Aug. 26, 1930. H. HONIGMANN 1,774,272

BED AND CYLINDER PRINTING PRESS

Filed Aug. 30, 1926 10 Sheets-Sheet 1

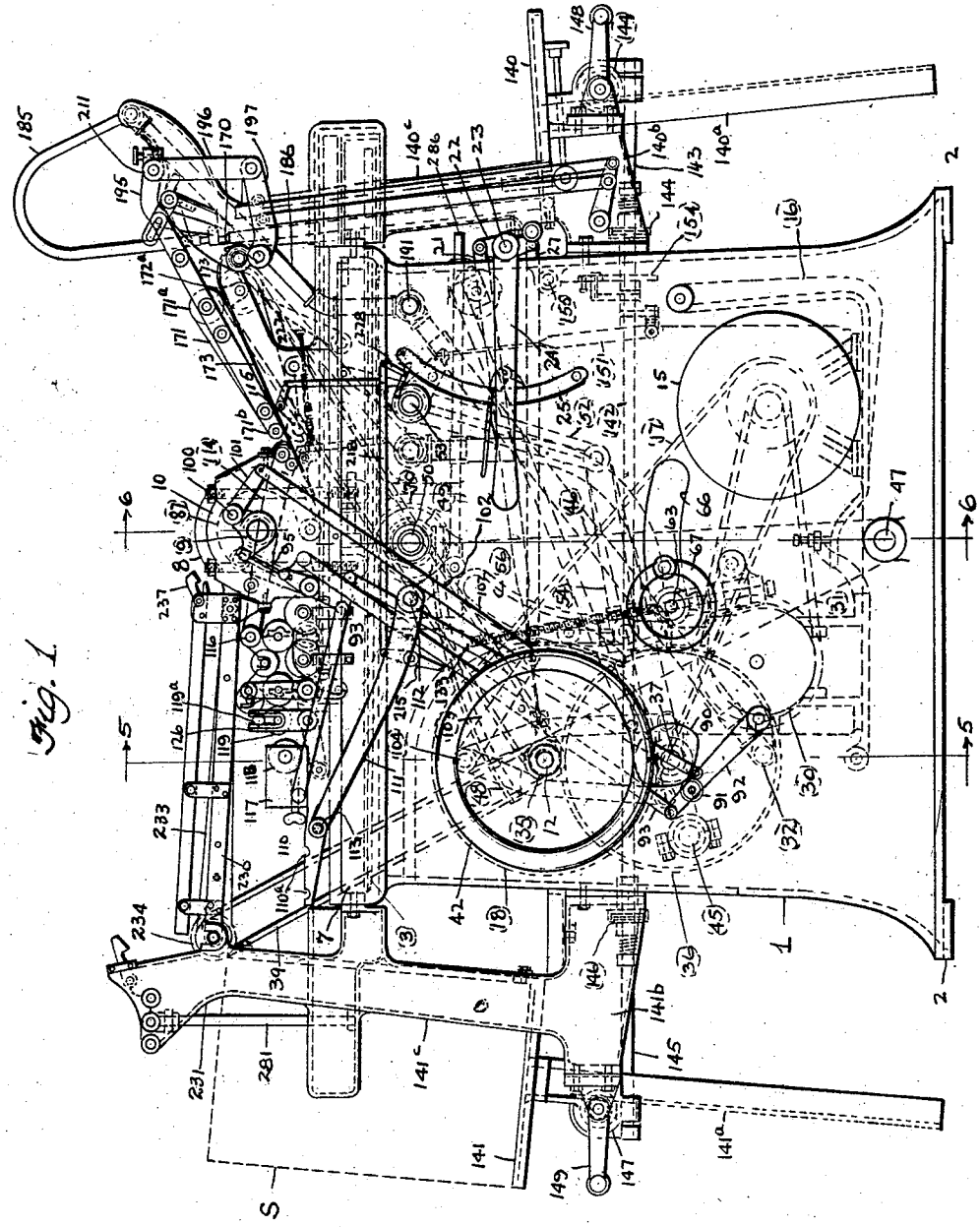


Fig. 1.

INVENTOR.
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Ray, Overlin & Ray
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Aug. 26, 1930. H. HONIGMANN 1,774,272

BED AND CYLINDER PRINTING PRESS

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Fig. 2.

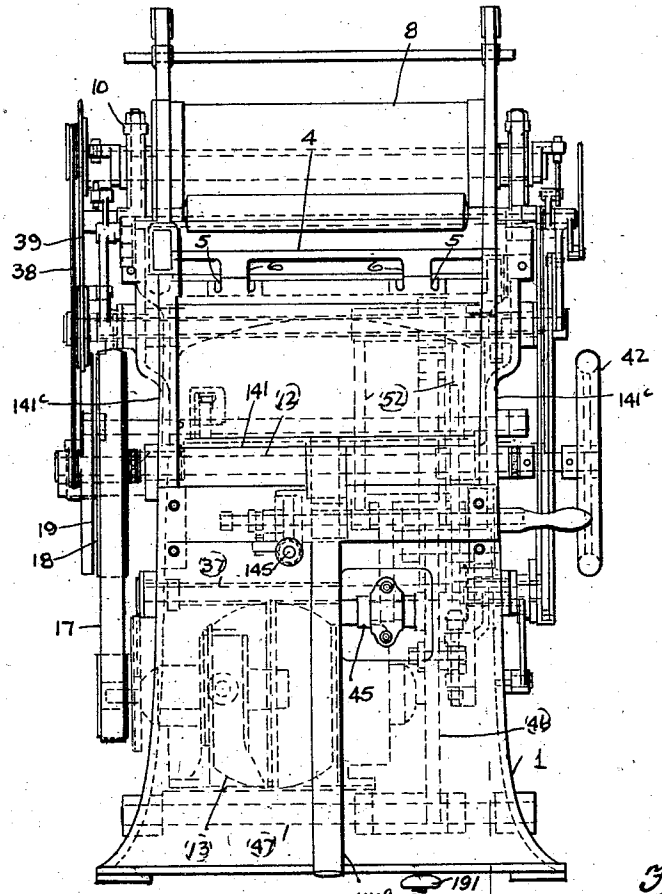
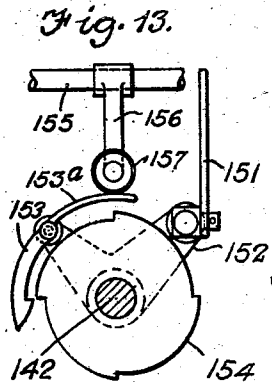


Fig. 13.



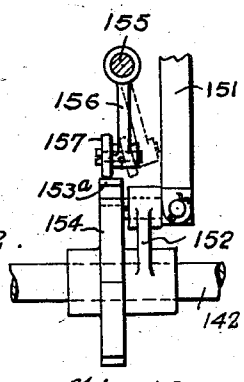


Fig. 14.

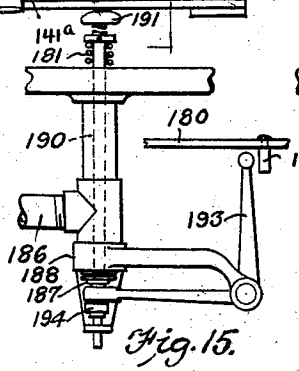


Fig. 15.

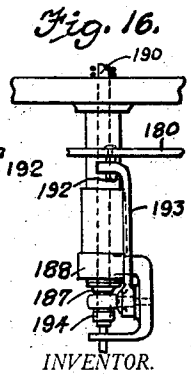


Fig. 16.

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Aug. 26, 1930. H. HONIGMANN 1,774,272

BED AND CYLINDER PRINTING PRESS

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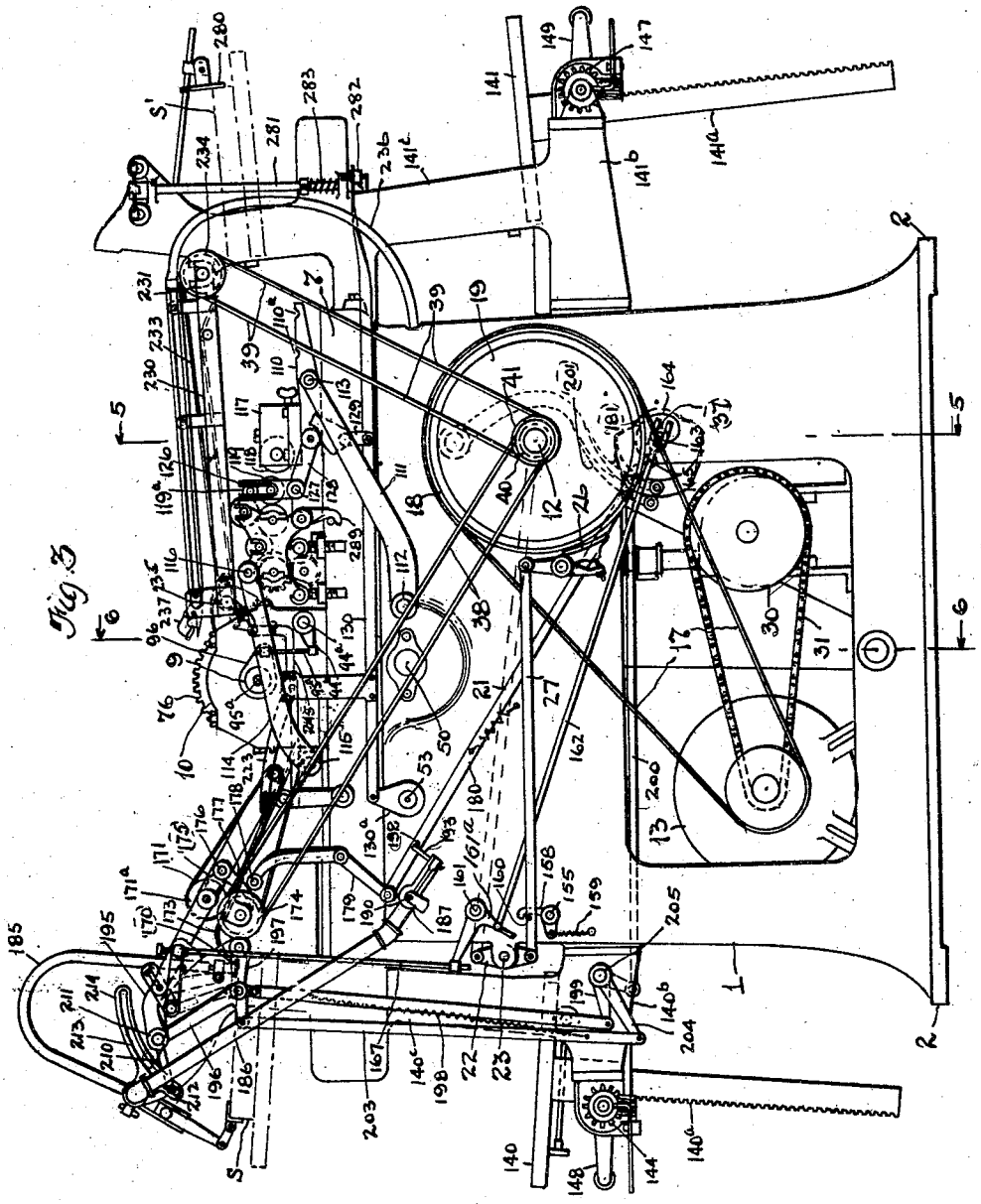


Fig. 3

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Aug. 26, 1930. H. HONIGMANN 1,774,272

