism combined with feeder detector mechanism, whereby failure to deliver a sheet from the cylinder is detected as well as failure to feed a sheet thereto. One form of delivery detector mechanism is illustrated by Figs. 1, 2, 10, 11 and 12. Referring to these views, the central one of the lower gripper fingers 91 has a longitudinal slot 112 in which is pivoted a finger 113 on an axis 114. The sheet engaging surface of the finger is rounded and in the normal position projects above the top surface of gripper finger 112. The central upper gripper finger has a notch 115 in its end located in the same vertical plane with finger 113, so that the projecting portion of finger 113 will enter notch 115 when the gripper finger 88 is closed, provided no sheet is present between the upper and lower gripper fingers. On the other hand, if a sheet is present when the gripper is closed, its engagement with finger 113 will depress this end of the finger and raise the tail end thereof. The tail end of the finger rests on a latch 116 which is fast on the inner end of a shaft 117 journaled in one of the brackets 62 and in a bracket 118 attached to bar 92.

The feeder detector illustrated (see particularly Figs. 1, 2 and 12) comprises a detector finger 30 and a tongue 30^a. The latter is composed of a flat strip of flexible steel fastened at one end to the feed board extension 19^a and extending above the forward edge thereof and projecting under the cylinder 21. As shown in Fig. 12, the detector finger 30 is considerably narrower than the tongue 30^a and has its free end tapered and its extremity abutting against the walls of a slot 30^b formed in the tongue 30^a. The detector finger 30 is fastened to the depending arm of a lever 30^c which is pivoted to an arm 30^d fast on a tie rod 30^e. The other arm of lever 30^c is connected by a link 30^f to an arm 30^g fast on shaft 117.

From the above it will be understood that shaft 117 is adapted to be locked, or latched, either by the coaction of delivery detector finger 113 with arm 116 or by the coaction of feeder detector finger 30 with tongue 30^a, or by both.

Fixed on the outer end of shaft 117 is an arm 119 connected by a link 120 to a depending arm 121 of a two arm lever which is pivoted to a stud 122 projecting inwardly from bracket 63. Mounted at an intermediate point on the other arm 123 of this lever is a roller 124 engaging a peripheral cam 125 secured to the suction wheel shaft 26 on the inside of frame 24. The extremity of arm 123 is connected by a link 126 to one arm of a bell crank lever 127, the other arm of which carries a laterally projecting pin 128 adapted to engage the upper or tail end of a pawl 129 which normally rests against a shoulder on the upper end of a rod 130. Pawl 129 is carried by a pivoted arm 131 connected to a push rod 132 which is periodically reciprocated by a cam (not shown) on the suction wheel shaft 26. The rod 130 when pushed downwardly by the operation of arm 131 and pawl 129 actuates mechanism to throw off the impression, interrupt the feeding of sheets, and, if desired, stop the press. The construction and operation of this mechanism and other parts of the press are fully shown and described in my copending application Serial No. 738,677, filed September 19, 1924.

The side jogger boards 137 are carried on pivoted arms 138 which are vibrated by connections to lateral cams 136 secured to suction wheel shaft 26. This jogger operating mechanism forms no part of the present invention, and is fully shown, described and claimed in my copending application Serial No. 36,944, filed June 13, 1925.

Secured in the brackets 66 slightly below the level of the upper runs of tapes 71 is a rod 139′ on which is mounted a pair of sheet guides 139 extending at an upward incline. These guides 139 are composed of flat strips of spring metal and are frictionally secured to rod 139′ by having their ends curled around said rod, as clearly shown in Fig. 4. The strips 139 are twisted through a small angle near their point of attachment to rod 139′ so that they will lie in planes downwardly and inwardly inclined. The sheets projected by the tapes onto these guides 139 being supported thereby only at their lateral margins will assume a curved position in falling onto the pile, the center lines of the sheet being the first to touch the top sheet of the pile and, further, due to the upward incline of the guides the tail edge of the sheet will be the first to contact the top sheet. Thus in falling from the guides the air under the sheets will be laterally displaced gradually and progressively starting from the front center point of contact. This eliminates any possibility of air pockets being formed by the sheets as they are projected onto the delivery table and effects a smooth accurate positioning of the sheets. These sheet guides are not claimed herein, being reserved for the subject matter of another application.

