Nov. 13, 1928. 1,691,656

W. M. KELLY

PRINTING PRESS

Filed June 13, 1925 6 Sheets-Sheet 1

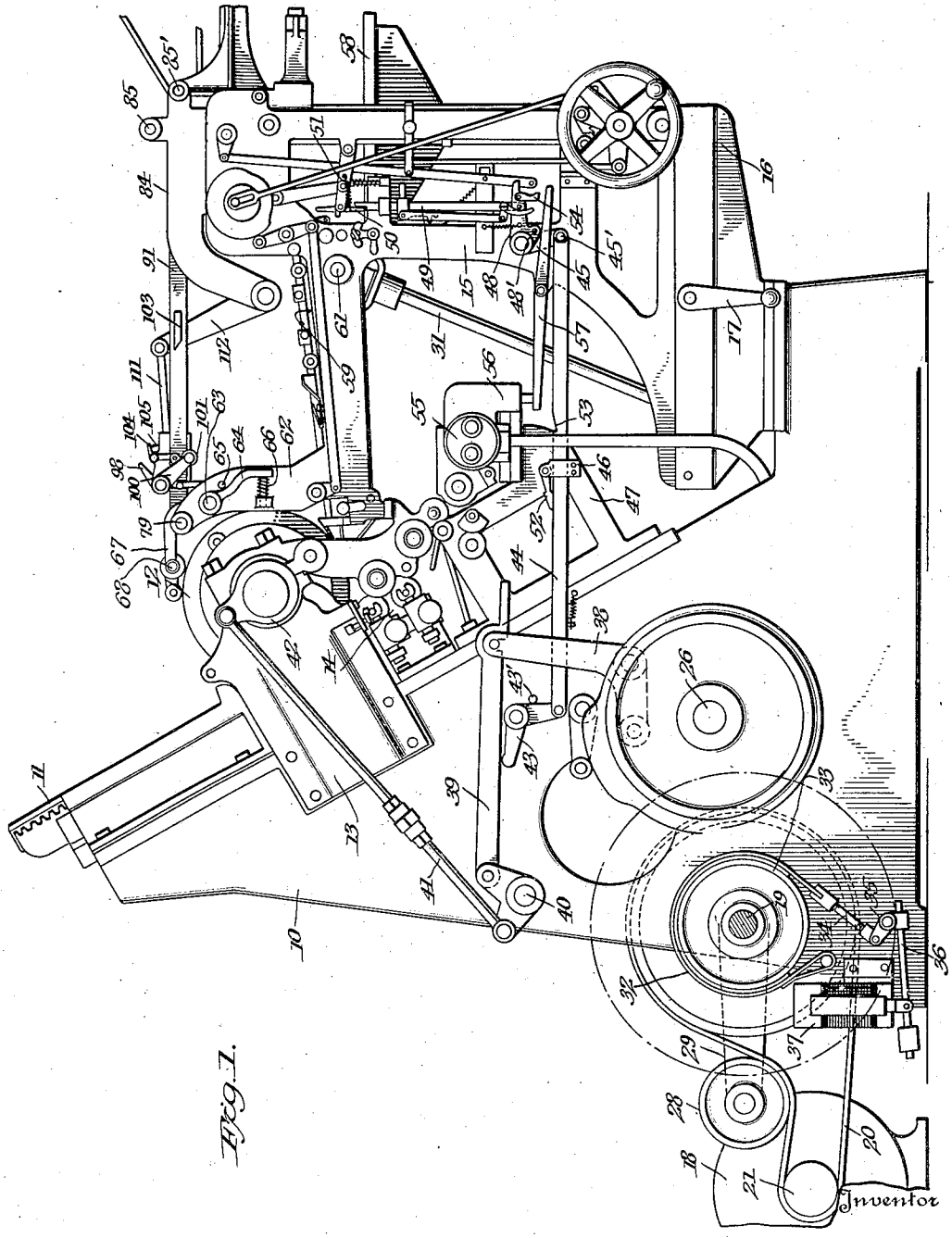


Fig. 1.

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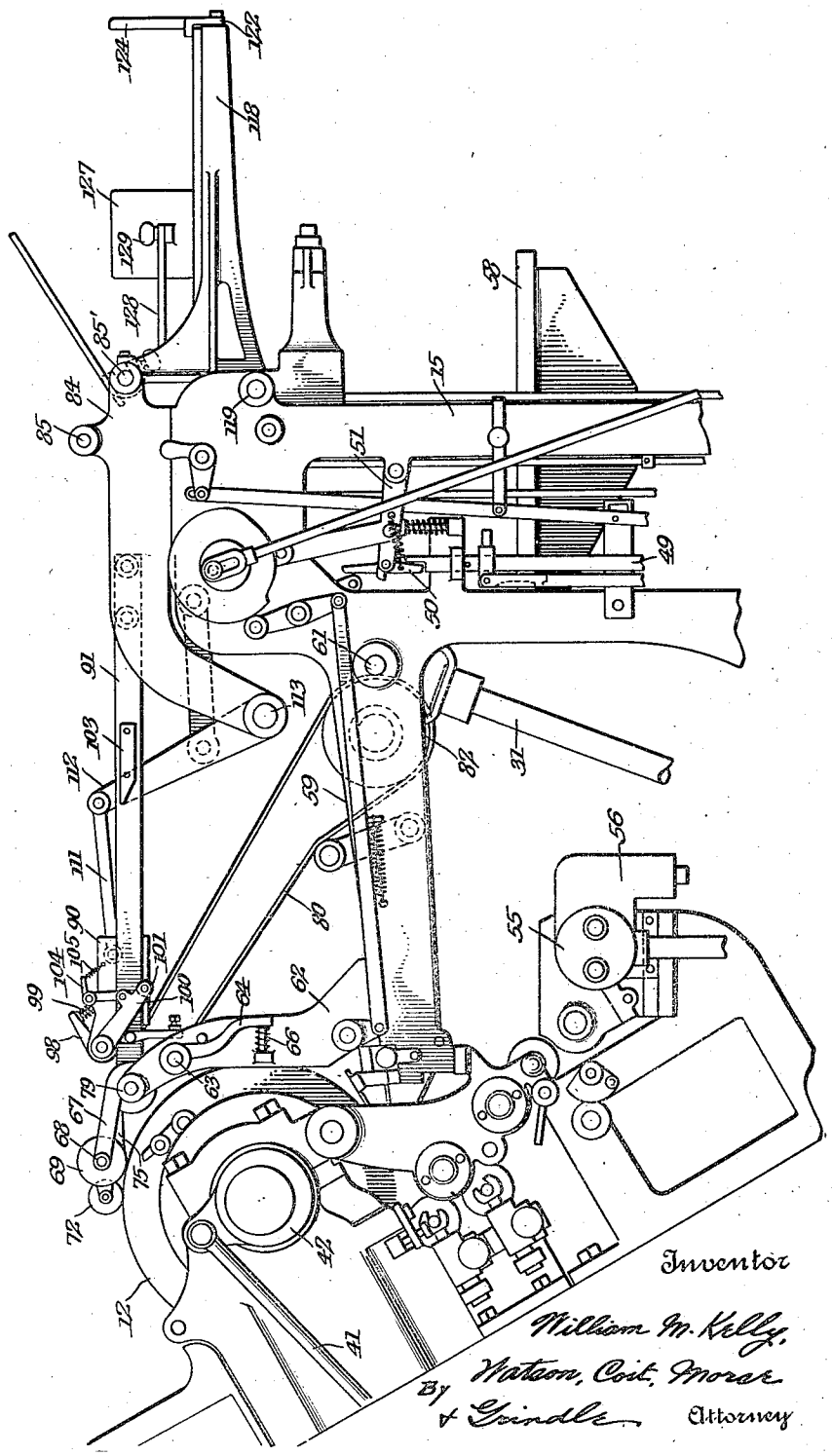


Fig. 2.