BED AND CYLINDER PRINTING PRESS

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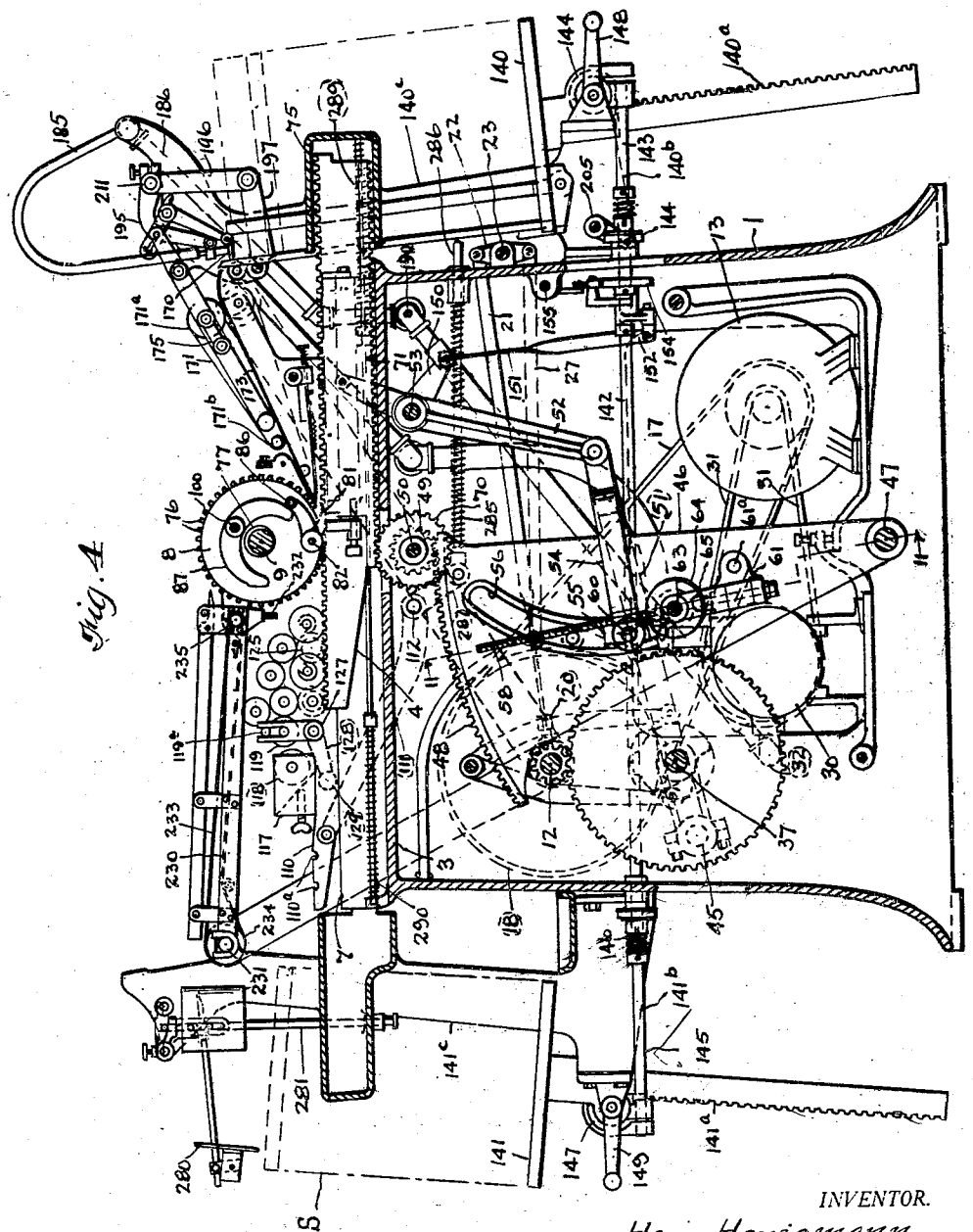


Fig. 4

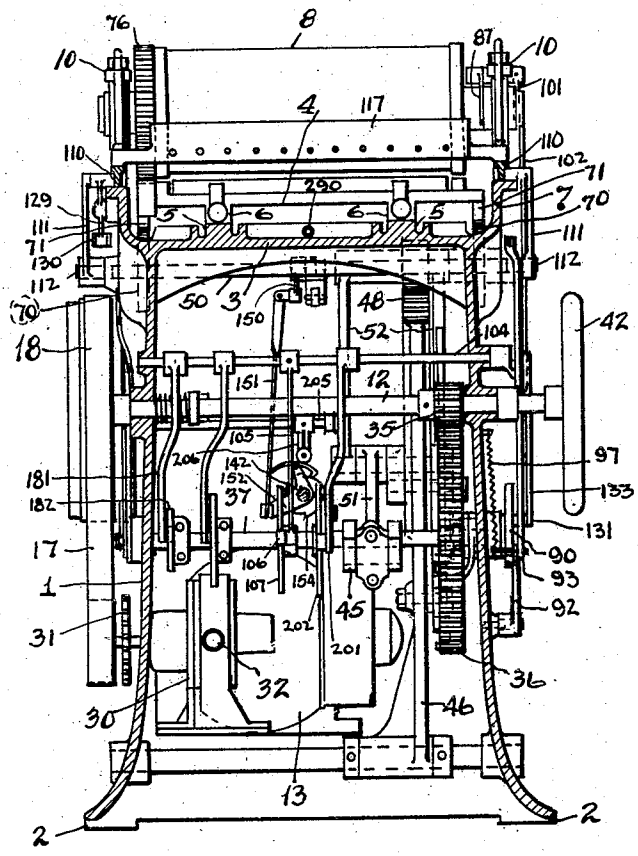
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Aug. 26, 1930. H. HONIGMANN 1,774,272

BED AND CYLINDER PRINTING PRESS

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Fig. 5



INVENTOR.

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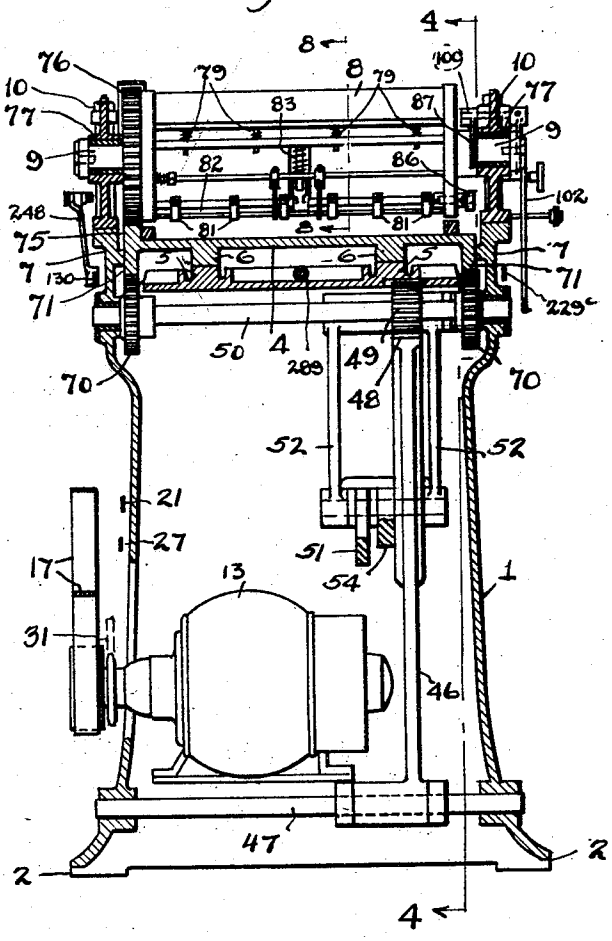
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Aug. 26, 1930. H. HONIGMANN 1,774,272

BED AND CYLINDER PRINTING PRESS

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Fig. 6



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Aug. 26, 1930. H. HONIGMANN 1,774,272

BED AND CYLINDER PRINTING PRESS

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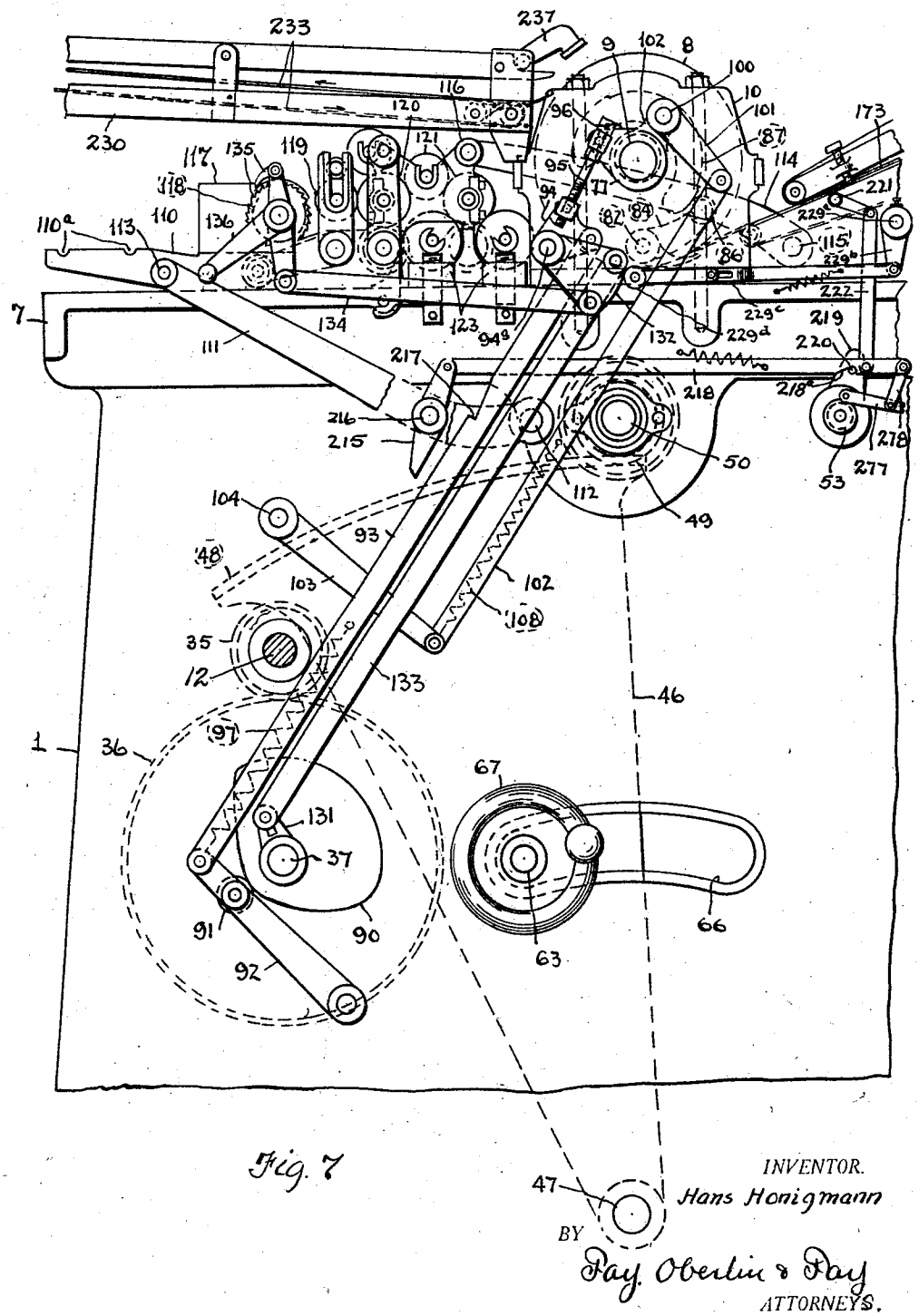


Fig. 7

INVENTOR.
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Aug. 26, 1930. H. HONIGMANN 1,774,272

BED AND CYLINDER PRINTING PRESS

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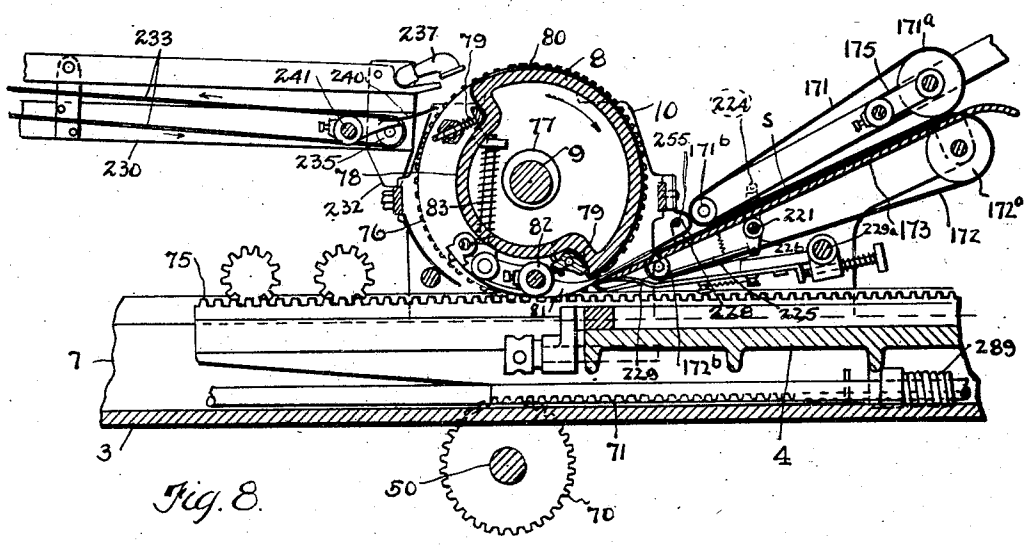


Fig. 8.

