

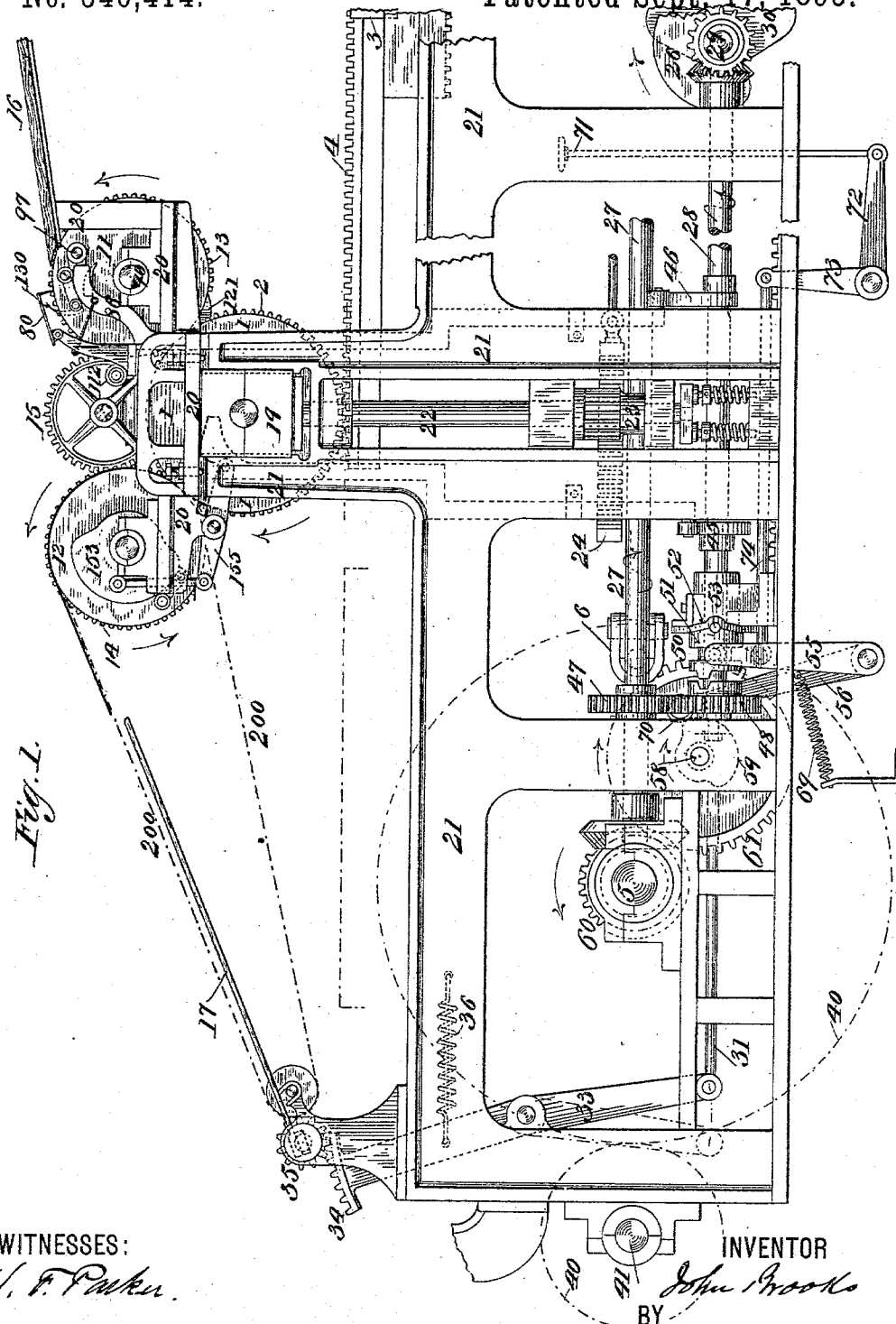
(No Model.)

5 Sheets—Sheet 1.

J. BROOKS.
PRINTING PRESS.

No. 546,414.

Patented Sept. 17, 1895.



WITNESSES:

