

July 11, 1939.

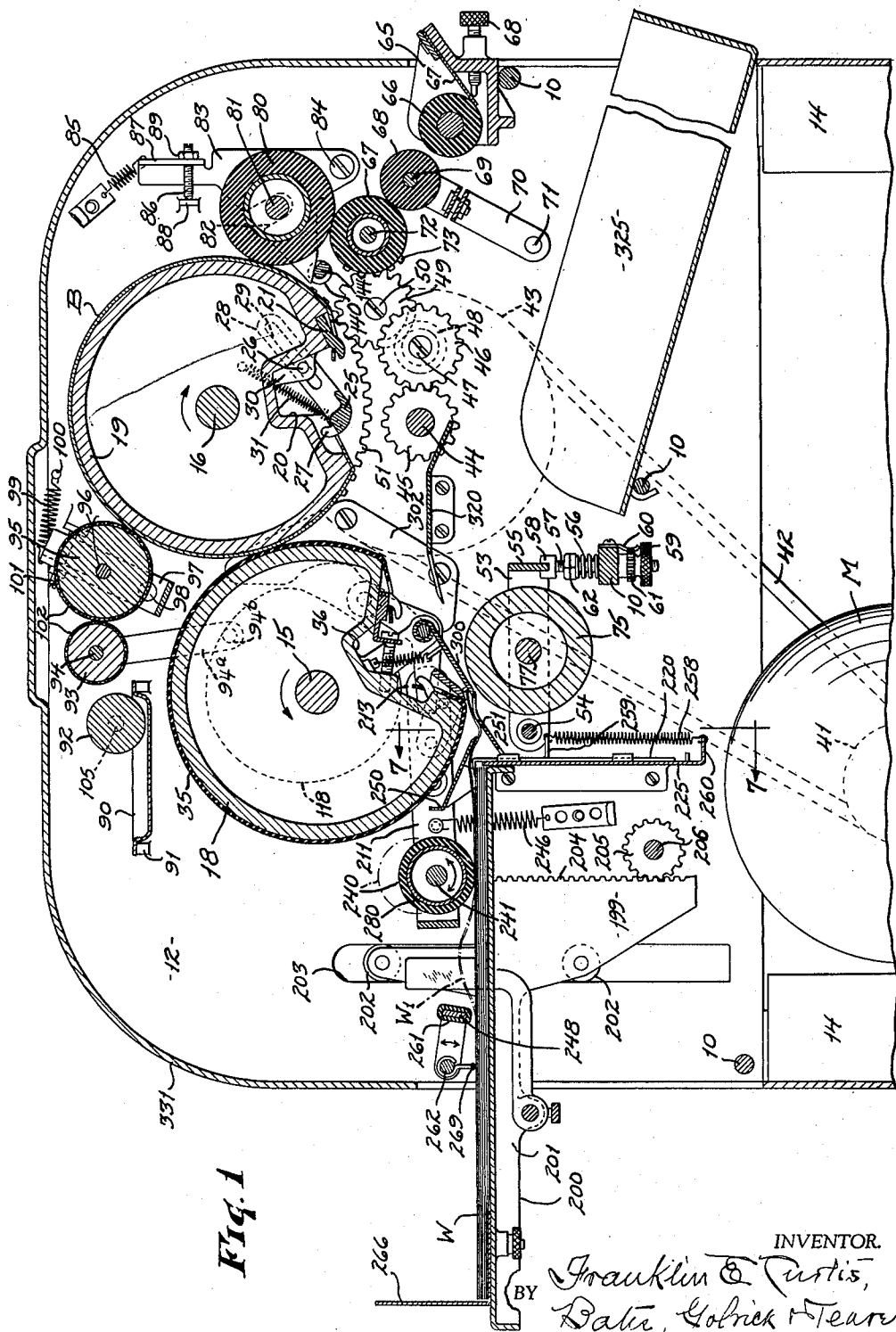
F. E. CURTIS

2,165,231

PRINTING MACHINE

Filed June 10, 1937

4 Sheets-Sheet 1



July 11, 1939.