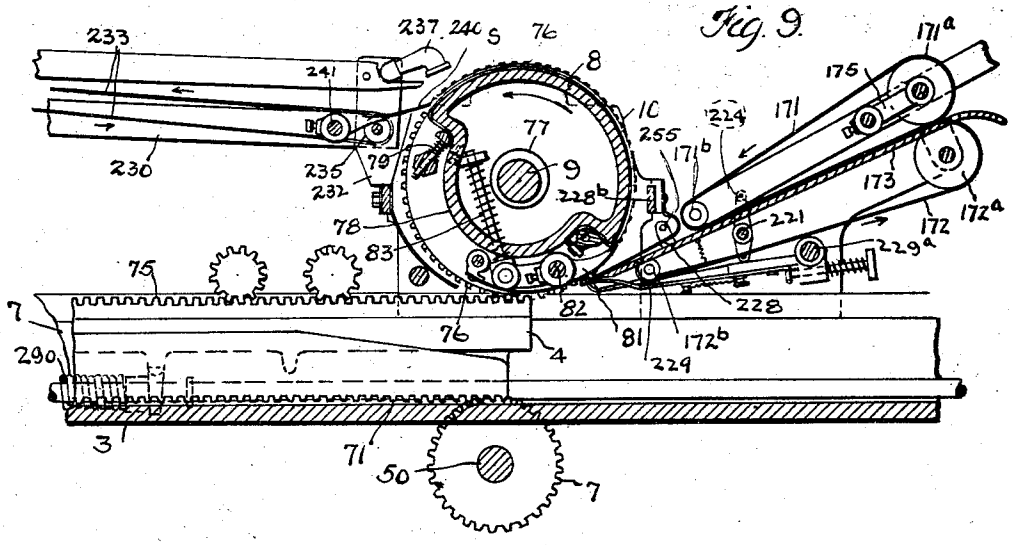


Fig. 9.

INVENTOR.

Hans Honigmann

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Aug. 26, 1930. H. HONIGMANN 1,774,272

BED AND CYLINDER PRINTING PRESS

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Fig. 11

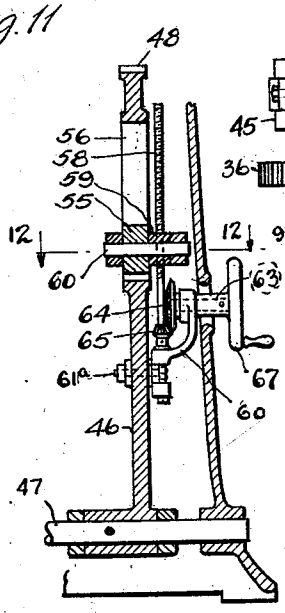
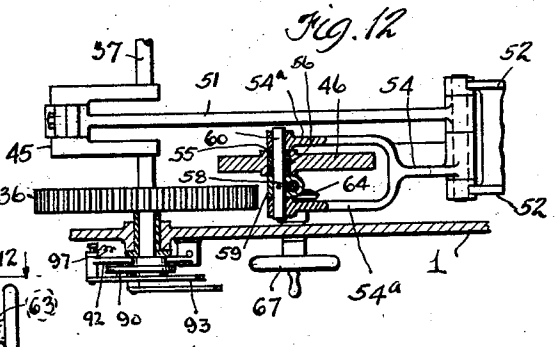


Fig. 12



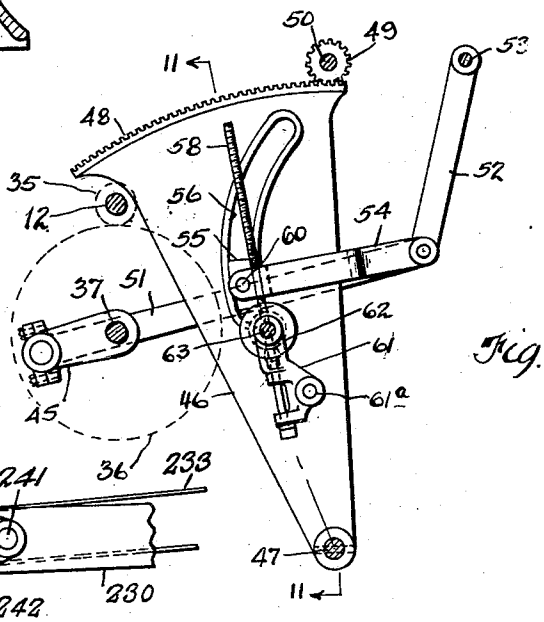


Fig. 10

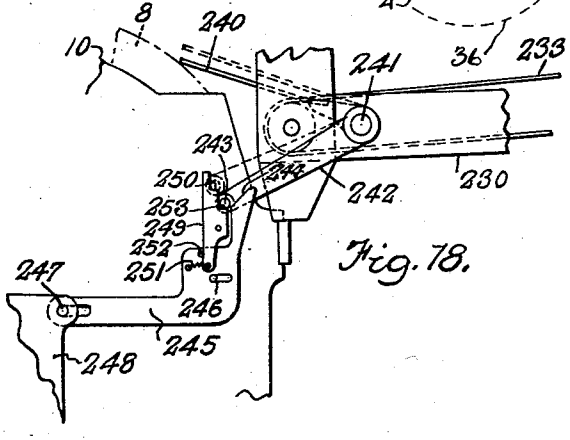


Fig. 78.

INVENTOR.

Hans Honigmann

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Pay, Oberlin & Pay

ATTORNEYS.

Aug. 26, 1930. H. HONIGMANN 1,774,272

BED AND CYLINDER PRINTING PRESS

Filed Aug. 30, 1926 10 Sheets-Sheet 10

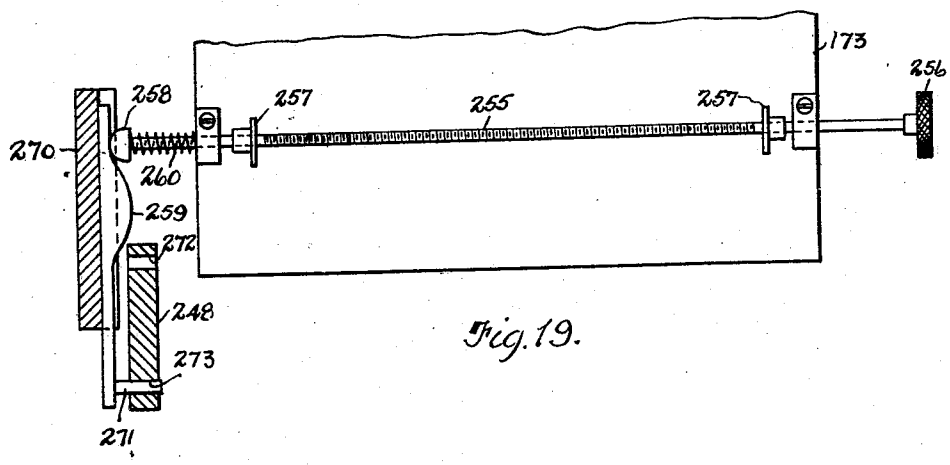


Fig. 19.

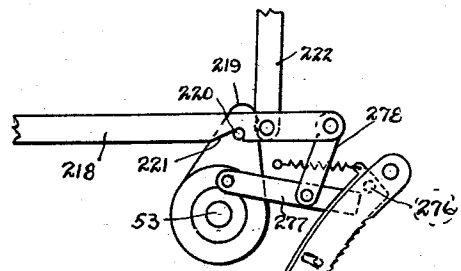
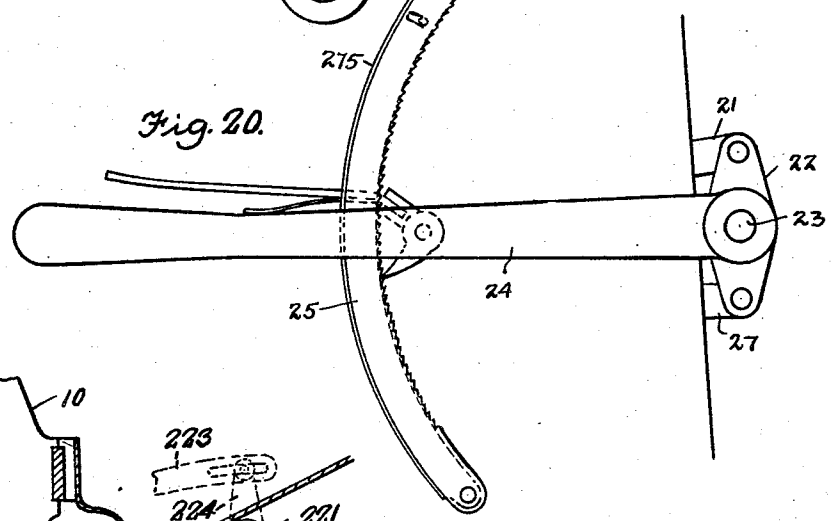


Fig. 20.



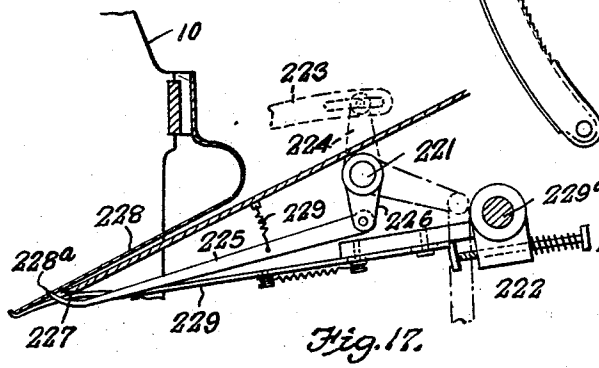


Fig. 17.

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Pay, Oberlin & Pay
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Patented Aug. 26, 1930 1,774,272

UNITED STATES PATENT OFFICE

HANS HONIGMANN, OF CLEVELAND, OHIO, ASSIGNOR TO THE CHANDLER & PRICE COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO

BED AND CYLINDER PRINTING PRESS

Application filed August 30, 1926. Serial No. 132,439.

The present improvements relating as indicated to printing presses have more particular regard to printing presses wherein the printing couple comprises a bed and cylinder, the type form being carried on a reciprocating bed and the sheet of paper to be printed being carried by a cylinder so disposed as to press such sheet against the form upon reciprocatory movement of the latter in one direction.

The invention has as its object the provision of improved mechanism for reciprocating the bed in a press of the type referred to whereby the extent of its movement may be varied and yet the bed always start from the same position. Another object is to provide a driving mechanism that will be capable of operation at high speed without undue vibration. Still another object is to provide simple and efficient mechanism for controlling the contact of the sheet carrying cylinder with the bed as well as simple and efficient mechanism for securing the sheet temporarily to the cylinder during the printing operation and for discharging the sheet therefrom onto the delivering mechanism. Other features of improvement are found in the sheet feeding mechanism proper as well as in the mechanism for inking the form on the bed.

To the accomplishment of the foregoing and related objects, the invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims. The annexed drawings and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:—

Fig. 1 is a side elevation of a bed and cylinder printing press embodying my present improvements; Fig. 2 is an end elevation thereof as viewed from the left in Fig. 1; Fig. 3 is an elevation of the opposite side of the machine from that shown in Fig. 1; Fig. 4 is a longitudinal section of the machine taken on a vertical plane as indicated by the line 4—4, Fig. 2; Figs. 5 and 6 are transverse vertical sections, the planes of said sections being indicated by the lines 5—5 and 6—6 respectively on each of Figs. 1, 3 and 4; Fig. 7 is a side elevation on a somewhat larger scale of certain operative parts shown on Fig. 1; Figs. 8 and 9 are broken sectional views through the cylinder and a portion of the bed, the plane of both sections being indicated by the line 8—8, Fig. 6, the difference between the two figures consisting merely in the different operative positions of the parts; Fig. 10 is partly a side elevation and partly a section of a portion of the bed actuating mechanism; Figs. 11 and 12 are sections of such mechanism, the planes of the sections being indicated by the lines 11—11 and 12—12 respectively on Fig. 10; Figs. 13 and 14 are detailed views, on somewhat larger scale than the preceding figures, of the elevator trip mechanism; Figs. 15 and 16 are similar views of the vacuum control valve associated with the sheet feeding mechanism; Fig. 17 is a detail view of a portion of an automatic control device for retaining the cylinder in raised position; Fig. 18 is a detail side elevation showing the mechanism for actuating the stripping fingers associated with the delivering conveyor; Fig. 19 is a plan view of the lower end of the feed conveyor showing the sheet registering device and operating means thereof; and Fig. 20 is a detail view of a device interconnected with the device shown in Fig. 17 for automatically stopping the press.

The main frame 1 of the machine will conveniently take the form of a hollow rectangular casting or box like structure as shown in the several main figures of the drawings, such frame having feet 2 which rest on the floor and being substantially closed above by a top 3 on which is reciprocably mounted the bed 4 that carries the type form, said bed is slidably supported on the top 3, the latter being formed with longitudinally extending guideways 5 on which rest complementary guides 6 on the under side of said table. The side walls of frame 1 rise above the top 3 whereon the bed 4 is thus supported in order to provide a lateral enclosure 7 for the bed as well as to support other operative parts as will

presently appear. The cylinder 8 which as hereinbefore indicated constitutes the other member of the printing couple is mounted on a shaft 9, the ends of which are supported in journal boxes 10 that are thus mounted on the lateral enclosure 7 just referred to.