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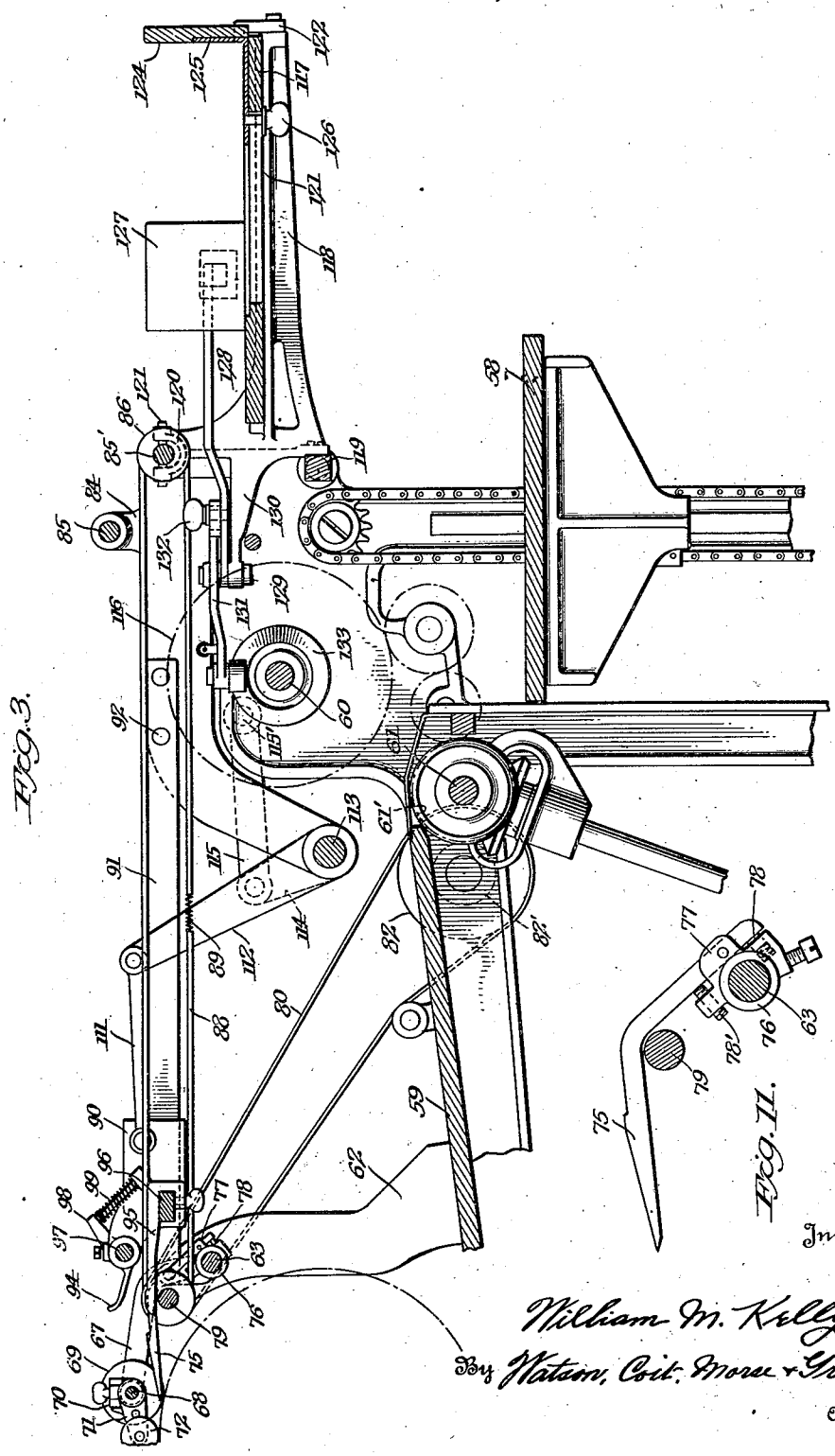


Fig. 3.

Fig. II.

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Filed June 13, 1925 6 Sheets-Sheet 4