F. E. CURTIS

2,165,231

PRINTING MACHINE

Filed June 10, 1937

4 Sheets-Sheet 2

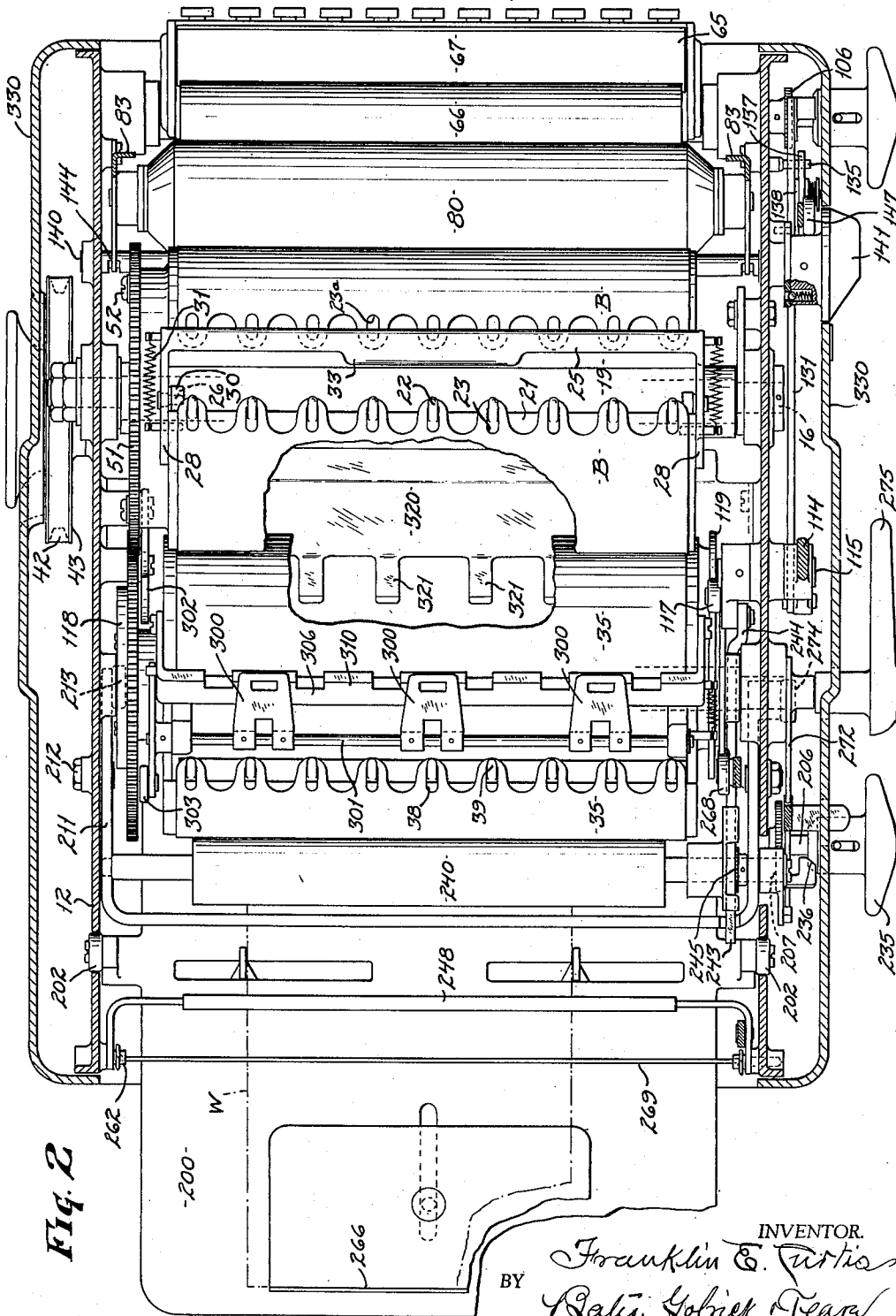


Fig. 2

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4 Sheets-Sheet 3

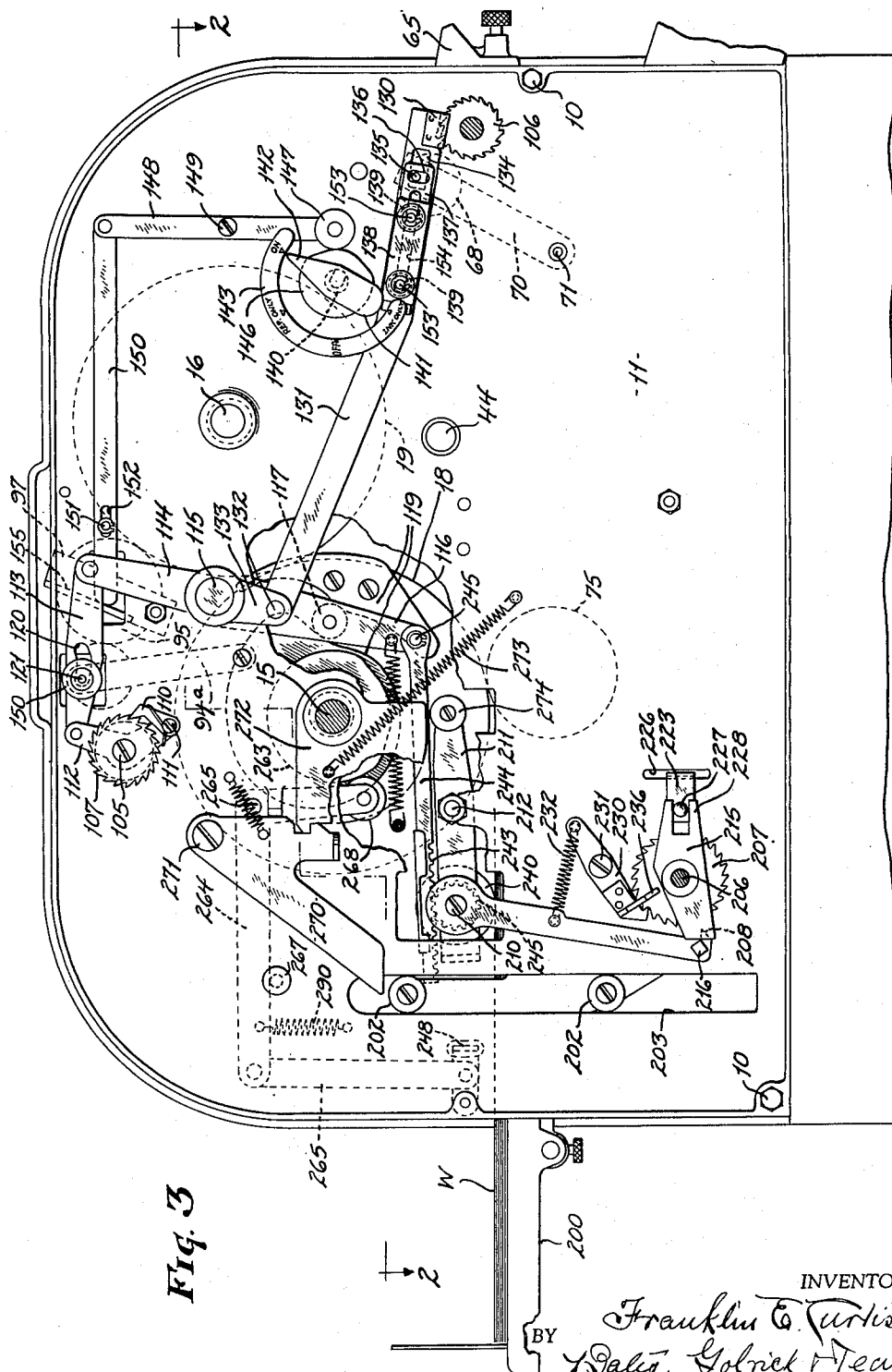


Fig. 3

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PRINTING MACHINE

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4 Sheets-Sheet 4

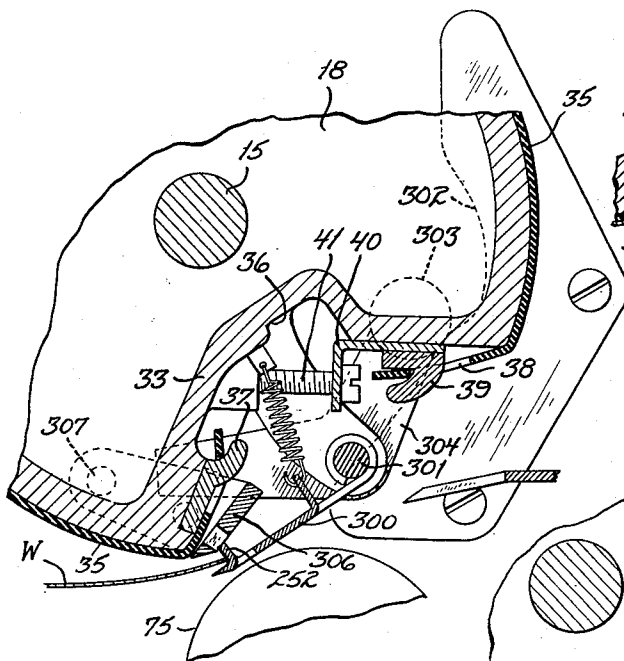


Fig. 4

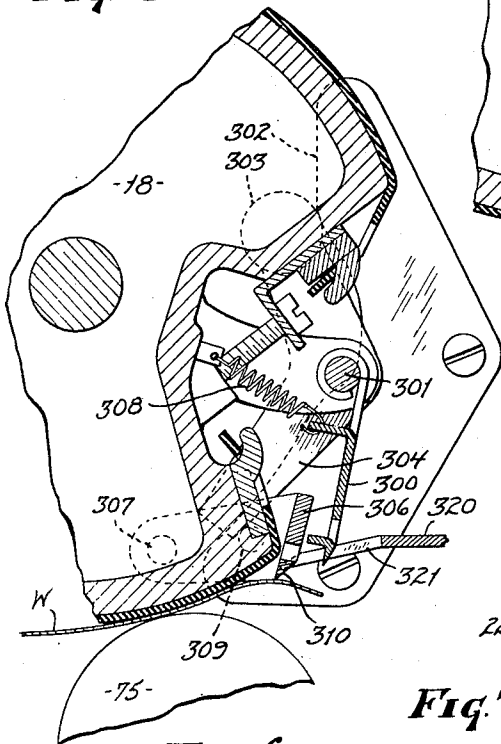


Fig. 6

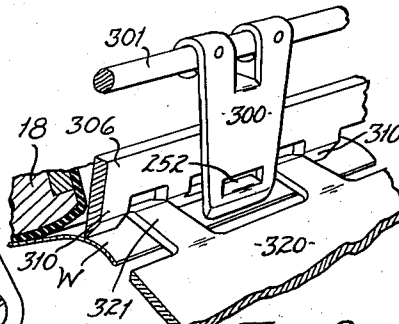


Fig. 8

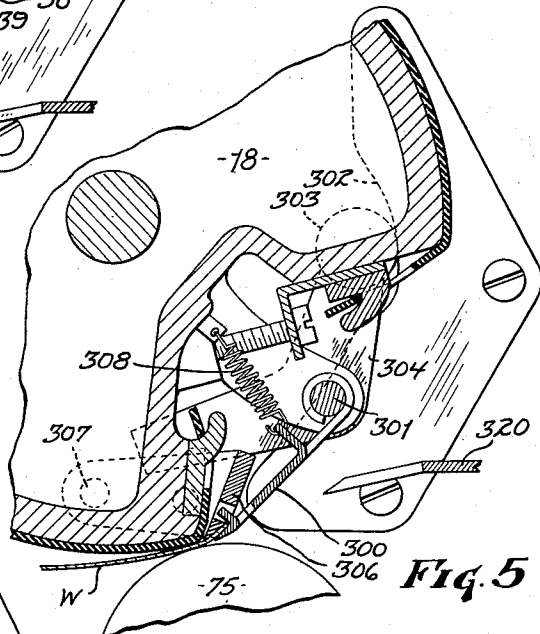


Fig. 5

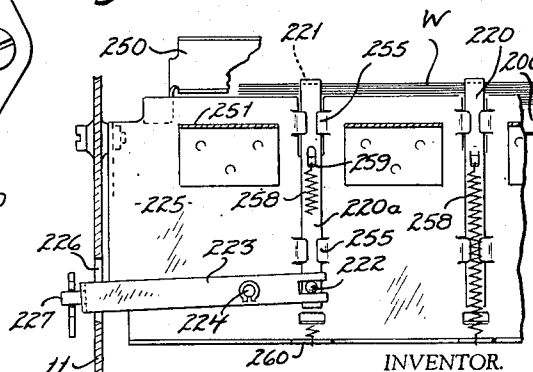


Fig. 7

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UNITED STATES PATENT OFFICE

2,165,231

PRINTING MACHINE

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Application June 10, 1937, Serial No. 147,507

22 Claims. (Cl. 101—141)

This invention relates to improvements in printing machines, and is especially concerned with improvements in and relating to rotary printing or duplicating machines of the planographic offset type.

The general object of the present invention is to provide an improved compact, planographic duplicating machine, especially adaptable for general office use, simple in operation, and which will require but a minimum amount of attention by the operator, to the end that comparatively unskilled operators may successfully operate the machine over continued periods of time.

The primary object of this invention is to provide very effective means for receiving a sheet feed from the top of a pile, effectively locate it as it is passing into the grip of the two members of the printing couple, and thereafter discharge it, all arranged so as not to injure or mar the forward edge of the sheet, and at the same time allow the sheet to be fed rapidly into coaction with the couple.

Other objects of this invention will become more apparent from the following description, reference being had to the accompanying drawings in which there is illustrated a preferred embodiment of the invention. The essential features of the invention will be summarized in the claims.

Fig. 1 is a substantially centrally located longitudinally extending section through the printing machine and feeding mechanism; Fig. 2 is a sectional plan view of the mechanism illustrated in Fig. 1, the plane of the section being substantially as indicated by the offset lines 2—2 on Fig. 3; Fig. 3 is a side elevation of the machine looking in the same direction as Fig. 1, with the side cover plate removed and certain other parts broken away to illustrate more clearly the operating mechanism for the printing machine; Figs. 4, 5 and 6 are sectional details on an enlarged scale of certain parts of the sheet feeding and guiding mechanism which are directly associated with the printing drum; Fig. 7 is a fragmentary vertical section, the plane of the section being indicated by the line 7—7 on Fig. 1; and Fig. 8 is a fragmentary detail of the sheet stripping mechanism.

