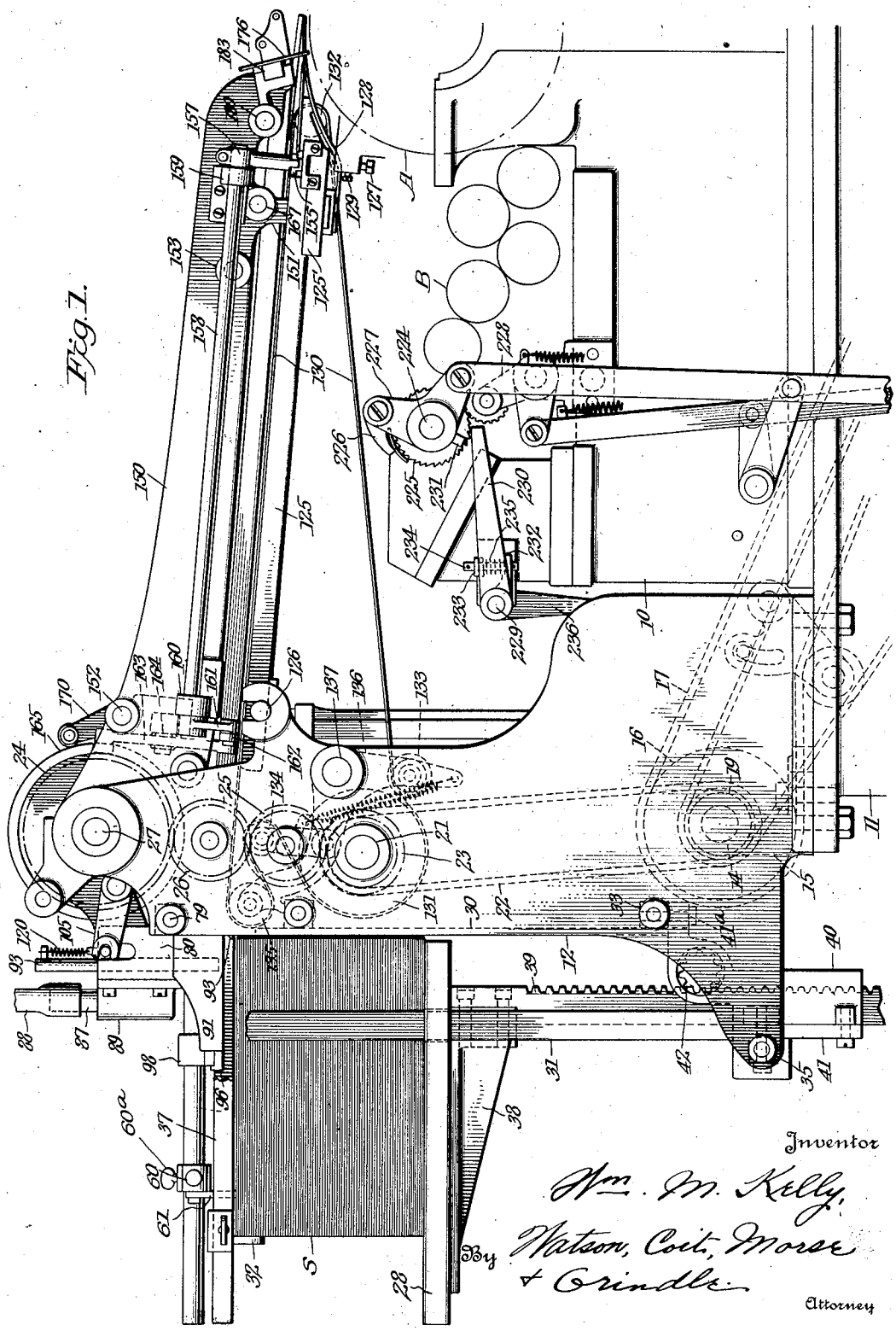
Jan. 6, 1931. W. M. KELLY 1,787,532

SHEET FEEDING MECHANISM

Filed Jan. 12, 1927 10 Sheets-Sheet 1

Fig. 1.



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SHEET FEEDING MECHANISM

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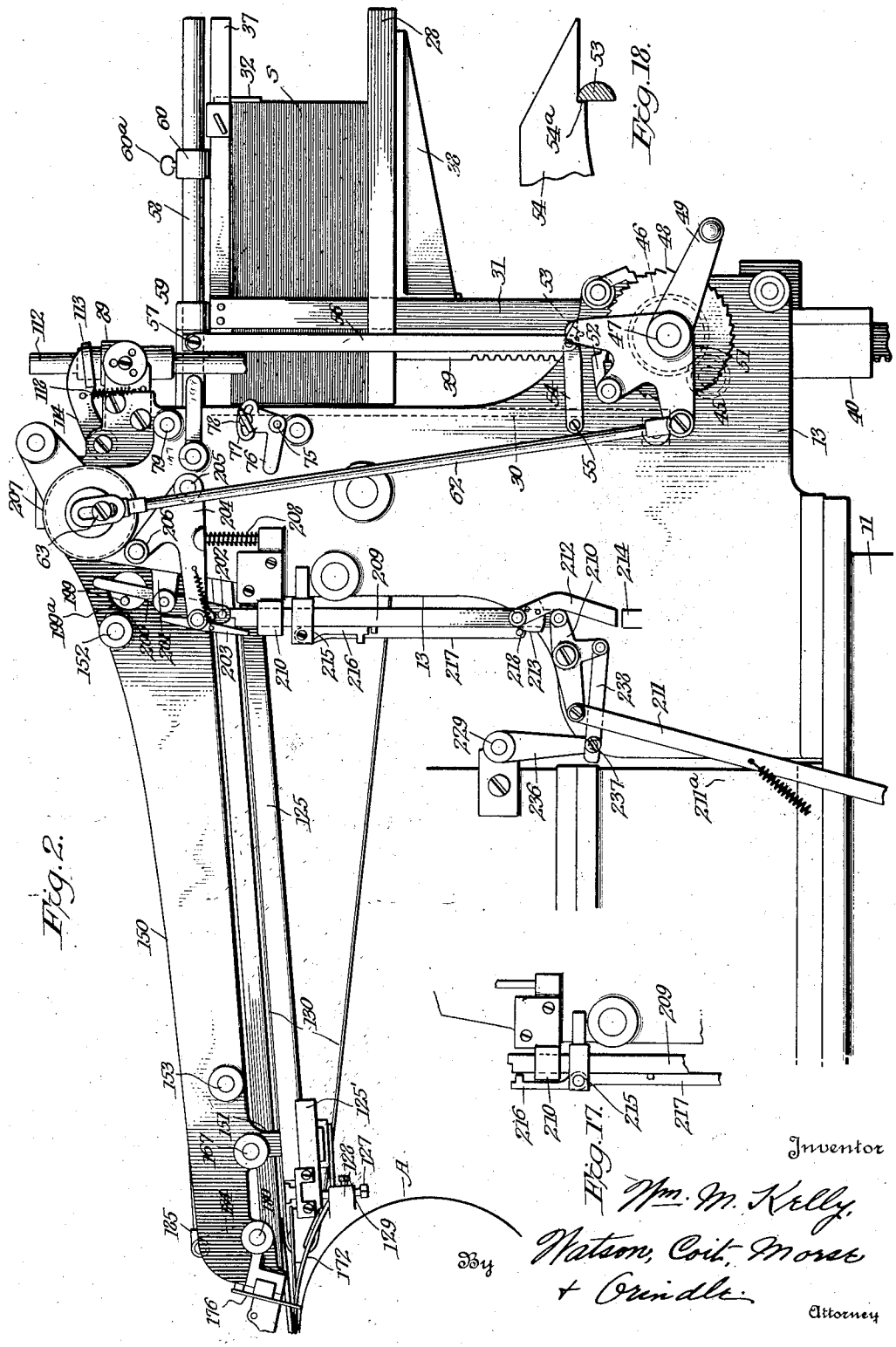


Fig. 2.

Fig. 17.

Fig. 18.

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SHEET FEEDING MECHANISM

Filed Jan. 12, 1927 10 Sheets-Sheet 3

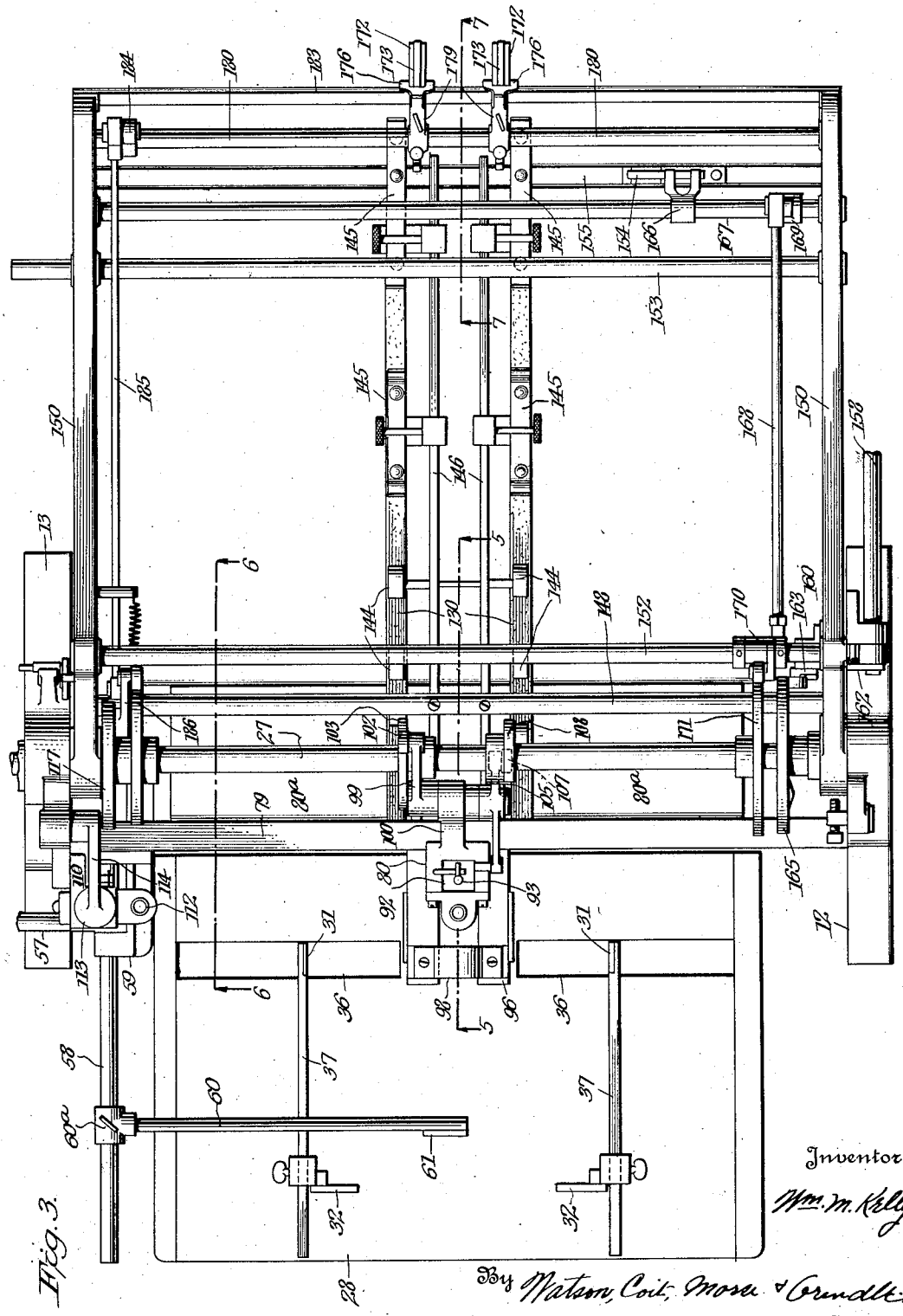


Fig. 3.