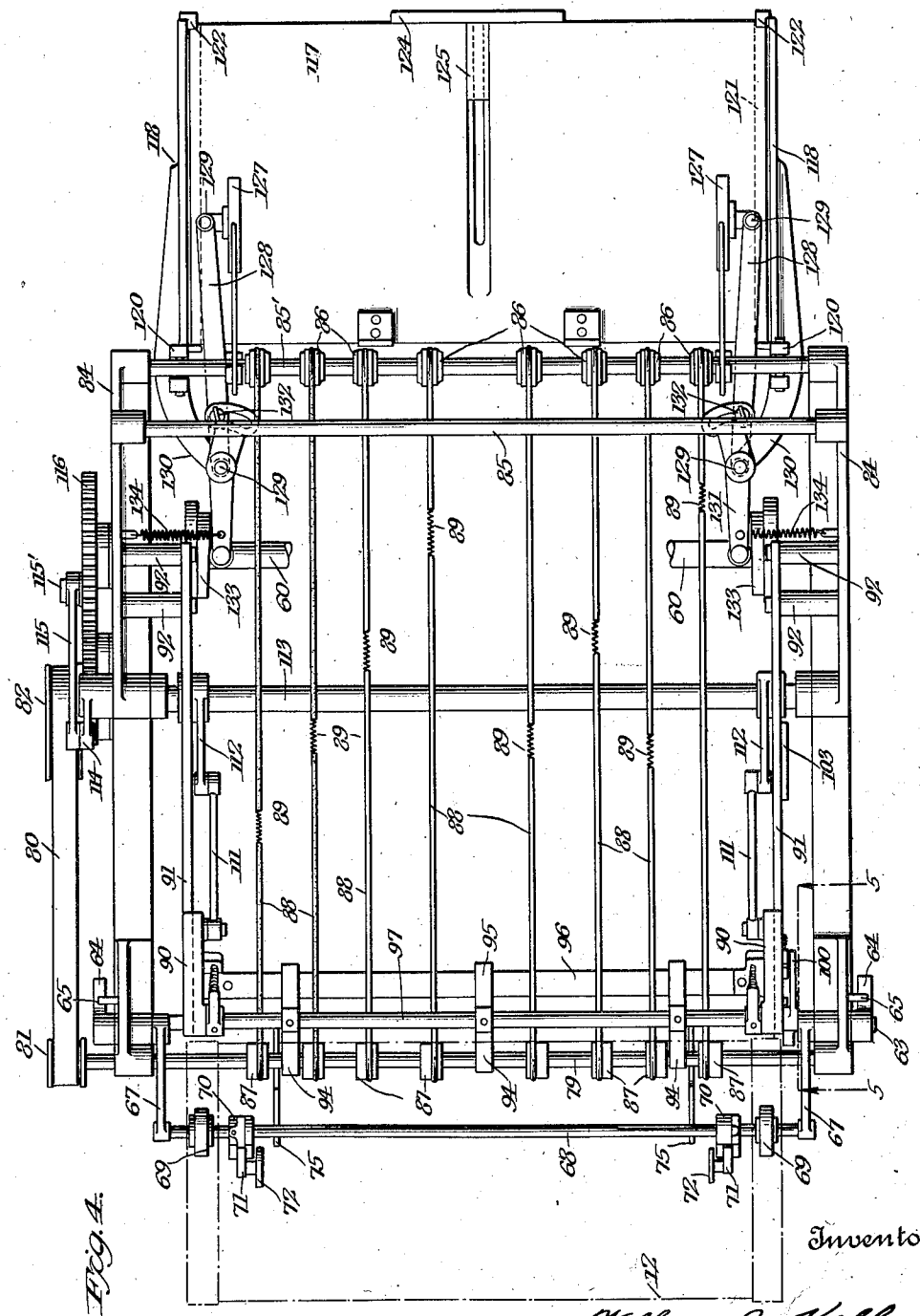


Fig. 4.

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Filed June 13, 1925 6 Sheets-Sheet 5

Fig. 5.

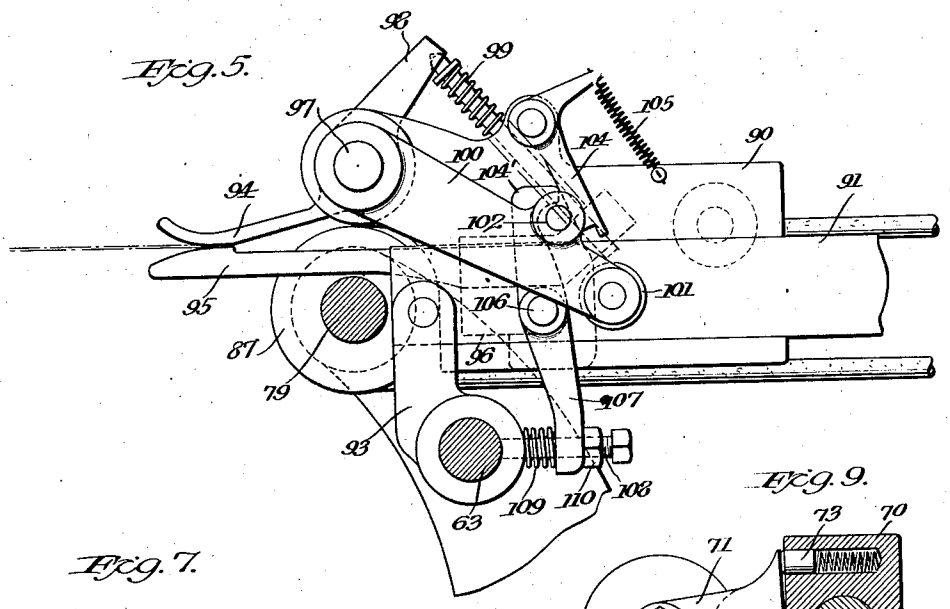
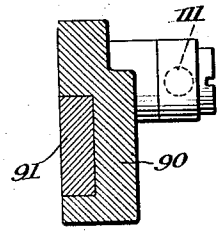



Fig. 9.




Fig. 7.



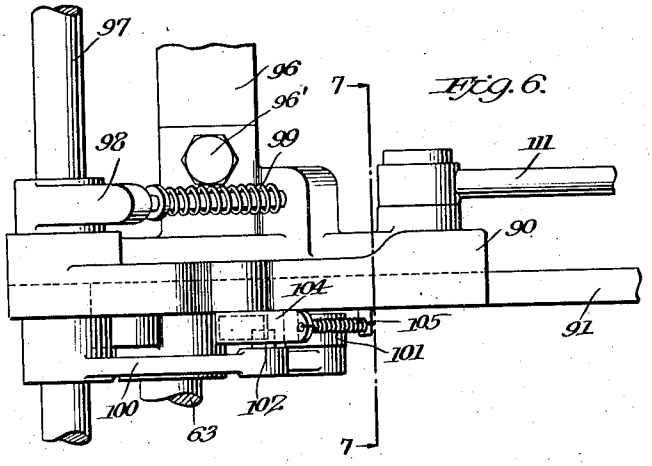
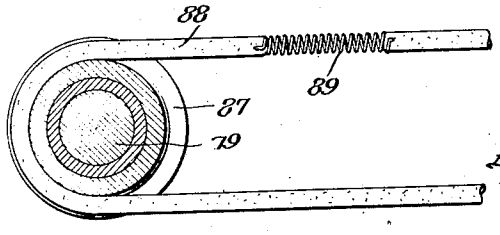




Fig. 6.

Fig. 8.




