

Dec. 31, 1929.

W. M. KELLY

1,741,848

PRINTING PRESS

Filed Sept. 19, 1924

22 Sheets-Sheet 1

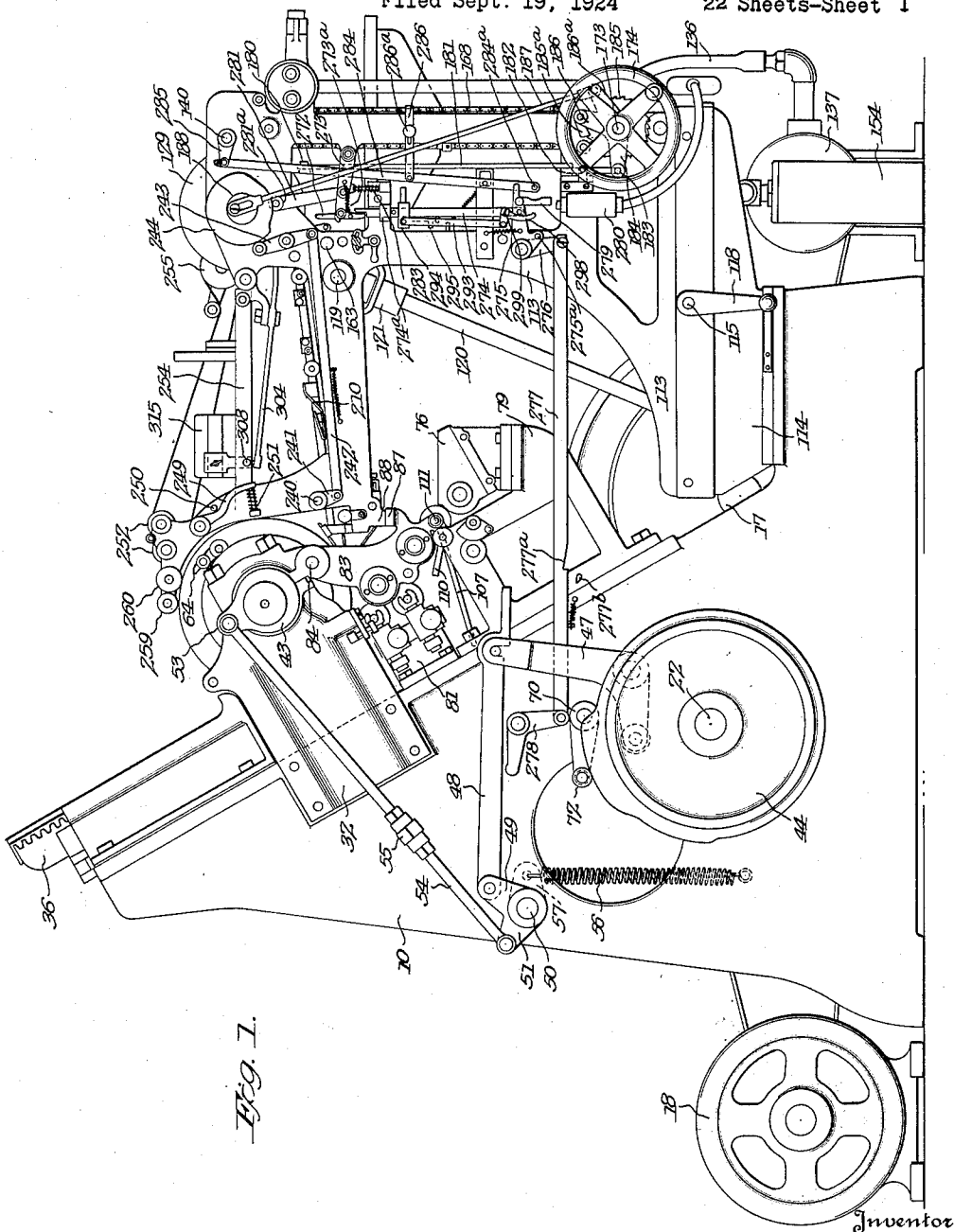


Fig. 1.

Wm. M. Kelly

By Watson, Coit, Morse & Grindle,
Attorneys

Dec. 31, 1929.

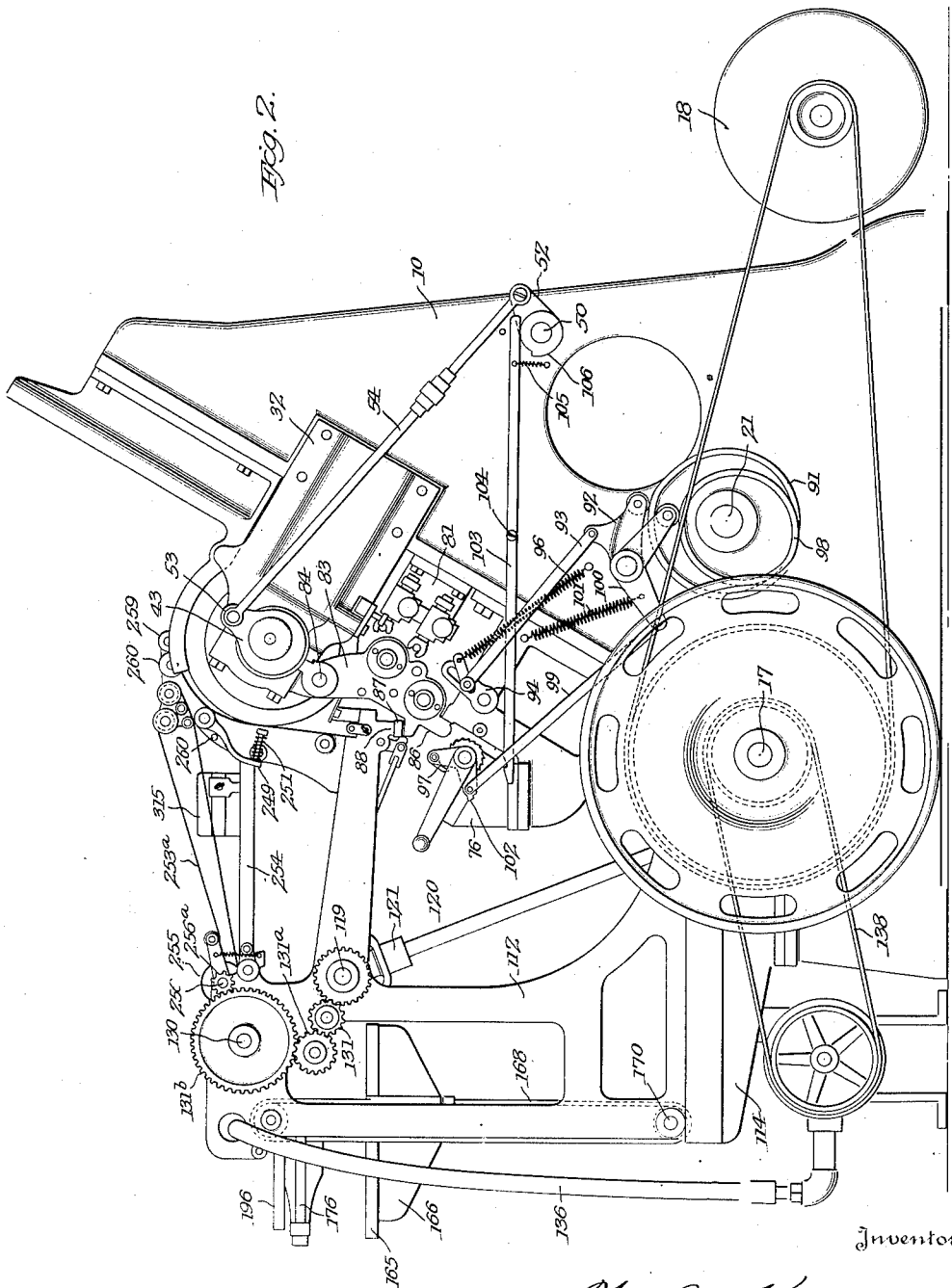
W. M. KELLY

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22 Sheets-Sheet 2



Inventor

Wm. M. Kelly.
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Attorney

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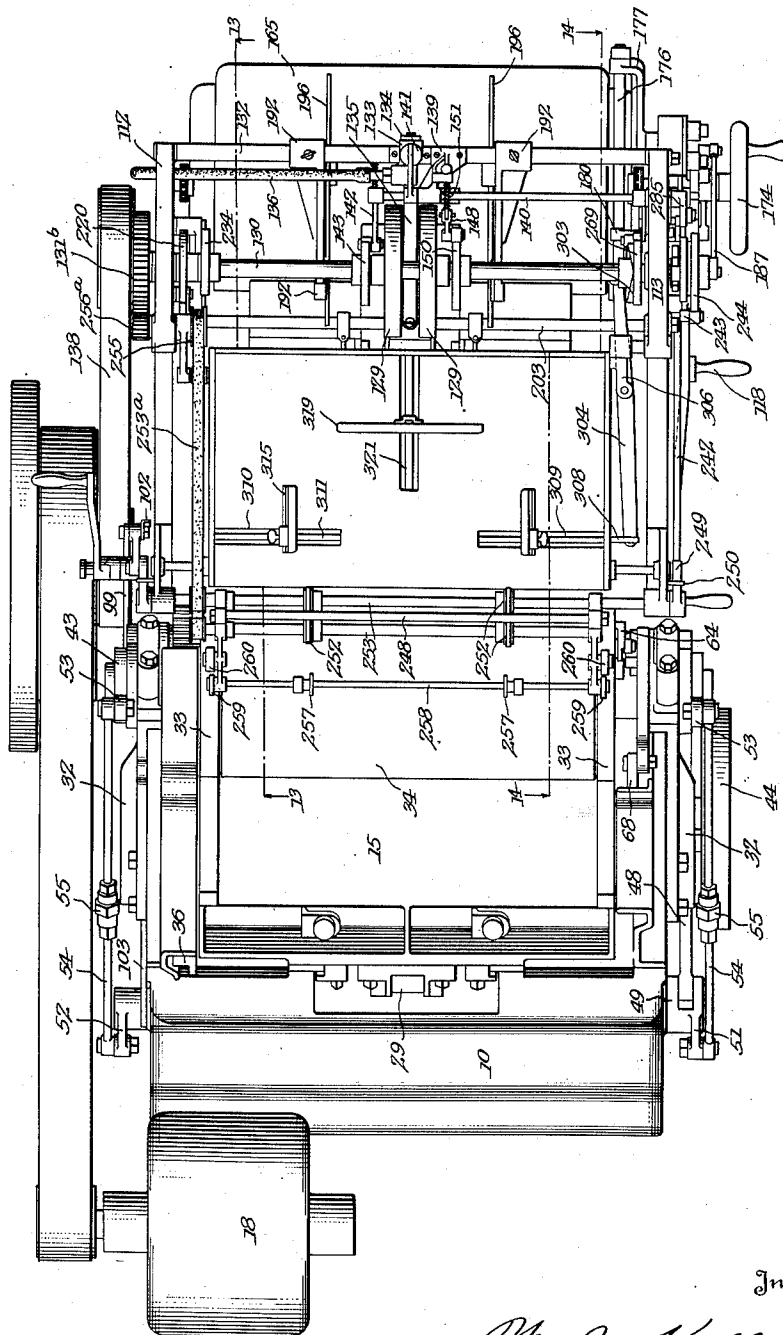
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22 Sheets-Sheet 3



Inventor

Mrs. M. Kelly,

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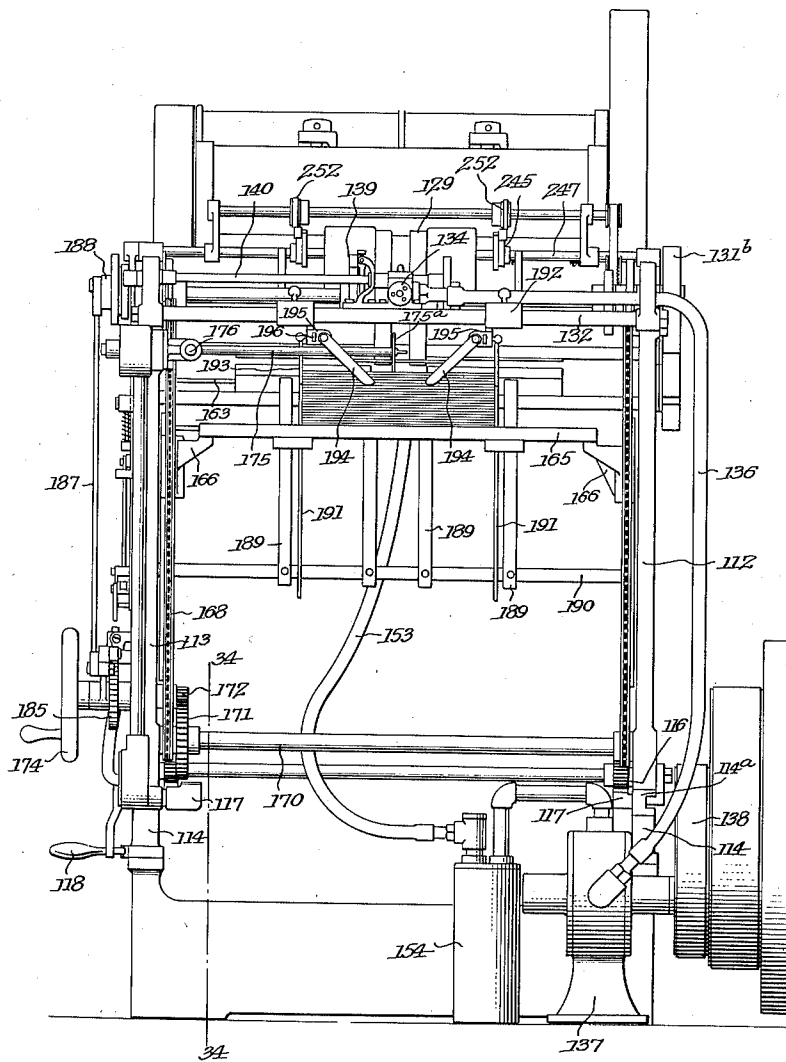
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22 Sheets-Sheet 4

Fig. 4.



Inventor

Wm. M. Kelly.

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Attorney

Dec. 31, 1929.

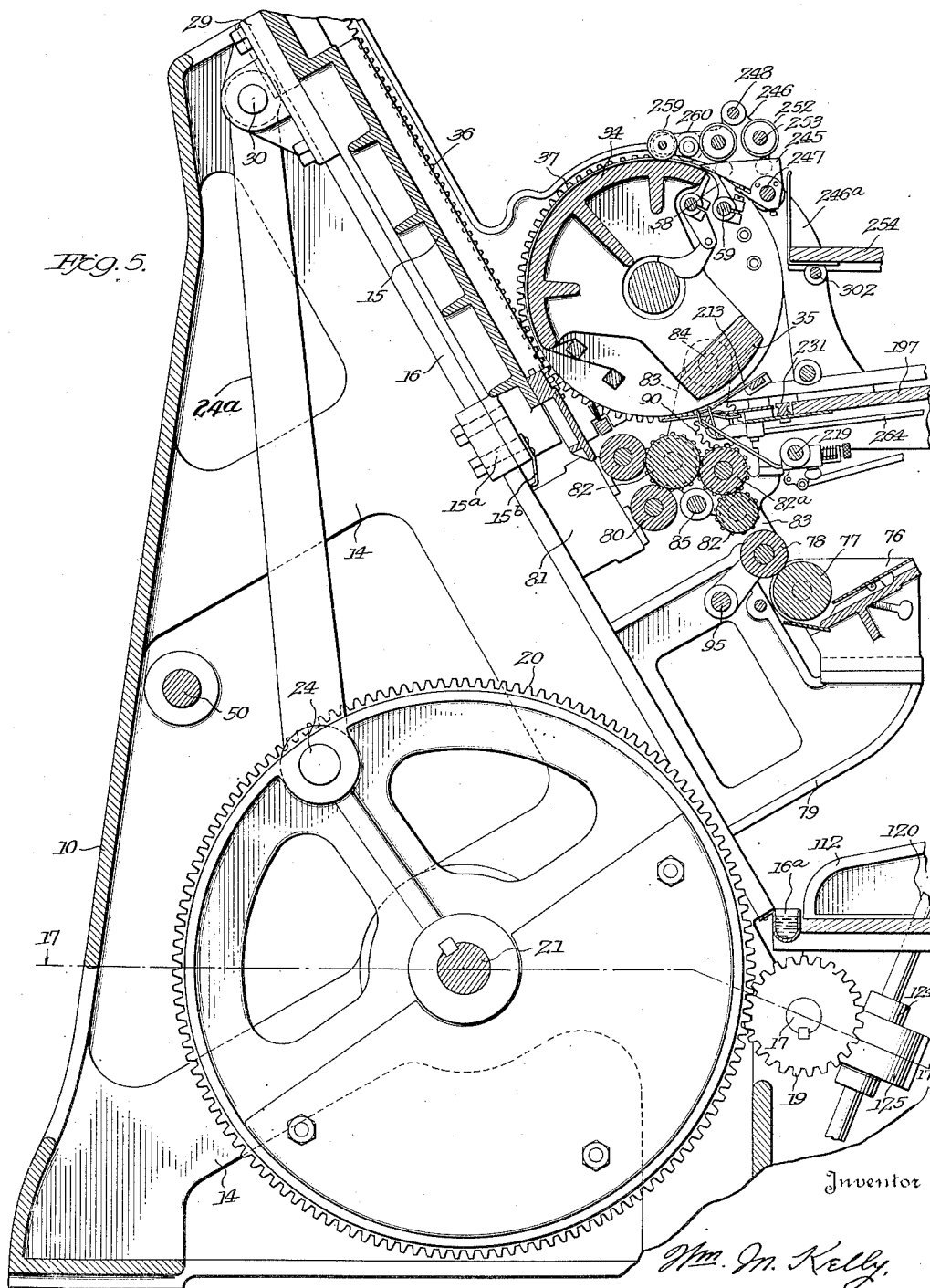
W. M. KELLY

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22 Sheets-Sheet 5



Inventor

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22 Sheets-Sheet 6

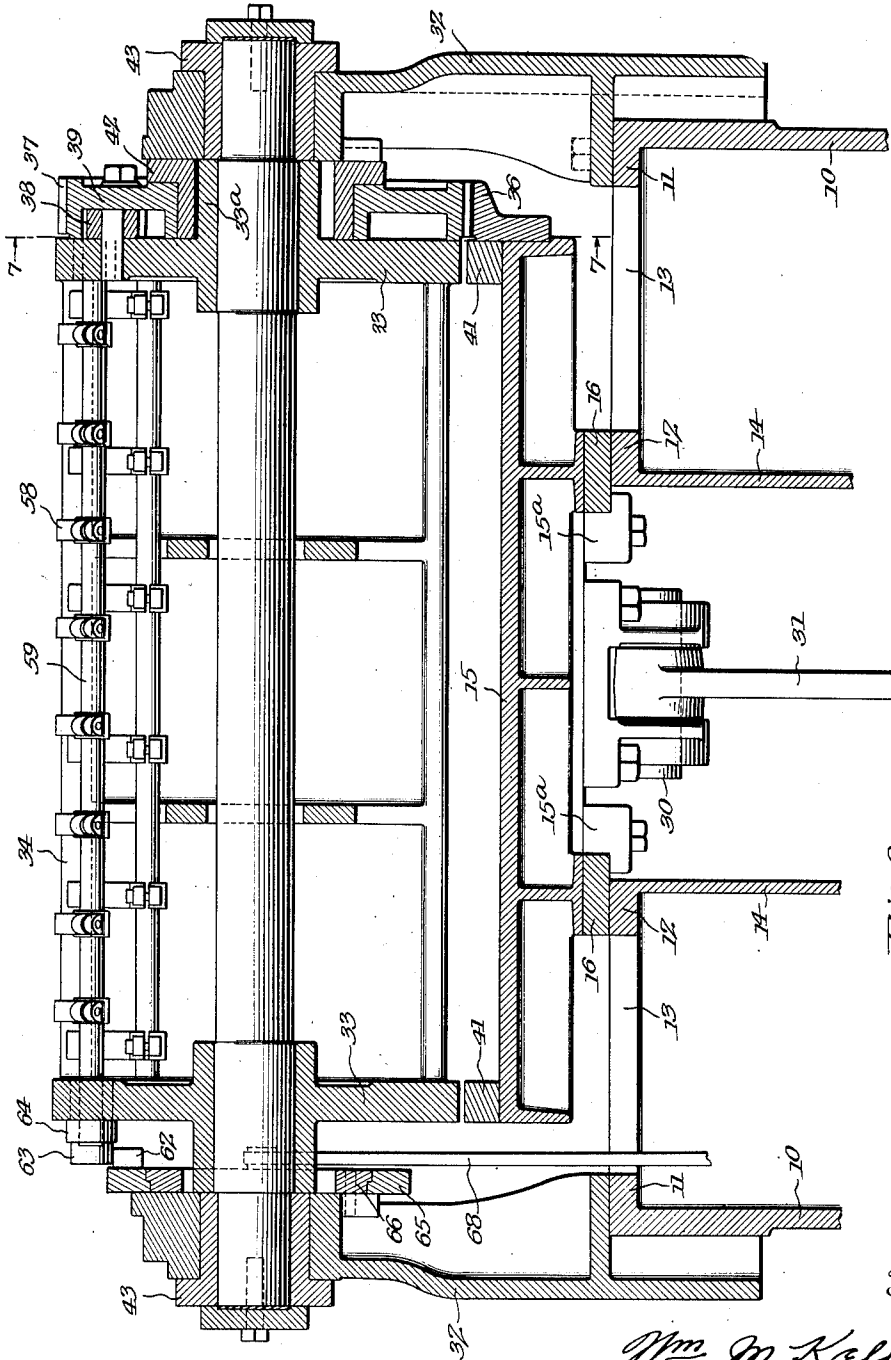


Fig. 6.