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SHEET FEEDING MECHANISM

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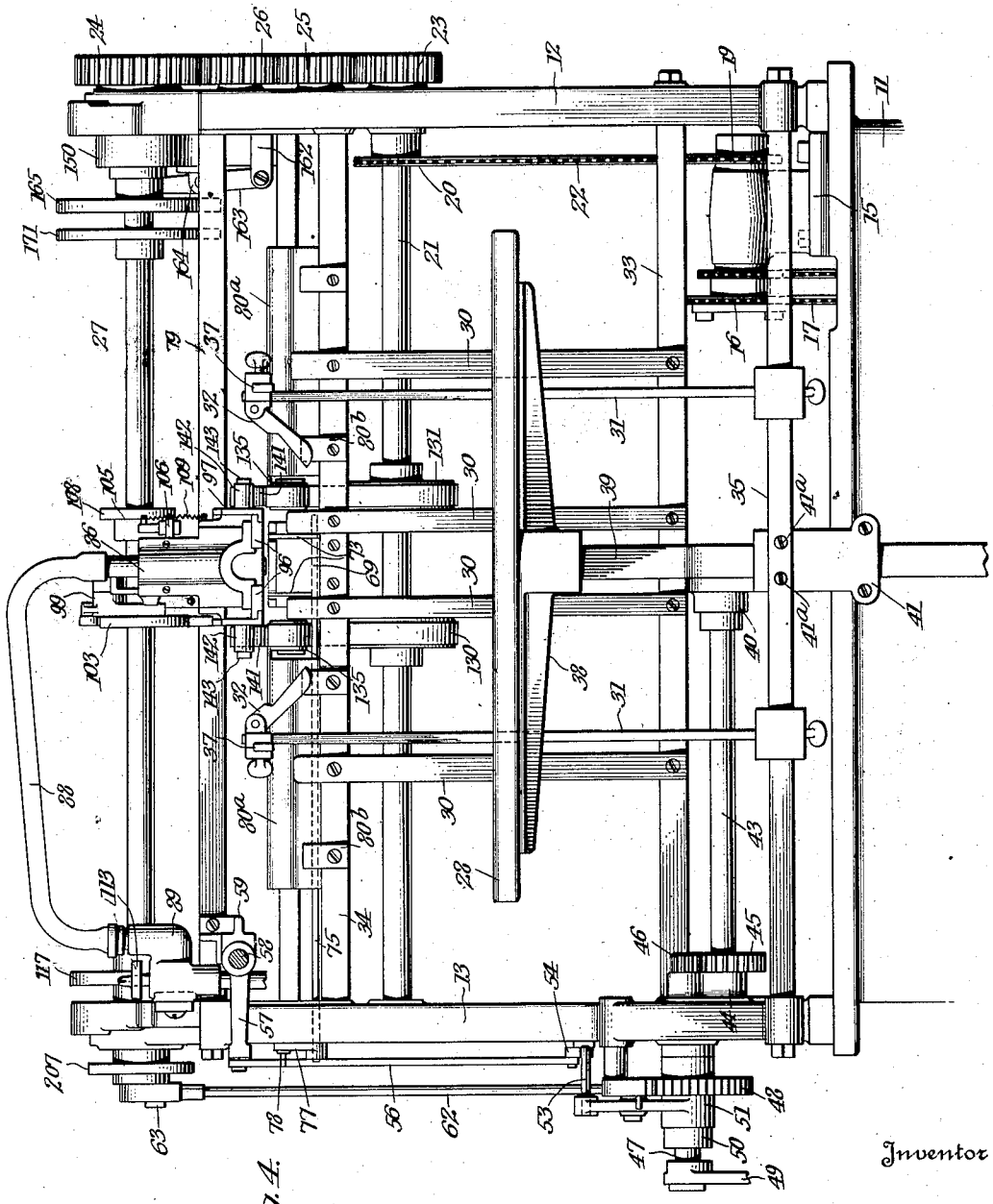


Fig. 4.

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SHEET FEEDING MECHANISM

Filed Jan. 12, 1927 10 Sheets-Sheet 5

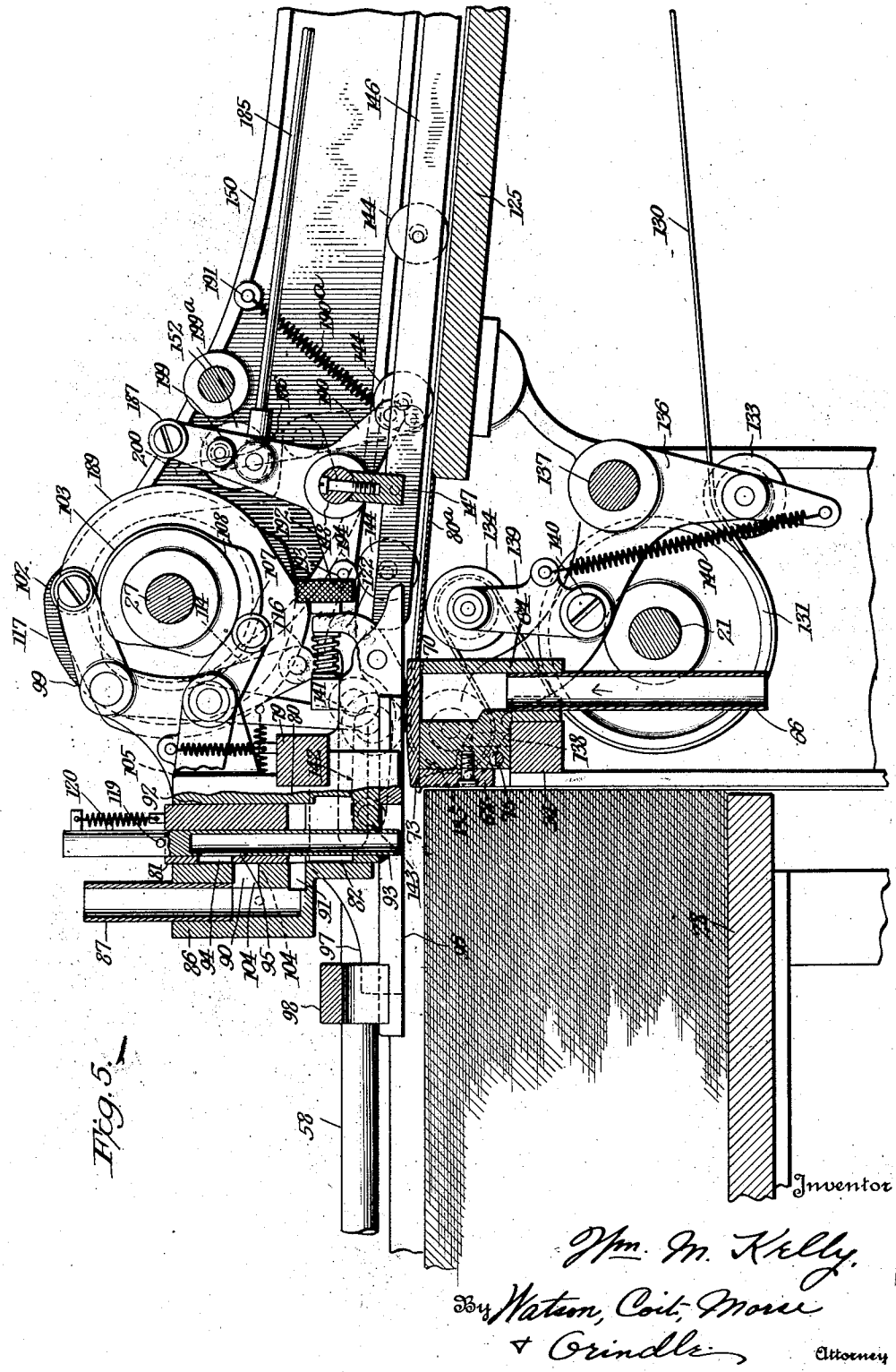


Fig. 5.

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SHEET FEEDING MECHANISM

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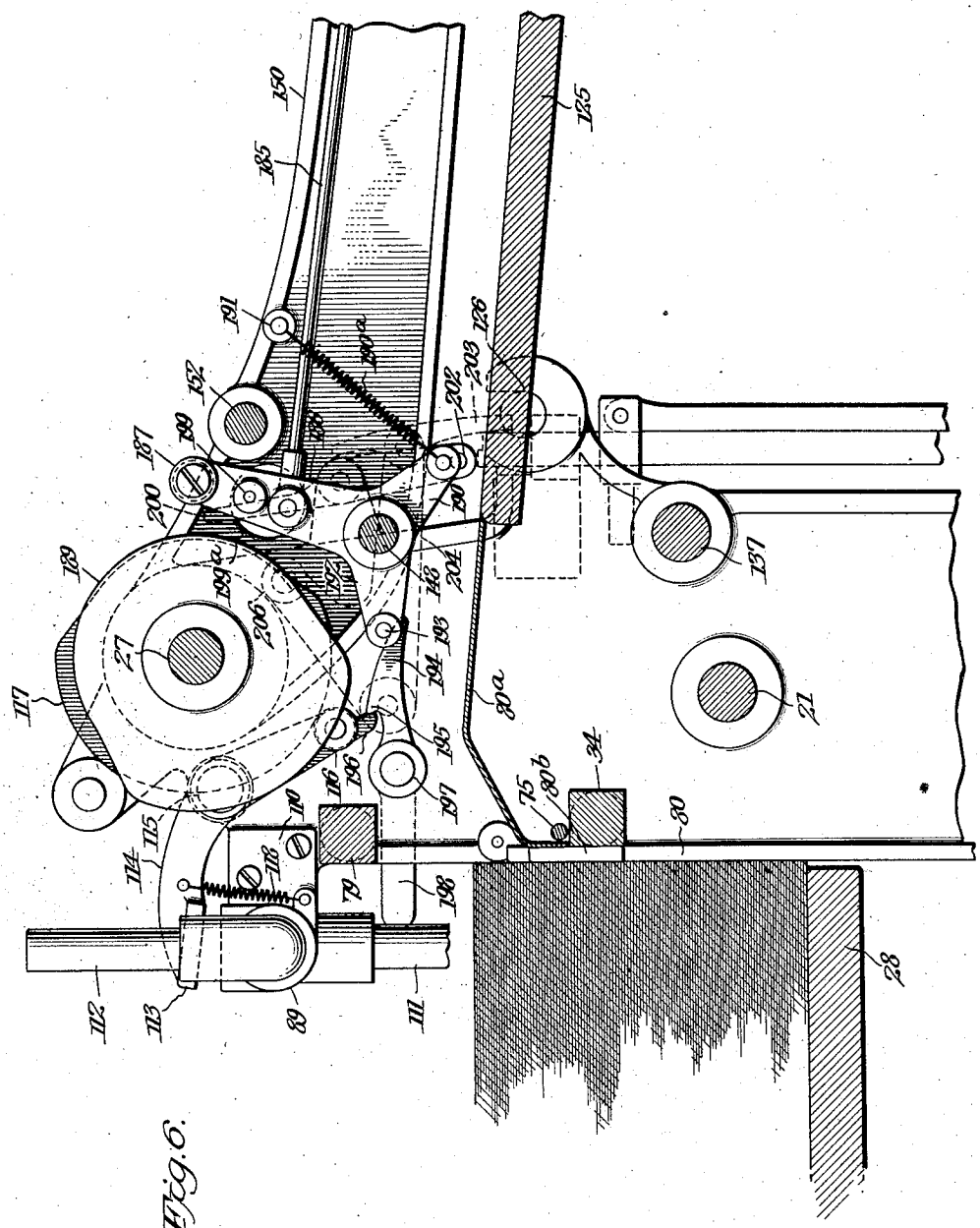


Fig. 6.