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1,691,656

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PRINTING PRESS

Filed June 13, 1925

6 Sheets-Sheet 6

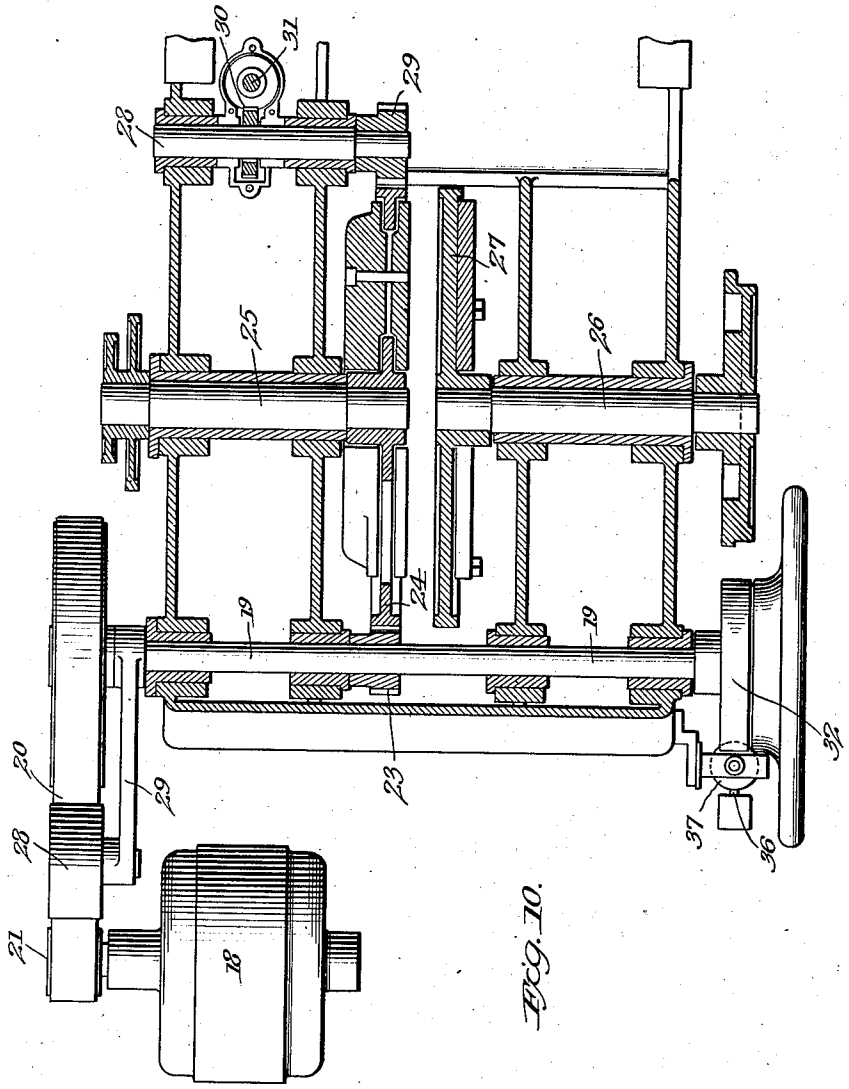



Fig. 10.

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Patented Nov. 13, 1928. 1,691,656

# 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 June 13, 1925. Serial No. 36,944.

The present invention relates to printing presses, and particularly to printing presses of the bed-and-cylinder type.

In my copending application Ser. No. 738,677, filed Sept. 19, 1924, there is shown and described an automatic jobber press including an oscillating cylinder and a bed reciprocating in an inclined plane, together with associated sheet feeding and delivering mechanisms. The sheet feeding and delivering mechanisms are mounted on a frame which can be moved away from the press at will to provide access to the opposed parts. This machine is equipped with an electric motor drive, automatic impression operating means, sheet detector mechanism for tripping the impression and, if desired, stopping the press when a sheet is absent from the feed board when due, means for double rolling or double inking the type for each sheet printed, pneumatic devices for lifting sheets singly from a pile and transferring them to sheet forwarding and controlling devices by which they are accurately fed to the cylinder, jogger mechanism associated with the delivery table, and various other mechanisms, all of which are very fully shown and described in said copending application.

The present invention effects certain improvements in the machine of said copending application, and particularly:—in the motor drive for the press; in the motor controlling means; in the sheet-detector-controlled mechanism for tripping the impression; in the sheet delivery mechanism; and in the jogger mechanism. These improvements are shown in the accompanying drawings with the machine illustrated in the application referred to, but it should be understood that certain of them, particularly the sheet delivery mechanism and the jogger mechanisms, are by no means limited in their application to the particular type of press illustrated.

Referring to the accompanying drawings:

Fig. 1 is a side elevation of a printing press and associated sheet handling mechanism, illustrating improvements effected by the present invention.

Fig. 2 is a similar view on a larger scale, but showing only a fragment of the press and only the upper portions of the feeder mechanisms, various elements of the sheet feeding mechanism, with which the present invention is not concerned, being omitted.

Fig. 3 is a fragmentary longitudinal sectional view, illustrating more particularly the sheet delivery and jogger mechanisms;

Fig. 4 is a plan view of the sheet delivery, the delivery table and the jogger mechanism;

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 4, illustrating the reciprocating grippers associated with the delivery tapes and mechanism for controlling the grippers;

Fig. 6 is a plan view of the mechanism shown in Fig. 5;

Fig. 7 is a sectional view on the line 7—7 of Fig. 6;

Fig. 8 is a longitudinal sectional view through one of the tape driving pulleys, illustrating particularly the construction of the tapes;

Fig. 9 is a detail view showing one of the rollers which are adapted to engage a sheet on the impression cylinder;

Fig. 10 is a sectional plan view showing the driving connection; and

Fig. 11 is a sectional elevational view showing a stripper finger to a larger scale.

It is not necessary to describe completely and in detail herein the complete machine with which the present improvements are associated, as this machine is fully described in the copending application referred to above and the present improvements relate to only a relatively few elements thereof. However, the description will be full enough and the drawings will show sufficient of the machine to give a clear and thorough understanding of the present invention.

The base or frame of the press consists of a hollow casting or housing 10 having a nearly vertical back and a front that is inclined to the vertical at an angle of about 30°, except near the bottom where a forward projection is provided.

The bed 11 is reciprocable on ways secured to the front inclined face of housing 10; the cylinder 12 is journaled in housings 13 bolted to the sides of the main housing 10, and the inking mechanism 14 is mounted below the cylinder. The feeder frame 15 is slidably mounted on brackets 16 attached to the for-

wardly projecting portion of housing 10 and is adapted to be moved manually towards and away from the press by means of a crank handle 17. All of said parts are constructed and arranged exactly like the corresponding parts shown and described in my copending application.

The first improvement relates to the drive of the press.

For operating the machine an electric motor 18, mounted to the rear and at one side of housing 10, is connected to a main drive shaft by a belt 20 which passes over a small pulley 21 on the armature shaft of the motor and over a large pulley 22 on the drive shaft. Drive shaft 19 has secured thereto a pinion 23 which meshes with a large spur gear 24 keyed on the inner end of a shaft 25 which is journaled in housing 10. In alignment with shaft 25 is a shaft 26 carrying on its inner end a disk 27 which faces gear 24 and is rigidly connected thereto by a wrist pin. A pitman connects this wrist pin with the under side of the bed. To maintain a uniform tension on belt 20 there is provided a heavy roller 28 resting on the upper run of said belt and carried on the outer end of an arm 29 swung on shaft 19. Journaled in housing 10 in front of shaft 25 is a shaft 28 on the inner end of which is a pinion 29 in mesh with gear 24. Shaft 28 is operatively connected by spiral gearing 30 with an inclined shaft 31 which drives the sheet handling mechanism mounted on frame 15.

In my copending application drive shaft 19 is located in front of shaft 25, necessitating a long belt between the motor and said shaft on the outside of housing 10. In the construction according to the present invention drive shaft 19 is located at the rear of shaft 25 and close to the motor, so that only a comparatively short belt is needed, occupying a small space at the rear side of the housing, where it is out of the way of the press mechanism and the attendants.