H. P. Parker.

Chas. Hanimann

INVENTOR

John Brooks

BY

Chas M. Forbes

ATTORNEY

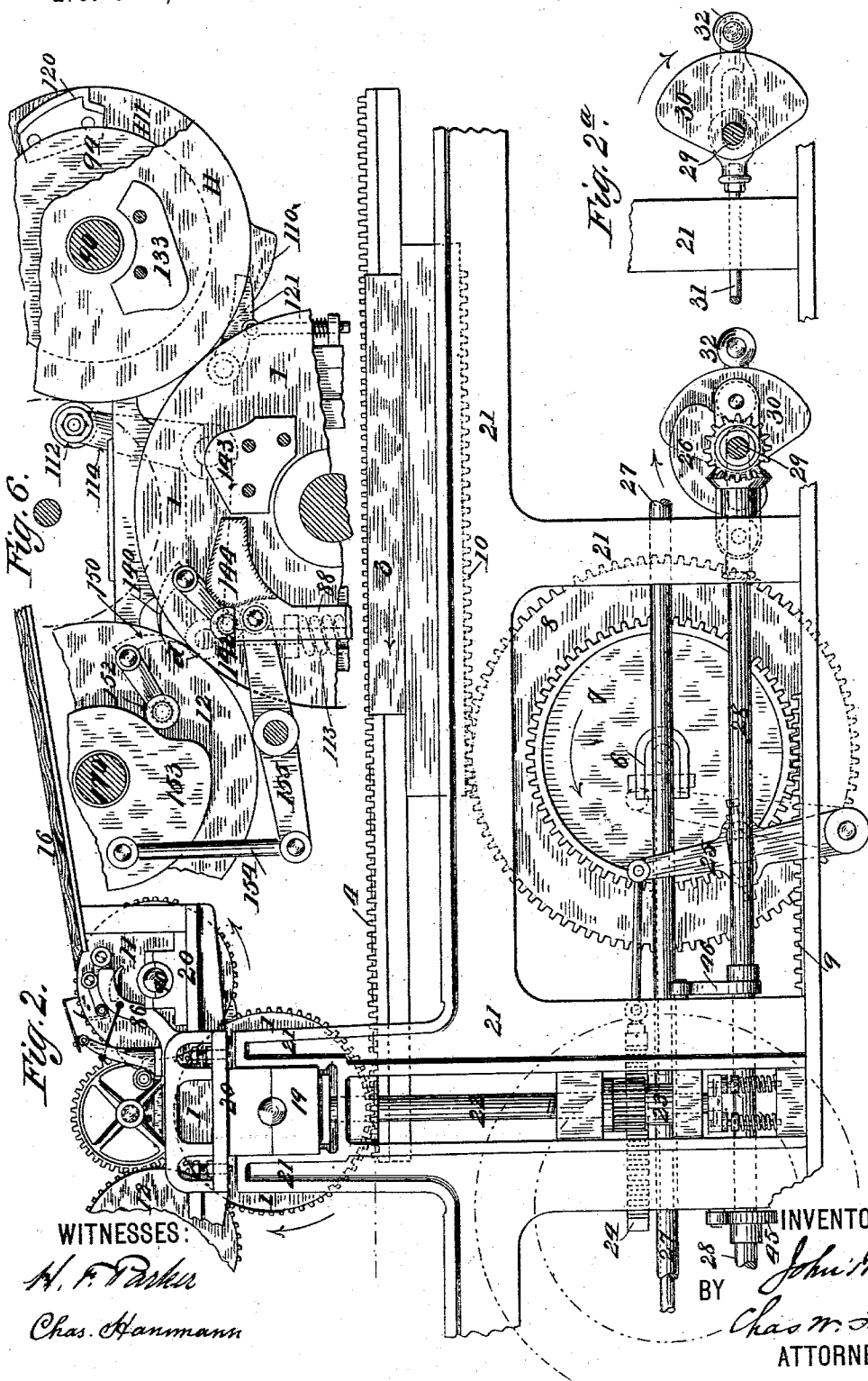
(No Model.)

5 Sheets—Sheet 2.

J. BROOKS.
PRINTING PRESS.

No. 546,414.

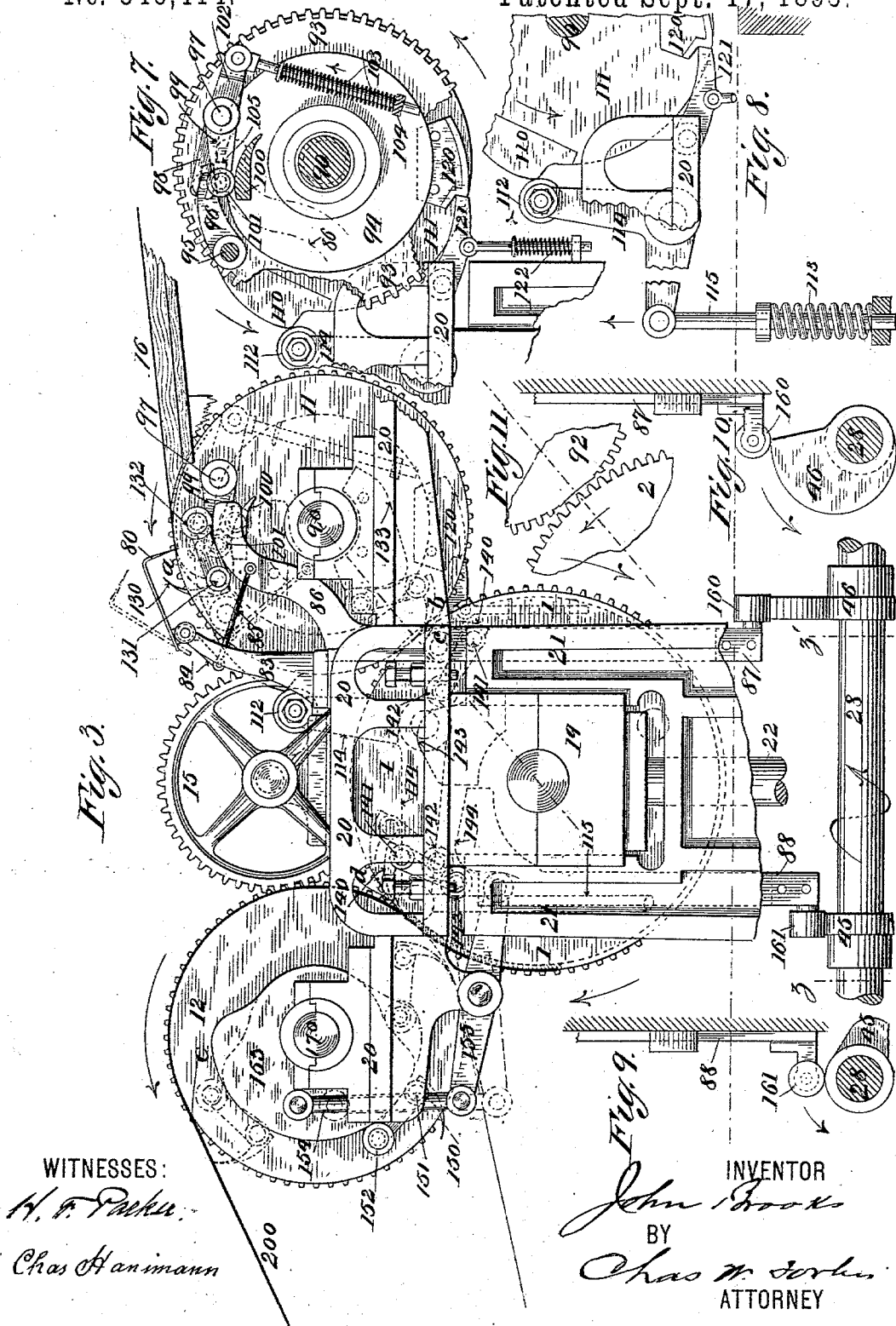
Patented Sept. 17, 1895.