Inventor

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W. M. KELLY

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22 Sheets-Sheet 7

Fig. 7.

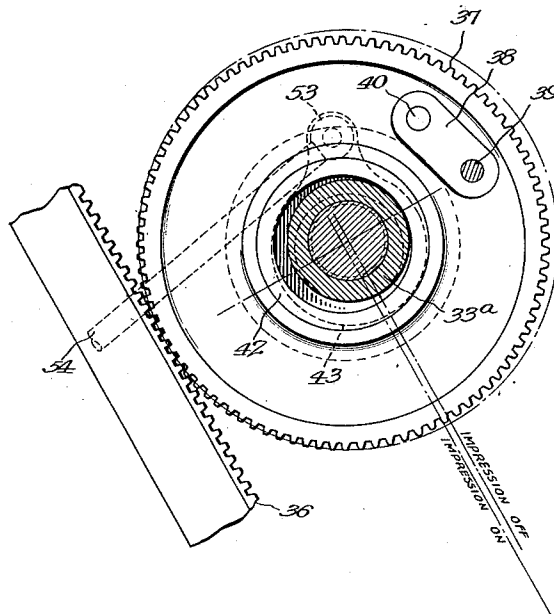


Fig. 8.

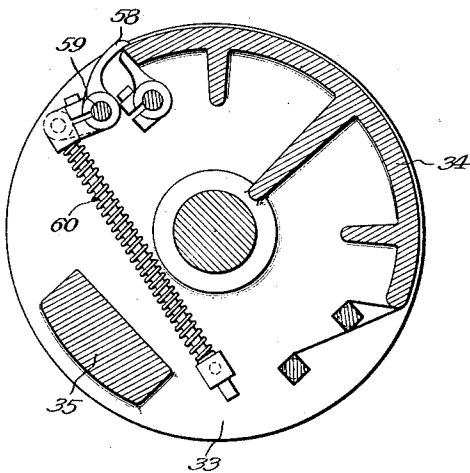
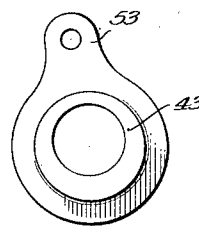


Fig. 9.



Inventor

Wm. M. Kelly.
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Attorney

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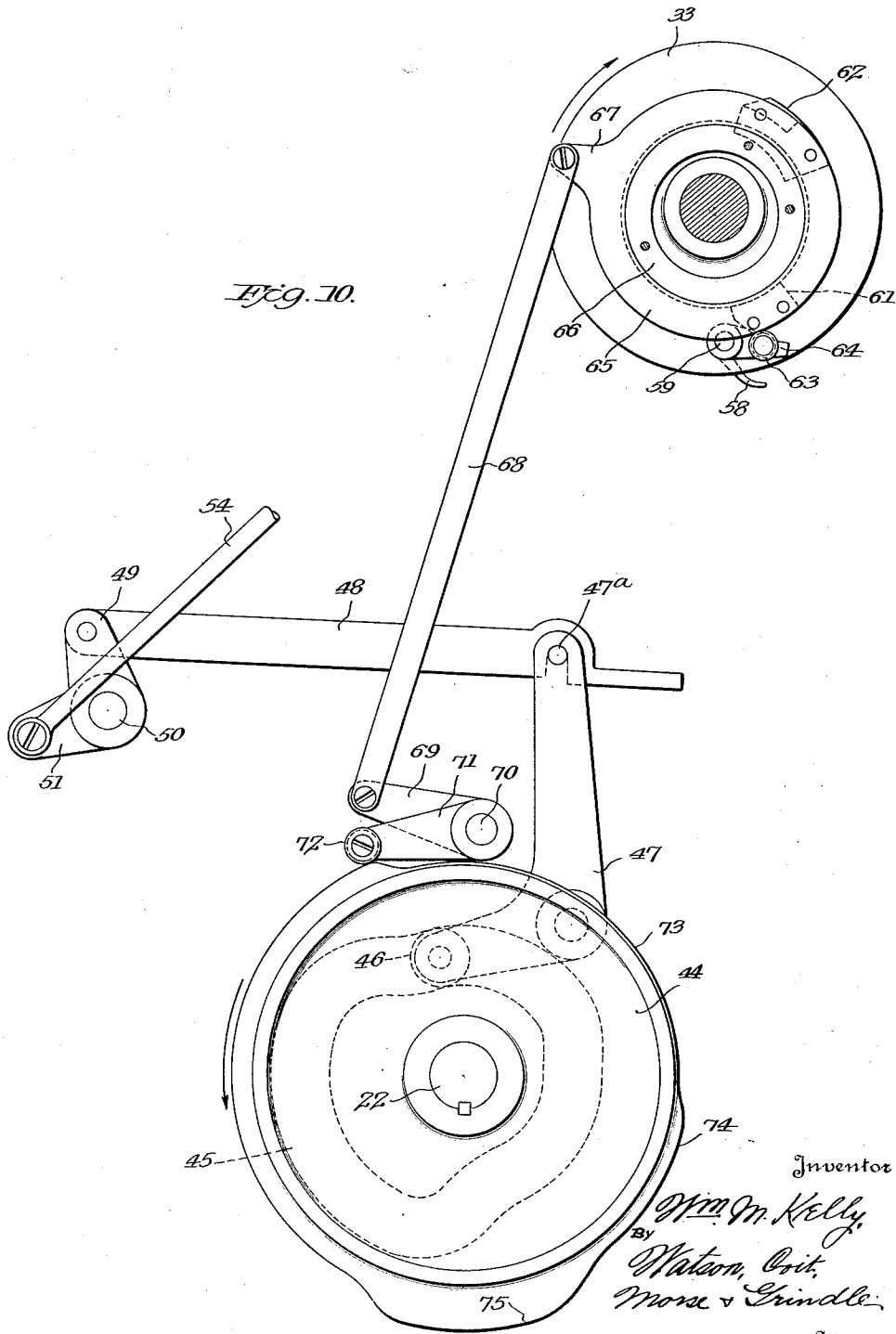
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22 Sheets-Sheet 8

Fig. 10.



Inventor

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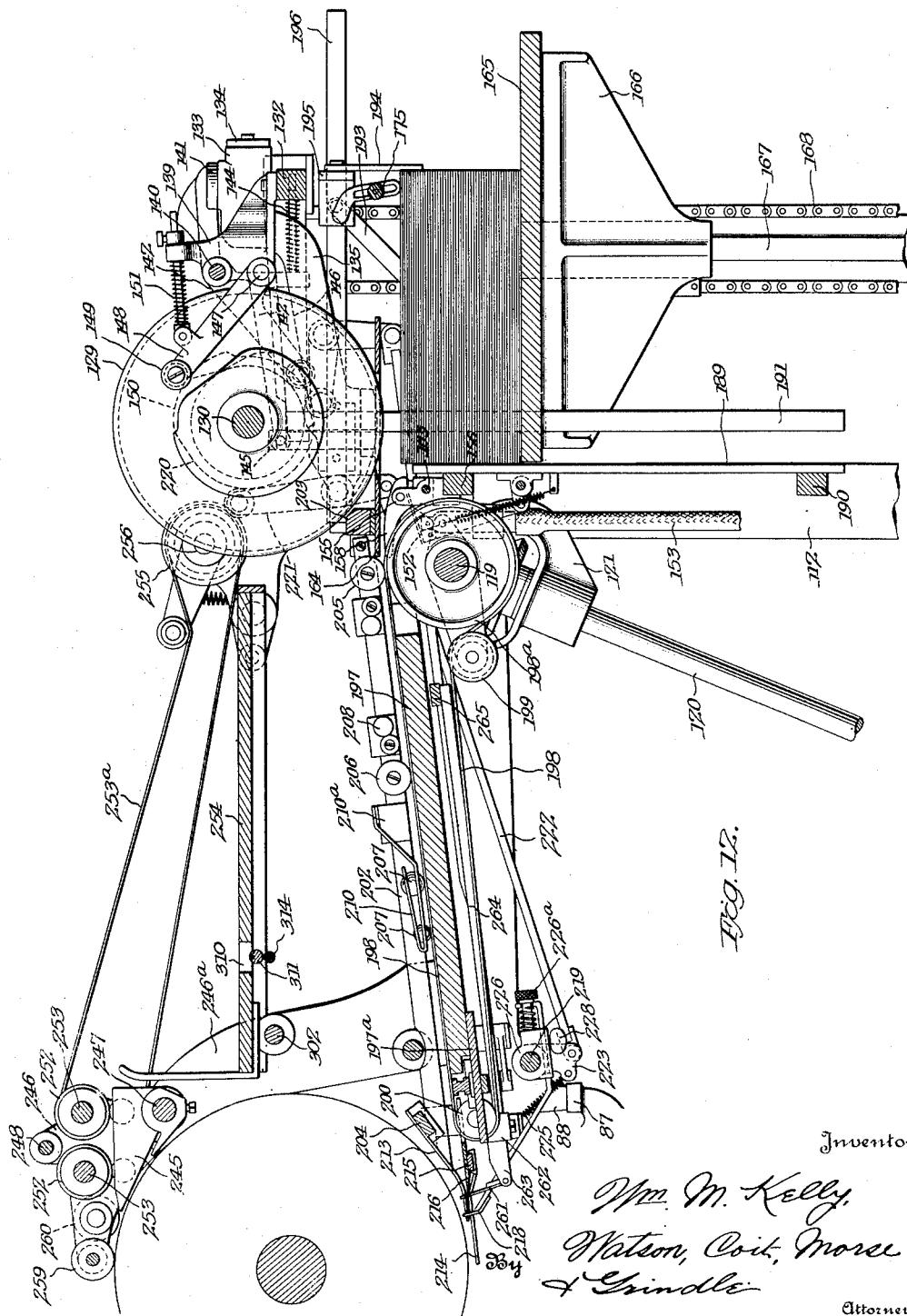


Fig. 12.

Inventor

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Attorney

Dec. 31, 1929.

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22 Sheets-Sheet 10

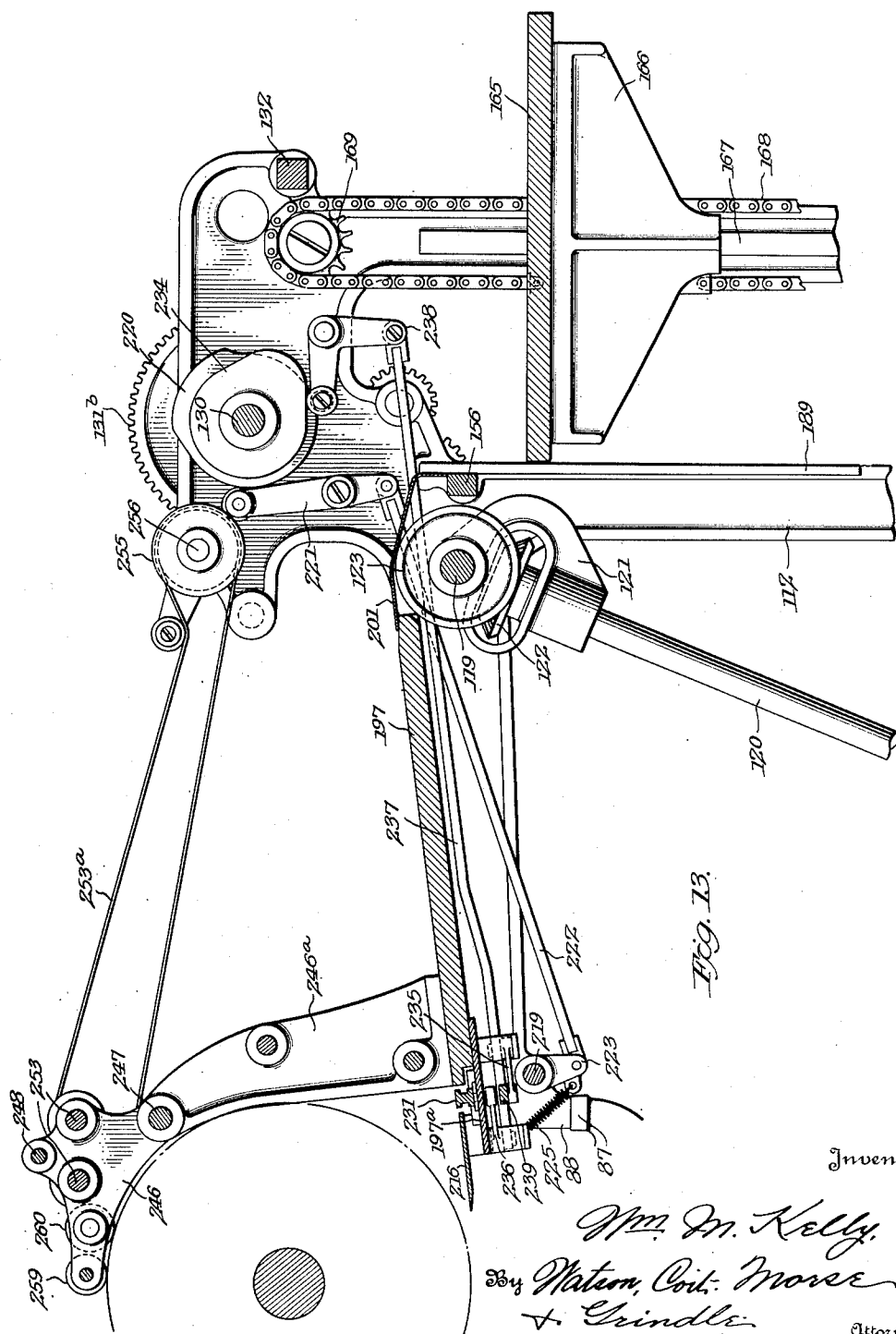


Fig. 13.

Inventor

Wm. M. Kelly.
By Walter C. Moore
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Attorney

Dec. 31, 1929.

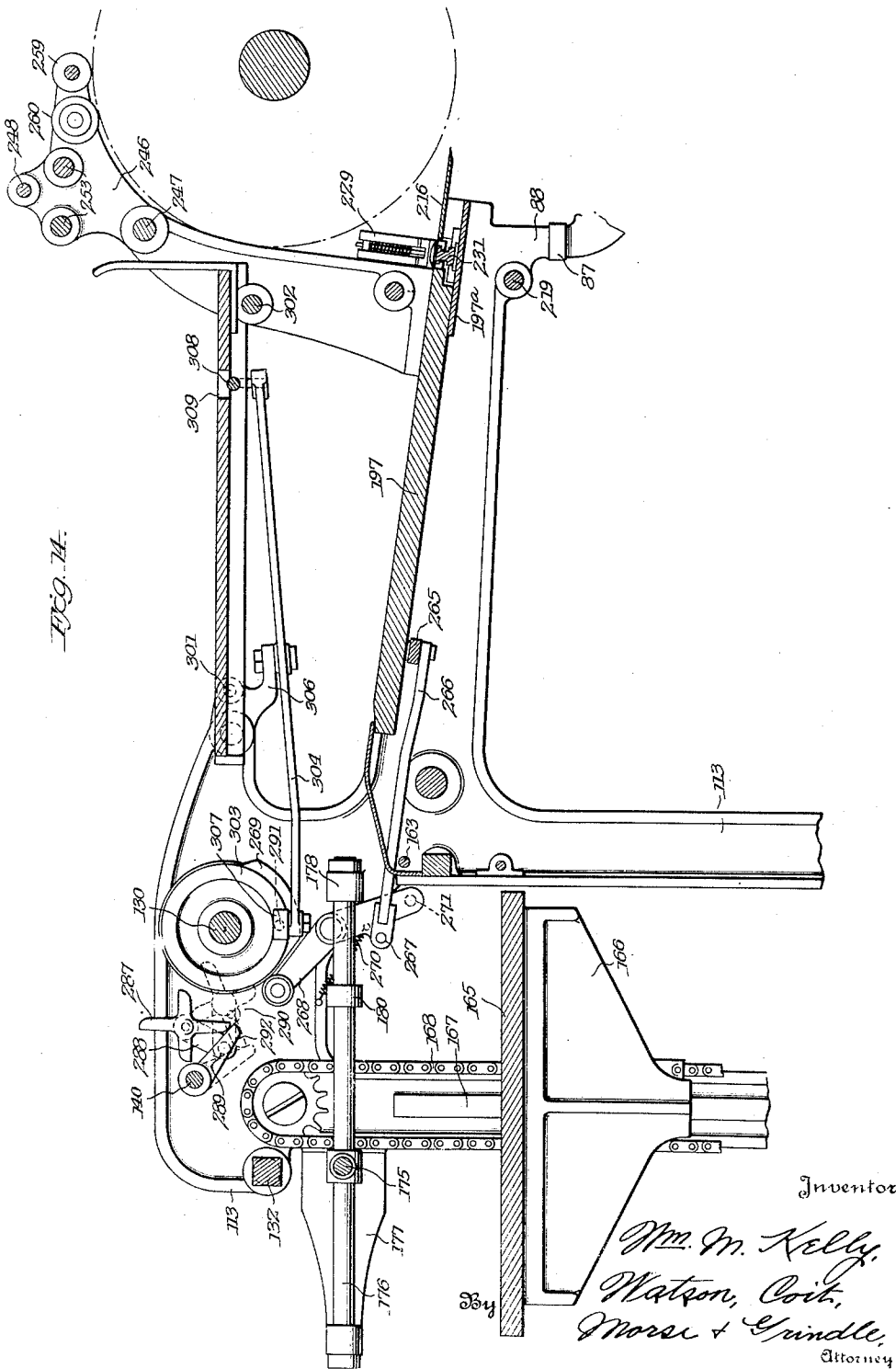
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22 Sheets-Sheet 11



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22 Sheets-Sheet 12

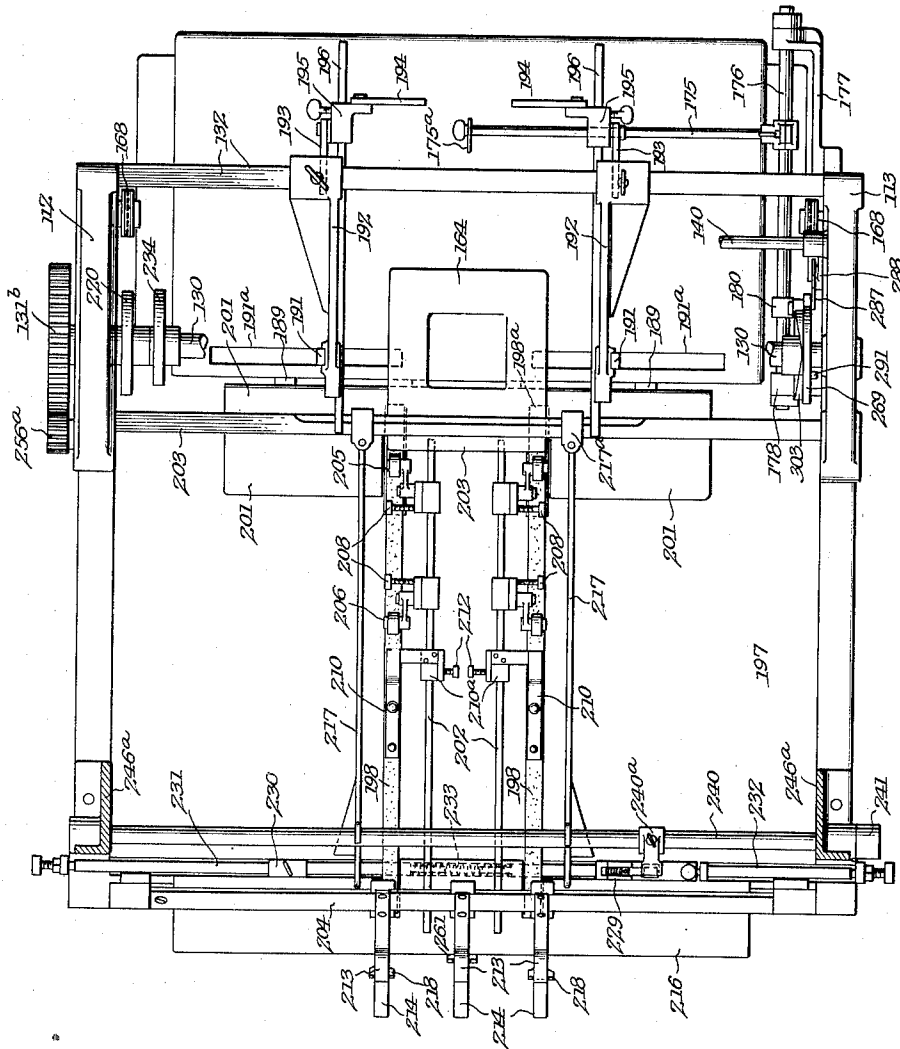


Fig. 15.