Referring now to the drawings, wherein there is illustrated a preferred form of the invention, there is shown a frame comprising a pair of side plates 11 and 12, tied together by suitable cross-frame members, some of which are generally indicated at 10. This frame is supported by suitable legs 14. Rotatably journaled in this frame are a pair of horizontally extending shafts 15 and 16, the former supporting a transfer roll 18 and the latter a printing plate or form roll 19. These shafts are preferably mounted in eccentric bushings in the well known manner to

permit them to be adjusted and aligned one with each other.

The form roll comprises a hollow cylindrical drum 19 which carries the printing plate B. This drum has its wall diverted inwardly, as indicated at 20, to provide a gap in which the plate retaining devices are mounted. One of these retaining devices comprises a bar 21 which is fixedly secured within the gap of the drum and is provided with a series of tongues or projections 22 adapted to enter elongated openings 23 formed in the end of a planographic or other similar flexible printing plate B.

At the other side of the gap is a plate-retaining member 25 in the form of a yoke, provided at each end with a bar-like formation 28, which lies along the ends of the drum. These bars are each provided with a slotted opening 29, through which pivot pins 26 pass. These pins are carried by suitable ears 30, formed on the drum 19. Springs 31 are interposed between the retaining device and the drum, as indicated in Fig. 1, and are positioned to rock the retaining device inwardly toward the axis of the drum and to move it bodily toward the pivot pin 26. The inwardly diverted portion of the drum wall is provided with a series of pockets 24. The material 24a of the drum between these pockets forms a flat support for the inwardly bent end of the plate.

The plate B is positioned on the lugs 22 and then wrapped around the drum 19, whereupon the operator grasps the retaining member 25, rocking it about its pivot 26, and inserts the tines or prongs 27 thereof into openings 23a formed on the other end of the plate. On release of the retaining member, the springs 31 thereby tension the printing plate or member about the drum 19. The bar 25 is as shown in Figs. 1 and 2, provided with an elongated handle-like formation 33, whereby it may be readily grasped by the operator to withdraw it against the action of the spring 31 to remove the plate B from the drum.