Due to the weight of the bed and its movement in an inclined plane, it has been found that the bed will gravitate to its lowest position after current has been cut off from the motor. It is desirable to maintain the bed and the other operating parts of the machine in substantially the positions they were at the instant current was cut off. This result is effected in accordance with the present invention by providing auxiliary holding means operating upon some moving element and rendered effective when the motor current is interrupted. In the form illustrated (Fig. 1), this holding means comprises a brake band 32 embracing a pulley 33 on drive shaft 19, anchored at one end to the frame and connected at its other end to a screw rod 34 which is pivoted to one arm of a bell crank lever 35. The other arm of bell crank 35 is rigid with a weighted rod 36 to which is connected the plunger of a solenoid 37. The circuit of the solenoid is controlled by the motor switch, so that the solenoid will be energized when the motor circuit is closed and deenergized when said circuit is opened. Thus when the motor circuit is opened to stop the press, either automatically or at the will of the operator, the weighted rod 36 will fall and rotate bell crank 35 in a direction to tighten the brake band on the pulley and so stop rotation of drive shaft 19 and hold all the operating elements of the press and sheet handling apparatus in substantially the positions they occupied at the instant the stopping operation was performed.

The second feature of the present invention relates to the control of the impression mechanism.

In my copending application there are fully described and shown mechanism for throwing on and off the impression and sheet-detector-controlled mechanism for tripping the impression operating means. Parts of said mechanisms are indicated in Fig. 1 and will be referred to only in a general way herein, but sufficiently to make clear certain modifications and improvements effected by the present invention.

The impression is thrown on and off periodically by means of a train of mechanism including a cam operated bell crank 38, a link 39 having a hooked end engaging over a pin on the upper arm of bell crank 38, a shaft 40 carrying an arm to which link 39 is pivoted, and links 41 connected at their lower ends to arms on shaft 40 and at their upper ends to eccentric bushings 42 in which the cylinder trunnions are journaled. This impression operating means is tripped or rendered inoperative by means of a bell crank 43 pivoted under link 39 and having an arm adapted to engage the under side of said link and lift the hook end thereof from the pin on bell crank 38. A pin 43′ is provided to limit the movement of bell crank 43 in one direction. Bell crank 43 is controlled by sheet detector mechanism mounted on the frame 15, so as to trip the impression operating mechanism when a sheet is absent from the feed board when due. The connections between the bell crank 43 and the sheet detector include a link 44 pivoted to the depending arm of bell crank 43 and having a semicircular notch in its other end engaging a laterally projecting pin 45′ on a pivoted arm 45, link 44 being slidably supported in a bearing 46 attached to the side of the ink fountain bracket 47. Arm 45 is operated by a pin 48′ on a lever 48 which is pivoted coaxially therewith. Lever 48 is connected to the lower end of a push rod 49 which is adapted to be depressed, upon failure to feed a sheet or to feed it properly, by means of a dog 50 which is carried on the free end of a periodically operated lever 51. Under normal operating con-

ditions, dog 50 is thrown out of engagement with rod 49 by the operation of the sheet detector, when lever 51 is depressed but when a sheet is not present on the feed board when due dog 50 engages rod 49 when lever 51 is depressed, and hence rod 49 is moved downwardly tripping the impression operating means.

The mechanism just described for tripping the impression operating means is similar in all respects to the corresponding parts more fully described and shown in my copending application, except that in the mechanism of the copending application the rod 44 has a hook end engaging over the pin on pivoted arm 45, whereas according to the present invention this rod is slidably supported by a fixed bearing and has a one-way connection with arm 45, simply having its end butting against the pin on said arm. With this modification the feeder frame on which arm 45 is mounted can be moved out of and into operative position without manipulating the link connection 44 to unhook its end from said pin, as was necessary with the former construction.

In order to hold the impression operating means tripped, as when the feeder is moved to inoperative position, there is provided a pawl 52 pivoted to slide bearing 46, normally turned back to the position shown in Fig. 1 but adapted when swung to the opposite position to engage a notch 53 in link 44 when the latter is in impression tripping position.

In my copending application the manually operable switch box for the motor is mounted on the feeder frame 15 at the side and near the top thereof, and the automatically operable plunger switch is mounted on the feeder frame directly below the lever 48, in such position that its plunger will be operated to open the motor circuit by a dog 54 depending from lever 48 when a sheet is not present on the feed board when due. To provide for movements of the feeder towards and from the press it is necessary to use flexible extensible conductor cables connecting the switches on the movable feeder frame with the stationary motor. According to the present invention the manually operable switch and the automatically operable plunger switch are formed as a unit and mounted in a fixed position with respect to the motor. As will be observed from Fig. 1, the manually operable switch 55 and the automatic plunger switch 56 form a unit which is mounted at the side of the ink fountain. To operate the plunger switch there is provided a lever 57 fulcrumed on the feeder frame 15. One end of lever 57 is adapted to project under the plunger of switch 56 when the feeder is in its operative position, and the other end extends under the dog 54 on lever 48, so that if the dog 54 is in its operative or depending position when lever 48 is depressed, upon failure to feed a sheet, lever 57 will be rotated and push up the plunger of switch 56, opening the motor circuit and stopping the press. The present construction has the decided advantage over that of the copending application, in that the manual and automatic switches are brought together in a compact unit fixed with respect to the motor, thereby eliminating the flexible conductors connected to the movable feeder frame, which are cumbersome and liable to get in the way of the mechanism and the attendants.

The third feature of the present invention relates to the delivery mechanism.

The sheets are fed from a table 58 supported for up and down movement in frame 15, devices being provided for raising and lowering the table manually or for raising it automatically to preserve the level of the sheet pile substantially constant. The sheets are taken from table 58 singly and forwarded on to feed board 59 by means of pneumatic devices including rotatable suction wheels (not shown) on shaft 60, and are conveyed along the table 59 to cylinder 12 by means of tapes passing over pulleys on shaft 61, suitable guiding, registering and controlling devices being provided to maintain the sheets in position during their passage over the feed board and to feed them accurately to the impression cylinder. These sheet feeding and controlling devices are fully shown and described in my copending application and as the present invention effects no modifications thereof, it is not desirable to describe them herein in detail.

In the construction shown and described in my copending application the printed sheets are stripped from the cylinder by stripper fingers and coacting rollers and are delivered directly therefrom on to a delivery board located vertically over the feed board. In the construction according to the present invention the sheets are taken from the strippers by reciprocating grippers which operate between a set of delivery tapes, the grippers receiving the margin of the sheet as it is projected from the cylinder by the action of the stripper fingers, grasping said margin, removing the sheet positively from the cylinder and finally opening to permit the tapes to forward the sheet to the delivery table. The sheets are thus positively and surely removed by the grippers from the cylinder, the grippers having a sufficient throw to remove the sheets entirely from the cylinder before opening to permit further forwarding thereof by the tapes.