Inventor

Wm. M. Kelly,
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Attorney

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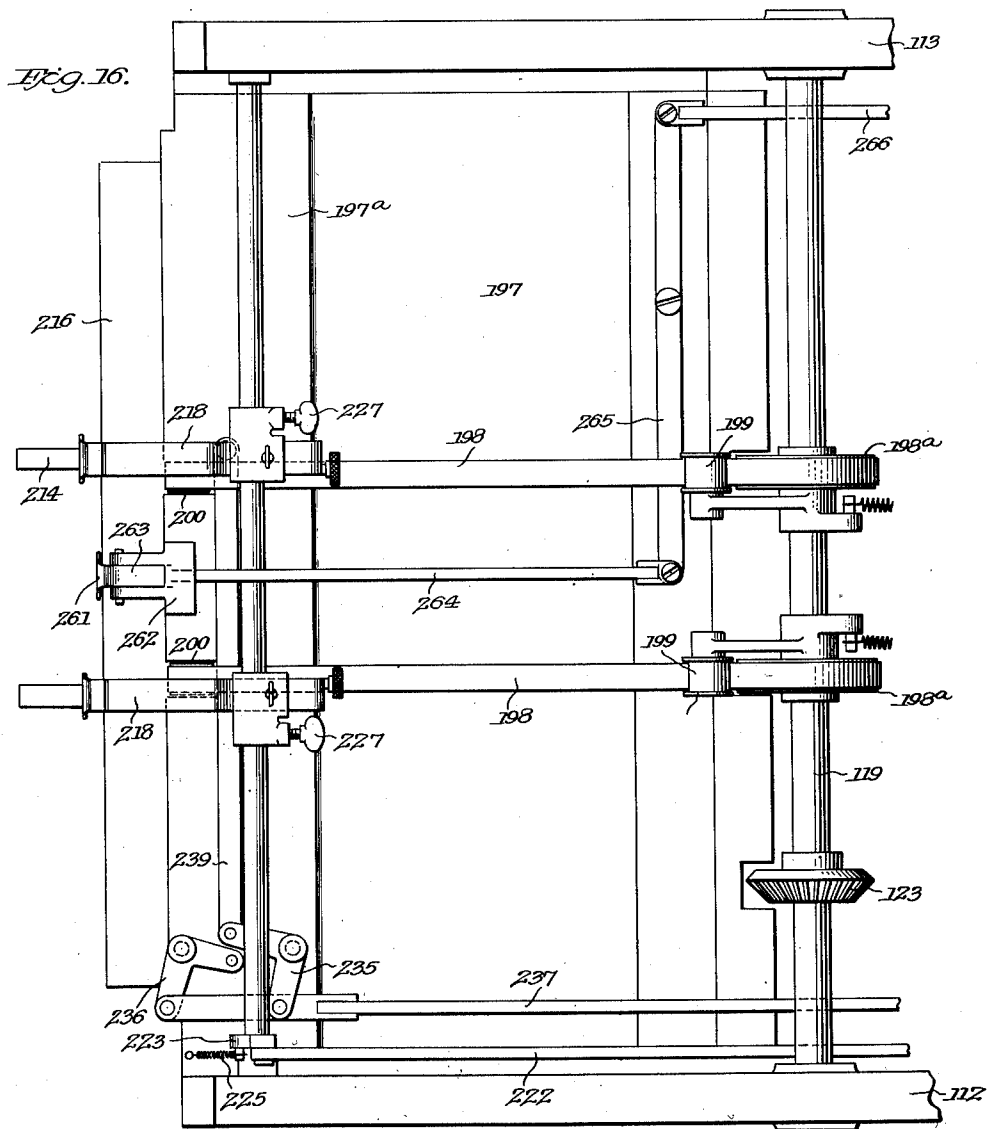
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22 Sheets-Sheet 13



Inventor

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Fig. 17.

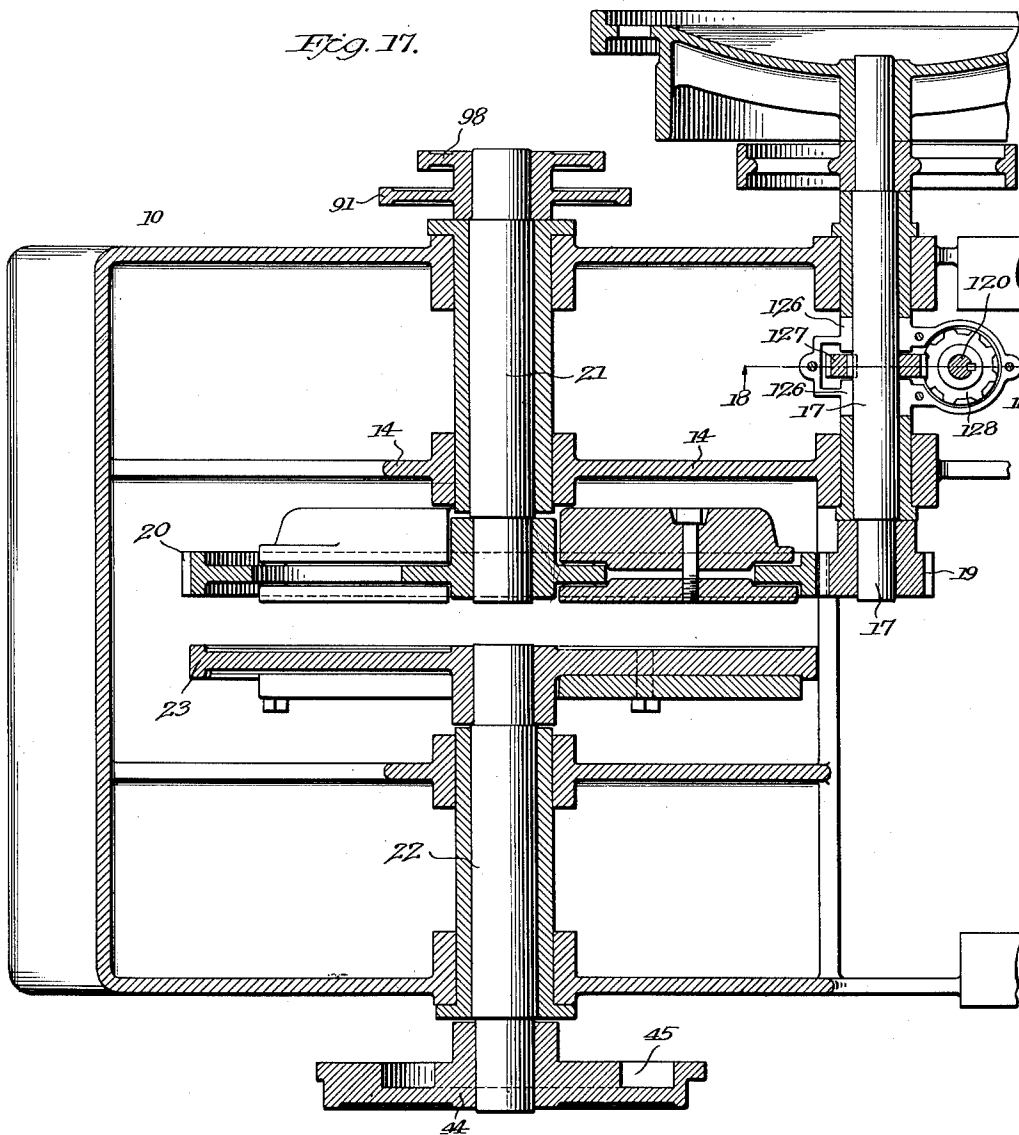
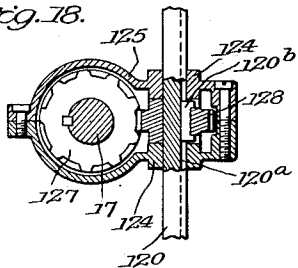


Fig. 18.



Inventor

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W. M. KELLY

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22 Sheets-Sheet 15

Fig. 24

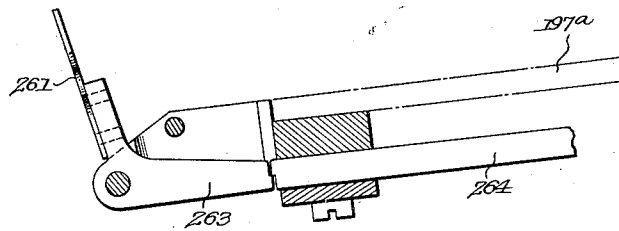


Fig. 25.

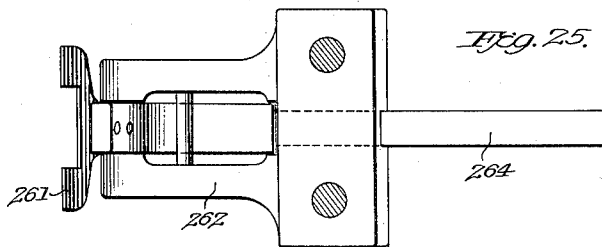


Fig. 21.

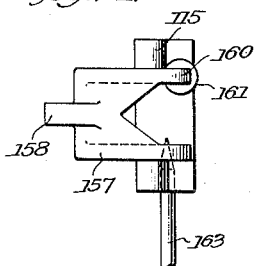


Fig. 22.

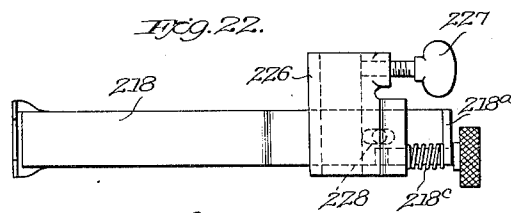


Fig. 20.

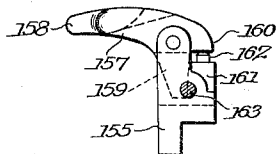


Fig. 19.

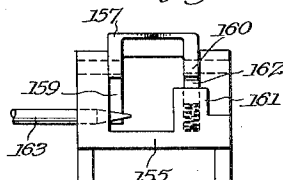
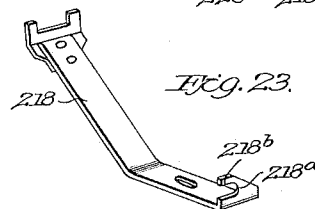


Fig. 23.



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W. M. KELLY

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Fig. 26.

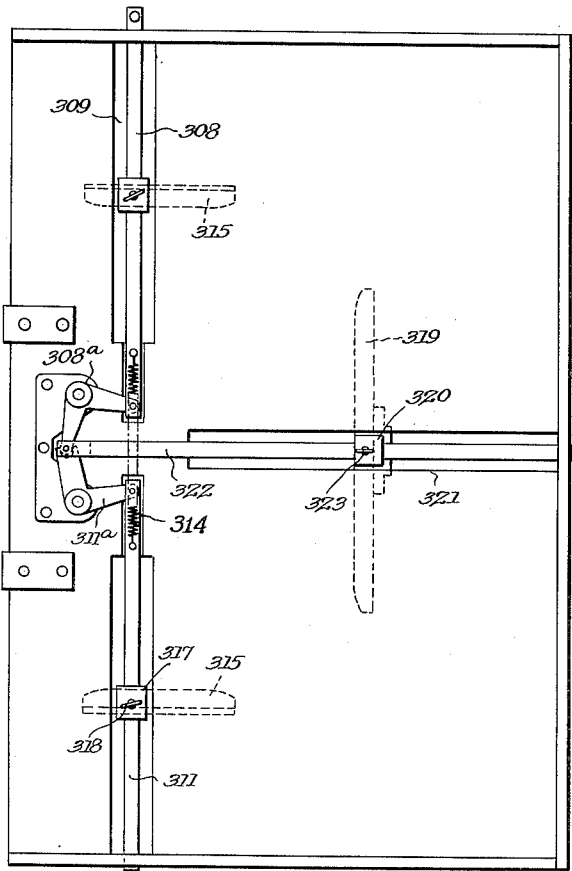
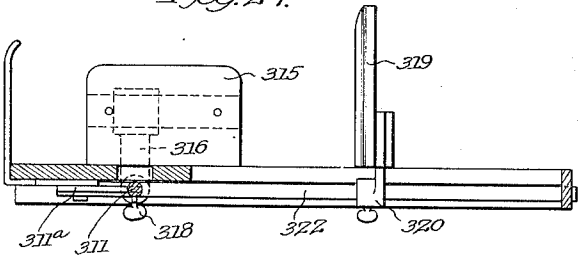


Fig. 27.



Inventor

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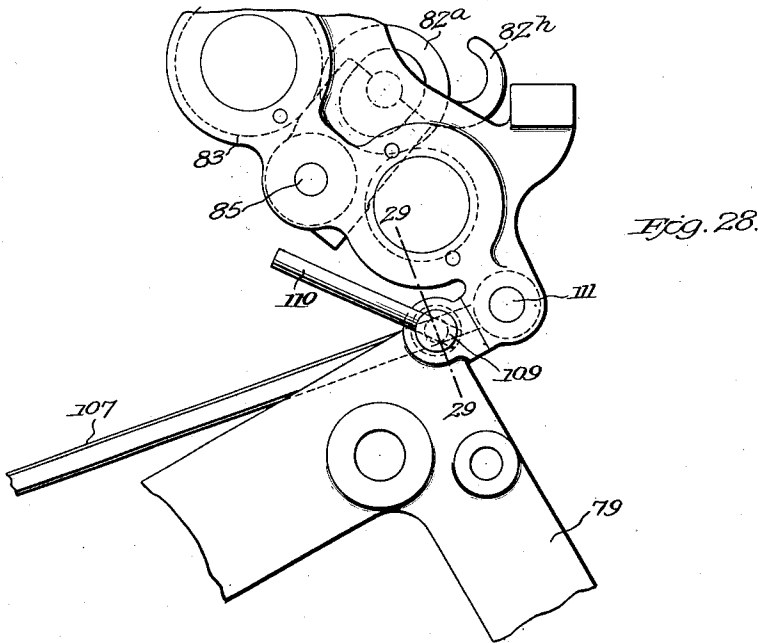


Fig. 28.

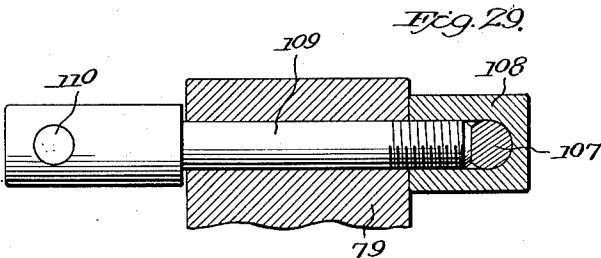


Fig. 29.

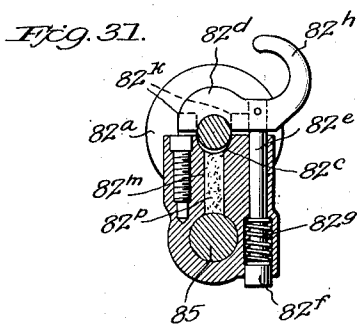


Fig. 31.

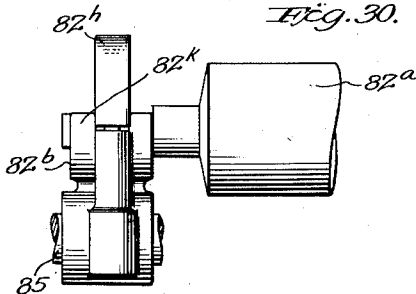


Fig. 30.

Inventor

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Dec. 31, 1929.

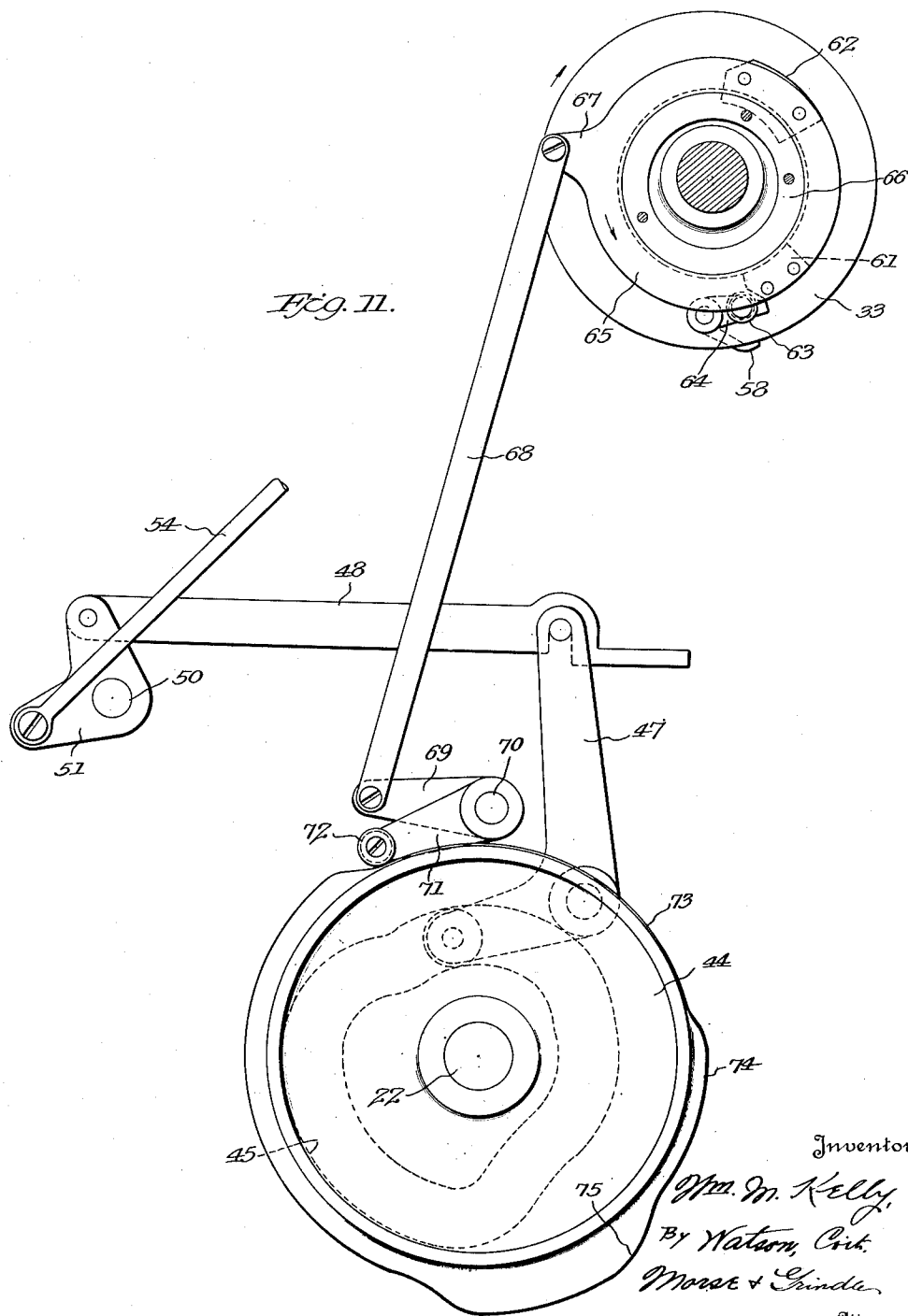
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Dec. 31, 1929.