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SHEET FEEDING MECHANISM

Filed Jan. 12, 1927 10 Sheets-Sheet 7

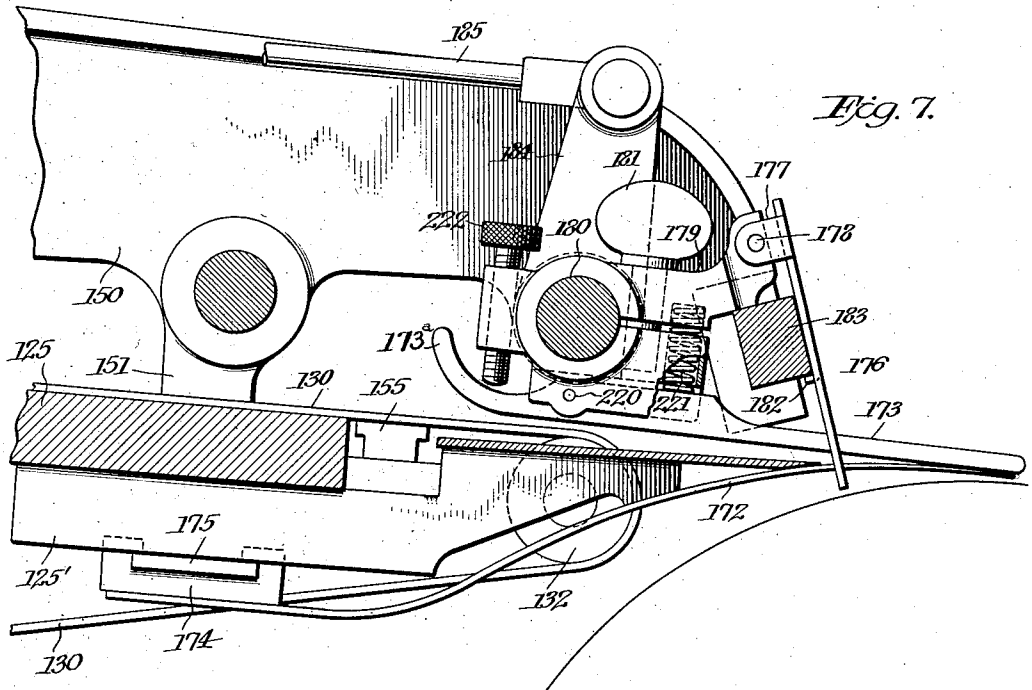


Fig. 7.

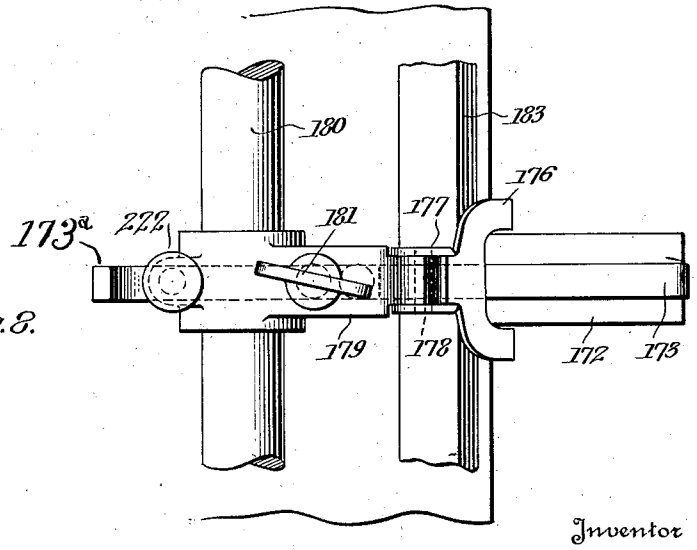


Fig. 8.

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SHEET FEEDING MECHANISM

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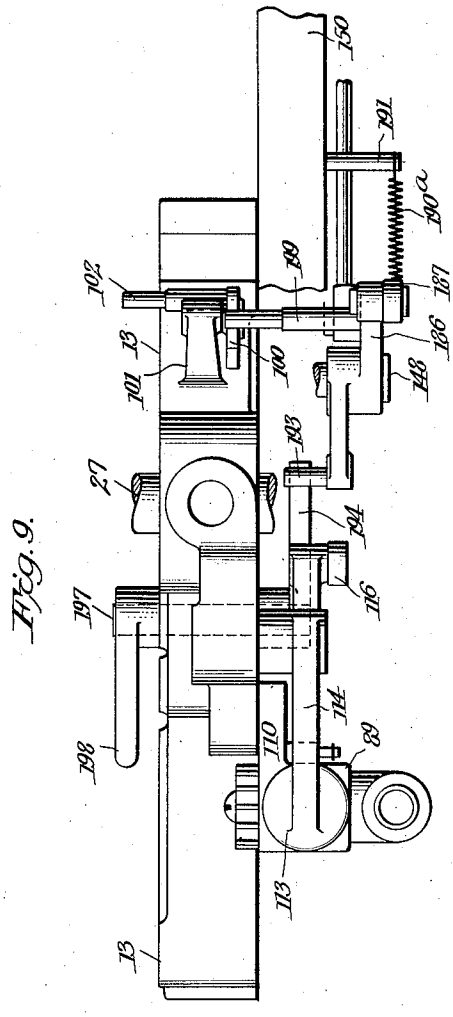


Fig. 9.

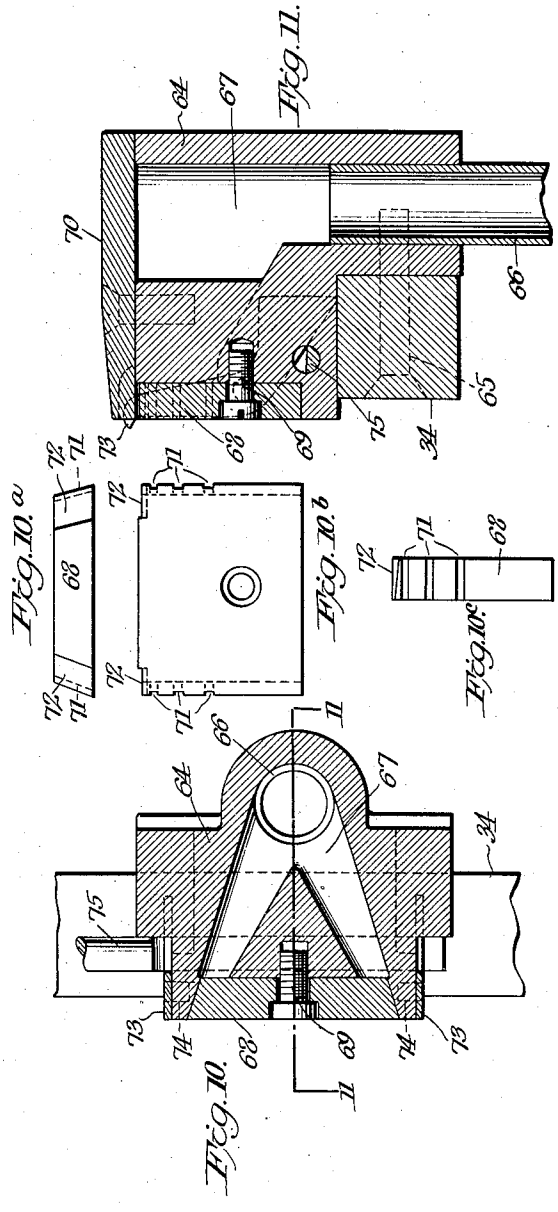


Fig. 11.

Fig. 10.a

Fig. 10.b

Fig. 10.c

Fig. 10.

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SHEET FEEDING MECHANISM

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Fig. 12.

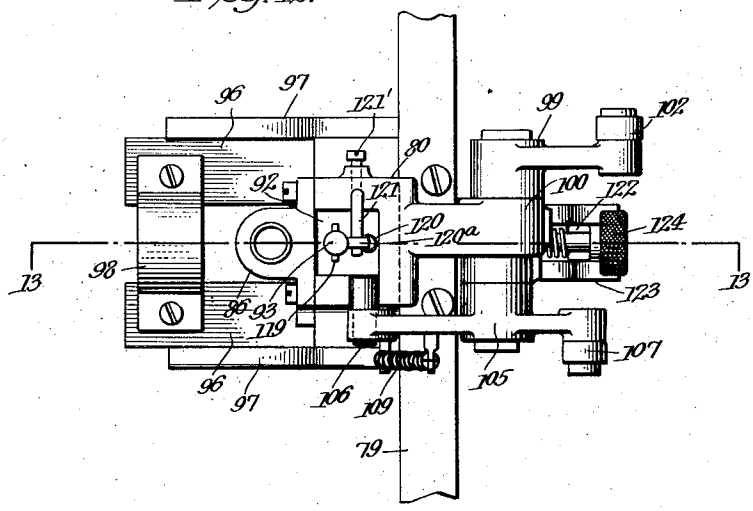
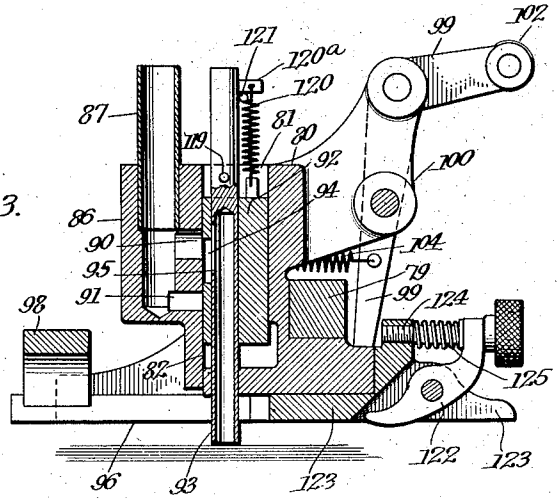


Fig. 13.



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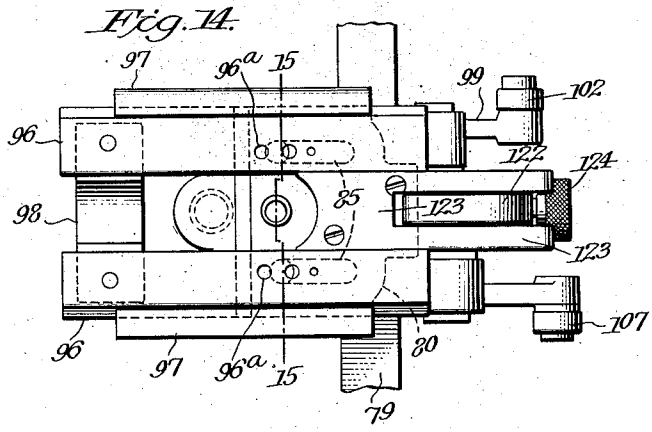
Attorney

Jan. 6, 1931. W. M. KELLY 1,787,532

SHEET FEEDING MECHANISM

Filed Jan. 12, 1927 10 Sheets-Sheet 10

Fig. 14.