The feeder frame 15 includes two side castings of the form shown in the side view (Fig. 1). The forward extensions of these castings have bolted thereto near their ends upstanding brackets 62, the upper ends of which are curved towards the cylinder 12. Rotatable in horizontally aligned bearings

near the upper ends of brackets 62 is a shaft 63. On the outer ends of shaft 63 are arms 64 which are yieldingly held against stop pins 65 by springs 66. On the shaft 63 just inside brackets 62 are arms 67 which have their ends connected by a rod 68. Rotatable on rod 68 are a pair of rollers 69 which engage the end disks of cylinder 12 when the feeder frame is in its operative position. Adjustably mounted on rod 68 inside rollers 69 are a pair of brackets 70, each of which is formed with spaced ears between which is pivoted an arm 71 (Fig. 9). Rotatable on arms 71 are rollers 72, which are adapted to engage a sheet on cylinder 12. Arms 71 are allowed a slight pivotal movement between limits determined by engagement of the upper and lower corners thereof with brackets 70, being yieldingly held by a spring pressed plunger 73 against upward movement. Rollers 69 are thus held in yielding engagement with the cylinder disks by the action of springs 66, and the rollers 72 are independently held in engagement with the sheet on the cylinder by the action of spring pressed plungers 73. The slight pivotal movement of rollers 72, against the action of the spring pressed plungers, thus provided independently of their movement about the axis of shaft 63, renders the rollers 73 very sensitive to any change or irregularities in the surface of the sheet on the cylinder, permitting them to yield to any such irregularities instantly and without strain. It will be noted that the axis of rollers 72 is further from the axis of shaft 63 than is the axis of rollers 69. Thus when the impression cylinder is moved away from the bed to impression off position and the cylinder is rotating reversely the rollers 72 will be moved slightly off the sheet and hence permit the sheet to be freely stripped from the cylinder.

A pair of stripper fingers 75 located inwardly of rollers 72 are mounted on collars 76 which are adapted to be adjustably clamped on shaft 63. The stripper fingers are pivoted between ears 77 formed on the collars and have tail portions on one side of their pivots which are acted upon by spring pressed plungers 78 and engage on the other side of their pivots adjusting screws 78′. The stripper fingers are thus adjustable laterally for sheets of different widths and are adjustable in vertical planes to bring them into accurate position with respect to the impression cylinder. The stripper fingers extend from their supporting collars in an inclined direction upwardly and forwardly and then bend over the tape shaft 79, extending therefrom at a slight downward inclination to the impression cylinder.

The tape shaft 79 is journaled in the upper ends of brackets 62 and is driven by a belt 80 which passes over a small pulley 81 on the projecting end of shaft 79 and over a larger pulley 82 on a stubshaft which is geared to shaft 61 by gears 61′ and 82′ (Figs. 2 and 3). Secured to the tops of the two side frame castings of the feeder frame 15 are brackets 84 which are tied together by a rod 85. These brackets are of identical form, each consisting of a rear horizontal portion and a front downwardly inclined portion. Supported in lugs on the rear portions of these brackets is a rod 85′, on which are journaled a number of laterally spaced idler pulleys 86. Fixed on tape shaft 79 are a corresponding number of drive pulleys 87, and passing around the pulleys 86 and 87 are tapes 88. Each tape includes a resilient insert consisting of a coil spring 89 having its ends secured to the spaced ends of the inextensible tape portion. This inserted coil spring serves to maintain the tape under constant tension irrespective of any changes in distance between the axes of the driving and idler pulleys caused by wear, temperature changes or other cause. It will be observed from Fig. 8 that the length of the inserted spring 89 is about equal to a ninety-degree arc measured along the periphery of the driving pulley 87. Thus the pulley will engage at all times a substantial portion of the inextensible tape while the spring 89 is passing therearound, eliminating any slippage due to the presence of the spring.

The margins of the sheets coming over the stripper fingers 75 pass into the throats of a plurality of pairs of grippers which are mounted on slides 90 reciprocable on ways 91. Each of the ways 91 is secured at its rear end to a pair of inwardly extending tubular projections 92 integral with bracket 84 and is pinned at its front end to a bracket 93 which is mounted on shaft 63 (Fig. 5).

Each pair of grippers consists of an upper rotatable finger 94 and a lower relatively stationary finger 95 (Fig. 5). The lower fingers 95 are adjustably fixed on a rectangular bar 96 which is fastened by bolts 96′ at its ends to lugs on slides 90. The upper fingers 94 are integral with collars adjustable on a shaft 97 which is supported at its ends in bearings formed in slides 90. Shaft 97 has fixed thereto just inside one of the slides 90 an arm 98 and acting on this arm in a direction to turn shaft 97 and close the upper fingers 94 on the lower fingers 95 is a spring pressed rod 99. One end of shaft 97 extends on the outside of the corresponding slide 90, and fixed on this end is an arm 100 on the free end of which is journaled a roller 101 and from the inner side of which projects a pin 102. When the grippers approach the limit of their movement away from the impression cylinder, roller 101 engages a cam 103 fixed on the outside of slide way 91. Shaft 97 is thereby rotated in a direction to swing the upper grippers 94 from the lower grippers 95. When shaft 97 has thus been rotated to open the gripper a pivoted latch 104 snaps over the pin 102 on

arm 100, being urged to do so by a spring 105. When the grippers approach the limit of their movement towards the impression cylinder latch 104 engages a trip arm 104′ and is thereby moved off the pin 102 permitting the spring pressed rod 99 to rotate shaft 97 and clamp the upper grippers against the lower grippers or against a sheet inserted between the grippers. Trip 104′ is pivoted at 106 to the outside of slideway 91 and has an integral depending arm 107 which is bored or bifurcated to receive a threaded stem 108 supported in the hub of bracket 93. A compression spring 109 surrounds the stem 108 between arm 107 and said hub and a nut 110 limits the movement of the arm under the action of the spring. By adjusting nut 110 the position of trip arm 104′ may be varied to vary the position at which the grippers are closed or uncocked.

For reciprocating slides 90 and the gripper mechanism carried thereby the following connections are provided: A pair of links 111 are pivoted at one end to inwardly projecting bosses on the slides and at their other ends to arms 112 which are rigid with a shaft 113. Shaft 113 is journaled in the ends of the downwardly inclined portions of brackets 84 and projects on the outside of one of the brackets, where it carries an arm 114 which is connected by a link 115 to an eccentric pin 115′ on the outside of the spur gear 116 on the end of suction wheel shaft 60. It will be observed from Fig. 3 that this spur gear is driven through a train from shaft 61.

In Figs. 2, 3, and 4 the grippers 94, 95 are shown nearing the limit of their movement towards the impression cylinder, the grippers being open or cocked. In Fig. 5 the grippers have reached the limit of their movement towards the cylinder and have been uncocked by engagement of latch 104 with arm 105. The operation of the grippers is so timed with respect to the operation of the press that the edge of a printed sheet will have entered between the grippers an instant before they are uncocked. In this position (Fig. 5) it will be observed that the grippers extend beyond the tape pulleys 87 towards the cylinder and are positioned so as to receive the edge of a sheet directly as it is raised from the cylinder by the action of the strippers 75. The grippers now move back from the cylinder positively carrying the sheet and when they reach the point at which the roller 101 on arm 100 engages cam 103 the sheet is entirely removed from the cylinder and is lying smoothly on the tapes 88, the velocity of the tapes not exceeding that of the grippers. It will be observed from Fig. 5 that the gripping surface of the lower grippers 95 is slightly below the top surfaces of the tapes and it will therefore be clear that when the upper grippers 94 are opened the sheet will already be resting on the tapes and will be forwarded thereby through the passage between the gripper fingers, and projected onto the delivery table.