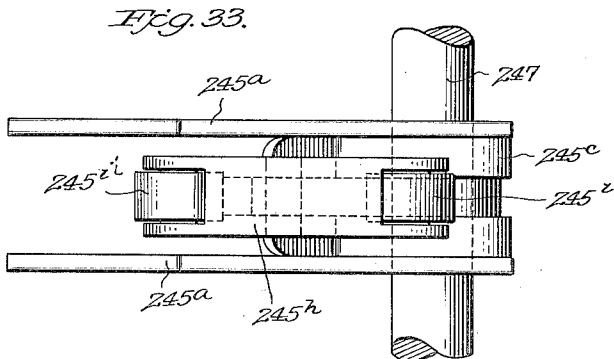
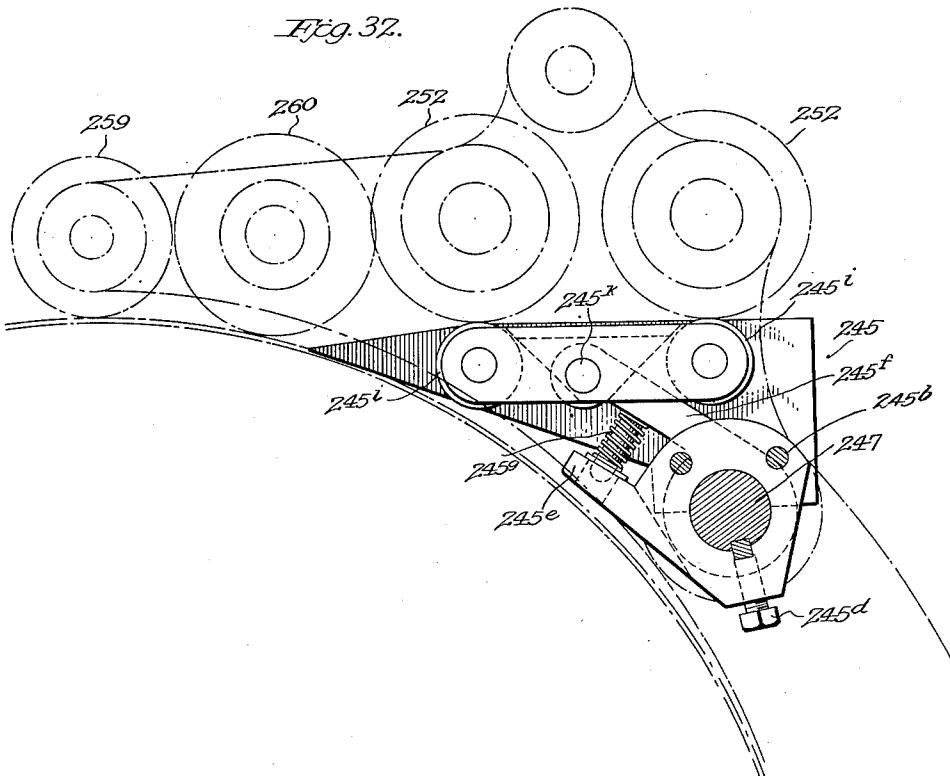
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Filed Sept. 19, 1924

22 Sheets-Sheet 19



Inventor

Wm. M. Kelly,
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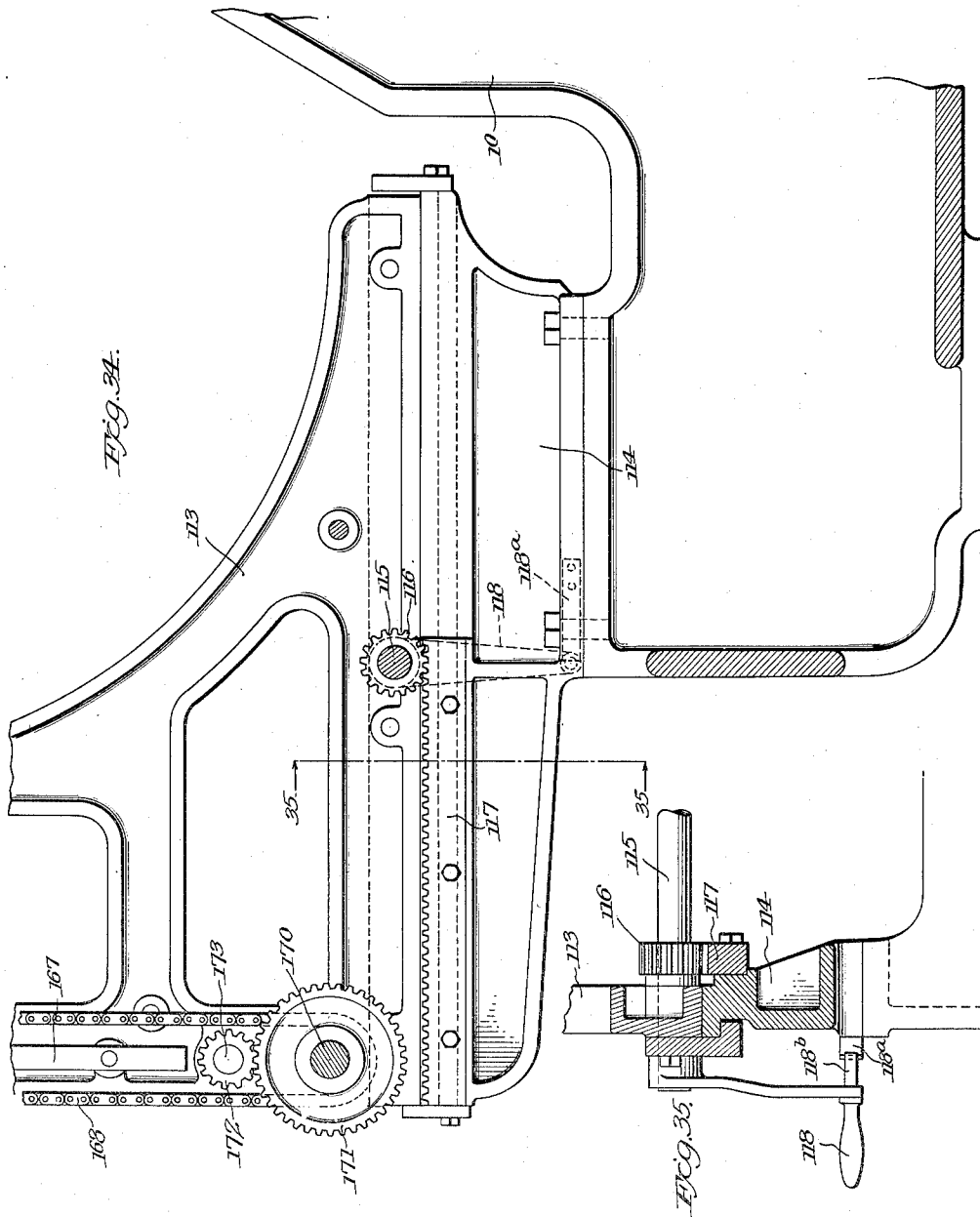
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Filed Sept. 19, 1924

22 Sheets-Sheet 20



Inventor

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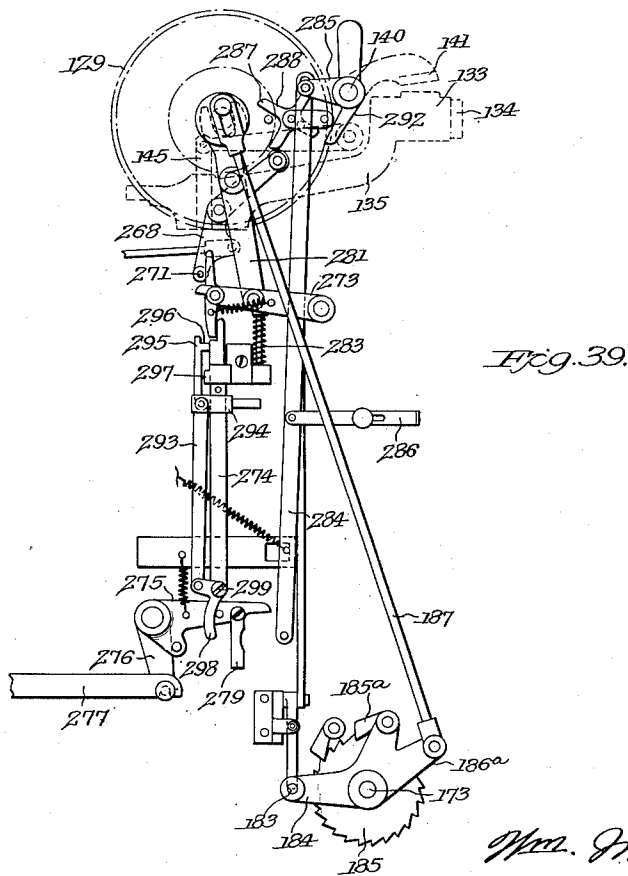
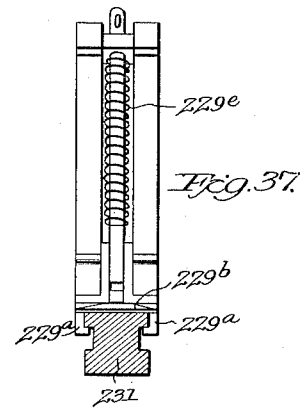
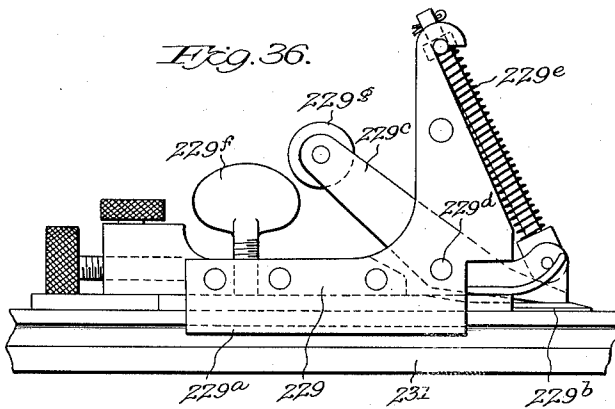
W. M. KELLY

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PRINTING PRESS

Filed Sept. 19, 1924

22 Sheets-Sheet 21



Inventor

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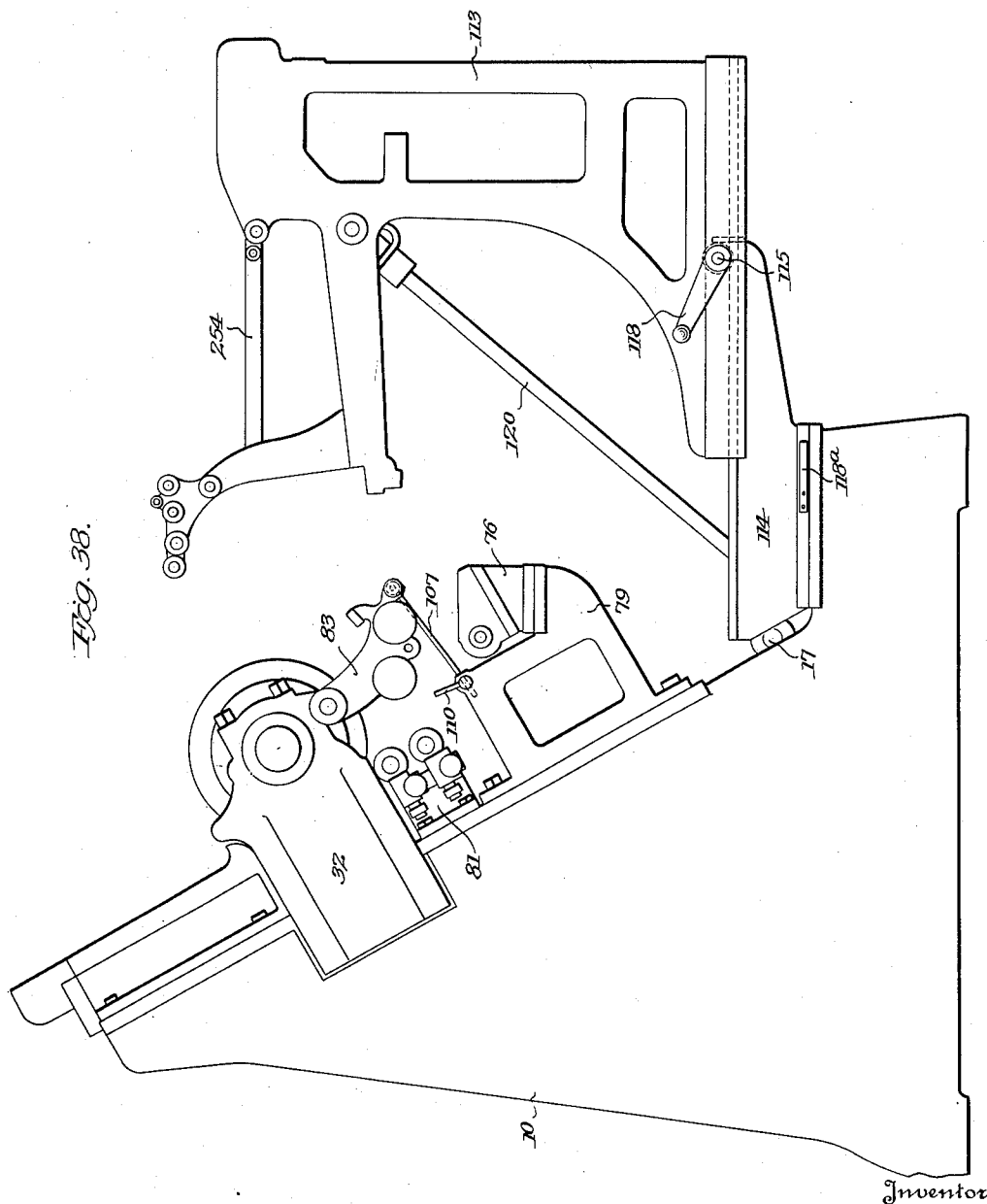
W. M. KELLY

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Filed Sept. 19, 1924

22 Sheets-Sheet 22



Inventor

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UNITED STATES PATENT OFFICE

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PRINTING PRESS

Application filed September 19, 1924. Serial No. 738,677.

The present invention relates to printing presses and more particularly to the type to presses known as jobbers.

This application is a continuation in part
5 of my application 504,015 filed Sept. 29, 1921.

Heretofore most jobber presses were of the platen type. This invention provides an improved jobber press of the cylinder and bed type and with even more automatic features
10 than usual, such as an automatic feed of the sheets, an automatic delivery of the sheets, a control of the impression governed by whether or not a sheet is present on the feed board when due, means to stop the press when
15 a sheet is absent on the feed board when due, or is out of register, etc.

The principal features of the invention consist in the provision of means whereby:

1. The sheets may be fed to the cylinder
20 when the impression is on.

2. The sheets may be delivered from the cylinder at a point approximately opposite the point where they are fed.

3. The sheets may be fed to the cylinder in
25 a direction approximately perpendicular to the path of the bed.

4. The sheets may be delivered from the cylinder in a direction approximately perpendicular to the path of the bed.

30 5. The bed is reciprocated in a path inclined to the vertical and driven by a crank disposed under the bed, the printing taking place on the up-stroke of the bed and at the time when the velocity thereof is substantially
35 constant.

6. The delivery board is disposed at the upper part of the press and the sheets are delivered to the same printed side up, so that the operator can view the sheet as it is delivered.
40

7. The delivery board is arranged above the feed board, the sheets being delivered to the under side of the impression cylinder and delivered at the upper side. This arrangement saves space and permits delivery of the sheets printed side up so that they may be viewed by the operator.
45

8. The cylinder takes the sheet on its forward stroke, thereby making the conditions
50 the same as for a two-revolution press.

9. The gripper fingers of the impression cylinder hold the sheet during the entire printing stroke, the cylinder being designed of sufficient diameter to accomplish this result.
55

10. The opening and closing of the gripper fingers when seizing a sheet, and the opening and closing of the same when delivering a sheet are varied by cams so that the opening and closing thereof do not occur at the same point in the oscillation of the cylinder.
60

11. The operation of the fountain roll of the inking mechanism is suspended when the impression is off so that the inking rolls will not be charged with too much ink.
65

12. A novel device for raising the frame carrying the inking rolls.

13. A novel device for retaining the ductor roll in its bearings and permitting easy removal of the roll therefrom.
70

14. The mechanism for operating the side register is disposed under the feed board.

15. The delivery board has a jogger device, and this is operated by means disposed under the delivery board and actuated from the
75 sheet feeding mechanism.

16. The front stops are supported under the feed board and operated by means also disposed thereunder.

17. The sheet detector is supported under
80 the feed board and operated by means also disposed under the board.

18. The impression cylinder and its drive gear are connected for rotation together so that the cylinder may be raised and lowered
85 from the bed independently of the gear.

19. The rollers carried by the frame that supports the fingers that strip the sheets from the cylinder, are raised so that they are out of contact with the cylinder when the cylinder
90 is turning in the opposite direction to the delivery direction. As a result, the delivery of the sheets is not retarded by opposite rotation of these rollers.

20. The press is equipped with means
95 whereby it may be converted, while in operation, from a single to a double-rolling press.

21. When double-rolling, the press is under the control of the automatic stopping devices just the same as when single-rolling.
100

22. The sheet feeding mechanism is supported on a frame that permits withdrawal of the mechanism to give access to the interior parts of the press.

23. This withdrawable frame also carries other devices such as the pile supporting table, the means for maintaining the elevation of the top of the pile substantially at a constant level, the feed board and its associated parts such as the side register mechanism, sheet detector and front stops, the delivery board, stripper fingers, etc., the devices for automatically stopping the press when a sheet is not fed or is out of register, the means for causing the press to double-roll when desired, etc.

24. This frame with its associated mechanisms can be withdrawn without disturbing in any way the drive for the sheet feeding mechanism, etc.

25. The vacuum pump for the pneumatic feed is driven from the main shaft of the press instead of by a separate electric motor.

26. The construction of the fingers that strip the sheet from the cylinder.

27. A novel form of gage to prevent the feeding of more than one sheet at a time to the feed board.

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

Figure 1 is a side elevation of a press constructed in accordance with the present invention;

Figure 2 is an elevation of the opposite side of the machine;

Figure 3 is a top plan view of the press;

Figure 4 is a rear elevation;

Figure 5 is a longitudinal sectional elevation taken substantially on a central vertical plane;

Figure 6 is a transverse sectional view taken on a plane passing through the axis of the impression cylinder and perpendicular to the bed;

Figure 7 is a sectional view taken substantially on the line 7—7 of Figure 6;

Figure 8 is a transverse sectional elevation of the impression cylinder;

Figure 9 is a side elevation of one of the eccentric bushings employed in connection with the cylinder;

Figure 10 is a view illustrating in elevation the impression and sheet gripper operating mechanisms;

Figure 11 is a view similar to Figure 10, but showing the parts in the positions they occupy after the main cam has turned through a slight angle from the position shown in Figure 10;

Figure 12 is a longitudinal sectional elevation of the sheet feeding mechanism and associated parts;

Figure 13 is a similar view taken on the

line 13—13 of Figure 3, the delivery table being omitted;

Figure 14 is a sectional elevation taken substantially on the line 14—14 of Figure 3;

Figure 15 is a top plan view of the feed board and associated parts, the pneumatic sheet feed devices however being omitted;

Figure 16 is a plan view looking up at the under side of the feed board, illustrating more particularly the means for operating the sheet detector mechanism and the side register devices;

Figure 17 is a horizontal sectional view taken substantially on the line 17—17 of Figure 5;

Figure 18 is a vertical sectional view taken substantially on the line 18—18 of Figure 17;

Figures 19, 20 and 21 are detail views of a sheet calipering device used in connection with the feeder;

Figures 22 and 23 are detail views of the front stop;

Figures 24 and 25 are detail views of the sheet detector;

Figure 26 is a bottom plan view of the delivery table illustrating the mechanism for operating the jogger associated with said table;

Figure 27 is a central longitudinal vertical section through the delivery table;

Figure 28 is a side elevation of the frame carrying the vibrator rolls and illustrating the means for raising the frame and holding it in different adjusted positions;

Figure 29 is a section on the line 29—29 of Figure 28;

Figure 30 is a front elevation of one end of a rider roll and the means for supporting same;

Figure 31 is a vertical sectional view through the bearing supporting the rider roll;

Figure 32 is a sectional view illustrating the position of the sheet stripper fingers and the equalizer rollers carried thereby;

Figure 33 is a plan view of one of the stripper fingers;

Figure 34 is a sectional elevation taken substantially on the line 34—34 of Figure 4 illustrating the means for withdrawing the slidable frame from normal position;

Figure 35 is a sectional view taken substantially on the line 35—35 of Figure 34;

Figures 36 and 37 are views of the snap guide;

Figure 38 is a diagrammatic view illustrating the press with the frame carrying the feeder and associated parts withdrawn from its normal position; and

Figure 39 is a detail view showing the position of some of the parts when adjusted for double-rolling.

Referring to the drawings and more particularly to Figures 1 to 6 inclusive, the base or main frame of the machine consists of a hollow casting or housing 10 having a nearly

vertical back and a front that is inclined at an angle of about 30° to the vertical except near the bottom where a forward projection is provided. The sloping front of this housing includes the inwardly extending side flanges 11 and a pair of spaced parallel longitudinal ribs 12 (see Figure 6), said ribs being connected to the sides of the base by integral bars 13 and to the back of the base by parallel webs 14, the flanges and ribs being disposed in the same inclined plane.

Bed reciprocating mechanism.—The bed 15 is mounted to reciprocate on ways 16 secured to the webs 12, being provided with guide blocks 15^a to prevent sideways displacement. The main drive shaft from which all the operating elements of the machine are driven is indicated by the numeral 17. This shaft is rotated by means of a belt and pulley connection with an electric motor 18 mounted at the rear of the base 10 and at one side thereof. As clearly shown in Figure 17, the drive shaft 17 is mounted in transverse horizontally aligned bearings in the side of the base 10 and in one of the webs 14. It extends inwardly to near the central plane of the base, and on its inner end carries a pinion 19 which drives a large gear 20 on the inner end of a shaft 21, journaled in transverse horizontal aligned bearings in the side of the base 10 and in the web 14. In alignment with the shaft 21 is a short shaft 22 which at its inner end adjacent the corresponding end of shaft 21 carries a disk 23 spaced from the gear 20. This gear 20 and disk 23 are equally spaced from the central vertical plane of the press. The gear 20 and disk 23 are connected by a crank pin 24 (Figure 5) and constitute a crank mechanism for operating the bed. The crank pin 24 is connected to the bed by a pitman 24^a being pivotally secured thereto by pin 30 carried by bracket 29 secured to the under side of the bed near the top thereof. The gear 20 and disk 23 are suitably counterbalanced. This construction provides a very strong and accurately balanced means for reciprocating the bed of the press permitting a very high speed operation without substantial vibration.