After the plate has been wrapped around the drum, the operator need only press the free end of it with his thumb slightly into the recess, and then with his other hand grasp the yoke bar and draw it outwardly against its springs and allow it to swing inwardly so that the prongs 27 pass through the openings and the bar finds its own seat when these prongs occupy the recesses 24.

The offset or transfer roll 18 is provided with an offset blanket 35. This blanket is preferably of the usual rubber or similar ink-retaining and transferring material, and may, if desired, be secured to the roll or surface of the drum in the same manner as is the printing plate. However, inasmuch as the offset blanket requires little

attention, a more permanent form of attaching device, such as illustrated in Fig. 1, may be used.

As shown in Fig. 4, the drum 18 is provided with a peripheral gap 36, within which is secured a plurality of tongues 37 arranged to enter suitable spaced openings in the offset blanket. The blanket is then wrapped around the periphery of the drum and the openings 38 in the other end of the blanket are inserted on ears 39, carried by an L-shaped plate or bar 40. Passing through this bar are set screws, one of which is shown at 41. These set screws are threadingly secured to a wall 33 of the drum 18, thereby facilitating the tensioning of the transfer or offset blanket.

The plate or pattern drum 19 is power-driven. As shown in the drawings, I provide a motor M, which may be supported in any suitable manner by the machine frame, such as by cross-frame members, not shown, but which are secured to the legs 14. The driving pulley 41 of this motor is connected by a driving belt 42 with a pulley 43, which is secured to a shaft 44, journaled in the frame plate 12. Secured to the shaft 44 on the inner side of the frame plate is a spur gear 45, which meshes with one gear of a compound idler gear member 46, journaled on a suitable stud 47, carried by the frame plate 12. The other gear 48, of the compound gear member 46, meshes with another gear 49, which is journaled on a stud 50, secured to the frame plate 12. The gear 49 in turn meshes with a gear 51, secured to the drum 19, as, for instance, by screws 52 (Fig. 2), and thus constitutes the driving gear for the plate drum.

Rotatably journaled below the transfer or offset cylinder 18 is a platen roll 75. This roll is preferably of bare steel and is rotatably journaled on a shaft 77, which is supported by arms 53 of a bail or yoke 55. These arms are pivotally mounted on a cross-shaft 54 carried by the frame members 11 and 12.

The platen roll is resiliently urged upward, toward the offset cylinder, by a pair of springs 56. Each spring is coiled about a threaded pin 57 (Fig. 1), which is slidably mounted for vertical movement in one of the transverse frame members 10. The upper end of each pin 57 is provided with a notched head 58, arranged to receive the bar 55 of the platen support. Threadingly secured to the lower end of the pin is an adjusting finger nut 59, which serves to limit the upward movement of the pin and therefore the platen. The relative adjustment of these nuts maintains absolute parallelism between the platen and transfer cylinder. A spring 60 secured to the bar 10 coacts with notches, indicated at 61, formed on the nut 59, to hold the nut positively in an adjusted position.

The pressure of the spring 56 which controls the pressure between the platen and the transfer roll is adjusted by a pair of lock nuts 62, the spring being interposed between the lock nuts and the cross-frame member 10. Thus, the platen may be raised or lowered to accommodate various thicknesses of paper, and to adjust pressure between the platen and the offset drum.

Ink is supplied to the pattern by an inking mechanism, best shown in Fig. 1. This inking mechanism comprises the usual fountain 65. The fountain is provided with a fountain roll 66, against which the usual fountain plate 67 is adjustably positioned by a plurality of adjusting screws, one of which is shown in Fig. 1 at 68. Ink is transferred from the fountain roll to a

transfer roll 67 by a ductor roll 68. This ductor roll is rotatably mounted on a shaft 69, supported by a pair of arms 70 pivotally secured to respective frame members 11 and 12, as at 71. The ductor roll is rocked periodically about the pivots 71 into alternate engagement with the fountain roll and the transfer roll, by mechanism to be hereinafter more fully described.

The transfer ink roll 67 is drivingly secured to a shaft 72, and secured to this roll is a gear 73, which meshes with the driving pinion 49, heretofore described. The ink roll 67 transfers the ink from the ductor roll to a form roll 80, which is journaled on a shaft 81. The ends of this shaft are mounted in slots 82 formed in respective bracket members 83, one of which is shown in Fig. 1. These bracket members are pivotally secured to respective frame members 11 and 12 by pivot pins 84, and are normally stressed about their pivots to draw the form roll into contact with the pattern or printing plate by a pair of springs, one of which is shown at 85 in Fig. 1.

The pressure of the form roll against the pattern is limited by a pair of set screws, which are mounted in the respective bracket members 83. One of these set screws is illustrated at 86 in Fig. 1, as being threadingly mounted in an ear 87 formed in the bracket and engaging a boss 88 of the adjacent frame member. A suitable lock nut 89 is provided to lock it in position.

The printing machine with which the present invention is concerned is especially adapted for use as a planographic or lithographic printing machine, and therefore is furnished with a moistening or repellent applicator mechanism to provide the planographic or lithographic plate with a suitable liquid for the usual purpose of rendering portions of such plate non-receptive to the ink. This moistening or repellent applicator mechanism is best illustrated in Fig. 1 and as there shown comprises a pan 90, adapted to be filled with a suitable liquid. This pan rests on bosslike formations 91 of respective frame members 11 and 12. Rotatably mounted in the frame members 11 and 12, is a fountain roll 92 with its lower region extending into the pan 90. This roll is driven by a mechanism hereinafter to be more fully described.

The moistening or repellent liquid is transferred from the fountain roll to a form roll by a ductor roll 93. This ductor roll is rotatably mounted on a shaft 94, supported between a pair of arms 94a, which are pivotally secured to respective frame members 11 and 12, as at 94b. The ductor roll 93 is intermittently rocked from contact with a fountain roll 92 into contact with a form roll 95, by mechanism to be hereinafter described.

The form roll 95 of the moistening or repellent mechanism is rotatably mounted on a shaft 96, carried between a pair of arms 97, which are pivoted to the respective frame members 11 and 12 as indicated at 98, in Fig. 1. The form roll is resiliently maintained in contact with a printing plate B, by suitable springs, such as the spring 99, illustrated in Fig. 1, as being interposed between the upper end of the form roll supporting arm 97 and a pin 100 secured to the frame 12. A suitable adjusting screw 101 is mounted in the form roll supporting arm 97, in a manner similar to the screw 86, heretofore described in connection with the form roll 80, and serves to limit the pressure of the form roll against the pattern or printing plate.

Both the form roll 95 and the ductor roll 93 75

are provided with absorptive fabric coverings 102 to enable them to convey the liquid from the fountain roll to the printing plate.