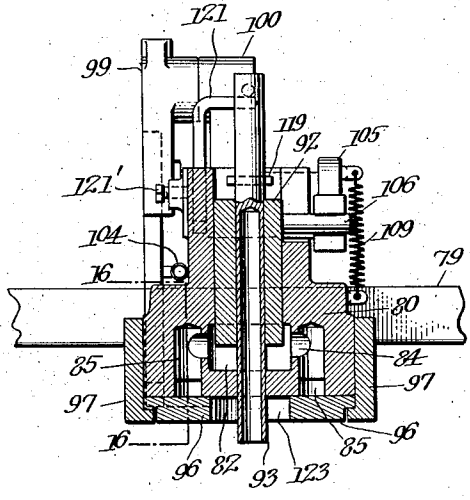


Fig. 15.

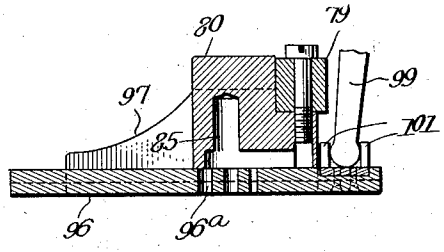


Fig. 16.

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Patented Jan. 6, 1931 1,787,532

UNITED STATES PATENT OFFICE

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SHEET-FEEDING MECHANISM

Application filed January 12, 1927. Serial No. 160,704.

The present invention relates to sheet feeding mechanism, and more particularly to sheet feeding mechanism adapted for use with printing presses of the bed and cylinder type.

The principal objects of the invention are to provide:

An improved blast nozzle for winding and separating the front edges of the sheets, and in association therewith separator fingers of novel construction and adjustability;

An improved suction sheet feeder for lifting sheets singly from a pile and forwarding them to suitable conveyor mechanism;

Slow down fingers of novel construction and operation mounted over the forward end of the feed board for checking the velocity of the sheets and registering them against the front stops;

Sheet detector mechanism controlling both the impression and the suction feeder in combination with manual means for preventing the operation of the detector mechanism, whereby the adjustment of the feeder for "double rolling" is simplified and facilitated;

Improved mechanism for interrupting the feeding of ink when the impression operating means is tripped, to prevent an excess accumulation of ink on the form.

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

Figure 1 is an elevation of one side of the feeder and of a portion of the press;

Figure 2 is a view of the opposite side;

Figure 3 is a plan view of the feeder;

Figure 4 is a rear elevation;

Figures 5, 6 and 7 are vertical sections, respectively, on lines 5—5, 6—6 and 7—7 of Fig. 3;

Figure 8 is a plan view of the mechanism shown in Fig. 7;

Figure 9 is a fragmentary plan view, showing details of the detector and suction valve mechanism;

Figure 10 is a horizontal section through the air blast nozzle;

Figures 10*a*, 10*b* and 10*c* are, respectively, a plan view, a front elevation and a side elevation of the blast nozzle plate;

Figure 11 is a vertical section on line 11—11 of Fig. 10;

Figure 12 is a top plan view of the suction feeder;

Figure 13 is a vertical section on line 13—13 of Fig. 12;

Figure 14 is a bottom plan view of the suction feeder;

Figure 15 is a section on line 15—15 of Fig. 14;

Figure 16 is a section on line 16—16 of Fig. 15; and

Figure 17 is a detailed view, showing the arm 216 in its raised position.

Figure 18 is a detail of the trip mechanism for maintaining the level of the feed pile substantially constant.

Referring to Figs. 1 and 2 of the drawing, the impression cylinder A, the inking mechanism B and other parts not shown are mounted in side members 10 secured to the main frame 11 of the press. The sheet feeder is mounted on a frame comprising side castings 12 and 13 bolted to the top side flanges of the main frame 11 and extending vertically to an elevation substantially greater than the height of the cylinder.

The operating connections for the feeder are shown more particularly in Figs. 1 and 4. Referring thereto, a short counter shaft 14 is mounted in a bracket 15 bolted to the main frame 11. Secured to one end of this shaft is a sprocket 16 driven by a chain 17 which passes around a sprocket wheel (not shown) on one of the operating shafts of the press. Secured to the other end of shaft 14 is a small sprocket wheel 19 which is connected to a sprocket wheel 20 on a shaft 21 by a chain 22. Shaft 21 extends across the feeder and is journaled at its ends in side castings 12 and 13. The right hand end of shaft 21 projects on the outside of casting 12 and carries a gear 23 which drives a gear 24 through a pair of idlers 25 and 26. Gear 24 is fixed on a cam shaft 27 journaled in bearings formed in the side castings 12 and 13 near the top thereof.

The sheet pile S is carried on a lift table

28. The pile is maintained in correct position by front guides 30, side guides 31 and end guides 32. The front guides 30 are attached at their lower ends to a tile bar 33 and at their upper ends to a tie bar 34. The side guides 31 are adjustably supported at their lower ends on a tie bar 35, pass through transverse slots 36 in the table and have secured to their upper ends rearwardly extending bars 37 on which the end guides 32 are adjustably mounted.

Table 28 is supported on a bracket 38 to which is bolted the upper end of a rack bar 39 guided for vertical movement in a bracket 40. The upper end of bracket 40 engages under the square tie bar 33 and is bolted thereto. The bracket has a cover 41 and is additionally supported by screws 41ª which pass through the tie bar 35 and the cover 41.

Meshing with rack 39 is a pinion 42 on a shaft 43 journaled in bracket 40 and in side casting 13. Shaft 43 carries a pinion 45 in mesh with a gear 46 on a short shaft 47 mounted in side casting 13 and extending on the outside thereof. Secured on shaft 47 on the outside of the frame is a ratchet wheel 48 and a handle 49. Rotatable on shaft 47, between a collar 50 and ratchet 48, is a three arm lever 51, (Fig. 2) the center arm of which carries a driving pawl 52 for ratchet wheel 48. One of the outer arms of this lever is substantially vertical and has fixed on its end a laterally projecting pin 53 which is hemispherical in cross section with its plane face disposed vertically. The end of a trip arm 54, pivoted at 55, is adapted to have its lower face rest on pin 53, the arm being provided with a shoulder 54ª engaging the plane face of the pin when the under face of the arm rests on the pin. Pivoted to trip 54 is the lower end of a link 56 the upper end of which is pivoted to an arm 57 rigid on a longitudinally extending shaft 58 journaled in a bracket 59. Adjustable longitudinally on shaft 58 is an arm 60 which extends transversely over the table 28 and carries at its end a feeler 61 resting on the top of the sheet pile. The arm is secured in adjusted position on shaft 58 by a set screw 60ª. The remaining arm of the three arm lever 51 is pivoted to the lower end of a link 62, the upper end of which is slotted and has working therein a crank pin 63 projecting from a disk secured to the left hand end of shaft 27.

The mechanism described serves automatically to maintain the level of the sheet pile within predetermined narrow limits. When the level of the pile is within the predetermined limits, the shoulder on trip 54 engages pin 53 and prevents rotation of the three arm lever 51 in a counter-clockwise direction, looking at Fig. 2, so that crank pin 53 operates idly in the slotted end of link 62. When the level of the pile sinks below the predetermined limit, the link 56 will be raised sufficiently to disengage the trip 54 from the pin 53, whereupon the three arm lever 51 will rotate counter-clockwise when crank pin 63 is rotating downwardly, and when the crank pin rotates upwardly, the three arm lever will be rotated clockwise by link 62 and through pawl 52 will rotate ratchet 48 to rack up the table and bring the level of the pile within the predetermined limits. Thus the level of the sheet pile will be maintained within narrow limits, or substantially constant.

The forward edges of the top sheets are raised, preparatory to feeding the sheets forwardly over the feed table, by air blasts delivered by a blast nozzle, the details of which are illustrated in Figs. 10, 11, 10*a*, 10*b*, and 10*c*. Referring to these views and to Fig. 5, a blast mouthpiece 64 is secured to the central portion of tie bar 34 by screws 65. This mouthpiece is formed with a bore opening through the bottom and having secured therein a pipe 66 connected to the pressure side of a suitable air pump (not shown). The bore opens upwardly into a chamber 67 which extends by diverging branches, progressively decreasing in cross sectional area, to a plate 68 attached to the mouthpiece by a screw 69. The top of the mouthpiece is plane and a cover 70 is secured thereon. As shown in the detail views, Figs. 10*a*, 10*b* and 10*c*, the plate 68 has beveled sides which fit correspondingly inclined surfaces formed in mouthpiece 64, and the beveled sides are formed with a number of small slots 71, three slots being shown on each side of the plate. These slots are about $\frac{1}{16}$th of an inch wide and 1/64th of an inch deep, and it will be understood that they are adapted to deliver three jets of air at each side of the mouthpiece, directed at an angle to the central vertical plane corresponding to the angle of inclination of the edges of plate 68. These small jets delivered at an angle against the front edges of the sheets serve very effectively for all kinds of stock to "wind" the sheets. In addition to these angularly directed jets, the nozzle is adapted to deliver two sheet-like jets above the "winding" jets, which serve to separate the top sheets. For this purpose a shallow notch 72 is formed in the top of plate 68 at each side. The notches 72 progressively decrease in depth towards the front, their depth at the front being about 1/64th of an inch, their width being uniform and about $\frac{1}{4}$th of an inch.

Separator fingers 73 serve to prevent more than one sheet being raised and forwarded by the feeding device described hereinafter. Two fingers are shown, each being pivoted on a pin 74 projecting from the side of the nozzle. For adjusting the separator fingers to project them more or less, according to the kind of stock being operated on, there is provided a rod 75 which is rotatable in a hori-

zontal bore formed through the solid portion of the nozzle. This rod is hemispherical in cross section where it passes through the nozzle and the tail ends of fingers 73 rest on the edge of the rod by gravity. From an inspection of Fig. 11 it will be apparent that by turning rod 75 in one direction or the other, the fingers will be retracted or projected from the nozzle. The rod 75 extends through side casting 13 (Fig. 2) and carries on its end a handle 76 and a slotted sector 77 engaged by a clamping screw 78, whereby the separator fingers may be adjusted from the outside and held in adjusted positions.

The top 70 of the blast nozzle projects through cut away portions of a pair of guide plates 80ª, which bridge the space between the forward edge of the sheet pile and the delivery table (Figs. 5 and 6). The rear downturned ends of these plates rest on tie bar 34 and are held from displacement by stops 80ᵇ secured to the rear face of the tie bar.