Impression cylinder.—The press has a cylinder carried by a shaft 31 mounted in housings 32 bolted to the sides and flanges 11 of the base 10. As shown in Figures 6 and 8, the cylinder comprises end disks 33 connected by a cylindrical segment 34 and a counterweight 35. The cylinder is oscillated by means of a rack 36 secured to one side of the bed and a gear 37 rotatively connected with the cylinder. The means for connecting the gear and cylinder which permits the cylinder to be thrown on-and-off-impression without corresponding movement of the gear, is shown in Figures 6 and 7, and consists of a short link 38 pivoted at one end to a pin 39 secured to the cylinder disk 33 and at its other

end to a pin 40 secured to gear 37. This link provides a rigid torque transmitting device between the gear and cylinder, but permits the cylinder to be moved independently of the gear in a direction transverse to its axis. When the impression is on, the cylinder disks roll on the parallel bearers 41 secured to the bed. The gear 37 is mounted for rotation on a sleeve 42 that surrounds the hub 33^a of the adjacent cylinder disk. This sleeve has an interior diameter substantially larger than the exterior diameter of the hub, permitting the cylinder to be moved to impression-on-and-off positions without affecting the gear. The gear 37 is always in full mesh with the rack and supports no part of the weight of the cylinder. With this construction, wear on the gear and rack is practically eliminated and the operation of the impression is rendered easy and smooth.

Impression operating mechanism.—The shaft 31 of the impression cylinder at its ends is journaled in eccentric bushings 43 which are rotatable in bearings formed in the upper ends of the housings 32. These bushings, under normal operating conditions, are automatically rotated during each reciprocation of the bed, to throw the impression on and off. For this purpose, shaft 22 has keyed on the outer end thereof a cam disk 44 (Figures 1 and 10) formed in its inner face with a cam groove 45, in which a roller 46 travels, said roller being carried by one arm of a bell crank lever 47 fulcrumed to the side of the base. The other arm of this bell crank lever 47 carries a pin 47^a which normally engages the hooked end of a link 48, said link being pivoted at its other end to a lever arm 49 rigid on one end of a horizontal shaft 50 which is journaled in the base 10 and projects transversely from both sides thereof. Integral with the lever arm 49 is a second arm 51, and on the other end of shaft 50 is a similar arm 52 (see Figure 2). Arms 51 and 52 are connected to ears 53 on the eccentric bushings 43 (Figure 9) by rods 54, each of the latter comprising two sections joined by a turnbuckle device 55, for adjusting the length of said rods and thereby the timing of the impression. The spring 56 (Figure 1) at one end connected to the base and at its other end to arm 57 on shaft 50, tends to rotate shaft 50 in a direction to hold the impression off. Since shaft 22 makes one complete revolution for each reciprocation of the bed and oscillation of the cylinder, the impression will be thrown on and off by this mechanism once for each reciprocation of the bed. The arrangement is such that the impression is on during the up-stroke of the bed.

Mechanism for operating the gripper fingers.—An important feature of this mechanism is that it effects a quick closing of the grippers when seizing the sheet and a quick

opening when delivering the printed sheet. The mechanism is illustrated in Figures 6, 10 and 11. The gripper fingers 58 are carried by a shaft 59 rotatably mounted in the cylinder disks 33 and yieldingly forced in a closing direction by a spring 60. The means for controlling the gripper fingers include two cams 61 and 62, located at one end of the cylinder, and adapted to coact with the roller 63 on the arm 64 which is secured to the projecting end of the gripper shaft. The cams 61 and 62 are secured to the inner face of a ring 65 which is rotatable on a smaller ring 66 secured to one of the cylinder housings 32, the coacting surfaces of the rings being shouldered so that the outer ring 65 is held between the shoulder on the inner ring 66 and the housing 32 (see Figure 6). The ring 65 is formed with a radially extending ear 67, to which is pivoted the upper end of a link 68, the lower end of which is pivoted to an arm 69 on a short shaft 70 journaled in the side of the base 10 and projecting on the outside thereof. On the projecting end of this shaft 70 is an arm 71 carrying a roller 72 riding on the periphery of a cam rigid with the cam disk 44. Referring to Figure 10, the parts just described are shown in the relative positions they assume when the bed has just finished its downward stroke and the cylinder has reversed and is moving in the direction of the arrow. The impression was thrown on just previously as is seen from the position of cam groove 45. The gripper fingers have been opened by the engagement of roller 63 with cam 61, to thereby receive the front edge of the sheet from the feeder. The roller 72 is just on the point of dropping onto the low part 73 of the cam. An instant later, the parts assume the positions shown in Figure 11. Here the roller 72 has dropped onto the low part of the cam and has caused the ring 65 to rotate in a counter-clockwise direction sufficiently to withdraw cam 61 from roller 63 and permit the fingers to rapidly close and grip the sheet. This movement of cam 61 causes the fingers to close sooner than if the cam were stationary, with the result that the fingers clamp the sheet well back from the edge thereof. This control of the gripper fingers is particularly advantageous in a high speed press, as it insures that the grippers will be instantaneously closed at the exact time required to properly grasp the sheet. It will also be observed that the impression was thrown on prior to the clamping of the sheet by the grippers, whereby any tendency to tear and throw the sheets out of register by operating the impression after the grippers have closed, is eliminated.

In the continued operation of the device, the roller 72 continues to ride on the low part 73 of the cam during a part of the printing stroke; then it rides onto an intermediate part 74, and near the end of the printing

stroke, it finally rides onto the highest part 75 of the cam, the ring 65 and cam 62 being rotated clockwise to a position somewhat further around than that shown in Figure 10. When the cylinder approaches the end of the printing stroke, the roller suddenly rides off the high part 75 of the cam, thereby causing the ring 65 to be rotated quickly counter-clockwise and bringing cam 62 under the gripper shaft roller 63, causing the grippers to open very rapidly and permit the strippers to receive the sheet. The cam 62 subtends a sufficient angle to insure that the grippers will be held open during the initial part of the return oscillation of the cylinder, so as to make certain that the sheet will then pass well onto the stripping mechanism before the fingers are again closed. It will be observed that the opening of the grippers at the end of the printing stroke is effected suddenly and at the exact time required to deliver the sheet correctly to the strippers and while the cylinder is near the point of reversing its rotation, and consequently has a low angular velocity.

It is to be noted that the sheet is held by the grippers during the entire printing stroke, the diameter of the cylinder and the arrangement of the gripper controlling elements being such as to effect this result. This is of importance in high speed operation for which the present press is designed, since it assures the positive and secure holding of the sheet to the cylinder up to the instant the strippers come into action.

Inking mechanism.—Referring to Figures 1, 2 and 5, it will be seen that the inking mechanism is mounted on the base 10 and below the impression cylinder. The ink fountain 76, fountain roll 77 and ductor roll 78 are carried by brackets 79 bolted to the side flanges 11 of the base 10. The form rolls 80 are journaled in bearings carried by brackets 81 mounted just above the brackets 79. The vibrator rolls 82 and composition roll 82^a have their shafts mounted in a pair of arms 83 which are pivoted at their upper ends to lugs 84 on the cylinder housing caps. These arms 83 are connected transversely by a rod 85. Each arm is formed with a lug 86 (Figure 2) engaging a corner of bracket 79, and with a lug 87 having an upper surface engaging a projection 88 on the feeder frame. Thus the arms are held from movement in either direction when in their down position, and when the feeder is in normal position. The vibrator rolls 82 are geared together and are driven from the cylinder gear 37 through a pinion 90 which meshes with the gear on the composition roll and which is adapted to mesh with gear 37 when the arms 83 are in down position.

The vibrator rolls may be vibrated by any suitable mechanism, but preferably this is effected by means of a screw thread on the

vibrator shaft cooperating with a fixed nut, as shown and described in my application, Serial No. 490,290.

The ductor roll is oscillated from a cam 91 (Figure 2) on shaft 21 through a lever 92 engaging said cam and a link 93 pivoted to the lever at one end and adjustably connected to an arm 94 rigid with shaft 95, to which are secured the arms carrying the ductor roll, the spring 96 being provided to hold the lever 92 in engagement with the cam 91. The fountain roll is provided with a ratchet so as to be intermittently rotated by a pawl on an arm 97, which is operated from a cam 98 on shaft 21 through a link 99 and a lever 100, a spring 101 holding the lever in engagement with the cam.

Means are provided to interrupt the feeding of the ink when the impression is off, so as to avoid an excess of ink on the form rolls. For this purpose, arm 97 (Figure 2) is formed with a projection 102 which is adapted to engage the hook end of a lever 103 pivoted at 104 to the side of the base 10. A spring 105 tends to throw the hook end of the lever 103 up into the path of projection 102, but when the impression is on, a cam 106 on the sleeve of arm 52 holds said hook end below the path of said projection. In Figure 2, the parts are shown in the positions they assume when the impression is off. The hook end of lever 103 is elevated and will be engaged by the projection 102 when cam 98 is rotated approximately 180° from the position shown, whereupon the hook will hold arm 97 from oscillation and the feeding of ink will be discontinued until the impression is again thrown on.

When the sheet feeder is moved away from the cylinder and bed, as described herein-after, arms 83 carrying the vibrator rolls may be swung up about pivots 84 and may be held at any desired elevation. For this purpose, one of the arms 83 (Figures 1, 28 and 29) has pivoted to its outer end a rod 107 which passes through a guide 108 located just inside the upper corner of bracket 79. A clamping screw 109 passes transversely through the corner of said bracket and has a threaded inner end tapped into a hole in guide 108 and adapted to engage and clamp rod 107. The outer projecting end of this clamping screw is provided with a handle 110 to aid in turning the same. The outer end of arm 83 is also provided with a handle 111 so that the arms may be raised with one hand and clamped by the other.

The composition or rider roll 82^a is removably supported in bearings at its ends as shown in Figures 28, 30 and 31. Mounted on the cross rod 85 just inside of the side arms 83 are these bearings. As shown, they comprise a member 82^b secured to the cross rod 85 and at its upper end having a bearing seat 82^c for the shaft of the roller. These shaft

ends are clamped to the bearing seat 82^c by manually displaceable bearing caps 82^d. Each cap is mounted for movement away from the shaft and also swinging movement about the axis of a pin 82^e supporting the cap. This pin is mounted for axial movement in the member 82^b and its lower end has a removable head 82^f between which and the end of a counter bore is a spring 82^g which tends to hold the cap 82^d in normal position. When it is desired to remove the composition roll, the hook 82^h on the bearing cap is clasped by the operator and the cap pulled upwardly and then swung about the axis of pin 82^e. This removes the cap so that the roll may be lifted from its bearings. In order to hold the cap 82^d against transverse displacement, the member 82^b is pivoted with the lugs 82^k on each side of the cap. For purposes of lubrication, the member 82^b is formed with the recess 82^m which is filled with felt 82ⁿ, and this felt retains the lubricant over a long period.

Sheet feeding mechanism.—The mechanism for feeding sheets to the cylinder and delivering the printed sheets is mounted on a feeder frame which is supported on the horizontal forwardly projecting part of the base 10. This frame is supported for withdrawal from normal position so that access may be had to the inking mechanism and interior parts of the press. As shown, the feeder frame comprises two side castings 112 and 113 of the form shown in the side views of Figures 1, 2, 8 and 34, said castings being tied together by suitable tie rods and shafts.

To permit withdrawal of the frame from normal position, it is slidably mounted on the longitudinal ways 114^a supported on brackets 114 which are bolted to the base 10. A transverse horizontal shaft 115 is journaled in the frame castings and carries near the inner side of each casting a pinion 116 in mesh with a longitudinal rack 117 fixed to the adjacent bracket 114. One end of shaft 115 projects outside the side castings and is provided with a crank handle 118. The frame is held against displacement from its normal operative position by spring 118^a which engages the notched end of a pin 118^b on the handle 118. This prevents rotation of the handle 118 in a counter-clockwise direction as viewed in Figure 34 until the spring 118^a has been disengaged from the pin 118^b.

The various elements of the sheet feeding mechanism are operated from a horizontal drive shaft 119 journaled in the sides of the feeder frame. This shaft is driven from the main drive shaft 17 of the press by a connection which is not disturbed by movement of the feeder frame to or from the press. In the form shown, this connection includes an inclined shaft 120 located just inside one of the side castings of the feeder frame, and at its upper end journaled in a bracket 121 (Fig-

ure 13) which is swung on shaft 119. Shafts 120 and 119 are rotatively connected by bevel gears 122 and 123. At its lower end, shaft 120 extends through bearing sleeves 124 in a gear box 125 (see Figure 18). This gear box is also formed with sleeves 126 (Figure 17) extending at right angles to sleeves 124 for receiving the drive shaft 17. Within the gear box the shaft 17 has secured thereto a spiral gear 127, and a meshing spiral gear 128 is splined on shaft 120. This shaft projects substantially below the gear box and is provided with a longitudinal key way 120^a for the key 120^b on the gear 128. This construction permits the feeder frame to be moved to and from the cylinder and bed without disturbing the drive for the mechanism carried thereby. The gear box 125 and bracket 121 swing on their respective shafts to permit the feeder to be withdrawn fully from the press without disengaging the shaft from gear 128.

The feeder is adapted to feed sheets from the top of a pile to the under side of the cylinder, and it has provisions for taking the sheet from the cylinder at the top thereof and delivering it on a table mounted above the feed board. The means for taking the sheets singly from the pile and delivering them to the feed board are, except for some details, substantially the same as shown and described in Patent 1,401,707, granted December 27, 1921. Hence the construction and operation of said means need be described herein only in a general way.

The device for feeding the sheets from the top of the pile comprises two laterally spaced wheels 129 secured centrally on a shaft 130 and provided with circumferentially opposed flanges each having a corresponding series of radial apertures. These wheels are continuously rotated during the operation of the press, shaft 130 being driven from shaft 119 through gears 131, 131^a and 131^b, as indicated in Figure 2. Supported on a cross bar 132 (Figure 3) which extends across the feeder above the pile supporting table, and is fastened at its ends to the side castings 112 and 113, is a suction box 133 provided with a regulating valve 134. A suction nozzle 135 communicates with this box and extends between the wheels 129 and is there provided with lateral extensions formed to engage the inner surfaces of the flanges of said wheels, said lateral extensions being provided with openings adapted to communicate periodically with the apertures in said flanges. The suction box is connected by a hose 136 to a vacuum pump 137 which is driven by a belt 138 passing over a pulley on its shaft and around a pulley on the main drive shaft 17.

Mechanism is provided for periodically placing the suction box in communication with the atmosphere. This mechanism includes a bracket 139 fastened to bar 132 and

having journaled therein a shaft 140 which extends from said bracket outwardly to the side casting 113 and projects on the outside thereof. Fast on this shaft 140 is an arm provided with a valve disk 141 which is adapted to cover an opening in the top of the suction box 133. On the inner end of shaft 140 is an arm 142 (Figures 3 and 12) carrying a roller which rides on a cam 143 secured to shaft 130, said roller being held in engagement with the cam by a spring 144 (Figure 12). Under normal operating conditions, the valve disk 141 is raised and lowered once for each printing cycle. It covers the opening in the suction box while the holes in wheels 129 are passing over the sheets, thereby creating a suction at said holes which operates to raise the sheet against the peripheries of the wheels and advance it forwardly to the feed board. This suction is broken at the proper time by the roller on arm 142 riding onto the high part of cam 143, thus opening the suction box to the atmosphere.

Auxiliary means for raising the sheets are provided particularly for use in connection with heavy stock. These means are substantially similar to the corresponding means of the patent previously mentioned, and consist of a vertically reciprocating tube 145 open at the bottom, mounted in the suction nozzle 135 and communicating with a chamber therein. The upper end of tube 145 is connected to a lever arm 146 fast to a short shaft 147 rotatable in the bracket 139 directly below the shaft 140. On the opposite side of the bracket, shaft 147 carries an arm 148 which is provided at its free end with a roller 149 riding on a cam 150 secured to shaft 130, a spring 151 being provided to hold the roller in engagement with the cam. In the construction illustrated in said patent, the operating means for said auxiliary lifter tube 145 is located at the left of the suction wheels, as viewed in Figure 12. In the present invention, as just described, this operating mechanism is disposed at the right of the suction wheels, as viewed in Figure 12. This is a simpler arrangement and effects a material economy in space.

To aid in separating the sheets, there is also provided an adjustable blast nozzle 152 (Figure 12) which is constructed, mounted and adjusted substantially in the same manner as described in the patent referred to above. This nozzle is connected by means of a hose 153 with a reservoir 154 (Figures 1 and 4) which is supplied from the exhaust of the vacuum pump and is adapted to deliver air under constant pressure to the blast nozzle.

For the purpose of preventing the passage of more than one sheet at a time to the feed board, a sheet calipering device is provided. Referring to Figure 12 and to the detail views of Figures 19, 20 and 21, this device is

mounted between two upstanding lugs of a bracket 155 which is secured to a cross bar 156 centrally thereof. The device includes a member 157 pivoted between said lugs and formed with a central forwardly projecting tongue 158 having an upper surface slightly curved convexly. The member also has a depending arm 159 and a tail 160. The bracket 155 is formed with a vertical socket 161 in which is a spring pressed plunger, at its upper end, bearing against the tail 160. A screw rod 163 is mounted in an aperture in the side of bracket 155 and in the side casting 113, and outside said casting is provided with a head for manipulating the screw. Its inner end is tapered to a needle point and adapted to bear against the depending arm 159, so that when the rod is screwed inwardly, the tongue 158 is raised against the resistance of the spring pressed plunger 162. On the other hand, when the rod is screwed in the opposite direction, the plunger acts to lower the tongue. As shown in Figure 12, the tongue is located under and spaced from a stripper plate 164 thereby forming a passage for the sheets, the size of which is controlled by manipulation of the said adjusting rod 163. Although this device is very simple, it has been found to be highly effective and accurate. It can be adjusted from the outside of the machine and with micro-metrical precision.

Pile supporting table.—The table 165 for supporting the pile of sheets at its opposite ends is secured to brackets 166 which have vertical guide slots slidable on vertical ways 167 secured to the inner faces of the side frame castings 112 and 113 (Figures 4 and 13). The table is supported and raised and lowered through the medium of the chains 168, each of which has one end fastened to a bracket 166 and passes around upper and lower sprocket wheels. The upper sprocket wheels 169 are journaled on stub shafts 170 mounted in the frame castings, and the lower sprockets are fixed on a transverse shaft 170 (Figure 4). This shaft carries a spur gear 171 (Figures 4 and 34) which meshes with a smaller gear 172 on the inner end of a short shaft 173 journaled in the frame casting 113 and projecting on the outside thereof where it carries a hand wheel 174, by means of which the table may be raised and lowered manually.

Automatic pile elevating mechanism.—In addition to the automatic sheet feeding means, the press is provided with mechanism for automatically raising the pile supporting table as the sheets are taken therefrom, in order to maintain the top of the pile at a substantially constant elevation or level. This automatic means very closely resembles the corresponding means described in said patent. It comprises a feeler device above the top of the pile consisting of an arm 175 (Fig-

ure 4) fast to a horizontal longitudinal shaft 176 (Figures 3 and 4) which is journaled at one end in a bracket 177 and at its other end in a bearing 178 (Figure 14). Arm 175 projects at right angles to shaft 176 and extends over the pile of sheets to the center thereof where it is provided with a feeler finger 175^a which is adapted to rest on the top sheet of the pile. Shaft 176 also has secured thereto an arm 180 which projects through an opening in side frame 113 and is pivoted to a downwardly extending link 181 on the outside of said frame (Figure 1). This link at its lower end is connected to the horizontal arm of a right angle lever 182, the depending arm of this lever being adapted to be moved into the path of a pin 183 projecting from one arm 184 of a three-arm lever which is sleeved on shaft 173 between the hand wheel 174 and a ratchet 185 (Figure 4) fixed on said shaft. Another arm 186 (Figure 1) of the three-arm lever has a pawl 185^a engaging said ratchet, and the other arm 186^a is connected to a link 187 which has a slotted upper end receiving a crank pin on disk 188 secured to the end of shaft 130.

When the top sheet of the pile is at a level within the limits to be maintained, the arm on lever 182 is in engagement with pin 183 whereby the link 187 is held in raised position, the crank pin on disk 188 operating idly in the slotted end of said link. When the level of the sheet pile falls below the predetermined limit, link 181 is raised sufficiently to cause the depending arm of lever 182 to be withdrawn from pin 183, thus permitting the three-arm lever to rotate clockwise, as viewed in Figure 1, when the crank pin, which is constantly rotating, permits. This crank pin will then engage the upper end of the slot in link 187 and raise the link to rotate the three-arm lever counter-clockwise and turn the ratchet through a predetermined angle. This will raise the table a corresponding amount, bring the level of the top sheet of the pile to the upper predetermined limit, whereupon the depending arm of lever 182 will again be brought into the path of pin 183 and so prevent further operation of the ratchet.

The devices for holding the pile of sheets properly on the pile table include front guides 189 (Figures 4, 12 and 13) which, at their lower ends, are secured to a cross bar 190 and near their upper ends to the cross bar 156. In the device as shown, there are four of these guides suitably spaced transversely so as to provide for sheets of all widths within the range of the press (Figure 15). Side guides are provided on each side near the front edge of the pile. These guides 191 (Figures 4 and 14) are secured at their upper ends in brackets 192 which are adjustably mounted on cross bar 132. These guides extend vertically through transverse slots

191^a (Figure 15) formed in the table near the front edge thereof. Additional guides 193 and 194 are provided for the rear corners of the pile. These corner guides are frictionally pivoted on blocks 195 which are adjustable on bars 196.