The fountain rolls 66 and 92 of the inking and repellent applying mechanism are intermittently driven. As shown in Fig. 3, the shafts which support the two fountain rolls have secured thereto ratchets respectively designated 106 and 107. The ratchet 107 of the repellent fountain roll 92 is intermittently progressed by a pawl 110, pivotally mounted as at 111, on a plate 112, which is pivotally mounted on the shaft 105. The upper end of this plate is connected by a link 113, with a lever 114, which is secured to a rock shaft 115, suitably journaled in the frame member 11. Secured to this rock shaft is a second arm 116, which is provided with a roller 117, arranged to engage a cam 119, carried by the offset roll drum 18.

The ink fountain roll 66, heretofore mentioned, is operated by the cam 119. As shown, a pawl 130 is mounted at one end of a lever 131, the other end of which is pivotally connected as at 132 with a lever 133, which is secured to the rock shaft 115 heretofore described, as being rocked by the cam 119. The ductor roll 68 of the ink fountain is reciprocated by the lever 131.

The driving connection between each of the links 113 and 131 and its respective ductor roll is such that the ductor rolls remain in contact with their respective fountain and form rolls for a period of time. One of the arms 95 which supports the ductor roll 93 is provided with a pin 121 which passes through a slot 120 in the driving link 113. Secured to the pin 121 and mounted at either side of the link 113 are friction disks 150. These disks are secured to the pin and frictionally embrace the link 113, so that, as the link moves to the left (Fig. 3), the friction disks 150 and the pin 121 of the ductor roll move with the link as a unit. When, however, the link has moved the ductor roll into contact with the fountain roll 92, further movement of the rolls is, of course, restricted by such contact. The link 45 then moves between the friction disks, thereby allowing the ductor roll to remain in contact with the fountain roll until such time as the link 113 starts its right-hand movement (Fig. 3). On the reverse movement, the ductor roll remains in contact with the form roll 95, for a similar period of time.

The connection between the ductor roll 68 of the inking mechanism and the link 131, is also such that this ductor roll remains in contact with its fountain roll 66, and its distributing roll 67 for a considerable period of time. As shown in Fig. 3, one of the ductor roll supporting arms 70 is provided with a pin 135, which projects through the frame member 11, thence through an elongated opening 134 in the link 131, and into an opening 136 in a strip 137. The strip 137 is frictionally carried by the link 131, being pressed between a pair of fibre strips 138 by compression springs 139, surrounding a pair of studs 153 carried by the link. These studs pass through an elongated slot 154 in the strip 137, allowing endwise motion of the strip with respect to the link. When the link 131 moves to the right (Fig. 3), the arms 70 are swung in a clockwise direction and the ductor roll 68 is brought into contact with the fountain roll 66. This contact is maintained for an interval of time, due to continued movement of the link and slipping of the strip 137. When, however, the link moves to the left, the ductor roll is disengaged from the fountain

roll and is moved into contact with the distributing roll 67. This contact is also maintained for an interval of time due to the frictional engagement of the strip 137 with the link and is broken only when the direction of movement of the link is again reversed.

When the machine is idle, it is desirable to move both the ink repellent form roller and the ink form roller out of contact with the pattern or printing plate. Again, at times it is desired to supply the repellent only, while at other times it is desirable to supply the printing plate with ink only. Therefore, there is provided a mechanism, about to be described, which may selectively move either or both of the form rolls out of contact with the pattern cylinder, as desired.

As shown in Figs. 1 and 3, a shaft 140 is journaled in the frame members 11 and 12, and on its outer end is provided a knob 141, to enable it to be readily grasped and turned by the operator. The knob is provided with a suitable pointer 142, which coacts with an index plate 143, secured to the frame of the machine, and which bears indicia indicating the position of the form rolls.

As shown best in Fig. 1, the shaft 140, intermediate its ends, is provided with a cam-like formation 144, which is arranged to selectively engage the bracket members 83 carrying the form roll 80, and rock such roll about the bracket pivots against the action of the spring 85, thereby moving the ink form roll out of contact with the printing plate.

Secured to the shaft 140, as shown in Fig. 3, is a cam 146, which is engaged by a roller 147 mounted at one end of a lever 148, pivoted as at 149 to the frame 11. The upper end of this lever has pivoted thereto a link or bar 150, which is guided in its movement by a pin 151, carried by the frame member 11 and projecting through a slot 152, formed in the lever. The left-hand end of this lever, as illustrated in Fig. 3, engages a lip 155, formed on one of the form roll supporting arms 97 of the repellent applicator form roll, and consequent upon the rotation of the cam 146 moves such form roll against the action of its spring 99 out of engagement with the printing plate.

The formation of the cam 146 and the cam shaft 144 is such that when the shaft is turned to the position illustrated in Fig. 3, both form rolls are in contact with the printing plate. As the cam is rotated from the "on" position, shown in Fig. 3, in a counter-clockwise direction to the position designated "Rep. only", the cam surface 144 acts to move the ink form roll away from the printing plate, thereby permitting the application of repellent only. Further movement of the shaft 140 in a counter-clockwise direction, to the "off" position, brings the cam 146 into action, moving the repellent applicator form roll also out of contact with the printing plate, thus positioning both form rolls free from the drum. Further movement of the shaft 140 in a counter-clockwise direction to the "ink only" position moves the cam shaft 144 out of active engagement with the brackets 83, thereby releasing the ink form roll for contact with the printing cylinder, whereas the cam 146 remains active, retaining the repellent form roll out of contact with the printing cylinder. Thus, the application of ink only to the printing cylinder is accomplished.

Carried between the frame plates 11 and 12 of the machine is a paper feed mechanism, which is arranged to support a stack of work sheets, one above the other, and feed the topmost sheet into

the bite of the offset printing roll 18 and the platen roll 75. This sheet feeding mechanism is of the type wherein the uppermost sheet in the stack is separated by buckling from the remaining sheets and then fed into the bite of the printing rolls.

The sheet feeding mechanism is best illustrated in Figs. 1, 2, 3 and 7. As there shown, there is provided a paper supporting table 200, which is slidably mounted for vertical movement in the frame, the arrangement being such that the table 200 may be raised at periodic intervals to maintain the uppermost sheet in the stack in a horizontal plane, passing substantially through the bite of the platen and offset printing roll.

As illustrated in Fig. 1, the paper table comprises a horizontal plate-like member having side flanges 201, each of which is provided with a pair of rollers 202. These rollers project outwardly from the sides of the table 200 and engage the walls of slotted openings 203 formed in the respective frame plates 11 and 12, thus guiding the table for vertical movement.