J. BROOKS.
PRINTING PRESS.

No. 546,414.

Patented Sept. 17, 1895.



WITNESSES:

H. T. Parker.
Chas. Hanemann

INVENTOR

John Brooks

BY

Chas. M. Sorlin
ATTORNEY

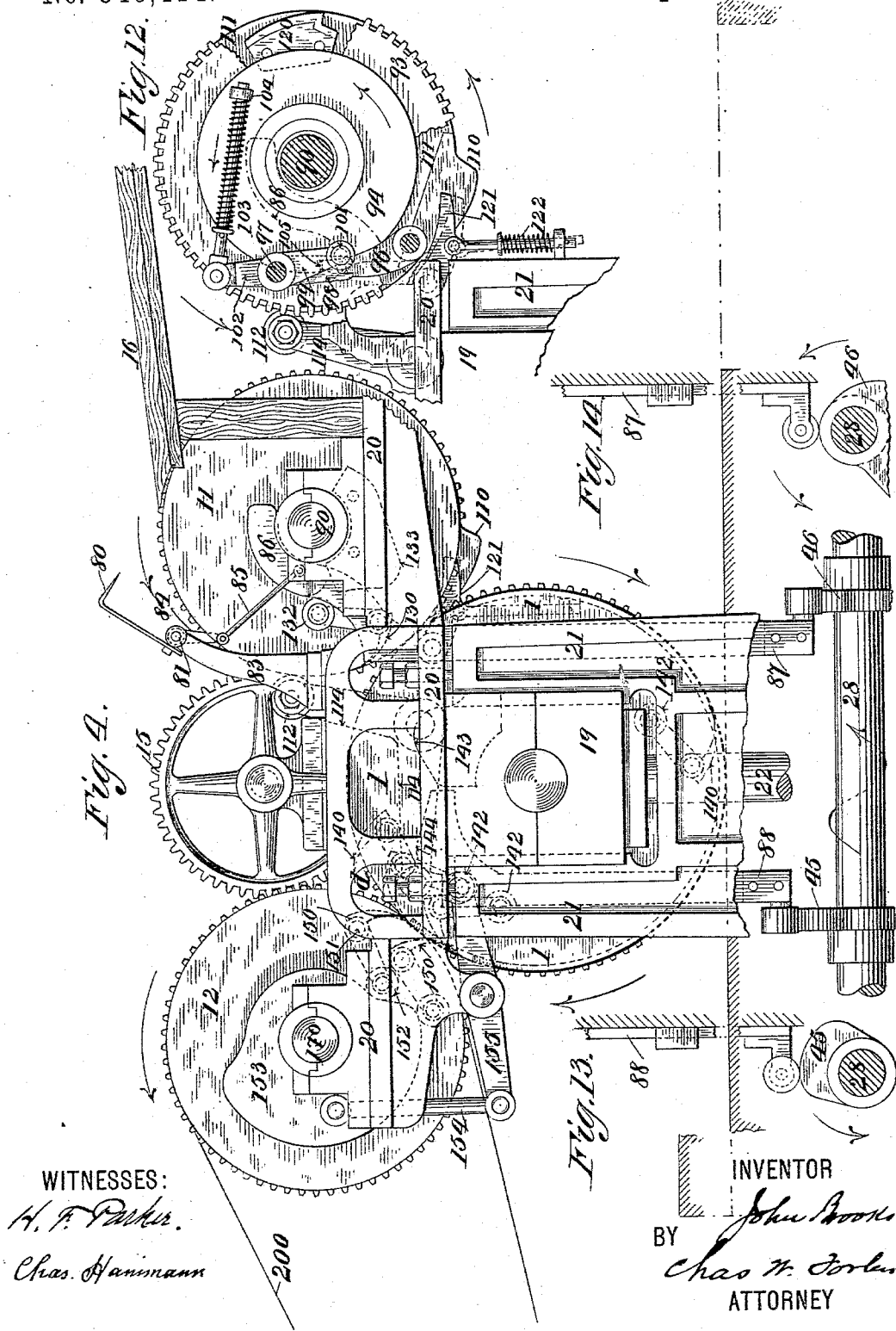
(No Model.)