The above described mechanism operates in the following manner. The sheets on table 25 are automatically picked up by suction

wheels which forward the sheets singly to continuously running tapes operating over the feed board, by which the forward edges of the sheets are carried between the upper and lower guide tongues 27 and 28 and against the front stops 29, raising the detector finger 30. When a sheet has been registered against the front stops 29, cylinder 21 is in the position where the edge of its cylindrical segmental portion over which the grippers operates is in alignment with said front stops, this position being the terminal position of the cylinder at the end of its non-printing stroke. The cylinder grippers now close on the edge of the sheet, the front stops are automatically depressed and the cylinder starts on its printing stroke, the impression having been thrown on just previous to the operation of the cylinder grippers. The cylinder is now rotating in the direction of the arrow, Fig. 2, and when it approaches the limit of its printing stroke the lateral margins of the printed sheet pass under the tension rolls 81 and then the front margin of the sheet is stripped from the cylinder by the stripper fingers 50, these fingers, as before pointed out, entering the bifurcations of cylinder fingers 36 and so penetrating the space provided by these bifurcations between the sheet and the packing. At the end of the printing stroke the front edge of the sheet has passed between the upper and lower gripper fingers 88 and 91, the upper gripper fingers at this time being raised. The roller 99 on arm 98 now rides from the high part onto the low part of cam 100, permitting the spring 101 to move arm 95. link 96 and arm 97 to the right as viewed in Figs. 2 and 4, and rotating shaft 87 to clamp the sheet between the gripper fingers 88 and 91. Substantially simultaneously with the passing of roller 99 onto the low part of cam 100, roller 106 passes from the low part 107^a of cam 107 to the high part 107^b, moving arm 102, link 103 and arm 104 to the left, thus rotating the shaft 72 to raise arm 79 and the margin rolls 81.

The delivery grippers remain closed during the return or non-printing stroke of the cylinder, the sheet being held stationary and the margin rolls being raised to release their tension on the sheet. It is to be noted that in this return stroke of the cylinder the cylinder fingers 36 by bridging the space between the edges of the cylindrical segment prevent the sheet held by the grippers from falling into the cylinder between these edges and thus being torn or wrinkled. This is the principal function of the fingers 36. The cylinder having completed its non-printing stroke and the cylinder grippers having closed on a succeeding sheet, the cylinder again starts on its printing stroke. At or near this instant, roller 99 rides onto the high part of cam 100, operating the delivery grippers 88 to release the first sheet and substantially simultaneously roller 106 rides onto the lower part 107^c of cam 107, rotating arms 79 to bring the margin rollers 81 down into engagement with the first sheet. During the printing stroke said first sheet, because of its adherence to the cylinder by the action of the margin rolls 81 and because of the static charges held by said sheet, will be projected through the delivery grippers onto the continuously operating delivery tapes 71 and carried thereby under the tension rolls 76 and 77 and projected onto the guides 139 from which it will fall onto the delivery pile in the smooth and accurate manner heretofore pointed out. At an intermediate point in the printing stroke of the cylinder, roller 106 rides onto the high part 107^d of cam 107, causing the margin rolls to be raised for the reception of the sheet being printed, this operation occurring after the first sheet has passed well onto the delivery tapes 71. Roller 106 then passes onto the low part 107^a of the cam, causing the margin rollers 81 to press down on the oncoming sheet, the said rollers being held in this position until the front edge of the sheet has passed between the grippers 88, 91, whereupon the roller 106 rides onto the high part 107^b of the cam, raising the margin rollers and the roller 99 passes from the high to the low part of cam 100, causing the grippers 88 to move down and clamp the sheet against the lower grippers 91.