The table 200 is periodically raised by a ratchet mechanism, which is operated by the offset roll shaft 15, and when raised is maintained in position by suitable detent mechanism. The table 200 is provided at either end with a depending plate 199, which is provided with a vertical rack 204. These racks are engaged by pinions 205, which are drivingly secured to a shaft 206, journaled in the frame plates 11 and 12. Drivingly secured to the outer end of this shaft, as shown in Fig. 3, is a ratchet wheel 207, which is periodically engaged by a pawl 208 carried by a lever 209. This lever is pivotally mounted as at 210 on a lever 211, which is pivoted to the frame intermediate its end as at 212. At its other end this lever 211 is provided with a roller 213, which is intermittently engaged by a cam 118, on the cylinder 18.

Mechanism is provided, whereby the pawl 208, which progresses the ratchet wheel 207 to raise the paper feed table 200, is maintained out of engagement with the ratchet wheel until a predetermined number of sheets, or more specifically a predetermined thickness of a group of sheets, has been fed from the table 200. As shown in Figs. 3 and 7, rotatably journaled on the ratchet wheel shaft 206, adjacent the ratchet wheel 207, is a lever 215, one end of which is arranged to engage a pin 216, secured to the lower end of the lever 209, and when in engagement therewith retains the pawl 208 out of engagement with the ratchet wheel.

As the sheets are fed from the stack W, they are withdrawn from beneath a series of fingers or hold-down members 220, hereinafter to be more fully described, but which members are resiliently drawn downwardly toward the table as sheets are withdrawn from beneath their overhanging lips 221. One of these fingers (220a) Fig. 7, is provided at its lowermost end with a pin 222, which is embraced by the slotted end of a lever 223, pivoted as at 224, to a plate 225. This plate extends transversely across the machine and is secured at its ends to respective frame members 11 and 12. The lever 223 extends outwardly through a suitable opening 226, in the frame member 10, and is provided at its outer end with a pin 227, which is engaged by the forked ends 228 of the lever 215, heretofore described.

As the sheets are drawn from beneath the fingers 220, and the fingers lowered, the lever 215 is rocked about its pivot in a counter-clockwise di-

rection. When a sufficient number of sheets have been withdrawn to rock this arm a distance permitting the pin 216 to become disengaged from the forward end of the lever 215, the pawl 208 engages the ratchet and raises the same, and thus raising the table. This raising movement of the table also raises the fingers, thereby resetting the lever arm 215.

The paper feed table is maintained in its raised position by a detent pawl 230, which is pivoted as at 231 to the frame member 11, and maintained in engagement with the ratchet wheel 207 by a spring 232, which is interposed between the arm 209 and the pawl 230, thus maintaining both the detent pawl 230 and the driving pawl 208, normally in engagement with the ratchet wheel 207.

When it is desired to lower the table, to replenish the supply of sheets, the operator pushes inwardly on a knob 235 (Fig. 2), which is slidably mounted on the outermost end of the shaft 206. This knob extends through an opening in the cover plate 330, which protects the operator from the moving parts. The inner end of the knob hub engages a bevelled nose 236 formed on the pawl, thus disengaging the detent pawl from the ratchet, permitting the table to drop, under the control of the knob. After a block of sheets has been placed on the table, the rotation of the knob in the clockwise direction, raises the table, to bring the top-most sheet into feeding position, with a consequent slight raising of the fingers 221.

As heretofore mentioned, the sheets are separated before they are fed into the bite of the printing rolls. This separating movement of the sheets withdraws them from beneath the fingers 221, and is accomplished by a feed roller 240, which is rotated first in one direction and then in the other, and is bodily reciprocated into and out of contact with the sheets.

As shown in the drawings, the feed roller 240 is provided with a rubber sheathe or covering 280, and is drivingly secured to a shaft 241, journaled in the arms 211, heretofore described. This roller is rotated by a rack 243, formed on the undersurface of a link 244, pivotally attached as at 245 to the lever 116, which, as heretofore described, is drivingly secured to the rock shaft 115, and is operated by the cam 119. The rack 243 engages a gear 245, drivingly secured to the shaft 241. Thus, as the cam swings the lever 116 the roll 240 is rotated first in one direction and then in the other, as indicated on the arrows on Fig. 1.

A suitable spring, such as that shown at 246, Fig. 1, maintains the feed roll 240 in contact with the uppermost sheet of the stack W. As indicated, the feed roll 240 rotates in a clockwise direction and thereby withdraws a sheet from beneath the fingers 221 and carries it rearwardly. Due to a stop bar 248, which engages such sheet at the rear of the roll, the sheet is buckled, as indicated at W1, thus separating such sheet from the remaining sheets in the stack. After the sheet has been separated, the cam and rack mechanism operates to rotate the feed roll 240 in a counter-clockwise direction, at a comparatively high rate of speed, and the stop bar is simultaneously raised out of contact with the paper, as hereinafter more fully described. The raising of the stop bar and the counter-clockwise movement of the feed roller results in the sheet being rapidly progressed toward the printing rolls.

The sheet is guided in its movement toward the rolls by a pair of guide plates 250 and 251, 75

secured to the frame members 11 and 12, and arranged to cause the sheet to progress in a somewhat tortuous path toward the roll, so that its forward edge is diverted in an upward direction to engage stop lips 252, carried by the printing drum, as will hereinafter be more fully described. The stop lips also serve to align the forward edge of the sheet in parallelism with the axis of the printing drum. The tortuous path of the sheet flexes the sheet and prevents injury to the forward edge by impact against the stop lugs in the transfer drum hereinafter described. This buckling also permits irregularities in the sheet alignment to be automatically rectified.

The stack fingers 220, heretofore mentioned, are best shown in Figs. 1 and 7. These fingers comprise vertically extending bars, provided with horizontally extending lips 221, arranged to overlap and engage the forward end of the uppermost sheet in the stack. These fingers are slidably mounted in guideways formed in the plates 225, heretofore described. The guideways may comprise overhanging lips 255, struck out of the plane of the plate, as indicated in Fig. 7. Suitable tension springs 258 are interposed between ears 259 formed on the fingers and ears 260, formed on the plate member 225, and serve to maintain the fingers in contact with the stacked sheets.

The paper stop-bar 248, which is used whenever average or light-weight sheets are used, is a yoke-like member, having a bar portion encased in rubber or some similar gripping material 261. The stop-bar is pivotally secured to a shaft 262 carried by the frame plates 11 and 12. The stop-bar is rocked up and down by a cam 263, secured to the offset drum shaft 16 and which coacts with a roller 268 carried by one end of a bell crank 264, pivoted as at 265, to the frame member 11. The outer end of the bell crank is connected to the stop-bar 248 by a link 265.

When comparatively heavy sheets are used, they require considerable distance for the formation of the separating buckle. The stop-bar is then moved up and held out of contact with the sheets, and the sheets are buckled against a rear paper guide. This guide comprises a plate-like member 266 and extends vertically upward at the rear end of the stack of sheets. To retain the stop-bar 248 out of contact with the sheets, a manually operable plunger or cam 267 is provided. This plunger is slidably mounted in one of the end frame members and is arranged to be moved into position beneath the horizontally extending arm of the bell crank 264 of the stop operating mechanism. A spring 290 normally serves to retain the stop bar 248 in contact with the uppermost sheet of the stack.