5 Sheets—Sheet 4.

J. BROOKS.
PRINTING PRESS.

No. 546,414.

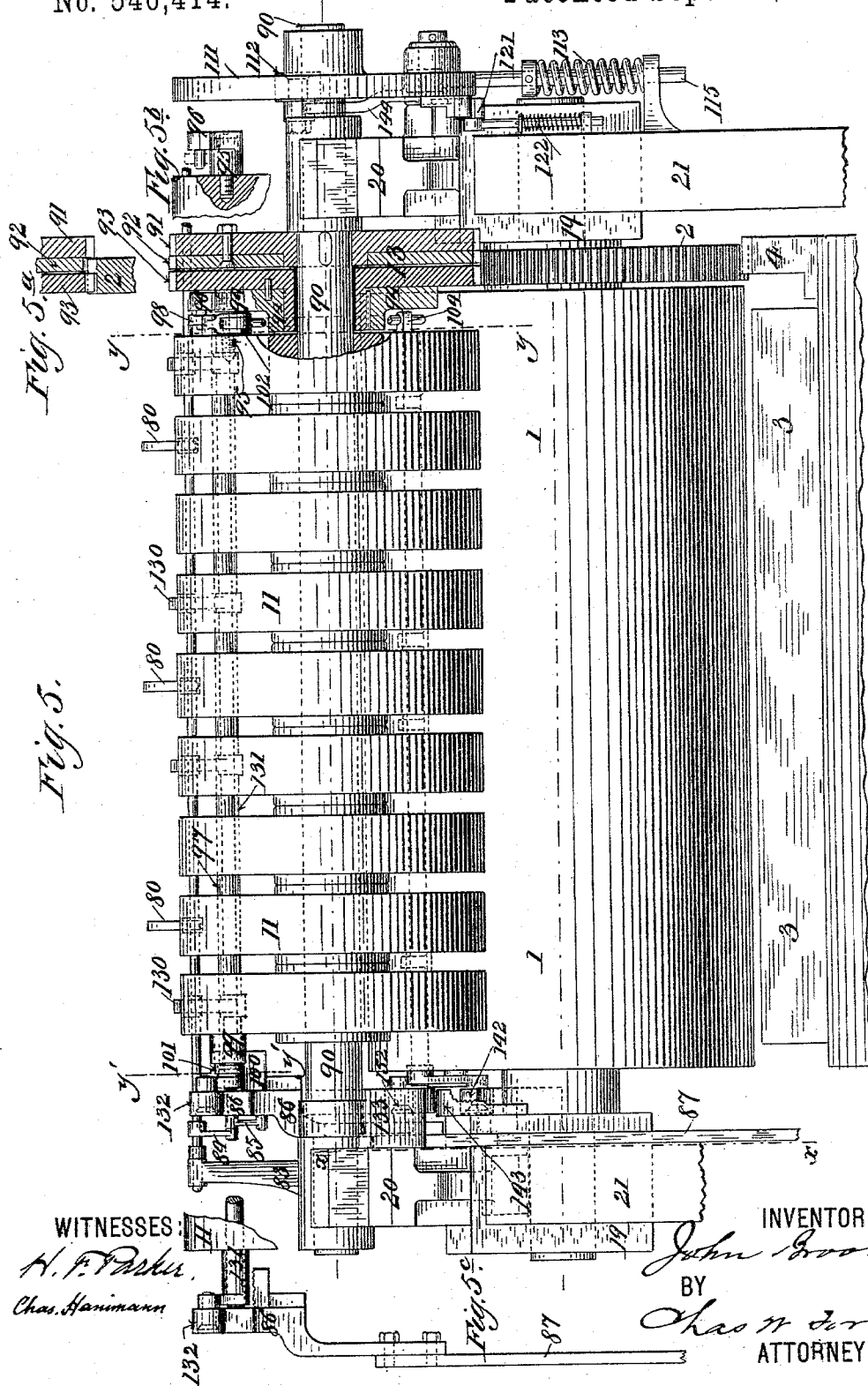
Patented Sept. 17, 1895.



5 Sheets—Sheet 5.

No. 546,414.

Patented Sept. 17, 1895.



ANDREW B. GRAHAM, PHOTO-LITHO, WASHINGTON, D.C.

UNITED STATES PATENT OFFICE.

JOHN BROOKS, OF PLAINFIELD, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE POTTER PRINTING PRESS COMPANY, OF SAME PLACE.

PRINTING-PRESS.

SPECIFICATION forming part of Letters Patent No. 546,414, dated September 17, 1895.

Application filed October 3, 1889. Serial No. 325,893. (No model.)

To all whom it may concern:

Be it known that I, JOHN BROOKS, a citizen of the United States, residing at Plainfield, in the county of Union, State of New Jersey, have invented certain new and useful Improvements in Printing-Presses, of which the following is a specification.

My invention relates to stop-cylinder presses. Its objects are to permit continuous oscillation of the impression-cylinder, to apply the stop-motion to small independent auxiliary cylinders in lieu of the impression-cylinder, and to time the release of such stop mechanism and the action of the gripper mechanism with proper relation to the movements of the form-bed and impression-cylinder irrespective of the will of the operator.