Under normal conditions, when a sheet passes the feeder detector finger 30, a preceding sheet is held by the grippers 88, 91, so that delivery detector finger 113 is depressed with its tail end raised from the shoulder of latch 116. The operation of feeder detector finger 30 by the passage of the sheet raises the end of said finger out of slot 30^b in tongue 30^a and thus permits movement of the finger in a forward direction and consequently permits rotation of shaft 117 in a counter-clockwise direction, looking at Figs. 1 and 2. The mechanism is so timed that immediately following the instant a sheet is fed past finger 30, the high part of cam 125 leaves roller 124 on arm 123, and said arm then moves down, and through link connection 126 rotates bell crank lever 127, causing the laterally projecting pin 128 thereon to engage the tail end of pawl 129 and trip said pawl from engagement with the shoulder on rod 130. Following close on this operation, push rod 132 is depressed, rotating arm 131 downwardly, but as pawl 129 is not in engagement with rod 130, the position of said rod is not affected. If, on the other hand, a sheet is not fed past the feeder detector finger 30 when due, or if a sheet is fed past the feeder detector when due and is not held by the grippers 88, 91, shaft 117 will be latched against rotation in a counter-clockwise direction, preventing roller 124 engaging the low part of cam 125 and preventing

pin 128 on bell crank 127 tripping pawl 129, so that when push rod 132 is depressed, pawl 129 will push rod 130 down, tripping the throw off and rendering the sheet feeding mechanism inoperative. When starting up the press, in order to prevent the operation of rod 130 from actuating the rod 133, which controls the feeding of sheets, this latter rod is moved to the right by slide 134, and the automatic switch controlling the press motor is also thrown out of operative relation with rod 130, so that, in starting, the sheet detector mechanism does not cause stoppage of the press and the sheet feeder. After the first sheet has been grasped by the grippers 88, 91, rod 130 is moved to the left back into operative relation with rod 130, and, if desired, the automatic switch controlling the press motor is replaced in operative relation with rod 130. The sheet detector mechanism will then function to throw off the impression, interrupt the feeding of sheets and stop the press, upon failure to deliver a sheet from the cylinder or to deliver it in proper condition, as well as upon failure to feed a sheet to the cylinder.

Although the embodiment of the invention illustrated has been set forth with great particularity, it will be clear to those skilled in the art that many modifications can be made in the specific mechanisms shown without modifying their functions or essential operating principles, and I do not intend to limit my invention except as defined in the following claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In combination with a bed and oscillating cylinder press, means to grip the delivery margin of a sheet on the cylinder when the cylinder nears the end of the printing stroke and hold the same during reverse rotation of the cylinder, and means to release the first means at about the beginning of the next printing stroke.

2. In combination with a bed and cylinder press having an oscillating cylinder, delivery grippers, and operating means for the grippers causing them to close on a sheet carried by the cylinder near the end of the printing stroke and to open near the beginning of the next printing stroke.

3. In combination with a bed and cylinder press having an oscillating cylinder, delivery grippers, operating means for the grippers causing them to close on a sheet near the end of the printing stroke and to open near the beginning of the next printing stroke, and strippers adapted to direct the sheet between the grippers.

4. In combination with a bed and cylinder press, means for stripping the margin of a sheet from the cylinder as the latter approaches the end of its printing stroke, means for holding said margin stationary during the non-printing stroke, and means to release said holding means near the commencement of the next printing stroke, whereby the sheet because of its adherence to the cylinder will be positively projected from the cylinder over the stripping means during the printing stroke.

5. In combination with a bed and cylinder press having an oscillating cylinder, means for stripping the margin of a sheet from the cylinder as the latter approaches the end of its printing stroke, grippers holding said margin during the non-printing stroke, means to open said grippers near the commencement of the next printing stroke, whereby the sheet because of its adherence to the cylinder will be positively projected therefrom during the printing stroke over the stripping means and through the grippers, and sheet conveying means adapted to receive the sheet thus projected.

6. In combination with a printing press having an oscillating cylinder, delivery grippers, operating means for the grippers causing them to close on a sheet near the end of the printing stroke and to open near the beginning of the next printing stroke, strippers adapted to direct the sheet between the grippers, rollers engaging the sheet on the cylinder, and operating means for said rollers causing them to be raised from the cylinder during its non-printing stroke.

7. In combination with a press having a bed reciprocating up and down and a cylinder making one oscillation for each reciprocation of the bed, means for feeding sheets to the cylinder at the lower side thereof, stripper and gripper mechanism mounted near the upper side of the cylinder adapted to strip the margin of a printed sheet from the cylinder when the latter approaches the end of its printing stroke and to hold the sheet during the return or non-printing stroke, and means to release the sheet near the commencement of the printing stroke, whereby the sheet is positively projected from the cylinder over the strippers and through the grippers during the printing stroke by reason of its adherence to the cylinder.