A stop for the uppermost reach of the table when the stack of sheets are replenished is provided, and may comprise a rod 269, which may be secured to and depend from the shaft 262 supporting the stop member 248.

As heretofore mentioned, the feed roll 240 is periodically moved up and down. It is raised out of contact with the sheet immediately after its counter-clockwise rotation, at which time the sheet has been gripped between the printing rolls to be further withdrawn from the stack, solely by the operation and contact of the sheet with such rolls. The movement of the feed roll is accomplished by the mechanism which was heretofore described in connection with the table raising mechanism and includes the roller 213, the cam 118 and the arms 211. Inasmuch as the

feed roll is journaled in these arms, the swinging movement imparted thereto serves to raise and lower the feed roll.

When, for any reason, it is desired to stop the paper feed such, as for instance, to enable sheets to be fed by hand, the roller 240 is raised out of contact with the sheets and the ratchet mechanism 207 and 208 is rendered inactive. The ratchet mechanism is also rendered inactive automatically whenever the table is raised a determined amount; that is, whenever the supply of sheets on the table has become or is about to become exhausted. At such time the uppermost feed table supporting roller 202 engages a lever 270, which is pivoted at 271 to the frame member 11, rocking the lever about its pivot and withdrawing the lever from locking engagement with a cam 272. This cam is rotatably journaled on the shaft 15, and consequent upon its release a spring 273 rocks the cam counter-clockwise about the shaft 15, causing the cam to engage a roller 274 secured to one of the levers 211 which support the feed roll 240 and operate the ratchet mechanism. This swings the lever 211 in a clockwise direction, raising the feed roll out of contact with the sheet and retaining the ratchet pawl 208 in its uppermost position. A suitable lever 275 is provided, whereby the operator may swing the cam 272 into locking reengagement with the arm 270, thus reestablishing the drive for the paper feed mechanism.

As heretofore mentioned, as the sheet W is fed from the stack to the guiding plates 250 and 251, the forward edge is diverted slightly upwardly, so that it engages a series of fingers 252 carried by the printing drum. These fingers and their associated mechanism are best shown in Figs. 4, 5, 6 and 8. As there shown, the fingers 252 are struck up from a series of spaced plates 300, which are secured to a shaft 301, journaled in the offset roll 18. These plates are swung about their pivot by a cam 302, secured to the frame of the machine, and which cooperates with a roller 303, carried by an arm 304, which is secured to the shaft 301. The arrangement is such that when the parts are in the position shown in Fig. 4, the plates 300 are moved out of contact with a bar 306, which is pivotally secured as at 307 to the drum.

As the forward edge of the sheets are aligned by the fingers 252, the rotation of the drum relative to the stationary cam 302 causes the plates 300 to swing into the position shown in Fig. 5. However, the pressure between the members 300 and 306 is limited by the force of the spring 308, which draws the members together. This spring is of such tension that the pressure between the members is insufficient to actually draw the sheet through the rolls, but is sufficient to frictionally retain the foremost end of the sheet in the recess formed in the drum so that it will not be interfered with by the platen. The frictional clamp provided by the coacting members 300 and 306 is therefore a leader for the paper, rather than a gripper, in the ordinary sense.

The engagement of the sheets between the two printing members actually serves to complete the withdrawal of the sheets from the stack. As the drum rotates into its printing position, the sheet is printed and ejected, as indicated in Fig. 6. There, it will be seen, that as the drum progresses, the stationary cam 302 cooperates with the roller 303 to rock the fingers 300 counter-clockwise, and, as the outermost end of the lever 304 engages a pin 309 of the bar 306, such

bar is rocked clockwise. These rocking movements of the plates 300 and the bar 306 move the outer edge of each of them, as well as the forward edge of the sheet, out of the recess formed in the drum.

Further rotation of the drum brings the prongs 310 of the bar 306 and the fingers of the plates 300 between the tines 321 of a stripper plate 320. This plate is such that the movement of the drum causes the tines to engage the upper surface of the sheet and prevent it from following the drum upwardly. Thereupon, the printed sheet is fed into a receptacle 325 removably mounted between the frame members 11 and 12, as illustrated in Fig. 1.

It will be seen that those moving parts which lie outside of the frame plates 11 and 12 are enclosed by cover plates 330. While the upper part of the machine may be enclosed, even while the machine is in actual operation, by a removable cover 331 which extends from one side plate to the other. Thus, a high degree of safety is insured to unskilled operators.

Reference is hereby made to divisional applications filed November 13th, 1937, for claims on certain subject matter illustrated herein, namely: Serial No. 174,394, for Paper feeding mechanism; Serial No. 174,395, for Means for attaching printing plates to drums; Serial No. 174,396, for Material applicator for planographic printing machines.

I claim:

1. A combination with a printing couple of a paper feed comprising a raisable table adapted to support a pile of sheets, said table extending beneath one member of the couple, stationary guides between the table and couple to direct said sheet first downwardly then upwardly diagonally and means for feeding the top sheet of the pile between said guides.

2. In a printing machine, the combination of a rotary platen, a rotary drum coacting with the platen and having a recess, a locator mounted in the recess comprising an arm with an inwardly projecting lug, a spring pulling the arm inwardly with less force than will grip and pull the sheet, means for supporting a pile of sheets, a movable feeding member adapted to engage the endmost sheet of a pile and force the same into the mouth of the locator to cause the forward end of the sheet to abut said lug, said feeding member continuing its engagement with the sheet until the sheet is gripped by the platen and cylinder.

3. The combination of a printing couple one member of which is provided with a paper locator, means for shoving a sheet of paper into the mouth of the locator and continuing shoving against it until the sheet is gripped by the coaction of the couple, and a paper ejecting device coacting with the locator to direct the printed sheet toward a receptacle.

4. The combination of a printing couple, one member of which is provided with a paper locator, means for shoving a sheet of paper into the mouth of the locator, a paper ejecting device coacting with the locator to direct the printing sheet toward a receptacle, said ejecting device comprising a plate having spaced fingers at its forward edge, a part of the locator passing through the space between the fingers in the rotation of the drum.

5. The combination of a printing couple, a locating device on one member of the couple adapted to engage the forward end of the sheet

fed toward the pass of the couple, means for shoving a sheet into engagement with said device, and means for diverting the course of the sheet between the shoving means and the locating device to prevent injury to the extreme front edge of the sheet.

6. The combination of a printing couple, a paper locating device on one member thereof, means for supporting a pile of sheets, means for engaging the endmost sheet of the pile and feeding it toward the couple and into coaction with the locating device, guiding means acting on the sheet between the pile and couple to divert it while leaving it free to bend and thus reduce the impact on the locating device, and means for continuing the feeding action on the sheet until the sheet is gripped by the coaction of the two members of the couple.