To these ends my invention consists, first, in both feeding and delivering the paper by means of auxiliary stop-cylinders operating in conjunction with an impression-cylinder, the gear whereof has permanent engagement with the rack of the bed; second, in an improved stop mechanism applicable to the feed or other cylinder of a stop-cylinder press; third, in certain improved gripper-operating mechanism, and, fourth, in a novel organization of the clutch mechanism through which the appliances for stopping or starting the feed-cylinder, for registering, transferring, or delivering the sheets, and for moving the impression-cylinder into or out of printing contact are actuated from the driving-shaft of the form-bed.

Referring to the accompanying drawings, in which similar letters and numerals of reference indicate corresponding parts throughout, Figure 1 is a partial side elevation of a machine embodying my invention; Fig. 2, a partial side elevation of the same, bringing into view certain portions not included in Fig. 1, and Fig. 2^a a detail view. Fig. 3 is an enlarged side elevation of the transferring-cylinders and impression-cylinder and connecting parts; Fig. 4, a similar view illustrating a different position; Fig. 5, a transverse sectional elevation of Fig. 3, and Figs. 5^a, 5^b, and 5^c detached views of portions of Fig. 5. Fig. 6 is an end view of the cylinders taken in a sectional plane *x x*, Fig. 5, being partly broken away to show portions at the opposite end of Fig.

5; and Fig. 7, a cross-section at *y y*, Fig. 5, except that the rock-arm 99 and cam 100 are shown in section at *y' y'*, the parts being in a position corresponding to Fig. 3. Fig. 8 is a sectional view similar to Fig. 7, in part. Figs. 9 and 10 are sectional detail views at *z* and *z'*, respectively, of the shaft 28 and cam thereon corresponding in position to Fig. 3. Fig. 11 is a detail view of adjacent portions of the impression and feeding cylinder gears. Fig. 12 is a similar view to Fig. 7, showing the parts in a position corresponding to Fig. 4. Figs. 13 and 14 are similar views to Figs. 9 and 10, corresponding in position to Fig. 4.

Referring to Figs. 1 and 2, 1 represents the impression-cylinder; 2, the gear thereon; 3, the form-bed, and 4 the rack attached to the form-bed, engaging with the said gear 2 of the impression-cylinder.

5 is the bed-driving shaft, driven through gears indicated at 40 from the counter driving-shaft 41 and bearing a crank from which motion is transmitted by a connecting-rod, of which 6 6 are the heads, to the reciprocating gears 7 8. The gear 7 rolls upon the stationary rack 9, and the gear 8 imparts the proper multiplied throw to the form-bed by means of the rack 10, such mechanism being well known to the art.

11 is the auxiliary feed-cylinder and 12 the auxiliary delivery-cylinder, which cylinders respectively transfer the paper from the feed-board 16 to the impression-cylinder 1 and from the impression-cylinder 1 to the flier 17.

The gear 2 of the impression-cylinder 1 drives a disconnective or loose section 93 of the gear 13 of the feed-cylinder 11. Motion is imparted through the intermediate gear 15 to the gear 14 of the delivery-cylinder 12, from the gear-section 91, fastened to the shaft 90, which turns with the cylinder 11, and an interrupted motion, hereinafter described as imparted to the cylinder 11 by engagement of the gear-section 93 therewith, is thereby also imparted to the cylinder 12.

The shafts of the impression and auxiliary cylinders 1 11 12 have journals in the vertically-movable frames 20, (see also Fig. 5,) the journal-boxes 19 fitting the guideways in the stationary side frames 21 of the press.

The vertical shafts 22, supporting the frames

20 at each side of the machine, rest upon rotary pinion-nuts 23, screw-threaded to said shafts. The reciprocation of the racks 24, received through the rock-arms 25 from the cams 26 at each side of the machine, effect the lowering or elevating of the frames 20, and the movement, therefore, of the impression-cylinder 1 into or out of printing-contact with the form, as common in practice.

27 is an auxiliary shaft of the press for driving the inking or other mechanism, said shaft being miter geared to the form-bed driving-shaft 5.

The shaft 28, together with the shaft 29, miter geared therewith, controls the feed-cylinder stop mechanism by means of cams 45 46, and the impression-cylinder elevating and lowering mechanism by means of the cam 26, and the flier for delivering the printed sheets 20 by means of the cam 30.

Fig. 2^a is a detail view of the flier-cam 30. As seen by an inspection of Figs. 1 and 2^a, the connecting-rod 31, which has a head straddling the shaft 29, bears the antifriction-roller 32, engaging with the cam 30, reciprocation being thereby transmitted at proper intervals to the flier through the arm 33, segment 34, and pinion 35, the spring 36 acting in co-operation with said cam 30. The shaft 28 receives its motion from the shaft 27 by means of the gear 47 and the loose gear 48, which loose gear imparts rotation to the shaft 28 by means of the clutch 50. The clutch 50 is of a construction corresponding to that referred to in a patent application filed by me March 16, 1889, Serial No. 303,594, being composed of a sliding collar 51, having clutch-teeth that interlock at a single point of revolution with the clutch-teeth on the hub of the gear 48, and having a stationary cam 52, into a depression whereof a pin 53 on the said collar enters at a definite point of rotation. The period of arrest of the parts driven by the shaft 28 is thereby determined when the clutch is released.