The main shaft 12 from which substantially all the operative parts of the machine are driven is journaled in the side walls of the main frame 1 near one end of the latter, i. e., the left end as shown in Fig. 1, this shaft being driven from a motor 13 supported on a cradle 16 in the opposite lower corner of said frame; said cradle is oscillatorily hung as shown in Fig. 1 and may be adjusted to vary the tension on the belt 17 that connects the motor with a pulley 18 on the one end of shaft 12. This pulley is preferably loosely mounted on the shaft but may be frictionally clutched thereto or rather to a disk 19 that is frictionally mounted on said shaft, one form of friction drive suitable for use in this connection being shown and described in my copending application filed July 30, 1926, Serial No. 125,922.

The connection of driving pulley 18 with the friction disk 19 is controlled through the medium of a bell crank 20 and connecting rod 21 (see Fig. 4) from a two-arm rocker 22 on a shaft 23 journaled in suitable bearings on the right hand end of the main frame 1 as viewed in said Fig. 4 as well as in Fig. 1. Attached to one end of shaft 23 is a hand lever 24 that cooperates with a segmental ratchet 25 by means of which the shaft and thus the rocker 22 may be oscillated and held in desired angular position, and as will be readily understood, the driving pulley 18 will be held in frictional engagement with disk 19 under corresponding pressure or else entirely released from such engagement as may be desired.

Preferably supported adjacent the face of pulley 19 that is exposed in the opening between the two parts of belt 17 is a brake shoe 26, such shoe being operable through the medium of a link 27 that is connected with the other opposite arm of rocker 22 to the one end of which link 21 is connected as just described above; and the arrangement being such that when the rocker is actuated to disconnect the pulley 18 from friction disk 19, the brake 26 will be simultaneously applied and thus retain shaft 12 against further rotation.

A rotary type air pump 30 is also housed in the lower portion of the main frame 1 adjacent the motor 15, by which it is driven through the medium of a supporting chain 31. The intake of said pump 30 is connected to a pipe 32 that constitutes in effect a manifold wherewith the several suction devices that form parts of the sheet feeding and delivering mechanisms respectively may be connected as will be later described.

Mounted on shaft 12 adjacent the opposite end thereof to the one on which pulley 18 is mounted is a pinion 35 that meshes with a gear 36 fixedly mounted on a second shaft 37 parallel with said main shaft and located directly therebelow. It is from this second shaft rather than from the main shaft that the movement of the printing couple as well as the several subordinate parts of the press mechanism are derived. It should however be noted that the tapes that constitute a part of the sheet feed mechanism as well as those that similarly constitute a part of the sheet delivering mechanism are driven by means of belts 38 and 39 respectively from corresponding pulleys 40 and 41 directly mounted on said main shaft 12. It will also be noted that on the projecting end of shaft 12 opposite to the pulley 18, there is mounted a hand wheel 42 which serves both as a fly wheel when the machine is in operation and as a means for turning over the various parts of the press by hand when adjusting such parts or setting up the press for operation.

Shaft 37 adjacent such last mentioned end but lying within the side wall of the main frame 1 is formed with a crank 45 from which the mechanism for reciprocating the bed 4 is driven as will now be described. As best shown in Figs. 10, 11 and 12, a plate like lever 46 is oscillatorily supported at its lower end on a transverse shaft 47 that extends across and is secured to the opposite side walls of said main frame. The upper end of this lever is in the form of a segmental rack 48 that engages with a pinion 49 mounted on a transverse shaft 50 in the upper portion of the frame, such shaft being located above and somewhat to the right of main shaft 12 and crank shaft 37 as shown in Figs. 1 and 4.

Crank 45 has an adjustable connection with the lever 46 through the medium of a pitman 51 connected at one end with said crank, and at the other end with paired links 52 that depend from a shaft 53 to which they are in turn pivoted at their upper ends. The links 52 are integrally united by means of an intermediate web and constitute in effect a single link (see Fig. 12). A second lever 54 is connected with the lower ends of said paired links 52 about the same axis as pitman 51, the other end of the lever being forked so as to pass around and lie on opposite sides of the plate lever 46 that carries the segmental rack 48, and between the arms 54^a of the fork is pivotally secured a suitably shaped block 55 that is slidably held in a curved slot 56 formed in said plate.

From the foregoing construction, it will be seen that depending upon the location of block 55 in slot 56, the angle of oscillation of the plate lever 46 and thus of the segment gear may be varied from a maximum approx-

imately equal to the throw of the crank 45 when the block is at the lower end of the slot to a minimum when said block is in the upper end of the slot. The slot 56 is substantially arcuate in form with the pivotal connection at the lower end of links 52 for its axis and as a result of this arrangement, the plate lever 46 will always be brought back to the position shown in Fig. 10 irrespective of the position of the block in said slot, variation in such position merely affecting the amount of forward movement of the plate.

For the purpose of conveniently adjusting the position of the block 55 in slot 56, a threaded rod 58 is passed through a nut 59 swiveled on the same pin 60 that passes through the forked arms 54ª of lever 54 and the block 55, the lower end of said rod being rotatably stepped in a bracket 61 that is swiveled onto the plate lever 46 about a pin 61ª. Journaled in an upwardly projecting arm 62 forming a part of said bracket 60 is a short shaft 63, the inner end of which carries a bevel gear 64 that meshes with a bevel pinion 65 pinned on the threaded rod 58. The outer end of the shaft projects through a slot 66 in the adjacent side wall of main frame 1 and is fitted with a hand wheel 67 whereby said shaft and thus the threaded rod may be rotated to raise or lower the block 55 in slot 56 as desired. The extent and curvature of slot 66 in the machine frame is such as to permit the shaft 63 with hand wheel 67 the necessary travel incidental to oscillation of the plate lever 46 that carries semental gear 48.

The shaft 50 on which is mounted the pinion 49 wherewith the aforesaid rack 48 engages, is provided at its respective ends with pinions 70 (see Fig. 6) that engage with downwardly directed racks 71 on the corresponding sides of the reciprocatory bed 4. Accordingly rotative movement imparted in the manner just described to said pinion 49 and thus to shaft 50 serves to reciprocate the bed back and forth on the guides or ways 5 but irrespective of the extent of such reciprocatory movement the bed is always brought back to the same starting point by virtue of the construction of the adjustable connected means between crank shaft 37 and the plate lever 46. The bed 4 may be of any standard construction so far as the present invention is concerned, provision being made on its upper face for the reception and clamping thereto of the type form in the usual manner.

The construction of sheet carrying cylinder 8 is shown in detail in Figs. 8 and 9. First however, it should be explained that this cylinder is driven in strict unison with the movement of the reciprocating bed 4 by being intergeared therewith through the medium of an upwardly projecting rack 75 on one side of the bed, (the left as shown in Fig. 6) that meshes with a gear 76 fixed on the corresponding end of the shaft 9 on which the cylinder is mounted. The ends of said shaft 9 are not directly journaled in the box 10 hereinbefore referred to but in eccentric bushings 77 that are then in turn journaled in the boxes, the degree of eccentricity of the bushings 77 being such that when conjointly oscillated to one position in their bearings in the box, the cylinder is raised entirely out of contact with the form on bed 4, whereas in another position of said bushings the cylinder will rest on the form so as to press against the latter a sheet of paper suitably attached to the cylinder so as to be carried thereby.

The cylinder 8 is in effect a hollow drum with a smooth exterior surface save for recesses 78 in which are received the clamping devices 79 that serve to secure the usual tympan 80 in taut condition on the sheet carrying portion of the cylinder, said recesses also serve to receive a corresponding number of gripper fingers 81, the outer ends of which project over the adjacent edge of the sheet carrying portion of the cylinder to grip thereto a sheet of paper when properly placed thereon. These gripper fingers are fixedly mounted on a rocker shaft 82 journaled in the cylinder body and are normally held in gripping position by means of a compression spring 83 associated with said shaft. However a rocker arm 84 mounted on one end of the shaft 82 and lying without the corresponding end of the cylinder is so disposed that its free end which is equipped with a roller 86 may engage with a cam 87 attached to the juxtaposed face of the corresponding box 10 (the right hand box as viewed in Figs. 5 and 6).

The cylinder 8 is shown in its sheet receiving position in Fig. 8 in which it will be noted the gripper fingers 81 lie substantially directly below the shaft 9. In this position due to engagement of roller 86 on rocker arm 84 with cam 87, said fingers are displaced outwardly slightly against compression spring 83 and accordingly a sheet S properly positioned by the sheet feeding mechanism will be caught by said fingers the moment the drum begins to travel in a clockwise direction with resultant release of roller 86 from cam 87. The sheet is wrapped around the cylinder as the latter rotates in the indicated direction and at the same time is pressed in contact with the form on the bed 4 which simultaneously moves to the left beneath the cylinder. The printed sheet thus wrapped about the cylinder is carried around until its trailing edge is in position approximately 180° from that occupied by the forward edge of the sheet at the center of the movement just described. Where the sheet is of sufficient extent to reach substantially half way around the cylinder, the gripper fingers 81 will occupy very nearly the same angular position

about the axis of the cylinder as they did at the start (see Fig. 9) but if the sheet is shorter, such rotative movement of the cylinder may be stopped sooner, the corresponding movement of the bed 4 to the left being of course at the same time stopped, all through the medium of the adjustable driving connection for such bed which has been hereinbefore described in detail. There is in other words, no need to carry the movement of the bed and cylinder any further than necessary to complete the printing operation and bring the training edge of the sheet into the delivering position in which such sheet is shown in Fig. 9.

Thereupon the reverse movement begins, the sheet being stripped off the cylinder and passing onto the delivery conveyor as the cylinder rotates in a counter-clockwise direction. Just before the original starting edge of the sheet passes on to the conveyor, the shaft 82 is rocked through the medium of arm 84 and cam 87 so as to release the sheet from the gripper fingers. The rotative movement of the cylinder continues until such gripper fingers are again brought to their initial or starting position shown in Fig. 8.

The eccentric bushing 77 wherein the respective ends of the shaft 9 that carries cylinder 8 are journaled is arranged for oscillation through suitable connections from the same shaft 37 that serves to reciprocate bed 4. These connections shown in detail in Fig. 7 include a cam 90 on the end of said shaft that projects through the right hand side wall of main frame 1 as viewed in Figs. 2 and 4, such cam being arranged to engage with a roller 91 on a lever 92 pivotally attached at one end to said side wall and having its other end connected by means of a link 93 with a rocker in the form of a bell crank 94 on the corresponding side of the machine that is mounted on a rock shaft 94^a, the latter extending transversely across the top of the machine and having a corresponding lever 94^b mounted on its opposite end and one arm of bell crank 94 is connected by means of a short adjustable link 95 with an arm 96 that projects from the adjacent eccentric bushing while a similar adjustable link 95^a connects the lever arm 94^b with the arm 96 on the eccentric bushing 77 at the other end of the drum. A tension spring 97 is connected with the lever 92 at the point where it is pivoted to said link 93 so as to cause the roller 91 to travel at all times in contact with cam 90, except when cylinder 8 is latched in raised position as later described.

As a result of the foregoing construction, it will be seen that with each revolution of crank shaft 37 which as hereinbefore described, serves to oscillate the lever 46 and thus to reciprocate the bed 4, the two eccentric bushings 77 are oscillated, such oscillation being so timed as to raise the cylinder slightly during the return movement of the bed. The cylinder however is not lifted so much as to disengage the gear 76 thereon from the upwardly directed rack 75 on the bed and the return rotative movement of the cylinder is thus produced simultaneously with the return movement of the bed despite the fact that the cylinder does not contact with the bed as would of course be undesirable.

The cam 87 on the inner face of the right hand bearing box 10 as shown in Figs. 5 and 6 is preferably not fixedly attached thereto but is oscillatory about the axis located midway between its ends being mounted upon a short shaft 100 that projects through said box and has a lever 101 mounted upon its outer end. This lever is then connected by means of a downwardly extending link 102 (see Fig. 7) with another lever 103 attached to the corresponding end of a transverse rock shaft 104 (see Fig. 5). At an intermediate point, i. e. located between the side walls of the main frame 1, said rock shaft 104 carries fixed thereto an arm 105 that is provided at its lower end with a roller 106 arranged to press against a disk cam 107 mounted on crank shaft 37. A tension spring 108 (see Fig. 7) is suitably connected with the outer end of lever arm 103 so as to retain the roller 106 at all times in contact with said cam 107, the form of the latter being such as to normally maintain the gripper-finger actuating cam 87 in the position shown in Fig. 7 but to slightly rock said last-mentioned cam first in one direction and then in the other so as to positively cause the gripper fingers 81 to lift in the manner and at the times hereinbefore described, i. e., when the cylinder 8 is in sheet receiving position and sheet delivery position respectively.