The top sheet is lifted and buckled, or snapped, by the separator fingers or detents 73 and fed forward by a suction feeder, the details of which are shown in Figs. 12 to 15, the fingers acting to prevent the second sheet from being lifted with the first. Supported on a tie bar 79, directly above the blast nozzle, is a chambered housing 80. This housing is formed with a vertical chamber 81, rectangular in cross section, which opens through the top of the housing and opens at its lower end into a chamber 82, which communicates through lateral ports 84 with L-shaped chambers 85. The horizontal portions of chambers 85 extend through the bottom of the housing, forming elongated slots therein. Bolted to the rear side of the housing is a cover 86 formed with a bore opening through the top in which is secured a pipe 87 connected by a hose 88 to a suction valve housing 89. The bore in cover 86 opens through ports 90 and 91 into the chamber 81. Slidable in chamber 81 is a valve block 92 and slidable in a vertical bore in this valve block is a tube 93 closed at its upper end and extending at its lower portion through a bore in the bottom of housing 80. A slot 94 through the wall of valve block 92 communicates on one side with port 90 and on the other side with a slot 95 through the wall of tube 93. Two suction plates 96 are slidably mounted on the under face of housing 80, one plate being mounted at each side and guided by a gib 97 secured to the side of housing 80. The two suction plates 96 are rigidly connected at their rear ends by a tie plate 98. The suction plates cover the elongated openings in the bottom of the housing formed by the horizontal portions of the L-shaped chambers 85, and each plate has a hole 96ª therethrough which communicates with the elongated opening. The suction plates 96 are reciprocated by an elbow lever 99 pivoted in the upper end of a lug 100 projecting forwardly from housing 80. The downwardly extending arm of lever 99 terminates in a rounded end which engages between two upstanding lugs 101 on a plate secured to the top face of one of the suction plates 96 (Fig. 16). The forwardly extending arm of lever 99 carries a roller 102 engaging a cam 103 fixed on shaft 27 (Fig. 5). Roller 102 is held engaged with the cam by a spring 104 secured at its ends respectively to the depending arm of lever 99 and to housing 80. Valve block 92 is reciprocated by a lever 105 pivoted on lug 100 at a point below the pivot of lever 99. One arm of lever 105 has a forked end which engages a pin 106 secured to valve block 92 and projecting therefrom laterally through a vertical slot in housing 80. The other arm of lever 105 carries a roller 107 engaging a cam 108 on shaft 27, the roller being held engaged with the cam by a spring 109 secured at its ends respectively to the first mentioned arm of lever 105 and to a pin on tie bar 79.

The suction valve housing 89 is formed with an integral plate 110 which is screwed to the inside of frame casting 13. Suction is produced in this housing through a pipe 111 which is connected to the suction side of the pump, and the suction is communicated through a pipe 112 and hose 88 to the suction feeder. The suction is controlled by a disk valve 113 on the end of a lever 114 fulcrumed on a stud 115 projecting from the inside of the frame. The other arm of lever 114 carries a roller 116 engaging a cam 117 fixed on shaft 27, the roller being held engaged with the cam by a spring 118. When roller 116 engages the high part of cam 117, valve 113 is held raised from a valve seat on housing 89 and the interior of the housing is open to the atmosphere, but when the roller engages the low part of the cam, valve 113 may be seated over the opening in housing 89, in which case suction is communicated to the feeder.

In the regular, or normal operation, a sheet is lifted by suction tube 93 and forwarded by the suction plates 96 at each revolution of the cam shaft 27. From an inspection of Fig. 5 it will be observed that roller 107 on lever 105 is engaging the high part of cam 108, so that valve block 92 and suction tube 93 are in their raised position. The suction tube 93 was carried to this position with valve block 92 by the engagement of a laterally projecting pin 119 on the suction tube with the top of the valve block, a spring 120 operating to hold the pin engaged with the block. It will be further observed that roller 102 on lever 99 engages the low part of cam 103, so that suction plates 96 are in their rearmost position; and that roller 116 on valve lever 114 engages the high part of cam 117, so that valve 113 is raised and consequently there is no suction at the feeder.

When shaft 27 has rotated in a counterclockwise direction, about 60° from the position shown in Fig. 5, roller 107 on lever 105 will be on the low part of cam 108 and the valve block 92 and suction tube 93 will be in their lowermost position, as shown in Fig. 13. In assuming this position the tube 93 was stopped in advance of the end of the downward movement of valve 92 by the engagement of the bent end of an arm 121 on housing 80 with the arm 120ª on tube 93 to which the upper end of spring 120 is connected. Arm 121 is mounted in a vertical socket in housing 80 and is adapted to be held at adjusted positions by a set screw 121′ (Fig. 15). Roller 116 on valve lever 114 is now engaging the low part of cam 117 and valve 113 is seated, whereby suction is communicated to tube 93, through hose 88, port 90 and slots 94 and 95 of the valve and tube respectively. This suction causes the top sheet to adhere to the bottom of tube 93 and when the tube is lifted to the position shown in Fig. 5, the sheet is raised against the lower faces of the suction plates 96. The valve 92 and tube 93 are in their lower positions for only a short interval, as the low part of cam 108 extends through a small angle. In moving from their lower positions, the valve block 92 is first raised until the top of the block engages the pin 119 on the suction tube, whereupon the tube and block move together for the balance of the upward travel. In passing to its upper position the lower end of valve block 92 uncovers port 91 (see Fig. 5), so that suction is communicated to the chamber 82 and the L-shaped chambers 85 and then to the holes 96ª in the suction plates, and port 90 is covered by valve block 92, thereby cutting off suction in the tube 93. On further revolution of shaft 27, roller 102 on lever 99 rides up on the high part of cam 103, and the lever moves the suction plates 96 forward with the sheet adhering thereto. Roller 116 will shortly thereafter ride onto the high part of cam 117, causing the suction valve 113 to rise from its seat and break the suction, releasing the sheet which is now engaged by the conveyor tapes.

The sheet in passing to the delivery tapes goes through a calipering device, the function of which is to prevent the passage of more than one sheet at a time. This calipering device is illustrated in Figs. 5, 12, 13 and 14. It consists of a pivoted tongue 122 the lower edge of which is convexly curved and cooperates with the top 70 of the blast nozzle to form an adjustable throat which prevents the passage of more than one sheet at a time. The tongue 122 is pivoted in the slotted end of a bracket 123 screwed to the under face of feeder housing 80, the side edges of the bracket engaging the inner edges of the suction plates 96 and cooperating with the gibs 97 to guide the suction plates (Fig. 14). The upwardly extending tail end of tongue 122 is bifurcated, and passing through this end and threaded in a portion of bracket 123 is a milled headed screw 124. A spring 125 between the tail end of tongue 122 and the bracket tends to move the tongue 122 counter-clockwise (Fig. 13). By operating the screw 124 in or out, the throat defined by the lower face of the tongue and the top surface of cover 70 may be contracted or enlarged, to accord with the kind of stock being separated and fed.

The feed board 125 is trunnioned at 126 (Figs. 1 and 6) in the side castings 12 and 13 and rests at its forward end on screws 127 mounted in lugs 128 of the cylinder housing (Fig. 1). The screws 127 may be locked in adjusted positions by set screws 129. The sheets are conveyed over the board by a pair of tapes 130 which pass over driving pulleys 131 secured to shaft 21 and over small idler pulleys 132 journaled in front extensions 125′ of table 125 (Fig. 7). The tapes also pass over idler rolls 133, tension rolls 134 and idler rolls 135, these rolls being carried by brackets 136 mounted on a tie rod 137 (Fig. 5). Brackets 136 extend upwardly and rearwardly and have the under surfaces of their rear end portions 138 resting on top of tie bar 34. The tension rolls 134 are carried by arms 139 pivoted on pins 140 secured to brackets 136 and exert on the tapes a proper tension under the action of springs 140. Presser rolls 141 engage the tapes over the idler rolls 135 and cooperate with the tapes in forwarding the sheet from the suction device. These presser rolls are carried by arms 142 pivoted on studs 143 fixed to and projecting laterally from gibs 97 (Figs. 4 and 5).

The sheets are advanced along the feed board by the tapes 130 and the cooperating rollers 144 and balls mounted in cages 145, which are carried by a pair of bars 146 secured near their rear ends to brackets 147 screwed to the under side of a tie rod 148 (Fig. 5). Tie rod 148 is part of a pivoted frame which carries detector and sheet registering mechanism in addition to the rollers and balls just described. This frame comprises side castings 150 pivoted at their rear ends on shaft 27 and formed near their forward ends with downwardly extending lugs 151 which rest on board 125. In addition to tie rod 148, this pivoted frame is strengthened by tie rods 152 and 153.

Any suitable side registering mechanism may be employed. As illustrated herein, it comprises a snap guide 154 which may be of any suitable construction, for instance, that shown and described in my application Serial No. 420,290, filed August 6, 1921. Referring to Figs. 1 and 3, the snap guide 154 is carried by a slidable bar 155 mounted on the extension board 125′ which, as shown in Fig.

7, is secured to the under side of the board 125 and extends forwardly therefrom over the impression cylinder. The bar 155 with its snap guide is reciprocated by a lever arm 157 (Fig. 1) secured to and depending from a shaft 158 mounted in brackets 159 and 160 on the pivoted frame 150. Secured to the rear end of shaft 158 is a depending arm 161 connected by a link 162 to the lower end of a lever 163 pivoted at 164 to a bracket on the inside of casting 150 (Fig. 4). The upper end of lever 163 carries a roller engaging a cam formed on the outer face of a disk 165 secured to cam shaft 27. The snap guide is operated by a forked arm 166 secured to a rock shaft 167 which is journaled at its ends in the pivoted frame castings 150. A link 168 connects an upstanding arm 169 on shaft 167 to the lower arm of a lever 170 pivoted on tie rod 152. The upper arm of lever 170 carries a roller engaging a cam 171 fixed to shaft 27 (Fig. 3). It is to be observed that these operating connections for the snap guide do not interfere with the raising of the pivoted frame comprising side castings 150, since this frame is pivoted on shaft 27 which carries the cams that operate the mechanism. The frame can be freely moved about the axis of shaft 27 and when returned to its normal position the parts will assume their correct positions.

The sheets pass from tapes 130 to throats defined by the tongues 172 and slow down fingers 173 (Fig. 7). There are two of these tongues, each associated with a superposed slow down finger. The rear ends of tongues 172 are adjustably supported on the underside of extension board 125'.

On entering the throats defined by tongues 172 and fingers 173, the sheets pass and operate detector fingers 176 (Figs. 7 and 8). These fingers have bifurcated lower ends which straddle the tongues and slow down fingers and are formed near their upper ends with lateral ears 177 pivoted at 178 to brackets 179 mounted on a rock shaft 180. These brackets are split and are adapted to be clamped on the rock shaft 180 by thumb screws 181, so that the brackets may be held at any desired position on the shaft. Each of the detector fingers has an inwardly bent portion, or detent, 182 between its forks, these detents normally engaging under the square corner of a bar 183 extending between and secured to the extremities of the side castings 150. It will be observed that when the detents engage the corner of bar 183, rock shaft 180 is locked from rotation in a counterclockwise direction, looking at Fig. 7. When a sheet passes the detector fingers, the latter are knocked forwardly about their pivot points, removing the detents 182 from the corner of bar 183 and permitting the shaft 180 to be rocked in a counterclockwise direction.

Secured to the rock shaft 180 is an upstanding arm 184 connected by a link 185 to a lever arm 186 pivoted on tie rod 148. Referring particularly to Figs. 5 and 6, the upper end of lever arm 186 carries a roller 187 adapted to engage a cam 189 fixed on cam shaft 27. Rigid with lever arm 186 is an arm 190 to which is secured one end of a spring 190a, the other end of which is attached to a pin 191 on side casting 150, the spring tending to hold the roller 187 against the cam 189. Also rigid with arm 186 is an arm 192 having fixed on its end a laterally projecting pin 193 which engages over the end of a pivoted latch 194. Latch 194 has a tooth 195 adapted to engage an extension 196 on the lower end of valve lever 114 when the valve is in its open position. Thus when the valve is opened by the operation of cam 117 on roller 116 of the valve lever, it will be held open until latch 194 releases the extension 196. Latch 194 is fixed to the inner end of a short shaft 197 journaled in side casting 13 and projecting on the outside thereof, where it carries a handle 198 (Fig. 9).