The clutch-shifting rock-arm 55 is rigid with relation to the rock-arm 56, and there is a clutch-shifting cam 59 upon a counter-shaft 58, rotated with specific relation to the shaft 5—say of one revolution for every two revolutions of said shaft 5—by means of gears 60 61. An antifriction-roller upon the rock-arm 56 is held in contact with the cam 59 by means of a spring 69. The clutch is thereby automatically released by the cam 59 or thrown into engagement by the said spring 69. The automatic engagement of the clutch 50 at the specified point of rotation may be prevented at will by the operator from his platform by means of the treadle 71, having connection with the rock-arm 55 through the rock-arms 72 73 and connecting-rod 74.

Referring now to the detail views, Figs. 3 to 14, inclusive, Fig. 3 illustrates the position of the mechanism when the auxiliary cylinders 11 12 are at rest, the gage 80 being lowered to determine the adjustment of the head of the sheet upon the feed-board 16 by the

operator. Fig. 4 illustrates the position of the mechanism during the act of impression, while the auxiliary cylinders 11 12 are in motion and at a period when the head of the sheet is seized by the grippers of the delivery-cylinder 12. The auxiliary cylinders 11 12 make two continuous revolutions corresponding with one printing operation and then stop during the return movement of the impression-cylinder and remain stationary, while the impression-cylinder continues to oscillate in its elevated position out of printing-contact and the ink is being applied to the form. The function of the cam 45, hereinbefore referred to, is to operate the grippers of the delivery-cylinder 12 at proper intervals and to co operate the grippers of the impression-cylinder in due relation therewith in transferring the head of the sheet. The function of the cam 46, also hereinbefore referred to, is to operate the grippers of the feed-cylinder 11 at proper intervals, both with relation to the registering-gage 80 and with relation to the grippers of the impression-cylinder, and also to control the stop-motion of the said cylinder 11 and its connected cylinder 12.

As seen in Fig. 5, the cylinder 11 is of skeleton construction, being composed of a series of flanges of minimum weight. The positions of the parts in Fig. 5 correspond to those in Fig. 3. The series of fingers composing the registering-gage 80 are fixed to a shaft 81 transverse to the machine, supported in brackets 83 upon the frame 20. The registering-gage is operated at proper intervals by means of its rock-arm 84, Figs. 3, 4, and 5, which is connected by a short rod 85 with the cam-head 86 of the cam-operated rod 87. The cylinder 11 is fixed to the shaft 90, Fig. 5, and the sections 91 92 of the gear 13 are also fixed to said shaft 90. The disconnective section 93, hereinbefore referred to, of the gear 13 is loose upon the shaft 90 and bears a ratchet-disk 94, rigidly fixed thereto.

95 is a pawl-bearing stud upon the end of the cylinder 11, bearing the pawl 96, whereby engagement is effected at intervals between the disk 94 and the said cylinder.

97 is a shaft extending through the cylinder 11, which bears the pawl-operating rock-arm 98 and the rock-arm 99, rigid therewith at its opposite end, which rock-arm 99 carries a friction-roller 101, acted upon by the pawl-operating cam 100, connected to the inner side of the cam-head 86 of the rod 87. The rock-arm 98 has a tail-piece 102, which is held upward by a spring 103, bearing on the abutment 104, projected also from the said end of the cylinder 11. The spring tends to engage the pawl 96 with a tooth 105 of the disk 94, and the cam 100 resists the same when raised. It is to be noted that the cam 100 and rock-arm 99, although located at the opposite side of the machine, are brought into view in Fig. 7 for convenience of reference. At the termination of a printing operation the cam 100 is raised, so as to release the pawl 96 from the

disk 94 before the latter and its gear are reversed in rotation. The said disk and gear are thereby left free to rotate to and fro in engagement with the gear of the impression-cylinder at all other times than during the printing operation, the reciprocation of the form-bed being continuous.

The section 92 of the gear 13 has a "mutilated" portion, as seen in Fig. 11, which lies stationary in a common radius with that of the gear 2 of the impression-cylinder when the machine is in a position corresponding with Figs. 3, 7, and 8, and the section 91, connected with the section 92 of the gear 13, is employed to mesh with the transmitting-gear 15, before referred to. The section 93 of the gear 13 and its ratchet-disk 94 has rotation to and fro in constant engagement with the impression-cylinder gear 2.

110 is a stop-cam upon the periphery of the disk 111, fixed to the cylinder-shaft 90. (See Figs. 7, 8, and 12.) The friction-roller 112 is held with constant pressure upon the periphery of the disk 111 by means of the spring 113 bearing on the right-angle lever 114. The momentum of the cylinder 11, as well as that of the connected cylinder 12, is overcome by abutment of the cam 110 upon the spring-roller 112 when the pawl 96 is released by the cam 100.

120 is a ratchet-tooth or abutment connected to the disk 111, and with which the locking pawl or stop 121 engages to prevent return movement of the cylinder 11, due to the pressure of the spring-roller 112 upon the cam 110. The locking-pawl 121 is pivoted to the frame 20, and is sustained by the spring 122.

Each cylinder 11, 1, and 12 is supplied with one set of grippers 130 140 150, respectively, the same being shown, however, in two or more successive positions by dotted lines in each instance, the cylinders rotating in the direction indicated by arrows while carrying the paper.