The delivery table comprises a wooden rectangular board 117 which is supported at its ends on brackets 118 secured to and projecting rearwardly from the top of feeder frame 15. The lower portions of brackets 118 are bolted to a cross bar 119 and the upper portions are bifurcated at 120 and straddle rod 85′. Screws 121 are mounted in the bifurcations to clamp the brackets snugly against rod 85′, whereby torque tending to rupture the attachment of the brackets to cross bar 119 is resisted. Board 117 rests on inner horizontal flanges 121 and is secured by clips 122 screwed in the outer ends of the brackets.

The delivery board is equipped with an adjustable sheet stop comprising an upright board 124 having secured on its inner face an angle piece 125, the horizontal portion of which is slidable in a groove formed in the upper face of board 117 along the longitudinal center line thereof. A thumb screw 126 is carried by the horizontal portion of 125 and projects through a longitudinal slot in board 117 communicating with the groove, whereby board 124 can be adjusted and clamped at different positions.

The delivery board is also equipped with side joggers 127. These joggers are attached to the ends of arms 128 by clamping screws 129 so that they can be clamped at different angular positions with respect to said arms. Arms 128 are pivoted on vertical axes at 129 to projecting portions 130 of brackets 118. Levers 131 are pivoted on the same axes as arms 128 and are formed at one end with curved slots centered on said axes. Clamping screws 132 pass through these slots and screw into arms 128. The other ends of levers 131 carry rollers which bear against cams 133 fixed on suction wheel shaft 60, springs 134 holding the rollers against the cams. This construction permits adjustment of the joggers for sheets of different widths. To adjust the joggers, screws 132 are loosened and arms 128 rotated to position the jogger pads at the desired points, whereupon the arms are clamped and then the jogger pads are adjusted to bring their faces parallel with the side edges of the sheets, by manipulating screws 129.

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

1. In combination with a printing press having a reciprocating bed and an oscillating cylinder, receiving sheets at the lower side of the cylinder and printing them at one stroke, means for projecting the margins of the printed sheets from the cylinder during the terminal portion of the printing stroke, grippers moving towards and from the cylinder

adapted to grasp said margins and strip the sheets from the cylinder at one end of their movement, and to open and release the sheets at the other end of their movement, and means to forward the sheets through the open grippers.

2. In combination with a printing press having a reciprocating bed and an oscillating cylinder, receiving sheets at the lower side of the cylinder and printing them at one stroke, gripper fingers projecting over the cylinder adapted to lift the margins of the printed sheets therefrom as the cylinder approaches the limit of its printing stroke, reciprocating grippers moving towards and from the cylinder adapted to grasp said margins and strip the sheets from the cylinder at one end of their movement, and to open and release the sheets at the other end of their movement, and means to forward the sheets through the open grippers.

3. In combination with a printing press having a reciprocating bed and an oscillating cylinder, receiving sheets at the lower side of the cylinder and printing them at one stroke, a set of endless tapes arranged tangentially to said cylinder and projecting in proximity thereto, strippers projecting over said cylinder adapted to lift the margins of the printed sheets therefrom as the cylinder approaches the limit of its printing stroke, and a set of grippers reciprocating between said tapes timed to grasp said margins, strip the sheets from the cylinder and release them to the forwarding action of said tapes carrying them through the grippers.

4. In combination with a printing press having a bed reciprocating in an inclined plane and an oscillating cylinder in front of the bed adapted to receive sheets at the lower side of the cylinder and print them during the upstroke of the bed, means for projecting the margins of the printed sheets from the cylinder during the terminal portion of the printing strokes, grippers moving towards and from the cylinder timed to grasp said margins and strip the sheets from the cylinder at one end of their movement, and to open and release the sheets at the other end of their movement, and means to forward the sheets through the open grippers.

5. In combination with a printing press having a bed reciprocating in an inclined plane and an oscillating cylinder in front of the bed, adapted to receive sheets at the lower side of the cylinder and print them during the upstroke of the bed, a set of endless tapes arranged tangentially to said cylinder and projecting in proximity thereto, means for projecting the margins of the sheets as the cylinder approaches the limit of its printing stroke, and a set of grippers reciprocating between said tapes timed to grasp said margins, strip the sheets from the cylinder and release them to be subsequently forwarded by the tapes carrying them through the grippers.

6. In combination with a printing press having a bed reciprocating in an inclined plane and an oscillating cylinder in front of the bed, adapted to receive sheets at the lower side of the cylinder and print them during the up-stroke of the bed, strippers projecting over the cylinder adapted to raise the margins of the sheets during the terminal portion of the printing stroke, a set of grippers reciprocating in a path tangential to said cylinder timed to grasp said margins and strip the sheets from the cylinder at one end of their movement, and to open and release the sheets at the other end of their movement, and means to forward the sheets through the open grippers.

7. In combination with a printing press having an up-and-down reciprocating bed and an oscillating cylinder in front of the bed, adapted to receive sheets at the lower side of the cylinder and print them during the up stroke of the bed, grippers moving towards and from the cylinder timed to grasp the margins of the printed sheets and strip them from the cylinder at one end of their movement, and to open and release the sheets at the other end of their movement, and means to forward the sheets through the open grippers.

8. In combination with a printing press having an up-and-down reciprocating bed and an oscillating cylinder in front of the bed, adapted to receive sheets at the lower side of the cylinder and print them during the up stroke of the bed, means to project the margins of the printed sheets tangentially at the upper side of the cylinder, reciprocating grippers timed to grasp said margins and strip the sheets from the cylinder at one end of their movement, and to open and release the sheets at the other end of their movement, and means to forward the sheets through the open grippers.

9. In combination with a printing press having a reciprocating bed and an oscillating cylinder, adapted to receive sheets at the lower side of the cylinder and print them at one stroke, means to project the margins of the printed sheets tangentially at the upper side of the cylinder, grippers moving towards and from the cylinder, means to cock said grippers as they approach the limit of their movement from the cylinder and means to uncock said grippers when they approach the limit of their movement towards the cylinder and have received between them the projected margin of a sheet.

10. In combination with a printing press having a reciprocating bed and an oscillating cylinder, adapted to receive sheets at the lower side of the cylinder and print them at one stroke, means to project the margins of the sheets tangentially at the upper side of the

cylinder, grippers moving towards and from the cylinder, means to cock said grippers as they approach the limit of their movement from the cylinder, means to uncock said grippers when they approach the limit of their movement towards the cylinder and have received between them the projected margin of a sheet, and means to adjust said last named means to vary the point at which said grippers are uncocked.