Projecting laterally from lever arm 186 through a circular aperture 199a in casting 150 is a pin 199, the outer end of which is adapted to engage the upper arm of a lever 200 pivoted in a forwardly projecting lug 201 of casting 13 (Fig. 2). Fixed to the lower end of lever 200 is a laterally projecting pin 202 adapted to engage a pawl 203 carried by a lever 204, which is pivoted at 205. Lever 204 carries a roller 206 engaging a cam 207 fixed on cam shaft 27, a spring 208 holding the roller against the cam. When roller 206 is on the low part of cam 207, pawl 203 is adapted to engage a shoulder on the upper end of a rod 209 slidable in a guide 210 on the feeder frame. Pivoted to the lower end of rod 209 is one arm of a lever 210 the other arm of which is connected by a link 211 to trip-mechanism (not shown) for disconnecting the impression operating means. Pivoted near the lower end of rod 209 is a depending dog 212 rigid with a sector 213. When rod 209 is moved down, the lower end of dog 212 is adapted to engage a plunger 214 which operates suitable switch mechanism for disconnecting the motor that drives the press and feeder. Frictionally mounted on rod 209 near the upper end thereof is a collar 215 on which is pivoted an arm 216 normally occupying the down position shown in Fig. 2, but when thrown up being adapted to be engaged by pawl 203. Depending from collar 215 is a rod 217 having a laterally projecting pin 218 at its lower end adapted to engage the curved edge of sector 213 and thereby move the arm 212 away from its operative position over plunger 214.

Under normal operating conditions, when

the rotation of cam 189 brings the lower part thereof opposite roller 187 on lever 186, a sheet is in engagement with the detector fingers 176 and has rotated these fingers so that the detents 182 are out of engagement with bar 183. There is also a sheet entering on the board, that is, in addition to the sheet at the detectors, a second sheet has just been fed from the pile so that the detector fingers control the feeding of the second following sheet. Hence shaft 180 is free to rock and permits the roller to pass from the high to the low part of the cam. When the roller passes from the high to the low part of the cam, lever 186 rocks and the pin 199 thereon engages the upper end of lever 200 and causes the pin 202 on the lower end to strike the pawl 203 and move it out of alignment with rod 209, so that when the subsequent downward movement of lever 204, under the action of cam 207, occurs, the pawl will not push down rod 209 to cause the impression to be held off and the press and feeder to be stopped. When the lever 186 rocks under these normal conditions, the arm 192 rigid therewith moves down and removes the latch 194 from engagement with the extension 196 of valve lever 114 and permits valve 113 to be seated when the low part of cam 189 comes opposite the roller 116, to render the suction feeder operative. In the event, however, that a sheet fails to pass and operate the detector fingers when due, shaft 180 will be locked and the roller 187 on lever 186 will not be able to follow the low part of cam 189, and hence pin 199 on lever 186 will not operate lever 200 to move pawl 203 out of alignment with rod 209, and when lever 204 is moved downwardly pawl 203 will engage the shoulder on the upper end of rod 209 and move the rod downwardly, tripping the impression and, if dog 212 has not been manually swung to its inoperative position, stopping the press and feeder. Moreover, latch 194 will hold valve 113 open to render the suction feeder inoperative.

When it is desired to double roll, or double ink, the form for each sheet printed, the operator merely has to turn up the arm 216 and then lift the latch handle 198 for one sheet, to cause the suction feeder to omit feeding a sheet, whereupon without further attention the mechanism will operate to feed a sheet only at every other cycle, or alternate cycles, of the press, and to hold off the impression during the alternate cycles when there is no sheet on the cylinder, thereby effecting a double inking of the form for each sheet printed. The present devices for accomplishing this result form a modification of the invention described in my Patent No. 1,469,515, granted October 2, 1923.

It should be borne in mind, that in the normal operation of the press the detectors control the feeding of the second subsequent sheet. In other words, if the sheet at the detectors is designated as A, there is a second sheet that may be designated B just delivered from the feeder, and the detectors have been tripped by the sheet A so that the third sheet, which may be designated C, will be fed. If sheet A had not tripped the detectors, sheet C, that is the second sheet after A, would not be fed. In double rolling, after the arm 216 has been raised to the position shown in Fig. 17, the passage of the first sheet, that is A, will trip the detector fingers and permit pin 202 on lever 200 to move pawl 203 so that when lever 204 is rocked downwardly, pawl 203 will push down on arm 216 and slide down the collar 215 with its rod 217, causing pin 218 to engage the curved edge of the sector 213 and move arm 212 from its operative position over switch plunger 214. The operator, by holding down on latch arm 198, has prevented the latch 194 from being released by the detector mechanism, and has held valve 113 open so that a sheet feeding operation was missed. The absence of this sheet, namely sheet B, when due at the detector fingers, will cause the impression operating means to be tripped, that is to say, the pawl 203 will push down on rod 209, thereby actuating link 211 and holding the impression off. The arm 212, during the downward movement of rod 209, is held out of engagement with the switch plunger 214 in the manner already described. In its downward movement the rod 209 starts to carry rod 217 and its attached parts with it, but the lug on arm 216 strikes the bracket 210, thus preventing movement of the rod 217, whereupon the continued movement of rod 209 results in sliding rod 217 and arms 216 back to their upper positions on the rod 209. Thereafter the upward movement of rod 209 carries with it the friction collar 215, rod 217 and arm 216, so that at the end of the upward movement of rod 209, the parts are in the position indicated in Fig. 17. It will be understood that the weight of the parts operated by the link 211 is sufficient to return rod 209 and the other parts to their upper positions, but to make this apparent from the drawings, I have shown a spring 211a. The feeding of sheet C now takes place and the cycle of operations just described is repeated. It is seen that by making the press miss one feeding operation, thereafter it will continue to miss every second feeding operation. Even when operating in this manner, if a sheet is missing at the detectors when due, the press will be stopped by arm 212 pressing down on the switch plunger 214. The mechanism just described is such that the arm 212 is held out of operative position when the normally second sheet, that is sheet B, is absent, but is returned to

operative position for either sheets A or C, that is for every second feeding operation.

Referring to Figs. 7 and 8, the slow down finger 173 is pivoted at 220 in a channel formed in the bottom side of bracket 179. A spring 221 seated in a socket in the bracket presses at its lower end on finger 173 at a point in front of the pivot 220, so that the front end of the finger is yieldingly held down on the tongue 172. The tail end 173*a* of the finger is curved upwardly and is engaged by the end of a screw 222 threaded in bracket 179. When the shaft 180 is rotated counter-clockwise, looking at Fig. 7, which it does immediately after the forward edge of a sheet passes the detector finger 176, the slow down finger 173 will be given first a longitudinal movement, during which its front end is pressed against the tongue 172 by spring 221, and then when the rotary movement of the shaft has brought the end of screw 222 against the tail end 173*a* of the finger, relative movement between the finger and bracket is stopped, and the finger rotates with the bracket during the remainder of the counter-clockwise rotation of the shaft, the forward end of the finger moving upwardly away from the tongue 172. The sheet entering the throats defined by fingers 173 and tongues 172 at a high velocity is caused to move with the fingers 173 in their longitudinal movement, and the sheet is accordingly slowed down preparatory to advancing against the usual drop guides, or front stops. It will be noted that the throat formed between the tongue 172 and the slow down finger becomes more constricted as the sheet advances into the throat. A thin sheet will advance farther into the throat than a thicker sheet, before it is almost stopped. Because of this feature, the device will function with sheets of different thicknesses without adjustment. Not only do the fingers act to slow down the sheet, but also to straighten it, and as strippers to prevent the forward edge of the sheet moving up with the drop guides when they are raised.

Mechanism is provided to control automatically the feeding of the ink, for the purpose of preventing an excess accumulation of ink on the rollers and form. This mechanism is illustrated in Figs. 1 and 2. Referring to these views, rigid on the shaft 224 of the fountain roller is a ratchet 225 driven by a pawl 226 on a lever 227 which is pivoted on said shaft. The ductor roll is carried by a lever 228. Levers 227 and 228 are oscillated in the operation of the press by any suitable mechanism. Extending across the back of the ink fountain and mounted in brackets secured to the fountain is a rock shaft 229, and rotatable on one end of this shaft is an arm 230 which extends under the fountain feed ratchet lever 227. When arm 230 is moved upwardly, its end is adapted to engage a pin 231 on lever 227 to prevent clockwise movement of the lever and thereby interrupt the feeding of the ink. Rigid on shaft 229 is a short arm 232, and passing through an aperture in this arm and through a lug 233 on arm 230 is a pin 234 surrounded by a coil spring 235 which bears at its ends respectively against the arm 232 and the lug 233. This resilient connection between the shaft 229 and arm 230 permits the arm to yield when the shaft is rocked at a time when the pin 231 is located in the path of the arm. When this is the case the end of arm 230 strikes against the pin and yields to permit the pin to pass over its end, whereupon the arm will snap up to oppose the return of the pin and lever. Fixed to the other end of shaft 229 is a depending arm 236 carrying a laterally projecting pin 237 which is normally engaged by the hook end of a link 238, the other end of which is pivoted to a depending arm of lever 210. This mechanism effects an interruption of the ink feeding when the impression is tripped, as will be understood from the foregoing description without further explanation. It will be recalled that when double rolling, the impression is tripped at every other cycle of the press. It is of course not desired to interrupt the feeding of the ink at these times, as it is the object to give the form a double inking for each sheet. Therefore when the press is double rolling, the hook end of link 238 will be detached from arm 236.

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

1. In a sheet feeding mechanism, the combination of a reciprocating pneumatic means for forwarding a sheet traversing the same path in its forward and return movements and pneumatic suction means associated with said first means for bringing the sheet within the field of action of the forwarding means.

2. In a sheet feeding mechanism, in combination, a table for supporting a pile of sheets, reciprocating pneumatic means arranged over the pile operable to forward sheets, said means traversing the same path in its forward and return movements and reciprocating means associated with the first means to take a sheet from the pile and carry the same into the field of action of said pneumatic means.

3. In a sheet feeding mechanism, in combination, a housing, reciprocating pneumatic means operating in said housing for forwarding a sheet, and means for picking up and presenting a sheet to said pneumatic forwarding means and carried by said housing.

4. In a sheet feeding mechanism, in combination, a housing, reciprocating pneumatic means operating in said housing for forwarding a sheet, and pneumatic means for picking up and presenting a sheet to said pneumatic

forwarding means and carried by said housing.

5. In a sheet feeding mechanism, in combination, a pneumatic means including a reciprocating suction plate for forwarding a sheet traversing the same path in both its forward and return movements, a suction tube, and means to reciprocate said tube to raise the top sheet of a pile into the field of action of said suction plate.

6. In a sheet feeding mechanism, in combination, reciprocating pneumatic means for forwarding a sheet, a second pneumatic means for bringing the top sheet of a pile within the field of action of the first pneumatic means, and means for rendering said second pneumatic means inoperative at the upper end of its stroke.