The grippers 130 140 150 are pivoted on their respective shafts 131 141 151, extending the length of the cylinders, such shafts being provided with the usual closing-springs. The said shafts 131 141 151 of the grippers are also provided with lifting-arms on the exterior of the cylinders bearing antifriction-rollers 132 142 152, respectively, which engage with the various gripper-opening cams as follows: As the machine approaches the position shown in Fig. 3, (as also in Fig. 7,) the curved upper surface of the cam-head 86, which is lifted by the cam 46, raises the gripper-roller 132, opening the grippers 130 at the point *a* preparatory to receiving the sheet. The descension of the cam-head 86 by rotation of the cam 46 and abrupt downward stroke of the friction-roller 160 of the rod 87 thereon quickly closes the grippers 130 to seize the head of the sheet at the point *a*.

It is to be here remarked that the movement as above described of the cam-head 86 simultaneously lifts the gage 80, as in Fig. 4,

to clear the sheet, and also drops the pawl 96 of the cylinder 11 into engagement with the tooth of the ratchet-disk 94, starting the cylinder 11 simultaneously with the seizure of the paper.

The cam 133, (see Fig. 6,) permanently fixed on the inner side of the frame 20, lies in the path of the roller 132, raising the grippers 130 at the point *b*, when opposite the grippers of the impression-cylinder, to permit the transferring of the sheet. The cam 143, (also clearly shown in Fig. 6,) which is permanently fixed to the journal-box 19 of the frame 20, engages the roller 142, raising the grippers 140 at the point *c*, opposite the point *b*, to receive and seize the head of the sheet released by the grippers 130.

The cam-head 144, Fig. 6, of the rod 88 is operated into and out of the path of the roller 142 at proper intervals by means of the cam 45, Figs. 3 and 4, on the shaft 28, which cam engages with the antifriction-roller 161, similar to the roller 160 of the rod 87. When the cam-head 144 is raised, as indicated in Fig. 6, the grippers 140 are opened at the point *d* to permit the second transferring of the sheet.

The cam 153 is loose upon the shaft 170 of the delivery-cylinder 12, and is oscillated at intervals to change its period of action on the grippers 150 by means of a connecting-rod 154 and lever 155, connected to the upper extremity of the rod 88. Normally the cam 153 remains in the position shown in Fig. 3 in order not to raise the grippers 150 at a time when they would abut upon the solid part of the impression-cylinder; but at intervals when such grippers come opposite and co-operate with the grippers 140 in the act of transferring the sheet, the cam 153 is advanced to the position shown in Fig. 6 and also by dotted lines in Fig. 3, at which the opening of the grippers 150 is delayed to the proper period to seize the head of the sheet at *d*. At *e* the grippers 150 are again opened by the rising surface of the cam 153, the same having resumed its normal position.

The operation is as follows: The machine being normally in the position shown by Figs. 1, 2, 3, and 7, time is afforded during the interval of stoppage of the feed-cylinder 11 and the elevation of the cylinder 1 out of printing-contact for the proper adjustment of the sheet against the registering-gage 80 and for one or more independent reciprocations of the bed to allow of the inking or other preparation of the type or other printing-surface. At the commencement or early part of the advance-stroke of the bed toward the impression-cylinder 1, the rotation of the bed-driving shaft 5 moves the cam 59 on the counter-shaft 58 in the direction of the arrow, closing the clutch 50, provided the treadle 71 is released. The cam 46, rotating and being at this time in the position of Fig. 10, causes the immediate descent of the rod 87 and the engagement of the pawl 96 of the feed-cylinder 11 with the ratchet-disk 94 of the gear-section

93. This starts the cylinder 11, shaft 90, and mutilated gear-section 92 thereon in coincidence with the gear-section 93, the ratchet-tooth 105 and the pawl 96 tallying at the moment the clutch 50 is caused to close by the cam 59. The gear-section 92, fixed to the cylinder-shaft 90, insures accuracy of registering the head of the sheet with relation to the impression-cylinder. The head of the sheet is thus timed to register in the grippers 140, and as the grippers 130 first come opposite the impression-cylinder the head of the sheet is transferred by agency of the cams 133 143 in the manner hereinbefore described. The cam 26 now causes the descent of the frame 20 to bring the cylinder 1 into printing-contact with the form, and the impression is made, as in Fig. 4. The cam 45 now raises the cam-head 144, as in Figs. 4 and 13, and rotates the cam 153, so that the transferring of the head of the sheet occurs between the grippers 140 150. The cam-head 144 is then dropped, as in Fig. 3, to avoid subsequent interference of the grippers 140 with the cylinder 12 when the latter is stationary, or interference of the grippers 150 with the surface of the impression-cylinder during the first revolution of said cylinder 12. It is to be observed here that the cylinders 1 11 have openings in their surfaces at such portions as will come opposite the grippers 130 or 140 during the stationary period of the cylinder 11 or during the second revolution of the latter, so as to clear the grippers. As the cam 46 approaches the completion of one rotation, the cam-head 86 is raised, so as to bring the cam 100 into the path of the roller 101 of the cylinder-pawl 96, stopping the cylinder 11 when the mutilated gear-section 92 comes opposite the gear of the impression-cylinder the second time. When the shaft 28 has completed its one rotation, the cam 59 releases the clutch 50, the stop-pin 53 arresting the cams 46, 26, and 30 at the proper point. The head of the sheet remains at the position indicated in Fig. 1 upon the conveying-belts 200, now at rest, and at the succeeding printing operation the sheet is advanced upon the flier 17 and delivered thereby to a suitable receiving-table.