11. In combination with the cylinder of a printing press, a frame movable towards and from said cylinder, a shaft mounted in said frame parallel to the axis of the cylinder, arms on said shaft, a rod connecting the outer ends of said arms, rollers on said rod engaging the end disks of the cylinder, springs holding said rollers yieldingly in engagement with the cylinder, brackets on said rod inwardly of said rollers, arms pivoted to said brackets so as to have a movement between narrow limits, rollers on said arms adapted to engage a sheet on the cylinder, and springs pressing said last named arms so as to hold said last named rollers yieldingly in engagement with the sheet.

12. In combination with a printing press having a bed reciprocating in an inclined plane and an oscillating cylinder in front of the bed, a frame in front of the cylinder, arms pivoted to said frame projecting over the cylinder, a rod connecting the free ends of said arms, rollers on said rod engaging the end disks of the cylinder, springs acting on said arms so as to hold said rollers in engagement with said disks, brackets mounted on said rod between said rollers, supports pivoted so as to be movable within narrow limits to said brackets, rollers carried by said supports, and springs acting on said supports so as to hold said last named rollers yieldingly against the surface of a sheet on the cylinder.

13. In combination with a printing press having a bed reciprocating in an inclined plane and an oscillating cylinder in front of the bed, a frame in front of the cylinder, arms pivoted to said frame, a rod connecting the free ends of said arms parallel to the axis of the cylinder, rollers on said rod engaging the end disks of the cylinder, brackets mounted on said rod between said rollers, supports pivoted to said brackets so as to be movable within narrow limits, rollers carried by said supports, and springs acting on said supports so as to hold said last named rollers yieldingly against the surface of a sheet on the cylinder.

14. In combination with a printing press having a bed reciprocating in an inclined plane and an oscillating cylinder in front of the bed, a frame mounted in front of the press and movable with respect thereto, means on said frame for feeding sheets to the cylinder, an electric motor operating the press, a switch mounted on the frame of the press controlling said motor, and sheet-controlled mechanism mounted on said movable frame operating said switch to open the motor circuit when a sheet is not present when due.

15. In combination with a printing press having a bed reciprocating in an inclined plane and an oscillating cylinder mounted in front of the bed, a frame movable towards and from the press, means on said frame for feeding sheets to the cylinder, an electric motor operating the press, a plunger switch fixed with respect to the frame controlling said motor, a lever fulcrumed on said manually movable frame having an arm extending to the plunger of said switch, and sheet-controlled mechanism mounted on said manually movable frame adapted to move the other end of said lever when a sheet is not present when due.

16. In a combined printing press and automatic sheet feeding mechanism in which the sheet feeding mechanism is mounted on a frame movable towards and from the press, an electric motor for operating said press and mechanism, a switch fixed with respect to the frame of the press, and sheet-controlled mechanism mounted on said movable frame for operating said switch.

17. In a combined printing press and sheet feeding mechanism, in which the sheet feeding mechanism is mounted on a frame movable towards and from the press, an electric motor for operating said press and mechanism, a motor control switch box fixed with respect to the frame of the press including manual means for controlling the motor circuit and automatically operable means for controlling said circuit, said latter means comprising a stem, a lever fulcrumed on said movable frame having an arm extending under said stem, and means for actuating the other arm of said lever when a sheet is not present when due.

18. In combination, a printing press having a reciprocating bed and a cylinder, means to throw the cylinder to impression on and off positions, means to feed sheets to said cylinder, means to deliver the printed sheets from the cylinder, a frame carrying said sheet feeding and delivering means mounted for movement to withdraw said sheet feeding and delivering means from operative relation with the cylinder to give access to interior parts of the press, and means to trip said impression actuating means when a sheet is not present on the sheet feeding means when due, said tripping means being constructed and arranged to permit the withdrawal movement of said frame and to automatically assume operative position when the frame is returned to its normal position.

19. In a printing press having a bed reciprocating in an inclined plane and an oscil-

lating cylinder in front of the bed combined with sheet feeding mechanism mounted on a frame which is movable towards and from the press, means for operating the impression, means for tripping the impression operating means including two arms pivoted respectively on the frame of the press and on said movable frame and a link slidably supported on the frame of the press having one end pivoted to the arm on the press frame and having its other end abutting a lateral projection on the other arm, and means for rotating the latter upon failure to feed a sheet.

20. In a combined printing press and sheet feeding mechanism including a bed reciprocating in an inclined plane, an oscillating cylinder in front of the bed and sheet feeding mechanism mounted on a frame movable towards and from the press, in combination, means for operating the impression, means for tripping the impression operating means including a rod slidably supported on the frame of the press and an arm pivoted on said movable frame having a lateral projection abutting against the end of said rod, and means to rotate said arm upon failure to feed a sheet.

21. In combination with a printing press having a bed reciprocating in an inclined plane and a cylinder oscillating in front of the bed, a sheet feeder and delivery comprising a frame movable towards and from the press, a feed board supported by the frame tangentially to the lower side of the cylinder, a feed table supported for vertical movement below and at the rear of the feed board, a delivery board supported at the top of said frame and projecting rearwardly therefrom and a sheet delivery between the cylinder and delivery board arranged tangentially to the upper side of the cylinder, said delivery comprising a set of endless tapes and means to take the sheets from the cylinder and position them on the tapes.

22. In combination with a printing press having a bed reciprocating up and down and a cylinder oscillating in front of the bed, a sheet feeder and delivery comprising a frame supported in front of the press, a feed board supported by the frame tangentially to the lower side of the cylinder, a delivery table supported near the top of said frame and a sheet delivery between the cylinder and delivery table arranged tangentially to the upper side of the cylinder, said delivery comprising a set of endless tapes and reciprocating grippers adapted to take the printed sheets from the cylinder and position them on the tapes.

23. In combination with a printing press having a bed reciprocating up and down and a cylinder oscillating in front of the bed, a sheet feeder and delivery comprising a frame supported in front of the press, a feed board supported by the frame tangentially to the lower side of the cylinder, a delivery table supported near the top of said frame and a sheet delivery between the cylinder and delivery table arranged tangentially to the upper side of the cylinder, said delivery comprising a set of endless tapes and means to take printed sheets from the cylinder and position them on the tapes.

24. In combination with a printing press having a reciprocating bed and an oscillating cylinder, receiving sheets at the lower side of the cylinder and printing them at one stroke, a delivery table, sheet conveying means extending from adjacent the cylinder to the table, reciprocating grippers having a relatively short stroke for gripping the margin of the sheet and placing the same on the tapes, the grippers then being opened and remaining open until after the sheet has passed through the same.

25. In combination with a printing press having a reciprocating bed and an oscillating cylinder, a feed board tangent to the lower element of said cylinder, said cylinder being adapted to receive sheets from said feed board and print them at one stroke, a delivery table, sheet conveying means tangent to the top of the cylinder over said board and extending from the cylinder to the table, reciprocating grippers having a stroke less than the distance between the cylinder and table for gripping the margin of the sheet and placing the same on the sheet conveying means, the grippers then being opened and remaining open until after the sheet has passed through the same.

In testimony whereof I hereunto affix my signature.

WILLIAM M. KELLY.