7. In a sheet feeding mechanism, in combination, a reciprocating intermittently acting suction means to forward a sheet, a slidingly mounted suction tube adapted to be moved into contact with the top sheet of a pile to raise it within the field of action of the suction means, and means to reciprocate the tube in timed relation with the intermittently acting suction means.

8. In a sheet feeding mechanism, in combination, a reciprocating intermittently acting suction means to forward a sheet, a slidingly mounted tube connected with the said suction means and adapted to be moved into contact with the top sheet of a pile and raise it within the field of action of the suction means, and means to reciprocate the tube in timed relation with the intermittently acting suction means.

9. A suction feeder for lifting sheets singly from a pile and advancing them, comprising a housing mounted over the forward edge of the pile, a tube reciprocable in the housing, said housing having a suction chamber communicating with the interior of the tube and having a longitudinal chamber opening through the bottom thereof, said longitudinal chamber communicating with the suction chamber when the tube is in its upper position, means for reciprocating the tube, a plate slidably mounted on the under side of the housing over said longitudinal chamber and having an aperture communicating therewith, means for reciprocating said plate, a valve controlling the suction in said suction chamber, and means for operating said valve in timed relation to the operation of said tube and plate.

10. A suction feeder for lifting sheets singly from a pile and advancing them, comprising a housing mounted over the forward edge of the pile, a valve block vertically reciprocable in the housing, a tube supported in the valve block to reciprocate therewith, said housing being formed with a suction chamber and said valve block having a slot communicating on one side with said suction chamber and on the other side with a slot through the wall of said tube, said housing having a longitudinal chamber opening through the bottom thereof, means for reciprocating said valve block, said block in its upper position opening communication between said suction chamber and said longitudinal chamber, a plate slidably mounted on the under side of the housing over said longitudinal chamber and having an aperture communicating therewith, means for reciprocating said plate, a valve controlling the suction in said suction chamber, and means for operating said valve in timed relation to the operation of said valve block and plate.

11. A suction feeder for lifting sheets singly from a pile and advancing them, comprising a housing formed with a vertical chamber opening through the top and with a longitudinal chamber at each side communicating with the vertical chamber and extending through the bottom of the housing to form elongated slots, a valve block slidable in said vertical chamber formed with a longitudinal bore, a tube slidable in said bore and extending through a bore in the bottom of the housing, said tube being open at the bottom and closed at the top, a suction chamber in the housing opening through two vertically spaced ports into said vertical chamber, a slot through said valve block communicating on one side with the upper of said ports and on the other side with a slot through the wall of said tube, a stop on said tube engaging said valve block, a spring holding said stop engaged with said block, a vertically adjustable stop adapted to limit the downward movement of said tube, means for reciprocating said valve block, the lower end of said block uncovering the lower of said vertically spaced ports when the valve block is in its upper position to communicate suction to said longitudinal chambers, plates slidably mounted on the under side of the housing over said elongated slots and having apertures communicating therewith, means for reciprocating said plates, a valve controlling the suction in said suction chamber, and means for operating said valve in timed relation to the operation of said valve block and plates.

12. A suction sheet feeder comprising a housing, a vertically reciprocating suction device mounted in said housing for lifting sheets singly from a pile, and a longitudinally reciprocating suction device mounted on the bottom of the housing for receiving the sheets from said vertically reciprocating device and advancing them, said longitudinally reciprocating device traversing the same path in both its forward and return movements.

13. A suction sheet feeder comprising a housing, a vertically reciprocating tube mounted in the housing and projecting from

the bottom thereof, means for communicating suction to the interior of the tube, said housing being formed with a chamber opening through the bottom thereof, a plate slidably mounted on the bottom of the housing over the opening of said chamber and having an aperture communicating therewith, means for communicating suction to said chamber when said tube is in its raised position and cutting off suction to the interior of the tube, and means for reciprocating said plate, said plate being constrained to move in the same path in both its forward and return movements.

14. A suction sheet feeder, comprising a vertically reciprocating tube adapted to have suction communicated thereto to lift sheets singly from a pile, in combination with a longitudinally reciprocating suction device adapted to receive the sheets and advance them, comprising a housing having a suction chamber opening through the bottom thereof, a plate mounted over the opening of said chamber having an aperture communicating therewith, and means for reciprocating the plate, said plate being constrained to move in the same path in both its forward and return movements.

15. Sheet feeding mechanism comprising a blast nozzle adapted to direct air blasts against the front edges of the top sheets of a pile, in combination with a housing mounted above the blast nozzle, a vertically reciprocating suction device mounted in said housing for lifting sheets from the pile, and a longitudinally reciprocating suction device mounted on the bottom of the housing for receiving the sheets and advancing them, said longitudinally reciprocating device being constrained to move in the same path in both its forward and return movements.

16. Sheet feeding mechanism comprising in combination, a blast nozzle adapted to direct air blasts against the front edges of the top sheets of a pile, a housing mounted above the blast nozzle, a vertically reciprocating device mounted in said housing for lifting sheets singly, a sheet calipering device comprising a tongue cooperating with the top of said blast nozzle to form an adjustable throat, and a longitudinally reciprocating device mounted on the bottom of said housing for receiving the sheets and forwarding them through said throat.

17. Sheet feeding mechanism comprising, in combination, a blast nozzle adapted to direct air blasts against the front edges of the top sheets of a pile, a housing mounted above the blast nozzle, a vertically reciprocating suction device mounted in said housing for lifting sheets singly, a sheet calipering device comprising a tongue cooperating with the top of said blast nozzle to form an adjustable throat, and a longitudinally reciprocating suction device mounted on the bottom of said housing for receiving the sheets and forwarding them through said throat.

18. In combination with a suction feeder comprising a housing and vertically and longitudinally reciprocating sheet feeding devices mounted thereon, a sheet calipering device comprising a finger pivoted at the forward part of the housing on a horizontal axis and cooperating with an opposed surface to form a throat, and a screw mounted on the housing for adjusting said finger.

19. A suction sheet feeder comprising in combination, a housing, a vertically reciprocable suction tube mounted in the housing and having its lower end projecting from the bottom thereof, a longitudinally reciprocable suction plate mounted on the bottom of the housing at the side of said tube, levers fulcrumed on said housing operably connected to said tube and plate respectively, and cams operating said levers.

20. A suction sheet feeder comprising a housing, a vertically reciprocable suction tube mounted in the housing and having its lower end projecting from the bottom thereof, a longitudinally reciprocable suction plate mounted on the bottom of the housing at the side of said tube, and means for reciprocating said tube and plate.

21. A suction sheet feeder comprising, in combination, a housing, a vertically reciprocable suction tube mounted in the housing and projecting through the bottom thereof, a longitudinally reciprocable suction plate mounted on the bottom of the housing at the side of said tube, means for reciprocating said tube and plate, and a sheet calipering device mounted on the housing in front of said tube.

22. In a sheet feeder, means for winding and separating the top sheets of a pile, comprising a blast nozzle formed with a plurality of small openings adapted to direct jets of air against the front edges of the sheets, in combination with separator fingers mounted at the sides of the nozzle having upper extremities projecting over the front edge of the top sheet of the pile, and means for adjusting said fingers.

23. In a sheet feeder, means for winding and separating the top sheets of a pile, comprising a blast nozzle formed with a plurality of small superposed channels directed to deliver jets of air at an angle against the front edges of the sheets, in combination with separator fingers pivoted at the sides of the nozzle and having upper extremities projecting over the front edge of the top sheet of the pile, and means for adjusting said fingers.

24. In a sheet feeder, means for winding and separating the top sheets of a pile, comprising a blast nozzle formed with a plurality of small superposed channels adapted to deliver jets of air at an angle against the front

edges of the sheets and formed with a relatively wide shallow channel above the small channels adapted to deliver a sheet-like jet, in combination with separator fingers having upper extremities projecting over the front edge of the top sheet of the pile.

25. In a sheet feeder, means for winding and separating the sheets of a pile, comprising a blast nozzle adapted to direct jets of air against the front edges of the top sheets, in combination with a separator finger pivoted at each side of the nozzle having an upper extremity projecting over the front edge of the top sheet of the pile and having a downwardly extending tail, a rod rotatable in the nozzle and having a portion non-circular in cross section, the tails of said fingers resting on said portion, and means for rotating said rod and fixing it in adjusted positions.

26. In a sheet feeder, means for winding and separating the sheets of a pile, comprising a blast nozzle supported so as to direct jets of air against the front edges of the top sheets, in combination with a separator finger pivoted at each side of the nozzle having an upper extremity projecting over the front edge of the top of the pile and having a tail, a rod rotatable in the nozzle and projecting on the outside of the feeder, and means on the outside of the feeder for rotating the rod and holding it in adjusted positions, said rod having non-circular portions on which the tails of said fingers rest.

27. In a sheet feeder, means for winding and separating the sheets of a pile, comprising, in combination with a blast nozzle adapted to direct jets of air against the front edges of the top sheets, a separator finger pivoted at the side of the nozzle having an upper extremity projecting over the front edge of the top sheet of the pile, a rotatable rod having a non-circular portion on the edge of which the tail of said finger rests, and means on the outside of the feeder for rotating the rod and holding it in adjusted positions.

28. In a sheet feeder, a blast nozzle comprising a housing having a chamber which opens through the top and rear side adapted to be connected to a source of compressed air, a plate secured to the housing at the rear side having its side edges beveled and fitting correspondingly inclined surfaces of the housing, said plate having a plurality of slits in its beveled edges forming with the inclined surfaces of the housing small channels which communicate with said chamber, the top of said plate being cut away at the sides to form relatively wide shallow notches, and a cover for the housing extending over the plate and forming with said notches channels.

29. In a sheet feeder, a blast nozzle comprising a housing having a chamber comprising diverging branches which open at the rear side of the housing, a plate secured to the housing at the rear side covering the openings of said branches, the side edges of the plate being beveled and fitting inclined surfaces of the housing, said beveled edges having a plurality of slits forming with the inclined surfaces of the housing, small channels communicating with said diverging branches, said channels being adapted to deliver angularly directed jets of air against the edges of the sheets, the top of said plate being cut away at the sides to form relatively wide shallow notches, and a cover for the housing extending over the plate and forming with said notches channels adapted to deliver sheet-like jets over said small jets.

30. In a sheet feeder, a blast nozzle formed with a plurality of small superposed channels adapted to deliver small jets of air against the front edges of the sheets and formed with a relatively wide shallow channel slightly spaced above the upper of said small channels adapted to deliver a sheet-like jet.

31. In a sheet feeder, a blast nozzle formed with a plurality of small superposed channels at each side extending outwardly at an angle to the central vertical plane of the nozzle adapted to deliver small jets of air at an angle against the edges of the pile of sheets and formed with relatively wide shallow horizontal channels adapted to deliver a sheet-like jet above said small jets.

32. Sheet feeding mechanism, comprising in combination, a pneumatic feeder, a valve member adapted when moved to one position to render the feeder inoperative to feed sheets, means to periodically move said member to said position, releasable means to hold said member in said position, and sheet detector mechanism controlling said releasable means.

33. Sheet feeding means, comprising in combination, a suction feeder, a valve adapted when open to render the feeder inoperative to feed sheets, a member to actuate said valve, releasable means operating directly to hold said valve open, and sheet detector mechanism adapted to release said means when a sheet is at the detector when due.