7. The combination of a printing couple, one member of which is provided with sheet locating device having a stop shoulder and acted on by a spring which is not strong enough to positively grip the sheet and pull it, and a paper feeding device to feed a sheet into the mouth of the locating device and continue to push the sheet therein until after such mouth has passed the line of coaction of the two members of the couple.

8. In a printing machine, the combination of two rotary members of a printing couple, a locator mounted in a recess in one of the members comprising a member with an inwardly projecting shoulder, a spring tending to move the member inwardly with less force than can the grip and pull sheet, means for shoving the sheet into the mouth of the locator while the locator is in front of the line of coaction of the two members of the couple, and continuing such shoving until the sheet is gripped by the two members of the couple, and means for opening such mouth after it has passed such line of coaction to free the forward end of the sheet after the sheet has been gripped by the couple.

9. The combination of a rotary printing cylinder, a paper locating device thereon comprising two movable members one having a bar against which the sheet may rest, the other having a stop finger to engage the end of the sheet, the latter member projecting beyond the finger to engage the opposite face of the sheet from the bar, whereby the movement of the sheet, independent of the printing cylinder, is limited and the forward portion thereof frictionally engaged, means for thereafter moving one member of the locating device to open the mouth of the clamp to release the sheet and moving the other member of the device to change the direction of the sheet.

10. The combination of a drum, a rubber blanket held thereon by having its ends inturned into a gap in the drum, a bar carried by the drum overlying one inturned end portion of the blanket, a movable member acted on by a spring and adapted to coact with the bar to frictionally engage the forward portion of the sheet between them, and means for moving said member away from the bar to free the sheet, and means for moving the bar to engage the sheet and change the direction thereof.

11. In a printing machine, the combination of a rotary drum having a gap, a movable bar mounted in said gap, a plate adapted to coact with the bar, a spring tending to move the plate inwardly, a finger carried by the plate and adapted to enter a recess in the bar, whereby the extreme end of the sheet will be engaged by

the finger while the forward portion of the sheet is frictionally engaged by the bar and plate, and means for moving the plate away from the bar to free the sheet and for moving the bar outwardly to change the direction of the freed end.

12. The combination of a rotary printing couple, a paper locating device on one member of the couple comprising a pair of coacting members each movable, spring means for moving one member toward the other to frictionally clamp the forward edge of a sheet of paper between them, means for thereafter moving one of the members away from the other to release the sheet, and means for moving the other member to divert the course of such released sheet.

13. The combination of a printing member, a paper locating device mounted thereon comprising an inwardly movable member carrying a stop shoulder, whereby the forward end of the sheet may be engaged and located and the forward portion frictionally clamped, and a stripping device having a recess at its forward edge through which the clamping members may move and pass to idle position on one side of the stripping member while the sheet travels on the other side of it.

14. In a printing machine, the combination of two rotary members of a printing couple, a locator mounted in a recess in one of the members, a spring tending to move one member of the locator inwardly with less force than will the grip and pull sheet, means for shoving the sheet into the mouth of the locator while the locator is in front of the line of coaction of the two members of the couple, and continuing such shoving until the sheet is gripped by the two members of the couple, means for opening such mouth after it has passed such line of coaction to free the forward end of the sheet after the sheet has been gripped by the couple and a paper ejecting device coacting with the locator to direct the printing sheet toward a receptacle.

15. The combination, in a printing couple machine, of a drum which is provided with a paper locator which is adapted to engage the forward edge of a sheet fed into the mouth of the locator, a paper ejecting device coacting with the locator to direct the printing sheet toward a receptacle, the sheet locator having a spring actuated bar carrying a projecting portion and a paper stop, and an ejecting device comprising a plate having spaced fingers, the projecting portion of the locator passing through the spaces between the fingers of the ejecting device in the rotation of the drum.

16. In a printing machine, the combination of a rotary drum having a gap, a roller platen beneath the drum, a paper locating and discharging device located in the gap, means for supporting a pile of sheets, means for feeding the top sheet of the pile toward the pass between the drum and platen, top and bottom plates providing a chute between which the sheet passes in a diverted course into the mouth of the locating device while such mouth is in front of the line of coaction of the drum and platen, and means acting after the mouth is at the rear of such line of coaction to open the mouth and free the forward end of the sheet, and a paper stripper along the underside of which the freed sheet may pass.

17. The combination of a rotary printing cylinder, a paper locating device thereon comprising

two movable members one being a bar against which the sheet may rest and the other having a stop finger to engage the end of the sheet, the latter member projecting beyond the finger to engage the opposite face of the sheet from the bar, whereby the movement of the sheet independent of the member, is limited and the forward portion thereof frictionally engaged, means for moving one member of the locating device to open the mouth of the clamp to release the sheet and moving the other member of the device to change the direction of the sheet, and a stripping device having recesses in its forward edge through which the members of the locating device may pass to idle position while the sheet passes on the other side of the stripping device.

18. The combination of a drum, a bar carried by the drum, a movable member acted on by a spring and adapted to coact with the bar to frictionally engage the forward portion of a sheet between them, and means for moving said member away from the bar to free the sheet, and means for moving the bar to engage the sheet and change the direction thereof, and a paper stripper serving to engage the sheet and direct it, said strippers being provided with recesses through which portions of the feed bar member may pass after freeing and diverting the sheet.

19. A printing machine comprising a rotary printing couple and an automatic paper feed, characterized in that one of the cylinders of the couple is provided with a locator into the mouth of which the sheet may pass, and the feeding mechanism is automatically connected in such timed relation with said cylinder that the feeding mechanism engages the sheet and pushes it into the locator in advance of the coaction of the couple and continues the pushing action as the cylinders rotate until the sheet is gripped by the coaction of the cylinders.

20. The combination of a roller platen, a rotary drum above it carrying a paper locating device, a table extending beneath the drum adapted to carry a pile of sheets, a movable member adapted to engage the top sheet of the pile and automatic mechanism for operating said member in such timed relation with the drum and for such length of time that it will feed the sheet into the mouth of the locating device and continue its engagement with the sheet until the sheet is gripped between the platen and drum.

21. The combination with a printing couple, one member of which carries a sheet locating device, and automatic means coupled in timed relation with the member of the couple carrying the locating device for shoving a sheet into coaction with the locating device and continuing the shoving action until the paper is gripped between the members of the couple.

22. The combination of a printing couple, a sheet locating device mounted on one member of the couple and comprising two cooperative clamping members and a comparatively weak spring causing them to approach each other, whereby the fed sheet may be frictionally clamped but with insufficient force to pull it into the grasp of the couple, and automatic means connected in timed relation with the couple for shoving the endmost sheet of a pile into coaction with the locating device and continuing such shoving action until the sheet is gripped by the coaction of the couple.

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