Feed board.—Sheets are feed to the cylinder in a direction that may be said to be approximately perpendicular to the path of reciprocation of the bed. They are also fed to the under side of the cylinder and delivered at the upper side and in a direction substantially parallel to the direction that they are fed to the cylinder. As clearly shown in Figures 12, 13 and 14, a feed board 197 is interposed between the pile supporting table and the cylinder, and directly above the same is a delivery table 254 to which the sheets are delivered printed side up. In other words, the feed board and delivery board or table are disposed one above the other and preferably so that the feed board advances sheets to be taken at the under side of the cylinder and the delivery board will receive sheets stripped from the upper side of said cylinder.

As shown, the feed board 197 is supported at its lower or cylinder end on a cross plate 197^a secured to the side frame castings. Running lengthwise of the feed board are two laterally spaced tapes 198 (Figures 12 and 15) which pass around driving pulleys 198^a on shaft 119, over tightening rolls 199 associated with pulleys 198^a and over rolls 200 journaled in suitable bearings carried by cross plate 197^a. As clearly shown in Figure 12, the upper reaches of these tapes are substantially flush with the upper surface of the feed board. Located at each side of the stripper plate 164 is a sheet guide plate 201 (Figures 13 and 15) which extends from the cross bar 156 to the rear edge of the feed board. Cooperating with each of the tapes 198 is a guiding and feeding device. Referring particularly to Figures 12 and 15, these devices are supported on a pair of rails 202 secured at their rear ends to a cross bar 203 and at their forward ends to a cross bar 204, the latter having its ends secured to supports attached to cross plate 197. Each set of these devices comprises rollers 205, 206 and a pair of balls 207, all engaging the upper reaches of the feed tapes at longitudinally spaced points. The rolls are carried in arms pivotally secured to blocks which are slidably mounted on the rails 202 and adapted to be clamped in any adjusted position thereon by screws 208. Each pair of balls is mounted in a cage 210 which is connected by an integral spring arm to a block 210^a which is adjustably secured to the rail by a screw 212.

At the cylinder end of the board, the cross bar 204 carries a set of top tongues 213, three being shown, and cooperating with these is a corresponding number of bottom tongues 214, the latter being secured for transverse ad-

justment to a cross bar 215 attached to the under side of the feed board extension plate 216. Parallel with the feed tapes and outside of each of the guide devices previously described, is a top guide rod 217 (Figure 15) which extends over the feed board from a head 217^a mounted on cross bar 203 for transverse adjustment.

Front stops.—As shown in Figures 12, 15, 16, 22 and 23, the front stops 218 are associated with the two outer pairs of top and bottom tongues 213 and 214, the tips of the stops being forked for said tongues. The stops are supported on a transverse shaft 219 journaled in the side frame castings so that the shaft is located under the feed board and extends transversely thereof. This shaft is rotated in one direction by mechanism operated by a cam 220 on the suction wheel shaft 130. Referring particularly to Figure 13, it will be seen that cam 220 actuates a lever 221 connected by a link 222 to a depending arm 223 on shaft 219. The shaft is turned in one direction by the devices just described and in the opposite direction by a spring 225. Referring to Figures 12, 22 and 23, it will be seen that the stops are carried by sleeves 226 longitudinally adjustable on shaft 219, the sleeves adapted to be secured in adjusted positions by clamp screws 227 (Figure 22). The stops each consist of a steel strip slidably mounted in sleeve 226 for longitudinal adjustment. The strip has a rear upturned end 218^a formed with a notch 218^b adapted to receive an adjusting screw 226^a which is tapped into the sleeve and has a knurled head bearing against the rear face of said upturned end, and a spring 218^c between the upturned end and sleeve. The sleeve also has a thumb screw 228 engaging a longitudinal slot in the strip to limit the adjustment of the stop. The strip extends upwardly and forwardly from the sleeve and has a forked extremity straddling the top and bottom tongues 213 and 214.

Side register.—In addition to the devices already described for feeding, advancing, guiding and controlling the sheets in their passage to the impression cylinder, there are provided side register devices. These include a snap guide, indicated in general by the reference character 229, and a side guide 230. The former is carried by a transversely movable bar 231 and the latter by a similar bar 232 (Figure 15), mounted to reciprocate on the cross plate 197. These two bars are forced apart by means such as the spring 233 between their inner ends and are moved inwardly toward each other by mechanism which comprises a cam 234 on the suction wheel shaft 130 (Figure 13) operated by a bell crank lever 238 which in turn is connected to a link 237 (Figures 13 and 16). Link 237 in turn is connected to one of the arms of each of two bell crank levers 235 and 236, arranged with their arms substantially parallel.

All of these parts are disposed under the feed board. The inner arm of bell crank lever 236 is directly connected by means of a pin to bar 231 (Figure 13), and the inner arm of bell crank lever 235 is connected to a link 239 which in turn has its other end operatively connected to the inner end of bar 232.

When the roller of lever 238 rides on the high part of cam 234, link 237 will be pulled rearwardly forcing the bars 231 and 232 towards each other against the resistance of spring 233, the spring moving the bars in the opposite direction when the roller of lever 237 rides off the high part of cam 234.

The snap guide is illustrated in Figures 36 and 37. As shown, it consists of a body member having bottom flanges 229^a for slidably mounting the member on the cross bar 231. The member carries a sheet engaging extension 229^b with which cooperates one end of the snap lever 229^c pivoted at 229^d. The lever is normally forced into contact with the part 229^b by spring 229^e. The whole guide is clamped to the bar 231 by set screw 229^f which permits adjustment of the guide longitudinally of the bar 231. The guide is actuated to grip and thereafter free the sheet by the arm 240^a on shaft 240. This arm 240^a engages the roller 229^g on the lever 229^c and holds the same open until the sheet has entered the throat at the lower end of the lever 229^c whereupon the lever is allowed to close, grasping the sheet and pulling it by the return movement of bar 231. Referring to Figure 1, it will be seen that shaft 240 at its outer end has a depending arm 241 which is connected by a link 242 to the lower end of a lever 243, the upper end of which carries a roller engaging a cam 244 on the suction wheel shaft 130. For each rotation of the shaft 130 therefore, the side register devices 229 and 230 will be actuated.

From the foregoing description it will be apparent that when a sheet has been fed against the front stops 218, the rotation of shaft 130 with the cam 244 thereon, through the follower lever 243 and link 242 connected to arm 241 will oscillate the shaft 240, as shown in Figure 1. Also in Figure 13, cam 234 on the same shaft 130, through the follower bell crank 238 and link 237 will oscillate bell crank levers 235 and 236, shown in plan in Figure 16. From an inspection of this figure (a bottom plan view) movement of link 237 toward the right will turn each of these bell cranks in the same direction. The link 239 and bar 232 connected thereto will (as shown in Figure 15) move the snap guide 229 toward the sheet against the action of spring 233. Bar 231 being directly pivoted to bell crank 236 (Figure 13) will be actuated against the action of the spring and move the side guide 230 toward the sheet (Figure 15).

When the snap guide moves toward the

sheet, the oscillation of shaft 240 described above will move the arm 240^a downward and hold the lever 229^c in open position until a sheet has entered the throat. Then the arm 240^a rises, releasing the lever, which then grips the sheet, and the retraction of the bar 232 will draw the sheet to registered position.

Sheet delivery.—The fingers 245 for stripping the sheet from the cylinder and cooperating rollers 252 are mounted on a frame consisting of side members 246 (Figures 3, 12 and 13) connected by roller shafts 253 and tie rod 248. The frame is secured to a shaft 247 supported by arms 246^a extending forwardly from said castings 112 and 113. The shaft 247 carries on its projecting ends arms 249 (Figures 1 and 2) which are yieldingly held against stops 250 by springs 251. A pair of driven rollers 252 on shafts 253 cooperate with each of the strippers to deliver the sheets onto the delivery table 254, which, as previously explained, is disposed above the feed board. The shafts 253 are driven by a belt 253^a (Figures 12 and 13) which passes around pulleys on the ends of said shafts and around a pulley 255 on a short shaft 256 journaled in the side frame casting 112 and carrying a pinion 256^a (Figure 2) on its outer end in mesh with the driving gear 131^b on the suction wheel shaft 130. As shown in Figure 3, contacting with the sheet on the cylinder is a pair of rollers 257 on a shaft 258 journaled in the side members 246 and carrying on its outer ends rollers 259 which roll on the peripheries of the end disks of the cylinder. Journaled on stub shafts carried by the side members 246 adjacent shaft 258 are a pair of rollers 260 which also roll on the cylinder end disks. When the impression is on, both rollers 259 and 260 roll on the cylinder disks and consequently are rotated with said cylinder. At this time the rollers 257 engage the sheet on the cylinder. When the impression is thrown off, however, the frame will be swung upwardly about the axis of shaft 247, and since the movement of rollers 259 will exceed that of rollers 260, the latter being closer to the axis of shaft 247, the rollers 259 will be lifted from contact with the cylinder disks, and also rollers 257 will rise from engagement with the sheet. If rollers 257 were not disengaged from the sheet, they would be rotated in the opposite direction on reversal of movement of the cylinder and the alternate rotations thereby set up would affect the delivery of the sheets. With the present construction therefore, the highly desirable result is obtained that when the cylinder is moving on its reverse stroke, after the printing stroke, the rollers 257 are out of engagement with the sheet and not stopped and started rotating in opposite directions, whereby they oppose no resistance to the stripping of the sheet from the cylinder.

The construction and method of mounting

the stripper fingers is illustrated more in detail in Figures 32 and 33. As shown, each stripper comprises two spaced side plates 245^a each secured as by screws 245^b to a sleeve member 245^c secured to shaft 247 by means such as a set screw 245^d. This sleeve 245^c is formed with a projection 245^e and carries an arm 245^f pivoted thereto, said arm being pressed upwardly as viewed in Figure 32 by a spring 245^g interposed between said projection and the arm. At its free end, the arm carries a pair of rollers on an equalizing device, said rollers being respectively in contact with the rollers 252. As shown, for this purpose, the lever 245^f at its upper end carries a roller support 245^h of inverted U-shape in cross section. The equalizer is pivoted on the free end of arm 245^f by means of a pin 245^k. At each of its ends, the equalizer carries a roller 245ⁱ. In operation the sheets are stripped from the cylinder by the pointed ends of the stripper fingers and delivered onto the delivery table by passage between the rollers 252 and 245ⁱ.

Sheet detector.—The sheet detector mechanism in many respects is similar to that described in my copending application No. 490,290, but embodies several changes and improvements thereon and will therefore be described in detail.

One of the novel features of the mechanism is that the detector finger is mounted under the feed board. Thus, referring to Figures 12, 16, 24 and 25, the detector finger 261 is pivoted between two forwardly extending arms of a bracket 262 secured to the under side of cross plate 197^a at about the transverse center of the feed board. The extremity of the finger is forked and straddles the center pair of top and bottom tongues 213 and 214. As shown, the finger is provided with a rigid rearwardly extending arm or tail 263, the said arm being of sufficient weight to hold the finger up in the path of the sheets. A feeler rod 264 has its forward end resting on the bracket 262 in alignment with the arm 263 and adapted to abut the end of said arm 263. The feeler rod 264 is connected at its rear end to a horizontal transversely arranged lever 265 (Figure 16) pivoted on the under side of the feed board. Pivoted to the other end of the lever 265 is a link 266 which is connected at 267 to the depending arm of a lever 268 (Figure 14). The upper end of this lever carries a roller engaging a cam 269 on the suction wheel shaft 130, a spring 270 tending to hold the roller in contact with the cam.

Movement of this lever 268 is employed for the purpose of controlling the impression. Thus the lower extremity of lever 268 carries a laterally projecting pin 271 which is adapted to engage the vertical extension of a dog 272 (Figure 1) which is pivoted to the extremity of a lever 273. The dog normally engages at its lower end a horizontal shoulder

formed on the upper end of a vertical rod 274, a spring 273^a tending to hold the dog from displacement. The rod 274 is adapted to slide in a vertical bearing 274^a on the side frame and at its lower end is pivoted to a lever 275 fulcrumed on the side frame casting and carrying a laterally directed pin 275^a adapted to engage a lever arm 276 pivoted coaxially therewith. The arm 276 is detachably connected to a link 277, said connection consisting of a pin on arm 276 engaged by a downwardly opening hook on the extremity of link 277. The other end of this link is connected to the depending arm of a lever 278 which is pivoted on casting 10 directly below the impression operating link 48. This lever at its other end has a horizontally extending arm adapted to engage link 48 and lift it from engagement with lever 47, thus rendering inoperative the mechanism for throwing on the impression. Link 277, intermediate its ends on its under side, has a notch 277^a which is adapted to engage a lug 277^b on the ink fountain bracket 79. Before moving the feeder frame to its withdrawn position, link 277 is disengaged from lever 276 and supported by the lug 277^b engaging in the notch 277^a.

The lever 275 carries a dog 279 adapted to engage the top of a plunger of a switch mechanism 280 controlling the circuit of the driving motor 18.

The lever 273 is oscillated through the medium of a bar 281 at its lower end pivoted to said lever, and its upper end being bifurcated and straddling the suction wheel shaft 130. A roller 281^a on the bar 281 engages a cam 282 on the suction wheel shaft, whereby lever 273 is periodically depressed against the resistance of a spring 283.

For each printing cycle, a sheet will be fed to the impression cylinder and in its passage between the top and bottom tongues 213 and 214, it will strike the detector finger and rotate it about its pivot, thereby raising the tail 263. At this time the roller on lever 268 rides onto the low part of cam 269, the spring 270 rotating said lever and thus causing pin 271 to move the dog 272 from engagement with the upper end of rod 274. The cam 288 now depresses the bar 281 and lever 273 idly. If for any reason, a sheet is not present on the feed board when due, the detector finger will not be turned and the spring 270 will be unable to rotate lever 268 when its roller is opposite the low part of cam 269, because the end of feeler rod 264 will engage the tail 263 of the detector finger and prevent such rotation. Under these conditions when lever 273 is depressed, dog 272 is in engagement with the upper end of rod 274 and consequently the said rod is pushed downwardly depressing lever 275 and operating the mechanism to render the impression actuated means inoperative. If the dog 279

is in its depending position, it will be moved downwardly by lever 275 and strike the plunger of switch 280 thereby stopping the press. The feeding of sheets is also interrupted by reason of the end of lever 275 coming into engagement with a pin 284^a on the lower extremity of a rod 284, thus moving this rod downwardly. The upper end of the rod is connected to an arm 285 on the valve shaft 140, whereby this downward movement rotates shaft 140 in a direction to raise the valve 141, breaking the suction and rendering the suction wheels inoperative to feed a sheet to the feed board.

Starting the press.—To start the press, it is necessary to swing the dog 279 about its pivot to a position above lever 275 so that it is in an inoperative position. The rod 284 is moved to the right as viewed in Figure 1 to carry the pin 284 out of the path of the end of lever 275. This latter movement is accomplished by means of a slide 286 pivoted to the rod and having slotted engagement with a pin 286^a on the frame. After a sheet has been fed this slide is adjusted to move the rod 284 back into operative relation with lever 279. If it is desired that the press shall be stopped on the absence of a sheet when due on the feed board, then the dog 279 is swung about its pivot to the depending position shown in Figure 1. If it is desired that the press operate without stopping when a sheet is absent when due on the feed board, then the dog is left in its upright position. Then on the absence of a sheet when due on the feed board, the impression operating means and sheet feeding means will be rendered inoperative.

Double-rolling.—The press is also provided with means to double-roll or double-ink the type when desired. According to the present invention, this means includes a star wheel 287 (Figure 14) mounted at the end of an arm 288 which is frictionally pivoted at 289 to the side frame casting. The star wheel has four arms, one pair of diametrically opposite arms being longer than the other pair, the arms thus alternating in length. The arm 288 supporting the star wheel is normally in the position shown in full lines in Figure 14 which is its inoperative position. Its operative position is shown in dotted lines, the arm having been swung downwardly against a stop 290. In this position the arms of the star wheel are adapted to be engaged by a pin 291 projecting from the side of cam 269 so that the wheel will be rotated through an angle of 90° for each revolution of this cam. The longer arms of the star wheel are adapted to be engaged by an arm 292 rigid with the valve shaft 140 so that when said longer arms are turned into the path of arm 299, said valve shaft will be prevented from rotating when the roller on arm 142 rides off the high part of cam 143. This holds the valve open ren-

dering the suction wheels 129 inoperative to feed the sheet. The shorter arms permit arm 289 to be swung to a position where the valve is closed so that every alternate normal feeding cycle of the sheet feeding device will be rendered inoperative. In other words, the sheet feeding mechanism will operate to feed a sheet on every second operation thereof. To render the double-roll mechanism inoperative, it is merely necessary to swing the arm 288 to the full line position shown in Figure 14.

The sheet feeder is provided with mechanism so that when double-rolling, the missing of every second feeding operation will not stop the press or render the feeding mechanism inoperative. It is also provided with means whereby when double-rolling, if a sheet is not present on the feed board when due, the impression and sheet feeding mechanisms will be thrown out of operation, and in addition, if desired, the press stopped.

For the above purposes, the rod 293 is disposed parallel with rod 274 and frictionally guided thereon by a collar 294 at its upper end. Also at the upper end of rod 293 is a pivoted dog 295 which, for single-rolling, is in the retracted position shown in Figure 1. For double-rolling, this dog is swung in a clockwise direction about the pivot at the upper end of rod 293 forming an extension of said rod. A detail of these parts with the dog in its extended position is shown in Figure 39. At its upper end, the dog 295 has a projection 296 which is adapted to contact with the bearing 274^a to limit its downward movement. At its lower end the rod 293 is connected to a control lever 298 pivoted as at 299 to the adjacent lower end of rod 274. When rod 293 is depressed, a pin 300 at the tip end of control lever 298 pushes dog 279 to the right as viewed in Figure 1 so that the lower end of this dog will be out of register with the plunger of the switch mechanism 280 and will slide down beside the same without operating the switch. The reason for this operation is as follows: When double-rolling, the sheet feeding device misses every second feeding operation. On each of these missed operations, the rod 274 is depressed and normally would render the impression and feeding mechanisms inoperative and operate the switch 280 to stop the press. However, when a sheet is fed, dog 272 is rocked on its pivot into a position where it depresses rod 293. This movement through lever 298 moves the switch dog 279 to a position out of register with the plunger of the switch, so that on the next cycle of the feeding device, when normally a sheet would be fed but for double-rolling the sheet is not fed, the depression of rod 274 resulting therefrom will not bring dog 279 into contact with the end of plunger 280 and stop the press.

When it is desired to convert the press so

that it will double-roll, arm 288 (Figure 14) is swung downwardly against stop 290, rod 284 is moved to the right as viewed in Figure 1 and dog 295 is turned clockwise about its pivot to its extended position. These operations can be performed without stopping the press. After the parts have been thus adjusted, the first sheet that is fed will operate the detector in the usual way, thus turning dog 272 so that its lower end is out of engagement with rod 274 and moving said lower end into registry with the dog 295 so that when lever 273 is depressed, the rod 293 will be pushed down, rotating control lever 298 and moving dog 279 out of registry with the switch plunger. These parts will remain in this position until the rod 274 is pushed downwardly a slight amount through the collar 294, on the subsequent feeding operation of the press. The forwarding of a sheet during the next cycle will be prevented by the rotation of star wheel 287 through an angle of 90° bringing one of its longer arms into engagement with the arm 292 on valve shaft 140, thereby holding the valve open and rendering the suction wheels inoperative to forward a sheet. The sheet detector mechanism will then operate to cause the depression of rod 274 and lever 275, thus moving the rod 274 a slight amount through the friction collar 294. Depression of lever 275 will cause the disconnection of the impression operating mechanism preventing operation of the cylinder to impression-on position. Due to the inoperative position of dog 279, the depression of lever 275 will not operate the switch 280 and stop the press. During the succeeding cycle, a sheet will be forwarded due to the rotation of the star wheel bringing one of the shorter arms into registry with the arm 292, thus permitting valve 141 to close and causing the suction wheels to forward a sheet. Thus, for every other cycle a sheet will not be forwarded and the impression will be held off. Hence, the type will be given a double inking for each sheet printed. Furthermore, if a sheet is not present on the feed board when due, the impression operating mechanism will be rendered inoperative and also the sheet feeding device, and if desired the press stopped.

The operation of the double rolling mechanism may be summarized as follows with reference to Figure 39. The lever 288 is swung downward, the dog 295 is swung upward and the rod 284 is moved to the right, so that all of these parts take the positions shown in this figure. The pin 291 carried by the cam 269 will then rotate the star wheel 287 90° for each revolution of the cam. The longer arms of the star wheel by engaging the arm 292 will prevent the closing of the valve 141 for alternate actuations of the star wheel, and thus skip alternate feeding operation.

When the sheet detector is operated, the dog

272 now engages dog 295 so that when the lever 273 is depressed the rod 293 will cause rotation of lever 298, moving dog 279 so that the switch plunger will not be operated.

It should be noted that the dog 272 when it is depressed, must operate to move either the rod 293 or the rod 274. Thus, in the impression or printing stroke, all of the mechanism will operate as if no double rolling were provided. On the double rolling stroke, however, the dog 272 will engage the dog 295 so as to prevent the cutting off of the motor, but will operate to move the cylinder to impression-off position.