The mechanism for inking the form on the reciprocable bed 4 as best shown in Fig. 7 (see also Figs. 1 and 4) is all supported on a separate frame 110 located immediately to the left of the box 10 in which the cylinder 8 is journaled, the sheet delivery mechanism normally lying above such inking mechanism. Such delivery mechanism however as will be presently explained, is readily moved or tilted out of the way so that access may be conveniently had to said inking mechanism and the latter is in turn movably supported so that it may be raised upwardly and forwardly, i. e., to the right in the figures just mentioned so as to lie above the cylinder and permit convenient access to the bed when the latter is in its retracted position, i. e., has been moved past said cylinder to the left. In this position of the parts just named, the form may be set up in the bed or removed therefrom as will be readily understood.

The frame 110 is of more or less open construction consisting essentially of two side members suitably connected together and normally rests on the lateral bed-enclosing walls 7 of the main frame 1. Said frame 110

is connected to said main frame by two corresponding links 111, one on each side, that are attached at their lower ends to a transverse shaft 112 journaled in said main frame and at their upper ends to a transverse shaft 113 in frame 110 and in addition another shorter link 114 on the side of the machine shown in Fig. 3 is connected in parallelism with said links 111 being pivotally attached at its lower end to a stud 115 on the main frame and at its upper end to a stud 116 on said frame 110. As a result of the foregoing link connections between the main frame and the supplemental frame that carries the inking mechanism, such last-mentioned frame it will be seen, when lifted upwardly will at the same time be carried forwardly in the manner already described, the points of pivotal attachment of the links being so arranged that said supplemental frame may be carried in the direction indicated far enough to rest securely of its own weight in the position last referred to.

The rear ends of the side members of frame 110, it will be noted extend beyond ink-fountain 117 and notches 110[a] are formed in such extensions to receive the riding and distributing rollers when these require to be lifted out of the way in order to get at the rollers beneath.

The detail construction of the inking mechanism will require only a brief description. The fountain 117 which may be of any standard construction is located on the supplemental frame 110 near its outer, i. e., left hand end as shown in Figs. 1, 4 and 7 and includes as usual a roller 118 that forms its inwardly facing wall, such roller upon rotation presenting a fresh film of ink to be taken up by an oscillatory mounted duct roller 119 which in turn transfers such ink to a riding roller 120 and thence by means of distributing rollers 121 onto two inking rollers 123 that are designed to contact with the form on the bed.

Such last mentioned inking rollers are driven from the same upwardly directed rack 75 on the bed as is cylinder 8, a pinion 125 being provided for this purpose on supplemental frame 110 which pinion engages with the rack in question and is at the same time directly intergeared with said inking rollers 123. The duct roller 119 as well as a steel rider roller 119[a] at rest thereon are held at their respective ends in slotted arms 126 that extend upwardly from a rock shaft 127 in supplemental frame 110 and the desired oscillation of said duct roller is produced by rocking said shaft through the medium of a lever arm 128 on the one end thereof which has rolling contact with the upper end of a double arm lever 129 pivotally secured to the side wall of the main frame 1. The other end of said lever 129 is connected by means of a longitudinally extending link 130 with a lever arm 130[a] fixed on the corresponding end of a shaft 53 to which the links 52 heretofore referred to as a part of the bed reciprocating mechanism are attached. It will be understood that this shaft is journaled in the main frame and said levers 52 keyed or pinned to the shaft so that the latter is oscillated synchronously with the rotation of crank shaft 37. Accordingly just as the inking rollers 123 are rotated in unison with the reciprocatory movement of the bed, so the duct roller 119 will be oscillated at the proper time to transfer ink from roller 118 to said ink rollers through the intermediate rider and distibuting rollers.

The fountain roller 118 is likewise given a step by step rotative movement in unison with the rotation of said crank shaft 37 being somewhat more directly connected therewith through the medium of a lever arm 131 on the same end of said shaft that carries cam 90, said lever arm lying outside the cam so as to be free to rotate through a full circle without interfering with the mechanism actuated by the cam. Pivotally attached to the corresponding end of the shaft 94[a] that carries bell cranks 94 is another bell crank 132 that is connected by means of a link 133 with the lever arm 131 and by means of a second link 134 with a pawl and ratchet device 135 of familiar construction on the corresponding end of the fountain roller 118. Rotation of crank shaft 37, it will accordingly be seen by rocking the bell crank 132 once for every revolution of said shaft, will rotate said fountain roller through a part revolution as determined by the setting of the pawl and ratchet device 135. A small hand crank 136 is also attached to said fountain roller to permit manual rotation thereof when and as desired.

The stack of blank sheets which are to be fed to the press will be supported on a feed table 140 which in general at least will be of standard construction and the same is true of the delivery table 141 on which the sheets are designed to be deposited after printing. Said tables 140 and 141 are located at the respective ends of the main frame 1 and incline slightly inwardly, i. e. towards each other as shown in Figs. 1, 3 and 4. Each table is carried on the upper end of a rack support 140[a] and 141[a] that is slidably held in a corresponding bracket 140[b] and 141[b] respectively, such brackets being attached to and projecting from the adjacent ends of the main frame and including an upwardly rising guide 140[c] and 141[c] against which the respective stacks of paper are designed to rest.

The sheet delivery or feed table 141 will require to be lowered simultaneously with the raising of feed table 140 and at the same rate inasmuch as the sheets taken off of the feed stack are after printing delivered to and

added onto the stack on said first-named table.

It is thus permissible and desirable to provide for simultaneous operation of the two tables in the opposite directions indicated and for this purpose I provide a shaft 142 that extends longitudinally through the main frame 1, (see Fig. 4), said shaft lying approximately midway between the side walls of said frame and being suitably journaled in the respective end walls thereof. Such extension 143 of the one end of said shaft 142 connected therewith by means of a friction slip clutch 144 is suitably intergeared with a pinion 144 in bracket 140^b that meshes with the rack support 140^a of the feed table; while a corresponding extension 145 of the other end of said shaft 142 similarly connected therewith by a friction slip clutch 142 is suitably intergeared with a pinion 147 that engages with rack support 141^a of delivery table 141. A hand crank 148 is adapted to rotate said pinion 144 through a suitable ratchet device and a hand crank 149 is similarly adapted to rotate said pinion 147 when it is desired manually to adjust the height of the respective tables, such adjustment being permitted such ratchet devices without interfering with the automatic operation of the elevators. The respective clutches 144 and 146, it will be understood, constitute safety devices in case the corresponding table is accidentally carried to the limit of its movement.

Automatic actuation of shaft 142 is derived from the oscillatory shaft 53 which as hereinbefore noted is rocked in unison with the crank shaft 37, incidentally to the reciprocation of the bed 4. As shown in Figs. 4 and 5, a downwardly inclining lever arm 150 is fixed to said shaft 53 at an intermediate point and a link 151 connects the outer end of said arm 150 with one arm of a bell crank 152 oscillatorily mounted on said shaft 142. The other arm of said bell crank carries a pawl 153 that is adapted in one position to engage with a ratchet wheel 154 fixed to said shaft and when thus engaging therewith oscillation of the bell crank will serve correspondingly to rotate said shaft. The pawl is counter-balanced or otherwise arranged so as normally to engage with the ratchet; it is designed, however, that it should only thus engage when the top of the stack of sheets on the feed table 140 has fallen to a predetermined level, the mechanism for thus controlling such pawl's engagement, and so the operative connection of rock shaft 53 with the feed and delivery table actuating shaft 142 depending upon the level of the stack of sheets on said feed table, being shown in detail in Figs. 13 and 14 (see also Fig. 3).

Journaled in the main frame 1 or rather in the end wall thereof adjacent the pawl and ratchet device just referred to is a light transverse shaft 155 upon which is mounted at an intermediate point lying directly above the axis of shaft 142 a short arm 156 provided at its lower end with a roller 157. In its normal position as shown in Figs. 13 and 14, this roller engages with a curved finger 152^a on pawl 153 and serves to retain such pawl out of engagement with ratchet wheel 154. In this position accordingly oscillation of the bell crank 152 and such pawl have no effect on either the feed or delivery table. One end of the shaft 155 projects beyond the side wall of the main frame shown in elevation in Fig. 3 and has mounted thereon a bell crank lever 158 to one arm of which is attached a tension spring 159 that normally serves to hold the other arm thereof against a stop pin 160, the position of the bell crank and shaft as thus determined corresponding with the normal position of parts shown in Figs. 13 and 14. Oscillatorily mounted on a stud 161 directly above said bell crank 158 is a second reversely disposed bell crank 161^a, the depending arm of which is adapted when it is swung far enough in a counter-clockwise direction as viewed in Fig. 3 to strike against the upwardly directed stop-engaging arm of said bell crank 158. Said bell crank 161^a is thus oscillated in unison with the movements of the printing couple and other parts of the machine through the medium of a link 162 which is connected at one end with such depending arm of said bell crank and which has a lost motion connection at its other end with crank shaft 37, such last-mentioned end of the link is forked to engage a stud 163 centrally projecting from the end of said shaft and a cam 164 on the latter is disposed to engage with a roller on the link adjacent such fork. Accordingly the link is moved to the left as viewed in Fig. 3 a distance equal to the maximum throw of said cam once every revolution of shaft 37 and is free so far as the operative connections with the shaft are concerned to return i. e. move to the right a sufficient distance to cause the depending arm of bell crank 162 to strike against the stop-engaging arm of bell crank 158 with the result that the roller 157 on arm 156 is rocked out of the path of pawl finger 153^a. However this movement of the parts in question can only occur when a vertically reciprocable gauge finger 166 connected with the other arm of bell crank 162 by means of a rod 167 and disposed to rest in its lowermost position on the top of the stack S, drops to a predetermined position as determined by the height of such stack.

As a result of the foregoing arrangement of parts, it will be seen that whenever the top of the stack S falls to a predetermined level, the hereinbefore described elevating mechanism will be actuated to raise the table 140 until the top of the stack is again brought to a level where bell crank 162 no longer engages and actuates bell crank 158. At the same time

that table 140 is elevated, the sheet receiving or delivery table 141 will of course be lowered a corresponding amount.

Successive sheets *s* of paper are brought from stack S to the position hereinbefore described where they are attached to cylinder 8 through the medium of the gripper fingers 81 on said cylinder as shown in Fig. 8, by means of picker fingers 170 oscillatorily mounted above the feed table 140, in combination with a conveying mechanism consisting of upper and lower sets of endless tapes 171 and 172. Such upper tapes 171 as best shown in Figs. 8 and 9 pass around rollers 171ª and 171ᵇ while the lower tapes 172 similarly pass around rollers 172ª and 172ᵇ. Associated with such lower tapes moreover is a slotted feed table 173 which assists at its upper end in guiding the sheet between the respective rollers 171ª and 172ᵇ as well as affords a support for the sheet as it is carried downwardly by the tapes that pass around said rollers and the corresponding rollers 171ᵇ and 172ᵇ.

The forward rollers 171ᵇ and 172ᵇ are suitably intergeared so that belt 38, the upper end of which passes around a pulley 174 on said roller 172ᵇ, serves to drive both sets of tapes. In order to facilitate the entrance of a sheet between the two sets of tapes, the upper roller 171ª instead of being mounted in fixed bearings as are the other rollers, is journaled in an oscillatory frame 175 so that upon oscillation of said frame, said roller and the corresponding ends of the tapes 171 may be raised just to clear the lower set of tapes 172 without however disengaging the gears that interconnect said roller 171ª with the opposed roller 172ª. For the purpose of thus oscillating frame 175 in unison with the other movements of the machine, the shaft 176 to which said frame is attached is provided at one end with a downwardly projecting arm 177 against which a roller 178 on the upper end of a two-arm lever 179 pivotally attached to the side of the main frame 1 or rather the bed enclosing extension 7 of such main frame is adapted to bear. For the purpose of actuating the same, the other arm of lever 179 is connected by means of a link 180 with a lever 181 pivoted at its upper end about shaft 104 (see Fig. 5) and having roller engagement at its lower end with a cam 182 on crank shaft 37. Said cam is so designed as properly to time the opening of the tapes in the manner just described so as to receive the fore edge of a sheet brought thereto by the picker fingers 170.

Such picker fingers are shown as of suction-actuated type, being connected by means of flexible ducts 185 with a branch 186 that leads from pipe 32 connected with the intake of the air pump 30. At a convenient point in said pipe 186 is located the vacuum control valve 187, the detail construction of which will be found in Figs. 15 and 16.

It will be understood that it is merely necessary that this valve should open said pipe 186 to the atmosphere in order to relieve the suction at the sucker tips and thus release the sheet therefrom. The valve accordingly takes the form of a poppet 187 that is normally held in seated position against the open ended casing 188, that forms the valve body, by means of a spring 189 which cooperates with the reciprocable stem 190 of said valve. This stem extends transversely through the machine frame and is provided on the front side of the latter with a suitable knob 191 whereby the valve may be manually operated when desired.