8. In combination with a printing press having a bed reciprocating up and down and a cylinder making a complete oscillation for each reciprocation of the bed, means for feeding sheets to the cylinder at one side thereof, relatively stationary stripper and gripper mechanism mounted near the opposite side of the cylinder adapted to strip the margin of a printed sheet from the cylinder when the latter approaches the end of its printing stroke and to hold the sheet during the non-printing stroke, and operating means for the gripper mechanism adapted to release the sheet near the commencement of the succeeding printing stroke.

9. In combination with a printing press having a bed reciprocating up and down and a cylinder making a complete oscillation for each reciprocation of the bed, means for feeding sheets to the cylinder at one side thereof, stripper and gripper mechanism mounted near the opposite side adapted to strip the margin of a printed sheet from the cylinder when the latter approaches the end of its printing stroke and to hold said margin stationary during the non-printing stroke, and means for delivering the sheet so held during the succeeding printing stroke.

10. In combination with a printing press having a bed reciprocating up and down and a cylinder making a complete oscillation for each reciprocation of the bed, means for feeding sheets to the cylinder at the lower side thereof, stripper and gripper mechanism mounted near the upper side adapted to strip the margin of a printed sheet from the cylinder and to hold said margin stationary during the non-printing stroke, rollers adapted to engage the sheet and press it against the cylinder, operating means for the rollers causing them to disengage the sheet during the non-printing stroke and to engage it during the printing stroke, and means to release the sheet from the grippers near the beginning of the printing stroke.

11. In combination with a printing press having a bed reciprocating up and down and a cylinder making a complete oscillation for each reciprocation of the bed, a frame in front of the cylinder provided with mechanism for feeding sheets to the cylinder at the lower side thereof, continuously running tapes mounted in the frame in a plane above the sheet feeding mechanism and substantially tangential to the cylinder, stripper fingers between the tapes and cylinder, grippers mounted to receive the margin of a sheet from the strippers before its passage to the tapes, rollers in front of the strippers adapted to engage a sheet on the cylinder, and means operating in timed relation to the operation of the press for closing the grippers on the margin of a sheet directed thereto by the strippers and raising the rollers from engagement with said sheet, said means holding the grippers closed and the rollers raised during the return, or non-printing, stroke of the cylinder and opening the grippers and lowering the rollers into engagement with said sheet near the commencement of the succeeding printing stroke.

12. In combination with a printing press having a bed reciprocating up and down and a cylinder making a complete oscillation for each reciprocation of the bed, stationary strippers and grippers, operating means for the grippers causing them to close on a sheet directed thereto by the strippers at the end of the printing stroke, and to open near the beginning of the succeeding printing stroke, rollers engaging the sheet on the cylinder in advance of the strippers, and operating means for the rollers causing them to engage the sheet during the greater part of the printing stroke, then to rise to receive the oncoming sheet, then to engage said oncoming sheet, then to disengage said oncoming sheet when the latter has passed to the grippers and to remain disengaged during the non-printing stroke.

13. In combination with a bed and cylinder press having an oscillating cylinder, delivery grippers, operating means for the grippers causing them to close on a sheet carried by the cylinder near the end of the printing stroke and to remain closed during the non-printing stroke and to open near the commencement of the succeeding printing stroke, and means responsive to the passage of sheets to the grippers for controlling the operation of the press.

14. In combination with a printing press having a bed reciprocating up and down and a cylinder making a complete oscillation for each reciprocation of the bed, a frame in front of the cylinder provided with mechanism for feeding sheets to the cylinder at the lower side thereof, sheet delivery mechanism mounted in said frame above the feeding mechanism, stripper fingers between the delivery mechanism and cylinder, stationary grippers mounted to receive the margin of a sheet from the strippers before its passage to said delivery mechanism, rollers in front of the strippers adapted to engage a sheet on the cylinder, and means operating in timed relation to the operation of the press for closing the grippers on the margin of a sheet directed thereto by the strippers and raising the rollers from engagement with said sheet, said means holding the grippers closed and the rollers raised during the return, or non-printing stroke of the cylinder and opening the grippers and lowering the rollers near the commencement of the succeeding printing stroke.