Jogger device.—Referring to Figures 3, 14, 26 and 27, the delivery table 197 is pivoted at its rear end at 301 on pins projecting from the inner sides of the frame castings and is supported at its forward end on a transverse rod 302. This table is provided with jogger boards and means for operating the same. The jogger mechanism is operated from a cam 303 (Figure 14) formed on the inner face of cam 269 on the suction wheel shaft 130 through the medium of a lever 304 arranged and pivoted at one side and under the delivery board. Thus the lever is fulcrumed on a depending lug 306 on the side frame casting 113 and carries at its rear end a roller 307 engaging cam 303 and is pivoted at its forward end to a slide rod 308 which operates in a transverse slot 309 formed under the table near its forward edge and extending inwardly short of the longitudinal center line of the table. A similar transverse slot 310 is formed in the table on the other side and has a slide rod 311 operating therein. The rods are pulled toward each other by a spring 314 connecting them and the motion of rod 308 is transmitted to rod 311 so that the two rods move in opposite directions by two bell crank levers 308^a and 311^a (Figure 27). One arm of each bell crank is connected to one of the rods and the other arms of the bell cranks are operatively connected by a pin and slot connection. The side jogger boards 315 are carried by brackets 316 which project through the slots and are formed at their extremities with sleeves 317 adapted to be clamped to the rods 308 and 311 by thumb screws 318. The tail jogger board 319 is secured to a bracket 320 which has a part projecting through a longitudinal slot 321 formed in the table along its center line. Motion is transmitted to this tail board from the adjacent arms of the bell crank levers by a rod 322, the bracket 320 being adjustably secured to this rod by a thumb screw 323. In this manner all of the jogger boards are moved inwardly by the coaction of roller 307 with the high part of cam 303 and are moved outwardly by spring 314 when the roller rides off said high part.

At the lower end of each of the ways 16

is an oil receptacle 16^a and secured to the lower end of the bed over each way are the oil dippers 15^b adapted, at the lower end of the stroke of the bed, to dip in the receptacles 16^a and on the upward stroke to transfer oil from the receptacles to the ways 16. Excess oil drains down the ways into the receptacles.

Another arrangement of sheet delivery mechanism is shown and claimed in my application Serial No. 153,990.

Having thus described my invention what I claim as new and desire to be secured by Letters Patent is:

1. In a jobber press, a bed, means to reciprocate the bed, a cylinder, means to throw the impression on and off, means to rotate the cylinder in time with the reciprocation of the bed, a feed board disposed to feed sheets to the cylinder, and means to take the sheets from the cylinder under positive control substantially 180° from the point where they are fed.

2. In a jobber press, a bed, means to reciprocate the bed, a cylinder, means to throw the impression on and off, means to rotate the cylinder in time with the reciprocation of the bed, a feed board disposed to feed sheets to the cylinder, and means to take the sheets from the cylinder under positive control at a point between 180° and 270° of the point where they are fed.

3. In a jobber press, printing means including a rotatable cylinder, means for feeding sheets to the cylinder, and means to take sheets from the cylinder under positive control at a point between 180° and 270° of the point where they are fed.

4. In a jobber press, printing means including a rotatable cylinder, means for feeding sheets to the cylinder, and means to take sheets positively from the cylinder under positive control at a point at the opposite side of the cylinder from the point where they are fed.

5. In a jobber press, a bed, means to reciprocate said bed, a cylinder, means to rotate the cylinder in time with the reciprocation of the bed, means whereby sheets may be fed to the cylinder in a direction approximately perpendicular to the direction of reciprocation of the bed, and means to take the sheets from the cylinder under positive control.

6. In a jobber press, a bed, means to reciprocate said bed, a cylinder, means to rotate the cylinder in time with the reciprocation of the bed, means whereby sheets may be fed to the cylinder in a direction approximately perpendicular to the direction of reciprocation of the bed, and means to take the sheet from the cylinder under positive control in a direction approximately parallel to the feeding direction.

7. In a jobber press, a bed, means to recip-

rocate said bed, a cylinder, means to rotate the cylinder in time with the reciprocation of the bed, means whereby sheets may be fed to the cylinder in a direction approximately perpendicular to the direction of reciprocation of the bed, and means to take the sheets from the cylinder under positive control in a direction approximately perpendicular to the direction of reciprocation of the bed.

8. In a jobber press, a bed, means to reciprocate said bed in a path slightly inclined to the vertical, a cylinder, means to rotate the cylinder in time with the reciprocation of the bed, means whereby sheets may be fed to the cylinder substantially at the bottom thereof, and means to take the sheets from the cylinder substantially at the top thereof.

9. In a jobber press, a bed, means to reciprocate said bed in a path slightly inclined to the vertical, a cylinder, means to rotate the cylinder in time with the reciprocation of the bed, means whereby sheets may be fed to the cylinder substantially at the bottom thereof in a substantially horizontal direction, and means to take the sheets from the cylinder substantially at the top thereof.

10. In a jobber press, a bed, means to reciprocate said bed in a path slightly inclined to the vertical, a cylinder, means to rotate the cylinder in time with the reciprocations of the bed, means whereby sheets may be fed to the cylinder substantially at the bottom thereof, and means to take the sheets from the cylinder substantially at the top thereof in a substantially horizontal direction.

11. In a jobber press, a bed, means to reciprocate said bed in a path slightly inclined to the vertical, a cylinder, means to rotate the cylinder in time with the reciprocations of the bed, means whereby sheets may be fed to the cylinder substantially at the bottom thereof in a substantially horizontal direction, and means to take the sheets from the cylinder substantially at the top thereof in a substantially horizontal direction.

12. In a jobber press, a bed, means to reciprocate said bed, a cylinder, means to rotate the cylinder in time with the reciprocations of the bed, means whereby sheets may be fed to the cylinder substantially at the bottom thereof, and means to take the sheets from the cylinder substantially at the top thereof.

13. In a printing press, in combination, an impression cylinder, strippers adapted to strip the printed sheets from said cylinder, means for moving the cylinder to impression-on-and-off positions, a device mounted in advance of the strippers adapted to engage a sheet on the cylinder when the impression is on, and means for disengaging said device from the sheet when the cylinder is moved to impression-off position.

14. In a printing press, in combination, an impression cylinder, strippers adapted to strip the printed sheets from said cylinder,

means for moving the cylinder to impression-on-and-off positions, a roller mounted in advance of the strippers adapted to engage a sheet on the cylinder when the impression is off, means engaging said cylinder to rotate said roller, and automatic means to disengage said roller from the sheet when the cylinder is moved to impression-off position.

15. In a printing press, in combination, an impression cylinder, strippers adapted to strip the printed sheets from said cylinder, means for moving the cylinder to impression-on-and-off positions, a shaft rotatably mounted in advance of said strippers, rollers on said shaft adapted to engage a sheet on the cylinder when the impression is on, a roller on said shaft adapted to engage the cylinder to rotate the shaft therewith, and automatic means to disengage said rollers from the sheet and cylinder when the cylinder is moved to impression-off position.

16. In a printing press, in combination, a bed, an impression cylinder, strippers adapted to strip the printed sheets from said cylinder, means for moving the cylinder to impression-on-and-off positions, a frame mounted to swing about an axis parallel to the cylinder and adjacent to a plane perpendicular to the bed and passing through the axis of the cylinder, a shaft mounted in said frame in advance of said strippers, rollers on said shaft adapted to engage a sheet on the cylinder and rollers on said frame between the pivot axis therefor and said shaft engaging said cylinder, whereby when the cylinder is moved to impression-off position said first mentioned rollers will be disengaged from the sheet.

17. In a printing press, in combination, a reciprocating bed and a rotary cylinder, means for moving the cylinder to impression-on-and-off positions a frame mounted to swing about an axis parallel to the cylinder, a shaft parallel to the cylinder mounted in said frame, rollers on said shaft adapted to engage a sheet on the cylinder and rollers on said frame between the pivot axis thereof and said shaft engaging said cylinder, whereby when said cylinder is moved to impression-off position said first mentioned rollers will be disengaged from the sheet.

18. In a printing press, in combination, a frame having inclined ways, a bed reciprocable on said ways, an impression cylinder mounted on said frame for rotary movement and for movements to impression-on-and-off positions, means for operating the impression a feeder frame, means on said feeder frame to feed sheets to said cylinder below the axis thereof, a frame mounted on said feeder frame to swing about an axis parallel to the cylinder and located above a horizontal plane passing through the axis of the cylinder, strippers mounted on said pivoted frame, a shaft mounted on said pivoted frame in advance of said strippers rollers on said shaft

adapted to engage a sheet on the cylinder, and a roller on said pivoted frame between the pivotal axis thereof and said shaft, whereby when said cylinder is moved to impression-off position said first mentioned rollers will be disengaged from the sheet.

19. In a printing press, in combination, a housing having inclined ways, a bed reciprocable on said ways, an impression cylinder mounted on said frame for rotary movement and for movement to impression-on-and-off position, means for operating the impression, a feeder frame having means to feed sheets to the cylinder below the axis thereof, a frame mounted on said feeder frame to swing about an axis parallel to the cylinder and above the axis thereof, strippers mounted on said pivoted frame, a shaft mounted on said pivoted frame in advance of said strippers, rollers on the ends of said shaft engaging the cylinder, intermediate rollers on said shaft adapted to engage a sheet on the cylinder, and rollers on said pivoted frame between the axis thereof and said shaft engaging said cylinder.

20. In a printing press, in combination, a bed mounted for up and down reciprocation, a cylinder in front of the bed, means for moving the cylinder to impression-on-and-off positions, a feeder frame having means to feed sheets to the cylinder below the axis thereof, a frame mounted on said feeder frame to swing about an axis parallel to the cylinder and above the axis thereof, yielding means tending to move said pivoted frame towards the cylinder, a shaft mounted on said pivoted frame, rollers on said shaft adapted to engage a sheet on the cylinder, and rollers on said pivoted frame between the axis thereof and said shaft engaging said cylinder.

21. In a printing press, in combination, a bed mounted for up and down reciprocation, a cylinder in front of the bed, means for moving the cylinder to impression-on-and-off positions, a feeder frame having means to feed sheets to the cylinder below the axis thereof, a frame mounted on said feeder frame to swing about an axis parallel to the cylinder and near a plane passing through the axis of the cylinder perpendicular to the bed, yielding means tending to move said pivoted frame towards the cylinder, strippers carried by said pivoted frame, a shaft mounted on said pivoted frame in advance of said strippers, rollers on the ends of said shaft engaging said cylinder, intermediate rollers on said shaft adapted to engage a sheet on the cylinder, and rollers on said pivoted frame between the axis thereof and said shaft engaging said cylinder.

22. In a printing press, in combination, a reciprocating bed, a rotary cylinder, means for moving the cylinder to impression-on-and-off positions, a frame pivoted to swing

about an axis parallel to the cylinder and located above the axis thereof, yielding means tending to move said frame towards the cylinder, strippers carried by said frame, a shaft mounted on said frame in advance of said strippers, rollers on the ends of said shaft engaging said cylinder, intermediate rollers on said shaft adapted to engage a sheet on the cylinder, and rollers on said frame between the axis thereof and said shaft engaging said cylinder.

23. In a printing press, in combination, a bed mounted for up and down reciprocation, a cylinder mounted in front of the bed, means to feed sheets to the cylinder below the axis thereof and to take sheets from the cylinder above said axis, and inking mechanism mounted below said sheet feeding means.

24. In a printing press, in combination, a housing having inclined ways at the front thereof, a bed reciprocable on said ways, a cylinder mounted in front of the bed well below the top of the housing, means to feed sheets to the cylinder at a point below the axis thereof, means for taking the printed sheets from said cylinder at a point above the axis thereof, and an inking mechanism mounted below said sheet feeding means.

25. In a printing press, in combination, an impression cylinder, throw off mechanism for said cylinder, grippers mounted in said cylinder and biased to closed position, means for opening said grippers near the beginning and end of the printing stroke, said means being automatically controlled to effect a quick closing of the grippers near the beginning of the printing stroke and a quick opening of the grippers near the end of said stroke and including a device operating separately with respect to the rotation of said cylinder and said throw off mechanism.

26. In a printing press, in combination, an impression cylinder, movable bearings therefor, grippers mounted in said cylinder, and means for controlling the closing of said grippers near the beginning of the printing stroke and for controlling the opening thereof near the end of said stroke, said means including a device operating separately with respect to the rotation of said cylinder and the movement of said bearings.

27. In a printing press, in combination, an impression cylinder, throw off mechanism therefor, grippers mounted in said cylinder, and means including a device operating separately with respect to the cylinder and throw off mechanism to cause the grippers to close near the beginning of the printing stroke and to open near the end of said stroke.

28. In a printing press, in combination, an impression cylinder, throw off mechanism therefor, a spring operated gripper shaft mounted in said cylinder, an arm on said shaft, cams movable with respect to said cylinder adapted to engage said arm near the

beginning and end of the printing stroke to open the grippers, and means for operating said cams separately with respect to the cylinder and throw off mechanism.

29. In a printing press, in combination, an impression cylinder, a gripper shaft mounted in said cylinder, an arm on said shaft, two angularly spaced cams rotatable about the axis of said cylinder adapted to engage said arm near the beginning and end of the printing stroke, and means for rotating said cams to effect a quick closing of the grippers in the initial part of the printing stroke and a quick opening of the grippers near the end of said stroke separately with respect to the rotation of said cylinder separately with respect to the cylinder and throw off mechanism.

30. In a printing press, in combination, an impression cylinder, a spring operated gripper shaft mounted in said cylinder and projecting from one end thereof, an arm on the projecting end of said shaft, a rotatable ring coaxial with said cylinder, angularly spaced cams on said ring adapted to engage said arm to open the grippers, and means for rotating said ring with respect to said cylinder near the beginning and end of the printing stroke to control said grippers.

31. In a printing press, in combination, an impression cylinder, a spring operated gripper shaft mounted in said cylinder and projecting from one end thereof, an arm on the projecting end of said shaft, a cam adapted to engage said arm near the beginning, and another cam at the end, of the printing stroke, and automatic means for moving said cams with respect to said cylinder near the beginning and end of the printing stroke.

32. In a printing press, in combination, an impression cylinder, a gripper shaft mounted in said cylinder, an arm on said shaft, a pair of rigidly connected angularly spaced cams rotatable about the axis of said cylinder, respectively adapted to engage said arm near the beginning and end of the printing stroke, a driving shaft, a cam on said shaft and a connection between said cam and said pair of cams to adjust the latter through a small angle about the axis of said cylinder for each printing cycle of the cylinder.

33. In a printing press, in combination, an impression cylinder, a gripper shaft mounted in said cylinder, an arm on said shaft, a rotatable ring coaxial with said shaft, a pair of angularly spaced cams on said ring adapted to engage said arm, a driving shaft for the press, a cam on said shaft, a lever operated by said cam and a link connecting said lever with said ring to adjust the latter through a small angle about the axis of said cylinder for each printing cycle of the cylinder.

34. In a jobber press, a bed, means to reciprocate the bed in a path inclined to the vertical, a cylinder having gripper fingers,

means to oscillate the cylinder in time with the reciprocations of the bed, means normally closing said fingers, means at the delivery end of the cylinder oscillation to open said fingers, a cam normally in ineffective position adjacent the feeding end of said oscillation, and means to move said cam into position to actuate the fingers open at said sheet feeding end of the oscillation.

35. In a jobber press, a bed, means to reciprocate the bed in a path inclined to the vertical, a cylinder having gripper fingers and throw off mechanism, means to oscillate the cylinder in time with the reciprocations of the bed, means normally closing said fingers, a cam at the delivery end of the cylinder oscillation to open said fingers, a cam normally in ineffective position adjacent the feeding end of said oscillation, and means to move said last mentioned cam into position to actuate the fingers open at said sheet feeding end of the oscillation without throwing off the impression.

36. In a jobber press, a bed, means including a crank shaft to reciprocate the bed in a path inclined to the vertical, a cylinder having gripper fingers, means to oscillate the cylinder in time with the reciprocation of the bed, means normally closing said fingers, means at the delivery end of the cylinder oscillation to open said fingers, a cam normally in ineffective position adjacent the feeding end of said oscillation, and means rotatable with said shaft to move said cam into position to actuate the fingers open at said sheet feeding end of the oscillation.

37. In a printing press having a reciprocating bed and a rotary cylinder provided with grippers, in combination, means for moving the cylinder to impression-on-and-off positions, and means for closing the grippers on a sheet subsequently to the movement of the cylinder to impression-on position.

38. In a printing press having a reciprocating bed and a rotary cylinder provided with grippers, in combination, means for moving the cylinder to impression-on-and-off positions and means for closing the grippers on a sheet while the cylinder is in impression-on position.

39. In a printing press, in combination, an impression cylinder, a gripper shaft mounted in said cylinder, an arm on said shaft, a cam adapted to engage said arm near the beginning of the printing stroke to open the grippers and automatic means for withdrawing said cam from said arm to effect a quick closing of the grippers independently of the rotation of the cylinder.

40. In a printing press, in combination, an impression cylinder, throw off mechanism therefor, grippers mounted in said cylinder and biased to closed position, a movable abutment adapted to open said grippers near the

beginning of the printing stroke without throwing off the impression.

41. In a printing press, in combination, an impression cylinder, a gripper shaft mounted in said cylinder, an arm on said shaft, a movable cam adapted to engage said arm near the end of the printing stroke and automatic means for moving said cam towards said arm to effect a quick opening of the grippers separately with respect to the rotation of the cylinder without moving the cylinder axis.

42. In a printing press, in combination, an impression cylinder, grippers mounted in said cylinder and means for controlling the closing of said grippers near the beginning of the printing stroke without moving the axis of the cylinder, including a device operating separately with respect to the rotation of said cylinder.

43. In a printing press, in combination, an impression cylinder mounted in eccentric bearings, grippers mounted in said cylinder, and means for controlling the opening of said grippers near the end of the printing stroke without moving said bearings, including a device operating separately with respect to the rotation of said cylinder.

44. In a jobber press, a bed, means supporting the bed for reciprocation in a path slightly inclined to the vertical, a crank shaft mounted under the path of reciprocation of the bed, a pitman connecting the crank and bed, a cylinder, means to rotate the cylinder in time with the reciprocations of the bed, and means to throw the impression on and off timed so that the impression is on during the up stroke of the bed.

45. In a jobber press, a bed, means to reciprocate the bed in a relatively fixed inclined path, a cylinder, means to rotate the cylinder in time with the reciprocations of the bed, means to throw the impression on and off, and means for the cylinder to take a sheet when the impression is on.

46. In a jobber press, a bed, means to reciprocate the bed in an inclined path, a cylinder having gripper fingers, means to rotate the cylinder in time with the reciprocations of the bed, means to throw the impression on and off, and means to close said fingers to take a sheet when the impression is on.

47. In a jobber press, a bed, means to reciprocate the bed in an inclined path, a cylinder having gripper fingers, means to rotate the cylinder in time with the reciprocations of the bed, means to throw the impression on and off, means to close said fingers to take a sheet when the impression is on, and means to open the fingers and deliver the sheet when the impression is off.

48. In a jobber press, a bed, means to support said bed for reciprocation at an angle of less than 90° to the vertical, means to reciprocate said bed, a cylinder, means to oscillate the cylinder in time with the reciprocations

of the bed, means to throw the impression on and off, means on the cylinder to take a sheet at one end of its oscillation and when the impression is on, and means to deliver the sheet at the other end of its oscillation and when the impression is off.

49. In a jobber press, a bed, means to support said bed for reciprocation at an angle of less than 90° to the vertical, means to reciprocate said bed, a cylinder, means to oscillate the cylinder in time with the reciprocations of the bed, means to throw the impression on and off, means on the cylinder to take a sheet at one end of its oscillation and when the impression is on, said sheet being fed in a direction approximately perpendicular to the direction of reciprocation of the bed, and means to deliver the sheet at the other end of its oscillation and when the impression is off.

50. In a jobber press, a bed, means to reciprocate the bed, a cylinder, means to rotate the cylinder in time with the reciprocations of the bed, means to throw the impression on and off, and means constructed and arranged for the cylinder to take a sheet when the impression is on.

51. In a jobber press, a bed, a shaft having a crank, a pitman connecting said crank and bed whereby rotation of the shaft reciprocates the bed in an inclined path, a cylinder, means to rotate the cylinder in time with the reciprocations of the bed, and means for the cylinder to take sheets so that the printing occurs on the up stroke of the bed.

52. In a printing press, in combination, a bed mounted for reciprocation, a cylinder mounted to coact with the bed, a frame movably mounted adjacent the bed and cylinder, devices on said frame for feeding sheets to the cylinder and taking the printed sheets therefrom, and means for withdrawing said frame from the bed and cylinder.

53. In a printing press, in combination, a bed mounted for up and down reciprocation, a cylinder mounted in front of the bed, a frame movably mounted in front of the bed and cylinder, devices on said frame for feeding sheets to the cylinder and taking the printed sheets therefrom, and means for withdrawing said frame from the bed and cylinder.

54. In a printing press, in combination, a bed mounted for up and down reciprocation, a cylinder mounted in front of the bed, inking mechanism mounted below the cylinder, a frame, sheet feeding and sheet delivering devices mounted thereon and means for withdrawing said frame from operative position.