In the operation of the feed conveyor, as should have been previously described, roller 171ª is designed to be raised upon movement of link 180 to the right as viewed in Fig. 3, just as soon as a sheet is carried by said conveyor to the lower end thereof in position to be gripped to the cylinder 8. While one sheet is being thus fed by the conveyor, the sucker tips 170 are moved back to the stack S to pick up a fresh sheet and suction accordingly requires at this stage to be applied to said tips and remain thereon until such fresh sheet is brought up to the receiving end of the feed conveyor, when the suction line 186 is again opened by unseating valve 187, this occurring coincidentally or preferably directly after the roller 171ª has been raised.

In order thus accurately to time the closing and opening of said valve 187 with such lifting of the upper tape roller, the valve actuating means are combined with those for thus lifting the roller. Specifically there is provided on the link 180 a stud 192 so arranged as to strike against one arm of a bell crank 193, the other end of which engages with a stop 194 on the outer projecting end of valve stem 190. Accordingly whenever the link is moved to the left as viewed in Fig. 3, said stud 192 strikes against the bell crank and holds the valve open against spring 189 until the link is again allowed to return incidentally to the pivotal lifting of said tape roller 171ª. As shown in Fig. 15, the stud 192 is slightly spaced from the corresponding end of the bell crank 193 so that there is a time interval before engagement of these parts occurs in order to permit said roller to be lifted in advance of the insertion of a sheet by the sucker tips and the release of such sheet by breaking the suction in line 186 due to the opening of valve 187.

Such sucker tips are adjustably clamped to the lower ends of oscillatory arms 195 to which is imparted a compound oscillatory movement by means now to be described. The arms in question are pivotally attached to and curve downwardly from the upper ends of the upwardly extending arms of corresponding bell cranks 196 that are oscillatorily supported on rock arms 197, the latter

having fixed pivotal supports on the frame of the machine. Said arms 197 are arranged to be periodically oscillated in a general vertical direction by means of a link 198 connected at its upper end with one such arm and at its lower end with a bell crank 199 that is in turn connected by means of a link 200, with a lever 201 pivoted at its upper end about shaft 104 (see Fig. 5) and having roller engagement at its lower end with a cam 202 on crank shaft 37. The lower downwardly extending arm of bell crank 196 is operatively connected with crank shaft 37 through similar means consisting specifically of a link 203 pivoted at its upper end to such arm and at its lower end to a lever arm 204 on the shaft 205 that serves at the same time as oscillatory support for bell crank 199, an angularly related arm 206 on said shaft being connected by means of a link 207 with another lever 208 pivoted at its upper end about shaft 104 and having roller engagement at its lower end with a cam 209 on said crank shaft 37.

The cams on crank shaft 37 whereby arms 197 and bell cranks 196 are thus respectively rocked are properly timed so as to impart to the sucker fingers the necessary up and down movement and movement in a horizontal direction to bring the fingers from the sheet engaging position shown in Figs. 1, 3 and 4 where assuming that the fingers are under suction, the topmost sheet on the stack S will be picked up and carried around the upper end of the feed table 173 and its forward edge inserted between the two top conveyors and in between the latter coincidentally with the raising of the upper tape roller 171; whereupon said sucker fingers are returned again to their initial position. The movement of the sucker fingers is further effected and controlled by an arm 210 that projects rearwardly from one of the arms 195 to which such sucker tips are attached or rather from the rock shaft 211 to which said arms are in turn attached; said arm 210 (see Fig. 3) having a roller 212 that travels in an arcuate slot 213 formed in an adjustably supported bracket 214.

In order to provide for the contingency where through accident or otherwise no sheet is fed in properly timed relation to the cylinder 8, it is necessary that such cylinder be held in its raised position wherein it does not contact with the form on bed 4, except as a sheet is thus supplied to it. To this end a latch 215 is pivotally mounted on a stud 216 on the side wall of the main frame 1 adjacent the link 93 whereby, as hereinbefore described, the eccentric bushings that serve to thus raise and lower the cylinder 8 are conjointly rocked. This link (see Fig. 7) it will be noted is formed on its adjacent edge with a notch 217 wherewith said latch 215 is adapted to engage in the position of the link corresponding with the raised position of the cylinder. Latch 215 is connected by means of a horizontally extending link 218 for movement to release said latch from engagement with said notch upon oscillation of shaft 53 which it will be recalled is operatively connected with crank shaft 37 through the adjustable means whereby the printing couple is operated. To this end an arm 219 on said shaft 53 is provided with a laterally extending pin 220 that is adapted to engage with a notch 218[a] on the under side of said link 218 provided the latter is allowed to drop downwardly far enough, as it should in case a sheet has been placed in position to be seized by the gripper fingers on the cylinder. In other words, in such case the link 93 should be left free to rock the eccentric bushings and thereby lower the drum or rather the sheet thus received thereon into contact with the form.

The notched end of link 218 is periodically raised and lowered in unison with the movement of the rest of the press mechanism by means of a rock shaft 221 extending transversely below the feed table 173 and connected with such link-end by means of a short link 222. Said shaft 221 is ocillated by means of the same reciprocable link or bar 130 (see Fig. 3) which serves to actuate duct roller 119, said bar being connected with the shaft in question through the medium of a link 223 that has slotted pivotal connection with an upwardly directed lever arm 224 on the corresponding end of the shaft.

Connection of the bar 223 with the shaft 221 is shown in detail in Fig. 17, which also illustrates the control element proper consisting of a light finger 225 pivotally connected at its rear end to a short downwardly directed arm 226 on the same shaft 221. The free end of the finger curves upwardly and bears on the outer side of the feed table 173 adjacent the lower edge 237 thereof, being held in light frictional contact with the under side of a guide 228 located above such feed-table edge by means of a tension spring 229. At the proper point in the line of contact of such finger end with plate 228, the latter is formed with an aperture 228[a] of the proper size to receive such finger end, this being the position of parts shown in Fig. 17. Normally, however, the forward movement of the finger occasioned by the periodical rocking of shaft 221 will occur following the deposit of a sheet by the conveyor between the lower edge of the table and the curved guide 228 so that the aperture 228[a] will be covered by such sheet. The end of the finger accordingly can not enter but will slide on past such aperture and the shaft 221 will rock far enough in a clockwise direction as viewed in Fig. 17 (see also Fig. 7) to permit the notched end of link 218 to engage with

the pin 221 with the resultant action hereinbefore described.

The rocking of the shaft in such clockwise direction is produced by gravity, the action of link 223 at this stage being merely permissive; however, such link upon movement to the left as viewed in Fig. 17 will positively lift the notched end of link 218 and at the same time retract finger 225 until its forward end is clear of the space between feed table 173 and guide 228.

There will be a plurality of guides 228 in addition to the one wherewith the finger 225 is adapted to cooperate in the manner just described in order to control the lowering of the cylinder into printing contact with the form on the bed. These fingers are of spring metal and bear lightly against the upper surface of feed table 173 at the lower edge of said table beyond which they project a short distance as shown in Figs. 8 and 9. Cooperative with said spring guides 228 are other similar guides 229 that extend forwardly from the under side of the feed table into contact at their tips with said guides 228. In counter-distinction to the upper guides which are fixedly attached to a cross bar 228^b extending between the box 10, these lower guides are adjustably attached at their rear ends to a rock shaft 229^a, said shaft being adapted for oscillation through the medium of a lever arm 229^b on the front end thereof and a link 229^c equipped at its free end with a roller 229^d bears against the adjacent face of the bell crank 132 which forms a part of the cylinder raising and lowering mechanism. This face of the bell crank has a cam conformation so as to be adapted to impart slight reciprocating movement to said link, this movement in turn being translated into a slight up and down movement of the tips of the guides 229, which last mentioned movement is timed to contact with the forward edge of a sheet that has been brought by the feed conveyor into position to be gripped to the cylinder.

While the conveyor that forms a part of the sheet feeding means extends in a downwardly inclined direction so as to bring the sheet to the forward angle between the cylinder and bed in the starting position thereof, the conveyor that constitutes the sheet delivery means extends from the opposite side of said cylinder in a line approximately tangential to the upper surface of the latter; furthermore the frame 230 of said delivery conveyor is oscillatorily supported about a pivotal axis 231 at the extreme end of the machine so that said conveyor as a whole may be tilted upwardly and to the left as regarded in Figs. 1 and 4 and thus uncover the inking mechanism, as also leave the way clear for the latter to be swung on the parallel link support therefor provided upwardly and to the left into a position of rest over the cylinder 8. When in its normal operative position, the free end of frame 232 rests upon and is temporarily secured to suitable abutments on the housings 10 in which the ends of the cylinder are journaled. Said delivery conveyor as shown comprises but one set of tapes 233 that pass over rollers 234 and 235 in the respective ends of the frame, such first mentioned roller being equipped with a pulley around which passes belt 39, the axis of the roller and such pulley coinciding with the pivotal axis 231 about which the frame 230 is oscillatory. A flexible duct 236 together with a pipe (not shown) that extends from the pump 30 illustrated serves to connect the exhaust side of the pump with a blower nozzle 237 adjustably mounted in the forward end of the frame 230, i. e., adjacent the cylinder 8.

In addition to the blower nozzle 237, there is provided at the forward end of the delivery conveyor frame 230 a plurality of stripping fingers 240 that are carried by a rock shaft 241 journaled transversely of said frame, said fingers normally lying under the influence of gravity in the position shown in Fig. 18 where they are adapted to engage with the under side of a sheet *s* on the cylinder upon the reverse, or sheet delivery movement of the latter. The function of the blast of air delivered by the nozzles 237 is to prevent the edge of the sheet from fluttering and insure its smooth passage over such stripping fingers onto the tape 233 of the delivery conveyor.

The stripping fingers 240 require to be raised as the freshly printed sheet is carried around the cylinder during the printing oscillation of the latter and to this end the actuating means shown in detail in the aforesaid Fig. 18 are provided. Such means include a lever arm 242 on the rear end of rock shaft 241, i. e., that shown in Fig. 3, such arm having a laterally projecting pin 243 adjacent its free end that, in the depressed or operative position of the stripping fingers, lies in the path of a reciprocable, inclined cam 244. The latter is formed on an upwardly projecting arm of a slide 245 that has slotted supporting engagement at an intermediate point with a pin 246 on the adjacent box 10 and has also slotted actuating engagement at its lower end with a pin 247 on an upwardly extending bracket 248 carried by the reciprocable link or bar 130. Pivotally attached to box 10 adjacent the cam-formed arm of slide 245 is a latch 249 formed on its one edge with a step or offset 250 so located as to be adapted to engage with pin 243 when the latter is raised by means of cam 244 in the manner described above, said latch being moved into position thus to engage the pin by means of a tension spring 251 that connects its lower end with the cam arm of the slide. A stop 252

is also provided on such arm to limit the movement of the latch under the impulse of the spring. The latch it will be further noted is provided with a second step or offset 253 below offset 250 whereon the pin 243 rests when the stripping fingers are allowed to drop into their operative position, which as already explained is the position in which they are illustrated in Fig. 20.

From the foregoing description, it will be seen that upon movement of slide 245 to the left in Fig. 18, the cam 244 on the upwardly directed arm thereof will ride under pin 243 and elevate the latter until it engages the stop or offset 250 on latch 249, where such pin will remain until the reverse movement of the slide occurs and rocks the latch so as to release the pin from offset 250, allowing it to drop onto offset 253.

It will be noted that link 223 which as hereinbefore described serves to actuate the rock shaft 221 (see Fig. 17) that controls the latch 215 whereby the drum is held in raised position is connected with the reciprocable link or bar 130 through the same bracket 248 wherewith slide 245 is connected and movement of the sheet registering device shown in Fig. 19 is likewise derived from this same bracket.

Such sheet registering device comprises a rod 255 transversely disposed above the curved guide plate 228 at the lower end of the feed table, said rod being slidably secured adjacent its respective ends to the upper face of the latter. The forward end of the rod, that corresponding with the elevation of the machine shown in Fig. 1, is provided with a knurled knob 256 or equivalent means whereby it may be manually rotated to adjust lengthwise of the rod either of two stops 257 that are adapted to be secured on said rod after the fashion of nuts. To this end the portion of the rod lying within the sides of the feed table is threaded save for a short distance adjacent each such side, which is left smooth and of slightly reduced diameter to receive the corresponding stop 257 when not in use.