15. A cylinder for printing presses having a cylindrical segmental portion on which the packing is carried and provided with a plurality of laterally spaced removable fingers bridging the space between the edges of the segmental portion.

16. A cylinder for printing presses having a cylindrical segmental portion on which the packing is carried and provided with a plurality of laterally spaced removable fingers bridging the space between the edges of the segmental section, said fingers being individually adjustable to vary the space therebetween.

17. A cylinder for printing presses having a segmental cylindrical portion on which the packing is carried and provided with the usual grippers operating over one edge of

the segmental portion, and having a plurality of spring fingers bridging the space between and overlapping the edges of the segmental portion, the ends of the fingers which overlap that edge over which the grippers operate being thin and slightly downturned whereby they embed themselves in the packing and thus present no impediment to the passage of the sheets to the grippers.

18. In combination with a cylinder for printing presses having a cylindrical segmental portion on which the packing is carried, a rod removably mounted in the end walls of the cylinder and a plurality of spaced fingers mounted on said rod and bridging the space between the edges of the segmental portion.

19. In combination with a cylinder for printing presses having a cylindrical segmental portion on which the packing is carried, a rod removably mounted in the end walls of the cylinder, a plurality of heads frictionally mounted on said rod, and a spring finger attached to each of said heads and bridging the space between the edges of the segmental portion.

20. In combination with a cylinder for printing presses having a cylindrical segmental portion on which the packing is carried, a rod provided at one end with an axial rounded projection adapted to engage a socket in one of the end discs of the cylinder, the other end of said rod having an axial socket, a spring pressed pin reciprocably mounted in the other end disc adapted to engage said axial socket and provided with a finger piece, a plurality of heads frictionally mounted on said rod, and a spring finger attached to each head and bridging the space between the edges of the segmental portion.

21. In a printing press having a reciprocating bed and an oscillating cylinder formed with a cylindrical segmental portion over which the packing is carried and provided with the usual grippers operating over one edge of the segmental portion, a plurality of removably mounted spring fingers bridging the space between and overlapping the edges of the segmental portion, the ends of the fingers overlapping that edge of the segmental portion over which the grippers operate being bifurcated and strippers adapted to enter said bifurcations under the edge of the sheet when the cylinder approaches the end of its printing stroke.

22. In a printing press having a reciprocating bed and an oscillating cylinder formed with a cylindrical segmental portion on which the packing is carried and provided with the usual grippers operating over one edge of the segmental portion, a plurality of removably mounted spring fingers bridging the space between and overlapping the edges of the segmental portion, the ends of the fingers which overlap that edge of the segmental portion over which the grippers operate being bifurcated and having their extremities very thin and slightly downturned whereby they embed themselves in the packing and thus present no obstacle to the passage of the sheets to the grippers, and strippers adapted to enter said bifurcations under the edge of the sheet when the cylinder approaches the end of its printing stroke.

23. A cylinder for printing presses having a cylindrical segmental portion on which the packing is carried and provided with spaced members overlying the packing along that edge of the segmental portion over which the grippers operate adapted to provide spaces between the sheet and packing for the entry of the strippers.

24. In combination with a cylinder for printing presses having a cylindrical segmental portion on which the packing is carried, a rod removably mounted in the end walls of the cylinder, a plurality of heads having bores through which the rod passes and having recesses at right angles to said bores, a plunger and spring in each recess, the spring pressing the plunger against the rod, and a finger attached to each head and bridging the space between the edges of the segmental portion.

25. In a printing press having a reciprocating bed and an oscillating cylinder formed with a segmental portion on which the packing is carried and provided with the usual grippers operating over one edge of the segmental portion, a plurality of removably mounted fingers bridging the space between and overlapping the edges of the segmental portion, the ends of the fingers overlapping that edge of the segmental portion over which the grippers operate being formed to provide spaces under the edge of the sheet, and strippers adapted to penetrate said spaces when the cylinder approaches the end of its printing stroke.