55. In a printing press, in combination, a housing having inclined ways at the front thereof, a bed reciprocable on said ways, a cylinder mounted on the housing in front of the bed well below the top of the housing, a frame slidable on ways secured at the front of the housing, sheet feeding and sheet de-

livering devices mounted on said frame, and means for moving said frame towards and from the press.

56. In a printing press, in combination, a housing having inclined ways at the front thereof, a bed reciprocable on said ways, a cylinder mounted on the housing in front of the bed, a frame slidable on ways secured at the front of the housing, sheet feeding and sheet delivering devices mounted on said frame, driving connections for operating said devices from a drive shaft of the press, and means for moving the frame towards and from the press without disconnecting said connections.

57. In a printing press having an up-and-down reciprocating bed and a cylinder in front thereof, in combination, a frame movable towards and from the press, sheet feeding and sheet delivering devices carried by said frame, driving connections for operating said devices, and means for moving said frame towards and from the press without disturbing said connections.

58. In a printing press having an up-and-down reciprocating bed and a cylinder in front thereof, in combination, a frame movable towards and from the press, sheet feeding and sheet delivering devices carried by said frame driving connections for operating said devices from a drive shaft of the press, and means for moving said frame towards and from the press without disturbing said connections.

59. In a printing press having an up-and-down reciprocating bed and a cylinder in front thereof, in combination, a frame movable towards and from the press, sheet feeding devices carried by said frame, driving connection for operating said devices from a drive shaft of the press including a feeder drive shaft, a bracket swung on said shaft, a connecting shaft journaled at one end in said bracket and having a gear thereon meshing with a gear on said feeder shaft, a gear box swung on said press drive shaft and having therein a gear on said press shaft and an intermeshing gear on said connecting shaft, said intermeshing gear being splined to said connecting shaft and the latter extending well beyond the gear box whereby it is not disconnected from said intermeshing gear when the frame is moved away from the press.

60. In a printing press, in combination, a cylinder mounted for up and down reciprocation, a cylinder in front of the bed, inking mechanism mounted to swing towards and from the bed, a frame movable towards and from the press and interengaging lugs on said frame and inking mechanism preventing movement of said mechanism from the bed.

61. In a printing press, in combination, a bed mounted for up and down reciprocation,

a cylinder in front of the bed, a feeder frame movable towards and from the cylinder, mechanism carried by said frame adapted to feed sheets to the cylinder below the axis thereof, an auxiliary frame pivoted on said feeder frame to swing about an axis parallel to the cylinder, strippers on said auxiliary frame, rollers carried by said auxiliary frame in advance of said strippers adapted to engage the sheet on the cylinder, and yielding means tending to rotate said auxiliary frame towards the cylinder.

62. In a printing press, in combination, a bed mounted for up and down reciprocation, a cylinder in front of the bed, a feeder frame movable towards and from the cylinder, mechanism carried by said frame to feed sheets to the cylinder below the axis thereof, an auxiliary frame pivoted on said feeder frame to swing about an axis parallel to the cylinder and yieldingly held towards the cylinder, and sheet stripping mechanism carried by said auxiliary frame.

63. In a printing press, in combination, a bed mounted for up and down reciprocation, a cylinder in front of the bed, a feeder frame movable towards and from the cylinder, mechanism carried by said frame adapted to feed sheets to the cylinder below the axis thereof, an auxiliary frame pivoted on said feeder frame to swing about an axis parallel to the cylinder and above the axis thereof and yieldingly held towards the cylinder, strippers mounted on said auxiliary frame, a shaft journaled at the outer end of said auxiliary frame, rollers on the ends of said shaft engaging said cylinder, intermediate rollers on said shaft adapted to engage a sheet on the cylinder, and rollers on said frame between said first mentioned rollers and said shaft engaging said cylinder.

64. In a printing press having a reciprocating bed and a rotary impression cylinder, in combination, means for operating the impression, a feeder frame having means to feed sheets to the cylinder, said frame being movable towards and from said cylinder, mechanism for rendering said impression operating means ineffective, and sheet detector mechanism on said feeder frame controlling said mechanism, said mechanism including a detachable connection permitting the feeder frame to be moved away from the cylinder.

65. In a printing press, in combination, a housing having inclined ways at the front thereof, a bed reciprocable on said ways, an impression cylinder in front of the bed, a feeder frame movable towards and away from the bed, means for operating the impression, mechanism for rendering said impression operating means ineffective, and sheet detector mechanism on said feeder frame controlling said mechanism, said mechanism including a detachable connection per-

mitting the feeder frame to be moved away from the bed.

66. In a printing press having a reciprocating bed and a rotary impression cylinder, in combination, means for operating the impression including a lever and a link detachably connected thereto, a bell crank having an arm underlying said link, a feeder frame movable towards and away from the press, sheet detector mechanism on said feeder frame and a link connected at one end to said bell crank and detachably connected at its other end to said mechanism.

67. In a printing press having a reciprocating bed and a rotary cylinder, in combination, means for operating the impression including a detachable connection, a feeder frame movable towards and away from the press, sheet detector mechanism on said feeder frame, means for detaching said connection and a detachable connection between said mechanism and said means.

68. In a printing press, in combination, a cylinder member, a bed member, means to support one of said members for up and down reciprocation, means to reciprocate said member, means to feed sheets one by one to said cylinder disposed in front of said members, means supporting said feeding means for withdrawal from operative position in front of said members without disturbing the drive for said sheet feeding means.

69. In a printing press, in combination, a cylinder member, a bed member, means to reciprocate one of said members, means to feed sheets one by one to said cylinder, a frame supporting said sheet feeding means and slidably mounted for movement away from said cylinder and bed, and means to slide said frame.

70. In a printing press, in combination, a cylinder member, a bed member, means to reciprocate one of said members, means to feed sheets one by one to said cylinder, a frame supporting said sheet feeding means and slidably mounted for movement away from said cylinder and bed, and means to slide said frame without disturbing the drive for said sheet feeding means.

71. In a press, in combination, a cylinder member, a bed member, means to support one of said members for up and down reciprocation, means to reciprocate said member, a sheet delivery associated with said cylinder and disposed in front of said members, and means supporting said sheet delivery for withdrawal from operative position in front of said members.

72. In a press, in combination, a cylinder member, a bed member, means to support one of said members for up and down reciprocation, means to reciprocate said member, a sheet delivery associated with said cylinder and disposed in front of said members, and means supporting said sheet delivery for

withdrawal from operative position in front of said members without disturbing the drive therefor.

73. In a press, in combination, a cylinder member, a bed member, means supporting one of said members for up and down reciprocation, means to reciprocate said member, a sheet delivery associated with said cylinder, a frame slidably mounted in front of said members and carrying said sheet delivery, and means for withdrawing the frame from operative position in front of said members.

74. In a press, in combination, a cylinder member, a bed member, means supporting one of said members for rectilinear reciprocation, means to reciprocate said member, means to feed sheets one by one to said cylinder, and a sheet delivery associated with said cylinder, said feed and delivery means being simultaneously withdrawable from positions cooperating with said cylinder.

75. In a press, in combination, a cylinder member, a bed member, means supporting one of said members for rectilinear reciprocation, means to reciprocate said member, means to feed sheets one by one to said cylinder, a sheet delivery means associated with said cylinder, and a frame supporting said feed and delivery means, said frame being movable to permit withdrawal of said means from positions cooperating with said cylinder.

76. In a press, in combination, a cylinder member, a bed member, means supporting one of said members for rectilinear reciprocation, means to reciprocate said member, a table for supporting a pile of sheets, mechanism for elevating said table to maintain the top sheet of the pile at a substantially constant level, means to take sheets from said pile and feed them one by one to the cylinder, a slidably mounted frame carrying said table, elevating mechanism and sheet feeding means, and means to slide said table from its position cooperating with said cylinder to give access to the interior parts of the press.

77. In a press, in combination, a cylinder member, a bed member, means supporting one of said members for rectilinear reciprocation, means to reciprocate said member, a table for supporting a pile of sheets, mechanism to elevate said table to maintain the top sheet of the pile at a substantially constant level, means to take sheets from said pile one by one and feed them to said cylinder, a sheet detector and means controlled thereby to govern the impression, a movably mounted frame carrying said table, table elevating mechanism, sheet feeding means and sheet detector, and means to move said frame to withdraw said parts from their normal positions.

78. In a press, in combination, a cylinder member, a bed member, means to support one

of said members for up and down reciprocation, means to reciprocate said member, means to feed sheets one by one to said cylinder disposed in front of said members, means to cause said feeding means to miss alternate forwarding operations, a movably mounted frame carrying said sheet feeding means and the other means, and means to move said frame to withdraw said feeding and missing means from normal positions.

79. In a press, in combination, a cylinder member, a bed member, means to support one of said members for up and down reciprocation, means to reciprocate said member, a frame movably mounted and disposed in front of said members, a feed board, sheet feeding means carried by said frame, means to cause said feeding means to miss alternate sheet forwarding operations, means to render the feeding means inoperative if a sheet is not present on said board when due, and means to move said frame from normal position to withdraw said various means and give access to the interior of the press.

80. In a press, in combination, a cylinder member, a bed member, means to support one of said members for rectilinear reciprocation, means to reciprocate said member, a slidably mounted frame, a feed board thereon, means on said frame to feed sheets one by one to said cylinder, means also on said frame to cause said feeding means to miss alternate operations, means carried by the frame to stop the press if a sheet is not present on said board when due, and means to slide said frame to withdraw the various means from normal positions to give access to the interior of the press.

81. In a press, in combination, a cylinder member, a bed member, means to support one of said members for rectilinear reciprocation, means to reciprocate said member, a feed board, means to feed sheets one by one to the cylinder, means to render said feeding means inoperative if a sheet is not present on said board when due, a slidably mounted frame carrying said feeding and stopping means, and means to slide said frame from normal position to give access to the interior of the press.

82. In a press, in combination, a cylinder member, a bed member, means to support one of said members for rectilinear reciprocation, means to reciprocate said member, a slidably mounted frame, a feed board thereon, means carried by said frame to feed sheets one by one to said cylinder, means carried by said frame to stop the press if a sheet is not present on said board when due, and means to slide said frame from normal position to give access to the interior of the press.

83. In a press, in combination, a cylinder member, a bed member, means to support one of said members for rectilinear reciprocation, means to reciprocate said member, a

frame movably mounted on the press, a feed board thereon, a table adapted to support a pile of sheets, means to elevate said table to maintain the top of the pile at a substantially constant elevation, means to take sheets from said pile one by one and feed them to said cylinder, and means to render said feeding means inoperative if a sheet is not present on said board when due, said frame carrying said table, table elevating means, sheet feeding means and stopping means, and means to move said table from normal position to give access to the interior parts of the press.

84. In a press, in combination, a cylinder member, a bed member, means to support one of said members for rectilinear reciprocation, means to reciprocate said member, a movably mounted frame, a table adapted to support a pile of sheets, means to elevate said table to maintain the top of the pile at a substantially constant elevation, means to take sheets one by one from said pile and feed them to said cylinder, said table, table elevating means, sheet feeding and sheet delivery means being carried by said frame, and means to move said frame from normal position to give access to the interior of the press.

85. In a press, in combination, a cylinder member, a bed member, means to support one of said members for rectilinear reciprocation, means to reciprocate said member, a movably mounted frame, a table adapted to support a pile of sheets, means to elevate said table to maintain the top of the pile at a substantially constant elevation, means to take sheets from said pile one by one and feed them to said cylinder, sheet delivery means cooperating with said cylinder, means to cause the press to double roll, said table, elevating means, sheet feeding and delivery means, and double roll means carried by said frame, and means to withdraw said frame from normal position to give access to parts between the frame and the bed or cylinder.

86. In a press, in combination, a cylinder member, a bed member, means to support one of said members for rectilinear reciprocation, means to reciprocate said member, a movably mounted frame, a table adapted to support a pile of sheets, means to elevate said table to maintain the top of the pile at a substantially constant level, means to take sheets one by one from said pile and feed them to said cylinder, sheet delivery means adapted to cooperate with said cylinder, means governed by the presence of a sheet in the feeding means when due to control the impression, means to cause the press to double roll, said table, elevating means, sheet feeding and delivery means, impression control and double roll means carried by said frame, and means to move said frame from normal position to give access to parts adjacent the cylinder or bed.

87. In a press, in combination, a cylinder member, a bed member, means to reciprocate

one of said members up and down, a feed board, and a delivery board, one disposed above the other and both substantially tangent to said cylinder member.

88. In a press, in combination, a cylinder member, a bed member, means to reciprocate one of said members up and down, a feed board, and a delivery board, the delivery board being disposed above and over the feed board.

89. In a press, in combination, a cylinder member, a bed member, means to reciprocate one of said members up and down, a pile supporting table, a feed board disposed between said table and cylinder, means to take sheets from the table one by one and advance them across the board to the cylinder, and a delivery board disposed above and over said feed board.

90. In a press, in combination, a cylinder member, a bed member, means to reciprocate one of said members up and down, a pile supporting table, a feed board disposed between said table and cylinder, means to take sheets from the table one by one and advance them across the board to the cylinder, a delivery board disposed above and over said feed board, a movably mounted frame carrying said table, feed and delivery boards and feeding means, and means to withdraw said frame from normal position, thereby giving access to parts between the frame and bed or cylinder.

91. In a press, in combination, a base, a bed mounted thereon for rectilinear reciprocation, a cylinder associated with said bed, a driving shaft carried on said base, a frame movably mounted on said base, sheet feeding means carried by said frame, a shaft for driving said feeding means also on said frame, and means connecting said shafts permitting withdrawal of said frame from normal position without disturbing said connecting means.

92. In a printing press, in combination, a bed mounted for up and down reciprocation, a cylinder in front of the bed, and inking mechanism below the cylinder mounted to swing on an axis parallel thereto towards and from the bed.

93. In a printing press, in combination, a bed mounted for up and down reciprocation, a cylinder in front of the bed, inking mechanism below the cylinder mounted to swing on an axis parallel thereto towards and from the bed, a stop limiting the movement of said mechanism towards the bed and means to hold said mechanism at any desired position from the bed.

94. In a printing press, in combination, a housing having inclined ways at the front thereof, a bed reciprocating on said ways, cylinder housings supported at the sides of said first mentioned housing, a cylinder journaled in said cylinder housings, an ink foun-

tain, a fountain roll and a ductor roll mounted on said first mentioned housing below said cylinder housings, a frame pivoted on said cylinder housings to swing about an axis parallel to said cylinder, and vibrator rolls mounted in said frame.

95. In a printing press, in combination, a frame having inclined ways at the front thereof, a bed reciprocable on said ways, cylinder housings supported at the sides of said frame, a cylinder journaled in said cylinder housings, inking mechanism below said cylinder including a plurality of vibrator rolls mounted on a frame swung on said cylinder housings on an axis parallel to said cylinder, and means for raising said frame and holding it at desired elevations.

96. In a jobber press, a bed, means supporting the bed for reciprocation in an inclined path, a cylinder, means to reciprocate the bed, a feed board disposed to feed sheets to the under side of the cylinder, and inking mechanism arranged in the space between the bed and the feed board.

97. In a printing press, in combination, a housing having inclined ways at the front thereof, a bed reciprocable on said ways, cylinder housings secured to the sides of said housing, eccentric bushings rotatable in said cylinder housings, a cylinder having a shaft journaled in said bushings, a rack on said bed, a toothed wheel connected to said cylinder meshing with said rack, a drive shaft journaled in said housing and extending to near the central plane thereof, a pulley on the outer end of said drive shaft, an electric motor at the rear of the housing having a pulley, a belt passing over said pulleys, a pinion on the inner end of said drive shaft, a second shaft parallel to said drive shaft journaled in said housing and having a large gear thereon meshing with said pinion, a third shaft in alignment with said second shaft having its inner end spaced therefrom and carrying thereon a disk, a pin connecting said gear and disk, a pitman connecting said pin to the under side of said bed, a cam on the outer end of said third shaft, a two-arm lever carrying a roller on one arm engaging said cam, a link connected to the other arm of said lever, a rock shaft journaled in said housing connected to said link, arms on said rock shaft and links connecting said arms to said bushings.

98. In a printing press, in combination, a housing having inclined ways at the front thereof, a bed reciprocable on said ways, cylinder housings secured to the sides of said housing, eccentric bushings rotatable in said cylinder housings, a cylinder having a shaft journaled in said bushings, a rack on said bed, a toothed wheel meshing with said rack connected to said cylinder, a drive shaft journaled in said housing, a pinion thereon, a parallel shaft journaled in the housing, a

large gear on said shaft meshing with the pinion, a third shaft in alignment with said parallel shaft having its inner end spaced therefrom, a disk on said inner end, a pin connecting said disk and gear, a pitman connecting said pin to the under side of said bed, a cam on the outer end of said third shaft, a lever engaging said cam, a rock shaft journaled in said housing, a connection between said lever and rock shaft, arms on said rock shaft and links connecting said arms with said eccentric bushings.

99. In a printing press, in combination, a housing having inclined ways at the front thereof, a bed reciprocable on said ways, cylinder housings secured to the sides of said housing, eccentric bushings rotatable in said cylinder housings, a cylinder having a shaft journaled in said bushings, a rack on said bed, a toothed wheel meshing with said rack connected to said cylinder, a rotatable cam journaled in said housing, a lever engaging said cam, a rock shaft mounted in said housing parallel to said cylinder shaft, a link connecting said lever to said rock shaft, arms on said rock shaft, and links connecting said arms to said eccentric bushings.

100. In a printing press, in combination, a housing, a bed reciprocable thereon, cylinder housings secured to the sides of said frame, eccentric bushings rotatable in said cylinder housings, a cylinder having a shaft journaled in said bushings, a rotatable cam mounted in said housing, a lever engaging said cam, a rock shaft mounted in said housing parallel to said cylinder shaft, an arm on said rock shaft, a link connected to said arm and having at its other end a downwardly opening hook engaging a pin on said lever, rods connected to said bushings, arms on said rock shaft connected to said rods, a lever having an arm underlying said link, and sheet detector mechanism operably connected to said last mentioned lever.

101. In a printing press, in combination, a feed board having means thereon to feed sheets to the impression cylinder, a transverse rock shaft journaled beneath said board near the forward end thereof, a sheet detector secured to said rock shaft extending upwardly and forwardly therefrom and having an extremity projecting above the forward edge of said board, and means operating in timed relation to the operation of the press for oscillating said rock shaft.

102. In a printing press, in combination, a feed board having means thereon to feed sheets to the impression cylinder, a pair of top and bottom tongues projecting from the forward edge of said board, a transverse rock shaft journaled beneath said board, a sheet detector on said rock shaft extending upwardly and forwardly therefrom and having a forked extremity straddling said tongues, and means operating in timed rela-

tion to the operation of the press for operating said rock shaft.

103. In a printing press, in combination, a feed board having means thereon to feed sheets to the cylinder, a transverse rock shaft journaled beneath said board near the forward end thereof, a sheet detector on said rock shaft extending upwardly therefrom and having an extremity projecting above the forward edge of said board, and means to oscillate said shaft in timed relation to the operation of the press.

104. In a printing press, in combination, a feed board having means thereon to feed sheets to the impression cylinder, a transverse rock shaft journaled beneath said board near the forward end thereof, a sheet detector on said rock shaft mounted for longitudinal and transverse adjustments with respect thereto, said sheet detector extending upwardly from the rock shaft and having an extremity projecting above said board, and means to oscillate said shaft in timed relation to the operation of the press.

105. In a printing press, in combination, a feed board having means thereon to feed sheets to the impression cylinder, side register operating mechanism mounted beneath said board, a transverse rock shaft journaled below said mechanism, sheet stops mounted on said rock shaft and projecting above the forward edge of said board, and means to oscillate said shaft in timed relation to the operation of the press.

106. In a printing press having a cylinder and a bed mounted for up and down reciprocation, in combination, a feed board disposed to feed sheets to the under side of said cylinder, a delivery table disposed to receive sheets taken from top of said cylinder and located above said board, jogger boards associated with said table and mechanism under said table operated by the press to actuate said jogger boards.

107. In a printing press having a cylinder and a bed mounted for reciprocation, in combination, means to feed sheets one by one to said cylinder and including a shaft, a delivery table disposed above said sheet feeding means, jogger boards associated with said table and mechanism under said table operated by said shaft for actuating said boards.

108. In a printing press having a cylinder and a reciprocating bed, in combination, a frame, means to feed sheets to said cylinder including a shaft and carried by said frame, a delivery table disposed above said sheet feeding means and also carried by said frame, jogger boards associated with said table, and mechanism under said table operated by said shaft to actuate said boards, said frame being mounted for movement so that the parts carried thereby can be withdrawn from normal position by movement of said frame.

109. In a printing press, in combination, a

reciprocating bed, a rotary cylinder, means for operating the impression including a rock shaft, inking mechanism including a fountain roll having a ratchet, a pawl lever driving said ratchet and having a projection thereon, a lever connected to said pawl lever, a cam for operating said last named lever in one direction and a spring for operating it in the other direction, a cam on said rock shaft, and a lever having one end held in yielding engagement with said cam and having a shoulder at its other end adapted to engage said projection and hold said pawl lever inoperative when the impression is off.

In testimony whereof I hereunto affix my signature.

WILLIAM M. KELLY.