The rear end of rod 255, that corresponding with the elevation of the machine shown in Fig. 3, is provided with a rounded head 258 that is adapted to bear against a transversely slidable cam 259, being held at all times in contact with such cam by means of a compression spring 260. This cam is detachably held in a slide 270 supported from the adjacent portion of the machine frame and is adapted to be connected at one end by means of a pin 271 thereon with either of two spaced apertures 272, 273 in the aforesaid bracket 248 that is carried by the reciprocable link or bar 130. The operative face of cam 259 comprises two contiguous symmetrical portions, one such portion being adapted to coact with the head 258 on rod 255 when the pin 271 is engaged with aperture 272 and the other portion thus to coact when said pin is engaged with the other aperture 273 in the bracket 248. Depending upon the manner in which the cam is thus connected with the bracket, it will be effective to cause movement of rod 255 in one direction or the other and is thus adapted to bring the corresponding stop 257 into the position with which it is desired to have the sheet registered. In other words, either lateral edge of the sheet may be brought into register as desired by properly adjusting the corresponding stop 257 on rod 255 and by properly connecting the cam slide 259 with bracket 248.

Associated with the mechanism shown in Figs. 7 and 17 for controlling the latch 215 whereby the cylinder 8 is held in raised position upon failure of a sheet to be properly fed thereto is an automatic device for completely stopping the operation of the press, this device being further illustrated in Fig. 20. Reference has heretofore been made to the hand lever 24 (see Fig. 1) that cooperates with a segmental ratchet 25 by means of which connection of the driving pulley 18 with the main shaft 12 is controlled.

Upon reference to Fig. 20, it will be seen that a shroud plate 275 is pivotally attached at its lower end to said segmental ratchet, said plate normally lying in inoperative position so as not to interfere with engagement of the pawl with such ratchet. On the upper free end of plate 275 is a pin 276 that lies approximately on the same level with and adjacent the rock shaft 53 and eccentrically pivoted at one end to such rock shaft is a plunger 277, the other or free end of which is adapted when raised to the proper plane to strike against pin 276 on shroud plate 275. A link 278 connects the outer notched end of link 218 with such plunger so that the latter will be thus raised whenever such notched end of said link 218 is raised, i. e., whenever a sheet fails to be received in proper position at the lower end of the feed table 173 for engagement by the gripper fingers on the cylinder 8.

The effect of raising the plunger 277 into position to engage with the pin 276 is to rock the shroud plate 275 through a sufficient arc to disengage the pawl on lever 24 from the ratchet 25. Accordingly whatever the position of the lever 24 may be, depending upon the speed setting of the press, it will thereupon instantly drop to its lower, i. e. full stop position, which not only releases the pulley 18 from driving connection with the shaft but serves at the same time to set the brake 26.

The sheets *s* are carried by the tapes 233 of the delivery conveyor to the further or rear end of the machine where they drop by gravity on the top of the stack S′ that accumulates on delivery table 141. Associated with the table is a suitable jogger 280 that serves to

settle the sheets properly onto such stack. This jogger is of familiar construction, the only feature of interest therein being the manner in which it is connected for periodical operation in unison with the movements of the other parts of the press, viz., through the medium of a vertical rock shaft 281 which is connected at its lower end by means of a lever arm 282 on its lower end with the adjacent pin of the reciprocable link or bar 130. A torsion spring 283 serves normally to position such shaft, the movement imparted thereto and thus to the jogger by the bar 130 being in the opposite direction to that induced by the spring.

Springs are employed in connection with a number of movable elements about the machine to normally position such elements and specific reference has been made in the foregoing description to certain of these. Others however, are merely shown in the drawing since the use of springs in this manner or of equivalent counterweights is generally understood. Attention should however be directed specifically to the compression spring 285 (see Fig. 4) that serves as a counterbalance for the supplemental frame 110 on which the inking mechanism as hereinbefore described is carried. Said spring 285 surrounds a rod 286 reciprocably mounted in the forward end of the machine frame and pivotally connected at its inner end to a lever arm 287 fixed upon and extending downwardly from the transverse shaft 112 to which the links 111 are attached. The spring 285 need not entirely counterbalance the weight of the inking mechanism but should be sufficiently strong to permit the frame 110 with such inking mechanism to be readily swung upwardly into position of rest over the cylinder 8, a suitable catch being provided to hold it in normal position.

It will also be noted that longitudinally extending compression springs 289 and 290 are provided at the respective ends of the top 3 of the machine frame 1, being so positioned as to engage with and serve as buffers for the bed 4 as it is reciprocated back and forth on such top.

The general operation of the press will it is believed be readily understood from the foregoing description of the construction and mode of operation of the several component mechanisms and devices. The movement of all such parts which is periodic in character is derived from the so-called crank shaft 38. This is true not only of the movement of the printing couple itself but of the inking mechanism, sheet feeding mechanism and sheet delivery mechanism as well as the various devices associated with said mechanism, with the cylinder and with the feed and delivery tables. It has already been pointed out how the vacuum to the picker fingers that form a part of the sheet feeding mechanism is controlled jointly with the raising and lowering of the upper roller of the feed conveyor, all from a single element operated by the aforesaid crank shaft 37. Similarly the operation of the duct roller that forms a part of the inking mechanism, of the latch for holding the cylinder in raised position, of the sheet registering device and of the stripping fingers that form a part of the sheet delivery mechanism and of the jogger associated with the delivery table are all operated from the reciprocable link or bar 130 which is in turn operated from said crank shaft.

As a result of the foregoing, despite the number of moving parts necessarily involved, the press presents an extremely compact appearance and its construction as a whole a minimum of complication. Furthermore all necessary adjustments and controls about the press are readily accessible to the operator. This is also true of the printing couple and inking mechanism to which access will necessarily be had every time the press requires to be set up for a new operation. In such case as previously described, the delivery conveyor frame 230 is simply swung out of the way to the left as viewed in Figs. 1 and 4 and the frame 110 that carries the inking mechanism thereupon swung in the opposite direction to its position of rest over the cylinder; whereupon by moving the bed 4 to its extreme left position, the form receiving space in such bed is directly accessible from either side of the machine.

Depending upon the longitudinal extent of the form on bed 4, the printing of the sheet may obviously be accomplished by movement of said bed through a greater or lesser distance and the adjustable connection between crank shaft 37 and said bed permits the extent of such movement to be readily controlled. The rotative movement of the cylinder 8 which is directly intergeared with the bed will of course at the same time be controlled so that in the case of a short form, it is possible correspondingly to speed up the press by eliminating any waste movement on the part of either member of the printing couple. Such members however, always return to the same starting position so that no change requires to be made in the location of the sheet feeding mechanism and this is equally true of the sheet delivery mechanism, since even where a minimum rotative movement is imparted to the cylinder, the trailing end of the sheet thereon will nevertheless be brought into position to be stripped from said cylinder. In other words in such case, the forward end of the sheet which is held to the cylinder by the gripper fingers on the latter is simply carried around through a correspondingly smaller arc instead of through the approximately full circle shown in Fig. 9.

Finally attention is directed to the very

important advantage in the way of smooth movement of the printing couple obtained by the balancing effect due to the interposition between the segment gear 48 and the rack on the bed of a pinion so that while the bed is moving in one direction, the lever 46 that carries such gear together with appurtenant parts moves in the opposite direction. Said oscillatory segment gear is of substantial construction, as shown in Figs. 10 and 11, and, together with appurtenant parts, presents a moment of inertia when stationary or momentum when moving approximately equal to that of the reciprocable bed. A counterbalancing effect is thus secured which contributes largely to the smooth running of the press at high speeds without any perceptible vibration.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; of variable-throw means for reciprocating said bed, said means being arranged and constructed to return said bed always to the same starting position.

2. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; of means for reciprocating said bed, said means including a rack on said bed, a shaft provided with two pinions, one such pinion engaging said rack, a lever having a segmental gear engaging the other such pinion, a drive shaft, and adjustable connections between said drive shaft and lever, said connections being arranged and constructed to return said lever always to the same starting position.

3. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; of means for reciprocating said bed, said means including a rack on said bed, a shaft provided with two pinions, one such pinion engaging said rack, a lever having a segmental gear engaging the other such pinion, a drive shaft, a pitman connected at one end with said drive shaft, a link oscillatorily supporting the other end of said pitman, and a second link connecting such last-mentioned pitman-end with said first-named lever.

4. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; of means for reciprocating said bed, said means including a rack on said bed, a shaft provided with two pinions, one such pinion engaging said rack, a lever having a segmental gear engaging the other such pinion, a drive shaft, a pitman connected at one end with said drive shaft, a link oscillatorily supporting the other end of said pitman, and a second link connecting such last-mentioned pitman-end with said first-named lever, the point of connection between the latter and said second link being adjustable.

5. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; of means for reciprocating said bed, said means including a rack on said bed, a shaft provided with two pinions, one such pinion engaging said rack, a lever having a segmental gear engaging the other such pinion, a drive shaft, a pitman connected at one end with said drive shaft, a link oscillatorily supporting the other end of said pitman, and a second link connecting such last-mentioned pitman-end with said first-named lever, the point of connection between the latter and said second link being adjustable along an arcuate path on said first-named lever having as its center the common point of connection between said two links and pitman.

6. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; of means for reciprocating said bed, said means including a rack on said bed, a shaft provided with two pinions, one such pinion engaging said rack, a lever having a segmental gear engaging the other such pinion, a drive shaft, a pitman connected at one end with said drive shaft, a link oscillatorily supporting the other end of said pitman, a second link connecting such last-named pitman-end with said first-named lever, a block adjustably secured to the latter along an arcuate path thereon having as its center the common point of connection between said two links and pitman and said second link being connected to said first-named lever by being pivotally attached to said block, and means adapted to move and hold said block in adjusted position in such path.

7. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; of means for reciprocating said bed, said means including a rack on said bed, a shaft provided with two pin-

ions, one such pinion engaging said rack, a lever having a segmental gear engaging the other such pinion, a drive shaft, a pitman connected at one end with said drive shaft, a link oscillatorily supporting the other end of said pitman, a second link connecting such last-named pitman-end with said first-named lever, a block adjustably secured to the latter along an arcuate path thereon having as its center the common point of connection between said two links and pitman and said second link being connected to said first-named lever by being pivotally attached to said block, a nut swiveled to said block, a bracket swiveled to said first named lever, and a threaded rod supported by said bracket and engaging said nut, whereby said block may be moved and held in adjusted position by rotating said rod.

8. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; of means for reciprocating said bed, said means including a rack on said bed, a shaft provided with two pinions, one such pinion engaging said rack, a lever having a segmental gear engaging the other such pinion, a drive shaft, a pitman connected at one end with said drive shaft, a link oscillatorily supporting the other end of said pitman, a second link connecting such last-named pitman-end with said first-named lever, a block adjustably secured to the latter along an arcuate path thereon having as its center the common point of connection between said two links and pitman and said second link being connected to said first-named lever by being pivotally attached to said block, a nut swiveled to said block, a bracket swiveled to said first-named lever, a threaded rod supported by said bracket and engaging said nut, whereby said block may be moved and held in adjusted position by rotating said rod, and means carried by said bracket adapted thus to rotate said rod.

9. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed; of a suitable frame thus reciprocably supporting said bed; journal boxes on said frame suporting said cylinder above said bed; a drive shaft journaled in said frame below said bed; a rack on said bed; a second shaft provided with two pinions, one such pinion engaging said rack; a lever pivoted in said frame below said drive shaft and having a segmental gear engaging the other such pinion; and means connecting said drive shaft with said lever at a point intermediate of the ends of the latter.

10. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed; of a suitable frame thus reciprocably supporting said bed; journal boxes on said frame supporting said cylinder above said bed; a drive shaft journaled in said frame below said bed; a rack on said bed; a second shaft provided with two pinions, one such pinion engaging said rack; a lever pivoted in said frame below said drive shaft and having a segmental gear engaging the other such pinion; and means connecting said drive shaft with said lever at a point intermediate of the ends of the latter and adjustable relatively to such ends.

11. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; of variable-throw means for reciprocating said bed, said means being arranged and constructed to return said bed always to the same starting position; sheet-feeding mechanism arranged and constructed to bring a sheet to the forward angle between said cylinder and bed in such starting position; and sheet delivery mechanism arranged and constructed to take a sheet from said cylinder in the same direction as such sheet is thus fed thereto but in a line approximately tangent to its upper surface.

12. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; of variable-throw means for reciprocating said bed, said means being arranged and constructed to return said bed always to the same starting position; a downwardly inclining sheet-conveyor disposed to bring the front edge of a sheet to the forward angle between said cylinder and bed in such starting position; and a second sheet-conveyor extending from the opposite side of said cylinder in a line approximately tangential to the upper surface thereof.

13. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; of variable-throw means for reciprocating said bed, said means being arranged and constructed to return said bed always to the same starting position; a downwardly inclining sheet-conveyor disposed to bring the front edge of a sheet to the forward angle between said cylinder and bed in such starting position; and a second sheet-conveyor extending from the opposite side of said cylinder in a line approximately tangential to the upper surface thereof, said second conveyor being tiltable upwardly about its end farthest removed from said cylinder.