34. Sheet feeding mechanism, comprising in combination, a suction feeder, a valve adapted when open to render the feeder inoperative, an arm connected to said valve, a cam operating said arm, a latch engaging said arm to hold said valve open, a second arm adapted to release said latch, sheet detector mechanism controlling said second arm, and manual means for holding said latch engaged with said valve arm.

35. Sheet feeding mechanism, comprising, in combination, a suction feeder, a valve adapted when open to render the feeder inoperative, an arm connected to said valve, a

cam operating said arm, a latch holding said valve open, sheet detector mechanism for releasing said latch, and manual means for holding said latch.

36. Sheet feeding mechanism, comprising, in combination, a suction feeder, a valve adapted when open to render the feeder inoperative, a cam operating said valve, a latch preventing the closing of said valve, an arm adapted to engage and release said latch, a second arm rigid with said arm, a cam engaging said second arm, sheet detector mechanism preventing said second arm from following the low part of said cam when a sheet is not present at the detector when due, means for tripping the impression operating means when said second arm fails to follow the low part of said cam, and manual means for holding said latch and thereby holding said valve open and preventing said second arm from following the low part of said cam.

37. Sheet feeding mechanism, comprising, in combination, a suction feeder, a valve adapted when open to render the feeder inoperative, a cam operating said valve, means to hold said valve open independently of said cam, sheet detector mechanism operating to prevent tripping of the impression operating means when a sheet is present at the detector when due and to release said holding means, and manual means to prevent operation of said detector mechanism.

38. Sheet feeding mechanism, comprising, in combination, a suction feeder, a valve adapted when open to render the feeder inoperative, a cam operating said valve, means to hold said valve open independently of said cam, sheet detector mechanism operating to prevent tripping of the impression operating means when a sheet is present at the detector when due and to release said holding means, and a handle on the outside of the feeder frame connected to the detector mechanism and adapted when held to prevent operation thereof.

39. Sheet feeding mechanism, comprising, in combination, a suction feeder, a valve adapted when open to render the feeder inoperative, means for periodically opening and closing said valve, independent means for holding said valve open, sheet detector mechanism operating to prevent tripping of the impression operating means when a sheet is present at the detector when due and to release said holding means, and manual means connected to the detector mechanism, to prevent the operation thereof.

40. Sheet feeding mechanism, comprising, in combination, a suction feeder, a valve adapted when open to render the feeder inoperative, means for periodically opening and closing said valve, independent means for directly holding said valve open, and sheet detector mechanism operating to prevent tripping of the impression operating means when a sheet is present at the detector when due and to release said holding means.

41. Sheet feeding mechanism, comprising, in combination, a suction feeder, a valve adapted when open to render the feeder inoperative, an arm connected to said valve, a cam operating said arm, a latch directly holding said valve open, and sheet detector mechanism operating to release said latch and to prevent the tripping of the impression operating means.

42. Sheet feeding mechanism, comprising, in combination, a suction feeder, a valve adapted when open to render the feeder inoperative, a cam operating said valve, a latch preventing the closing of said valve, an arm adapted to engage and release said latch, a second arm rigid with said arm, a cam engaging said second arm, sheet detector mechanism preventing said second arm from following the low part of said cam when a sheet fails to pass the detector, and means controlled by said second arm for tripping the impression operating means when said second arm fails to follow the low part of said cam.

43. In a sheet feeder, a table over which sheets are adapted to be conveyed, a transverse shaft mounted over the table at the forward end thereof, a tongue projecting from the forward end of said table, a bracket secured to said shaft, a rigid finger pivoted in said bracket below the axis of said shaft and projecting forwardly over said tongue, a spring tending to hold said finger down against said tongue, said finger having a tail and said bracket having a stop adapted to engage said tail, whereby upon rotation of said shaft in one direction, the finger will move longitudinally while maintaining engagement with said tongue until said stop engages said tail whereupon the finger will move up out of engagement with the tongue.

44. In a sheet feeder, a table over which sheets are adapted to be forwarded, a tongue projecting from said table, a bracket mounted to oscillate, a rigid finger pivoted on said bracket below its axis and resting on said tongue, a spring mounted in said bracket and bearing down on said finger, said finger having a tail and said bracket having a stop adapted to engage said tail after a predetermined rotation of the shaft in one direction.

45. In a sheet feeder, a table over which sheets are adapted to be conveyed, a tongue projecting from said table, a bracket mounted to oscillate, a finger pivoted on said bracket below its axis and resting on said tongue, said finger having a tail and said bracket having a stop adapted to engage said tail after a predetermined rotation in one di-

rection, and a detector finger pivoted on said bracket and having a bifurcated lower end straddling said tongue and finger.

46. In a sheet feeder, a table over which sheets are adapted to be forwarded, a transverse shaft mounted over the table near the forward end thereof, a tongue projecting from said table, a bracket secured to said shaft, a finger pivoted on said bracket below said shaft and resting on said tongue, said finger having a limited movement about its pivot, and a detector finger pivoted on said bracket and having a bifurcated lower end straddling said tongue and finger.

47. In a sheet feeder, a table over which sheets are adapted to be forwarded, a transverse shaft mounted over the table near the forward end thereof, a slow down finger mounted on said shaft, and a sheet detector controlling the rotation of said shaft.

48. In a sheet feeder, a table over which sheets are adapted to be conveyed, a transverse shaft mounted over the table near the forward end thereof, a bracket secured to said shaft, a finger pivoted on said bracket below said shaft projecting forwardly over a stationary surface and cooperating therewith to form a gradually contracting throat, said finger having a limited movement about its pivot, a detector finger pivoted on said bracket and extending downwardly into the path of the sheets, said finger having a detent engaging under a stationary abutment, a pivoted arm, impression tripping mechanism controlled thereby, a cam, a roller on said arm cooperating with said cam, and a link connecting said arm and shaft.

49. In a sheet feeder, a table over which sheets are adapted to be forwarded to the impression cylinder of a printing press, a bracket mounted to oscillate, a cam adapted to rock said bracket in one direction, a detector finger pivoted on said bracket and extending downwardly into the path of the sheets, a stationary abutment, said detector finger having a detent adapted to engage said abutment, if not disengaged by a sheet, and a slow down finger carried by said bracket.

50. In sheet feeding mechanism, in combination, a sheet supporting member, a rigid slow down finger resting at its forward end on the surface of said member and extending at an angle thereto to form therewith a contracting throat for the sheets, a front stop, means to advance sheets along said member and against said stop, and means to periodically give said finger a rectilinearly advancing movement toward said stop and then slightly lift it from contact with the sheet on said member.

51. In sheet feeding mechanism, in combination, a sheet supporting device, a tongue projecting from the edge of said device, a rigid slow down finger resting at its forward end on the surface of said tongue and extending at an angle thereto to form therewith a contracting throat for the sheets, a front stop straddling said finger and tongue, means to advance sheets along said device into said throat and against said stop, and means to periodically give said finger a rectilinearly advancing movement and then slightly lift it from contact with the sheet on said tongue.

52. In a sheet feeder, a table over which sheets are adapted to be forwarded to the impression cylinder of a printing press, a transverse shaft mounted over the table near the forward end thereof, a bracket secured to said shaft and extending forwardly therefrom, a cam operably connected to said shaft, a transverse bar having a flat front face secured to the feeder frame and extending in front of said bracket, a detector finger pivoted on said bracket and extending downwardly into the path of the sheets with its rear side resting on said face of said bar, said detector finger having a rearwardly extending detent adapted to engage the lower corner of said bar, impression tripping mechanism controlled by said shaft, and a slow down finger carried by said bracket.

53. A sheet feeder comprising a fixed frame, a feed board mounted on said frame, reciprocable side register mechanism mounted near the forward end of the table, a frame pivoted at its rear end on said fixed frame and comprising side plates, a longitudinal shaft mounted in bearings secured to the outside of one of said plates, an arm secured to the forward end of said longitudinal shaft operably connected to said side register mechanism, a depending arm fixed to the rear end of said shaft, a lever pivoted on the inside of said plate to swing transversely, a link passing under said side plate connecting said depending arm with the lower end of said lever, a roller on the upper arm of said lever, and a face cam engaging said roller secured to said shaft.

54. In a printing press, an ink fountain, a fountain roll, a ratchet rigid on the shaft of said roll, a lever having a pawl engaging said ratchet, means for oscillating said lever in the operation of the press, a transverse shaft, a yieldable arm carried by said shaft adjacent one end thereof, an abutment on said lever, the end of said arm normally extending below said abutment, an arm secured to the other end of said shaft, impression tripping mechanism, a lever operating said mechanism, and a detachable connection between said lever and said last mentioned arm, whereby when the impression is tripped, the end of said yieldable arm will be moved into the path of said abutment to prevent operation of said ratchet and interrupt the feeding of the ink.

55. In a printing press, an ink fountain, a transverse shaft, an arm secured to one end of said shaft, impression tripping mech-

anism, a lever operating said mechanism, a detachable link connecting said lever to said arm, said link when detached remaining detached until manually restored, a second arm on the other end of said shaft, and means controlled by said second arm for interrupting the feeding of the ink when the impression is tripped.

56. In a printing press, an ink fountain, a fountain roll, a ratchet rigid on the shaft of said roll, a lever pivoted on said shaft, having a pawl engaging said ratchet, means for oscillating said lever in the operation of the press, a transverse shaft, a yieldable arm carried by said shaft adjacent one end thereof, an abutment on said lever, the end of said arm normally extending below said abutment, an arm secured to the other end of said shaft, impression tripping mechanism, and a detachable connection between said mechanism and said last mentioned arm.

57. In a printing press, an ink fountain, a transverse rock shaft, an arm on said shaft, a lever connected to means for tripping the impression, an arm on said lever, a link pivoted to one of said arms and having a hook engaging the other of said arms, said link when unhooked remaining unhooked until manually rehooked, and means for interrupting the feeding of the ink when said shaft is rocked.

58. In a printing press, means for interrupting the feeding of the ink when the impression operating means is tripped, comprising, in combination, a rock shaft having arms secured adjacent the ends thereof, a detachable connection between one of said arms and the impression tripping mechanism, said connection when detached remaining detached until manually restored, whereby said shaft will be rocked when the impression operating means is tripped, and a fountain feed roller, the other of said arms being adapted to interrupt the operation of said roller when said shaft is rocked.

59. In a sheet feeder, in combination, a rigid projection positioned to engage the top surface of the top sheet of a pile adjacent an edge thereof, means to direct an air blast against the edges of the sheets adjacent said projection, and suction means adapted to engage said top sheet adjacent said projection and raise it vertically, snapping it by said projection, the projection acting to prevent a second sheet being lifted with the first.

60. The feeder as recited in claim 59, with means to adjust the extent of contact of the projection and the top sheet.

61. In a printing press, in combination, an ink fountain, ink feeding mechanism including a fountain feed roller, an impression throwoff, connections between said impression throwoff and said fountain feed roller adapted to interrupt the feeding of the ink when the impression is off, and manual means for rendering said connections inoperative, said means being effective until manually restored, whereby the press can be operated for double rolling without interrupting the ink supply.

62. In a printing press, in combination, an ink fountain, ink feeding mechanism, an impression throwoff, connections between the said impression throwoff and said ink feeding mechanism adapted to interrupt the feeding of the ink when the impression is off, and manual means for rendering said connections inoperative, said means comprising a detachable link which when detached remains detached until manually restored, whereby the press can be operated for double rolling without interrupting the ink supply.

In testimony whereof I hereunto affix my signature.

WILLIAM M. KELLY.