26. In a printing press having a reciprocating bed and an oscillating cylinder comprising a segmental portion on which the packing is carried and provided with the usual grippers operating over one edge of the segmental portion, spaced members overlying the packing along that edge of the segmental portion over which the grippers operate adapted to provide spaces under the edge of the sheet, and strippers adapted to penetrate said spaces when the cylinder approaches the end of its printing stroke.

27. In combination with a bed and cylinder press, grippers mounted to receive printed sheets from the cylinder, a pivoted member mounted in the path of the sheets to the grippers, and mechanism controlled by said member operating to throw off the impression upon failure of a sheet to pass to the grippers when due.

28. In combination with a bed and cylin-

der press, grippers mounted to receive printed sheets from the cylinder, means responsive to the passage of sheets to the grippers, and mechanism controlled by said means operating to throw off the impression upon failure of a sheet to pass when due.

29. In combination with a bed and cylinder press, a plurality of pairs of upper and lower gripper fingers mounted to receive the front margins of the printed sheets, means for operating said grippers to clamp the sheets, the lower one of one pair of grippers having a longitudinal slot and the cooperating upper gripper having a slot in registry therewith, a finger in the slot of the lower gripper pivoted on a transverse axis and having a sheet engaging portion projecting above the lower gripper so that when a sheet is held by the grippers the sheet engaging end of the finger will be depressed, and mechanism responsive to the position of said finger controlling the operation of the press.

30. In combination with a bed and cylinder press, a plurality of pairs of upper and lower gripper fingers mounted to receive the front margins of the printed sheets, means for operating said grippers to clamp the sheets, the lower one of a pair of grippers having a longitudinal slot and the cooperating upper gripper having a slot in registry therewith, a finger in the slot of the lower gripper pivoted on a transverse axis and having a sheet engaging end projecting above the lower gripper, a latch upon which the tail end of said finger normally rests, and means controlled by said latch for throwing off the impression.

31. In combination with a printing press, sheet feeding and delivering mechanism adapted to feed sheets to the press and take printed sheets therefrom, a member responsive to the passage of sheets to the press and actuated upon the passage of each sheet, a member responsive to the delivery of sheets from the press, a shaft normally latched by said members and unlatched only when said members are both in actuated positions, periodically operating means for throwing off the impression and means operated by said shaft for rendering said periodically operating means ineffective.

32. In a bed and cylinder press, sheet feeding and delivery mechanisms adapted to feed sheets to the cylinder at the lower side thereof and take printed sheets from the upper side of said cylinder, a sheet detector responsive to the passage of sheets to the cylinder comprising a pivoted member and an abutment engaging the free end thereof, said member adapted to be disengaged from said abutment by the passage of a sheet, a shaft connected to said pivoted member, a sheet detector responsive to the passage of sheets from the cylinder, a latch for said shaft actuated by said last mentioned detector, periodically operating means for throwing off the impression, and means operated by said shaft for rendering said periodically operating means ineffective.

33. In combination with a printing press, a sheet delivery conveyor adapted to take the printed sheets from the press and means adjacent the entrance end of said conveyor responsive to the passage of sheets therethrough for controlling the operation of the press.

34. In combination with a printing press, sheet feeding and delivery conveyor mechanisms adapted to feed sheets to the press and take the printed sheets therefrom, and means controlling the operation of the press comprising sheet detector mechanisms responsive to the passage of sheets through the same to and from the press, one mechanism being disposed at the feed side of the press and the other located at the entrance end of said conveyor mechanism.

35. In combination with a printing press, sheet feeding and delivery conveyor mechanisms adapted to feed sheets to the press and take printed sheets therefrom, a member responsive to the passage of sheets to the press and actuated upon the passage of each sheet, a member at the entrance end of said conveyor in the path of the sheets being delivered responsive to the delivery of sheets from said press, periodically operating means for throwing off the impression and means for rendering said periodically operating means ineffective when said members have been actuated.

36. In combination with a bed and oscillating cylinder press, means to feed sheets to said cylinder for the impression when the cylinder is turning in one direction, means to hold said sheet stationary while the cylinder is moving in the reverse direction and to permit its delivery on the next oscillation, and means responsive to the passage of sheets therethrough in the delivery thereof for controlling the operation of the press.

In testimony whereof I hereunto affix my signature.

WILLIAM M. KELLY.