14. The combination with a printing couple comprising a reciprocable bed for carry-

ing the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; of variable-throw means for reciprocating said bed, said means being arranged and constructed to return said bed always to the same starting position; a downwardly inclining sheet-conveyor disposed to bring the front edge of a sheet to the forward angle between said cylinder and bed in such starting position; a second sheet-conveyor extending from the opposite side of said cylinder in a line approximately tangential to the upper surface thereof, said second conveyor being tiltable upwardly about its end farthest removed from said cylinder; and mechanism for inking the form on said bed located between the latter and said second conveyor.

15. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; of variable-throw means for reciprocating said bed, said means being arranged and constructed to return said bed always to the same starting position; a downwardly inclining sheet-conveyor disposed to bring the front edge of a sheet to the forward angle between said cylinder and bed in such starting position; a second sheet-conveyor extending from the opposite side of said cylinder in a line approximately tangential to the upper surface thereof, said second conveyor being tiltable upwardly about its end farthest removed from said cylinder; mechanism for inking the form on said bed located between the latter and said second conveyor; and means movably supporting said inking mechanism relatively to said printing couple, whereby said printing mechanism may be bodily lifted to a position of rest above said cylinder.

16. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; of variable- throw means for reciprocating said bed, said means being arranged and constructed to return said bed always to the same starting position; a downwardly inclining sheet-conveyor disposed to bring the front edge of a sheet to the forward angle between said cylinder and bed in such starting position; a second sheet-conveyor extending from the opposite side of said cylinder in a line approximately tangential to the upper surface thereof, said second conveyor being tiltable upwardly about its end farthest removed from said cylinder; mechanism for inking the form on said bed located between the latter and said second conveyor; and parallel links adapted to support said inking mechanism in a position of rest above said cylinder.

17. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; of variable-throw means for reciprocating said bed, said means being arranged and constructed to return said bed always to the same starting position; sheet-feeding mechanism arranged and constructed to bring a sheet to said cylinder in such starting position thereof; means adapted alternately to raise and lower said cylinder with respect to said bed as the latter is reciprocated; and means affected by the presence of a sheet in said sheet-feeding mechanism adapted to control said cylinder raising and lowering means.

18. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; of variable-throw means for reciprocating said bed, said means being arranged and constructed to return said bed always to the same starting position; a sheet-conveyor adapted to bring a sheet to said cylinder in such starting position thereof; eccentric bushings for supporting said cylinder; means adapted to oscillate said bushings in unison with the movement of said printing couple; and other means affected by the presence of a sheet in said sheet-conveyor adapted to control said bushing oscillating means.

19. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; of variable-throw means for reciprocating said bed, said means being arranged and constructed to return said bed always to the same starting position; a sheet-conveyor adapted to bring a sheet to said cylinder in such starting position thereof; eccentric bushings for supporting said cylinder; means adapted to oscillate said bushings in unison with the movement of said printing couple; and other means affected by the presence of a sheet in said sheet-conveyor adapted to control said bushing-oscillating means, said control means including a movable latch adapted in one position to retain said cylinder out of contact with said bed, a periodically moving member, a second member disengageable therewith adapted to move said latch to operative position, and a finger connected with said second member and movable into and out of the path of a sheet being fed to said cylinder.

20. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; of means adapted to reciprocate said bed; a sheet delivery conveyor

extending in a line approximately tangential with the upper surface of said cylinder; stripper fingers oscillatorily mounted at the end of said conveyor adjacent said cylinder and means interconnected with said bed-reciprocating means adapted periodically to operate said fingers.

21. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; means adapted to reciprocate said bed; a sheet delivery conveyor extending in a line approximately tangential with the upper surface of said cylinder; stripper fingers oscillatorily mounted at the end of said conveyor adjacent said cylinder, said fingers normally lying in position to engage a sheet carried by said cylinder upon reverse movement of the latter; and means interconnected with said bed-reciprocating means adapted periodically to move said fingers from such position.

22. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; means adapted to reciprocate said bed; a sheet delivery conveyor extending in a line approximately tangential with the upper surface of said cylinder; stripper fingers oscillatorily mounted at the end of said conveyor adjacent said cylinder, said fingers normally lying in position to engage a sheet carried by said cylinder upon reverse movement of the latter; and a movable member interconnected with said bed-reciprocating means to move in unison therewith, said member being operatively connected with said fingers whereby the latter are periodically moved from their sheet-engaging position.

23. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; means adapted to reciprocate said bed; a sheet delivery conveyor extending in a line approximately tangential with the upper surface of said cylinder; stripper fingers oscillatorily mounted at the end of said conveyor adjacent said cylinder, said fingers normally lying in position to engage a sheet carried by said cylinder upon reverse movement of the latter; a movable member interconnected with said bed-reciprocating means to move in unison therewith, said member being operatively connected with said fingers whereby the latter are periodically moved from their sheet-engaging position; and a latch adapted to retain said fingers in the position to which they are thus moved.

24. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; means adapted to reciprocate said bed; a sheet delivery conveyor extending in a line approximately tangential with the upper surface of said cylinder; stripper fingers oscillatorily mounted at the end of said conveyor adjacent said cylinder, said fingers normally lying in position to engage a sheet carried by said cylinder upon reverse movement of the latter; a movable member interconnected with said bed-reciprocating means to move in unison therewith, said member being operatively connected with said fingers whereby the latter are periodically moved from their sheet-engaging position; and a latch adapted to retain said fingers in the position to which they are thus moved, the operation of said latch being controlled by the reciprocation of said member.

25. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; means adapted to reciprocate said bed; a sheet delivery conveyor extending in a line approximately tangential with the upper surface of said cylinder; stripper fingers oscillatorily mounted at the end of said conveyor adjacent said cylinder, said fingers normally lying in position to engage a sheet carried by said cylinder upon reverse movement of the latter; a slidable member interconnected with said bed-reciprocating means to reciprocate in unison therewith; a lever arm connected with said fingers; and a cam-face on said member adapted to engage said lever arm and thereby move said fingers from their sheet-engaging position.

26. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; means adapted to reciprocate said bed; a sheet delivery conveyor extending in a line approximately tangential with the upper surface of said cylinder; stripper fingers oscillatorily mounted at the end of said conveyor adjacent said cylinder, said fingers normally lying in position to engage a sheet carried by said cylinder upon reverse movement of the latter; a slidable member interconnected with said bed-reciprocating means to reciprocate in unison therewith; a lever arm connected with said fingers; a cam-face on said member adapted to engage said lever arm and thereby move said fingers from their sheet-engaging position; and a pivotal latch adjacent the cam-face on said member adapted to engage said lever arm and retain same, and thereby said fingers in such last-mentioned position.

27. The combination with a printing couple comprising a reciprocable bed for car-

rying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; means adapted to reciprocate said bed; a sheet delivery conveyor extending in a line approximately tangential with the upper surface of said cylinder; stripper fingers oscillatorily mounted at the end of said conveyor adjacent said cylinder, said fingers normally lying in position to engage a sheet carried by said cylinder upen reverse movement of the latter; a slidable member interconnected with said bed-reciprocating means to reciprocate in unison therewith; a lever arm connected with said fingers; a cam-face on said member adapted to engage said lever arm and thereby move said fingers from their sheet-engaging position; and a pivotal latch adjacent the cam-face on said member adapted to engage said lever arm and retain same, and thereby said fingers in such last-mentioned position, said member and latch being interconnected whereby movement of the former controls operation of the latter.

28. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; means adapted to reciprocate said bed; a sheet-feeding conveyor including a table extending downwardly into one of the angles between said bed and cylinder; and means for laterally registering a sheet on said table, said means being operatively interconnected with said bed-reciprocating means.

29. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; means adapted to reciprocate said bed; a sheet-feeding conveyor including a table extending downwardly into one of the angles between said bed and cylinder; means for laterally registering a sheet on said table, said means including a transversely reciprocable rod, and two stops independently adjustable on said rod; a movable member interconnected with said bed-reciprocating means to move in unison therewith; and adjustable connections between said member and rod whereby movement of the former may effect reciprocation of the latter in either direction as desired.

30. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; means adapted to reciprocate said bed; a sheet-feeding conveyor including a table extending downwardly into one of the angles between said bed and cylinder; means for laterally registering a sheet on said table, said means including a transversely reciprocable rod, and two stops independently adjustable on said rod; a movable member interconnected with said bed-reciprocating means to move in unison therewith; and a cam adjustably connected with said member and co-operative with said rod to reciprocate the latter in either direction depending upon the connection of said cam with said member.

31. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared wtih said bed; means adapted to reciprocate said bed; and means normally tending to stop said bed-reciprocating means, operation of said stop means being affected by presence of a sheet in feeding relation to said cylinder.

32. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; means adapted to reciprocate said bed; means adapted periodically to raise and lower said cylinder; and means normally tending to stop said bed-reciprocating means, operation of said cylinder-raising-and-lowering means and of said stop means being simultaneously affected by the presence of a sheet in feeding relation to said cylinder.

33. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; means adapted to reciprocate said bed; a sheet-feeding conveyor including a table extending downwardly into one of the angles between said bed and cylinder; resilient fingers fixedly supported above said table and extending slightly beyond its lower edge; and other fingers oscillatorily supported below said table and adapted in one position to contact with said first-named fingers.

34. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; means adapted to reciprocate said bed; means adapted periodically to raise and lower said cylinder; a sheet-feeding conveyor including a table extending downwardly into one of the angles between said bed and cylinder; resilient fingers fixedly supported above said table and extending slightly beyond its lower edge; other fingers oscillatorily supported below said table and adapted in one position to contact with said first-named fingers; and means adapted to oscillate said second fingers in

unison with the raising and lowering of said cylinder.

35. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed; of a suitable frame thus reciprocably supporting said bed; journal boxes on said frame supporting said cylinder above said bed; eccentric bushings in said boxes for thus supporting said cylinder; a drive shaft journaled in said frame; connections between said shaft and bed for reciprocating the latter; a sheet feeding conveyor including a table extending downwardly into one of the angles between said bed and cylinder; resilient fingers fixedly supported above said table and extending slightly beyond its lower edge; other fingers oscillatorily supported below said table and adapted in one position to contact with said first-named fingers and common operative connections between said shaft and both said eccentric bushings and said oscillatory fingers.

36. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed; of a suitable frame thus reciprocably supporting said bed; journal boxes on said frame supporting said cylinder above said bed; eccentric bushings in said boxes for thus supporting said cylinder; a drive shaft journaled in said frame; connections between said shaft and bed for reciprocating the latter; a sheet feeding conveyor including a table extending downwardly into one of the angles between said bed and cylinder; resilient fingers fixedly supported above said table and extending slightly beyond its lower edge; other fingers oscillatorily supported below said table and adapted in one position to contact with said first-named fingers; and common operative connections between said shaft and both said eccentric bushings and said oscillatory fingers, said last-named connections including a bell-crank, means for rocking the same from said shaft, links connecting said bell-crank with said bushings, said bell-crank being formed with a cam-face, and a rod interposed between the latter and the oscillatory support of said fingers.

37. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed; of a suitable frame thus reciprocably supporting said bed; journal boxes on said frame supporting said cylinder above said bed; eccentric bushings in said boxes for thus supporting said cylinder; a drive shaft journaled in said frame; connections between said shaft and bed, for reciprocating the latter; a sheet-feeding conveyor including a table extending downwardly into one of the angles between said bed and cylinder; resilient fingers fixedly supported above said table and extending slightly beyond its lower edge; other fingers oscillatorily supported below said table and adapted in one position to contact with said first-named fingers; and common operative connections between said shaft and both said eccentric bushings and said oscillatory fingers, said last-named connections including a cam on said shaft, a lever actuated by said cam, a bell-crank, links connecting said bell-crank with said bushings, another link connecting said bell-crank with said lever; said bell-crank being formed with a cam-face, and a rod interposed between the latter and the oscillatory support of said fingers.

38. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; of means for reciprocating said bed, said means including a movable member arranged and constructed to move in a direction reverse to that of the movement of said bed and having a momentum substantially equal to that of the latter, to provide a counter balancing effect.

39. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; of means for reciprocating said bed, said means including a rack on said bed, a geared movable member having a momentum substantially equal to that of said bed, and a pinion interposed between said rack and member, whereby said bed and member are caused to move in opposite directions and thereby produce a counterbalancing effect.

40. The combination with a printing couple comprising a reciprocable bed for carrying the form and a cylinder for carrying the sheet to be printed, said cylinder being intergeared with said bed; of means for reciprocating said bed, said means including a rack on said bed, an oscillatory member provided with a segmented gear and having a momentum substantially equal to that of said bed, and a pinion interposed between said rack and gear, whereby said bed and member are caused to move in opposite directions and thereby produce a counterbalancing effect.

Signed by me this 28th day of August, 1926.

HANS HONIGMANN.