By the use of my invention the strain upon the machinery incident to the employment of a stop mechanism applied directly to the impression-cylinder is avoided. The impression-cylinder being essentially heavy requires great resistance to overcome its momentum when released from engagement with the rack of the form-bed, as heretofore, and the accuracy required in the point of its arrest is difficult to maintain, due to the rapid wear of the stop mechanism when brought into heavy service. It is to be understood, however, that the stop mechanism herein is applicable to other than an auxiliary feed-cylinder, and is in itself a novel part of my invention. The sectional-gear 13 may be employed in conjunction with a substituted equivalent for the gear 2, such as a rack or segment.

Should it be desired to give more than one advance and return stroke to the form-bed during the intervals of printing, especially as in the instance of lithographic work, the gears 61 60 may be proportioned otherwise than shown—say of a ratio of three to one, respectively—whereby the cam 59 will cause the printing at every third advancement of the bed. Moreover a differential speed mechanism may be employed between the shafts 5 and 58, whereby differently proportioned sets of gears may be brought into use at will by means of a shifting-clutch or other device.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a printing machine, the combination of an impression cylinder, a co-acting form bed, a paper feeding cylinder having grippers for seizing the paper and delivering it direct to the impression cylinder and intermittent driving connections connecting said paper feeding cylinder with the impression cylinder, substantially as described.

2. The combination in a printing machine of a form bed reciprocating in its plane of impression, an oscillating impression cylinder, a paper feeding cylinder auxiliary to the impression cylinder, a paper delivering cylinder auxiliary to the impression cylinder operative in conjunction therewith and with the paper feeding cylinder and a stop motion mechanism for the feeding and delivering cylinders in the manner described.

3. The combination in a printing machine, of an oscillating impression cylinder and spur gear thereon, an auxiliary paper feeding cylinder, a mutilated tight gear section and a loose ratchet and companion gear section upon the shaft of the feeding cylinder, said gear sections engaging with the said spur gear, and a pawl upon the feed cylinder opposite the periphery of the said ratchet operative in the manner described.

4. The combination in a printing machine, of an oscillating impression cylinder and spur gear thereon, an auxiliary paper feeding cylinder having a tight mutilated gear section and a loose companion gear section engaging with the spur gear, an auxiliary paper delivering cylinder, a spur gear thereon, a transmitting gear, and a tight gear section of said feeding cylinder driving said transmitting gear.

5. The combination in a stop cylinder mechanism for a printing press of a driving spur gear (or equivalent) a mutilated tight gear section and a loose ratchet and companion gear section on the stop cylinder shaft, which gear sections engage with said spur gear, a pawl upon the cylinder opposite the periphery of the said ratchet, a pawl operating cam head independently movable, a circular cam disk fixed to the stop cylinder shaft bearing a projection, a spring retained roller opposite the periphery of the cam disk, a locking pawl pivoted to the frame of the machine, and a locking

pawl tooth attached to said disk or other part rigid with the stop cylinder, said parts all being co-operative in the manner set forth.

6. In a printing machine, the combination
5 of a form bed, an oscillating impression cylinder, an auxiliary feed cylinder, a stop motion mechanism substantially as described for the feed cylinder, a pawl and pawl operating cam head controlling the stop motion, a shaft and
10 cam thereon for operating said cam head, a clutch substantially as described, a shaft receiving motion from the driving shaft of the form bed and a cam thereon for operating the clutch to control the stop motion at intervals
15 in definite relation to the movements of the form bed and impression cylinder.

7. In a printing machine the combination with a form bed reciprocative in its plane of impression on a stationary frame, and an impression cylinder and auxiliary paper feeding and delivering cylinders journaled in conjunction therewith upon a frame movable perpendicularly to the said plane of impression.

8. The herein described organization of a printing press, consisting in the combination of a form bed, an oscillating impression cylinder having permanent driven connection therewith, auxiliary paper feeding and delivering cylinders to which the stop motion mechanism is applied, a movable cylinder journal frame and a lifting mechanism therefor, a pawl and pawl operating cam head controlling the stop motion, a shaft and cams thereon for
25 lifting the journal frame, and for operating the pawl cam head, a clutch having a single stop point, and a clutch operating cam geared in definite relation to the movement of the form bed and impression cylinder.

9. The combination in a printing press, of an oscillating impression cylinder having permanent driven connection with the form bed, an auxiliary paper feeding cylinder adjacent the impression cylinder and to which the stop motion is applied, grippers on said cylinders for seizing the paper, fixed cams for operating the gripper rollers of the respective cylinders to transfer the head of the sheet from one to the other of said cylinders, a cam head intercepting the path of the gripper roller of the feed cylinder as it approaches the stop point but independently movable to close the grippers of the feed cylinder simultaneously with the starting of the same, and a shaft and cam thereon for operating the said gripper cam head.

10. The combination in a printing press, of an oscillating impression cylinder having permanent driven connection with the form bed, an auxiliary paper feeding cylinder adjacent the impression cylinder and to which the stop motion is applied, grippers on said cylinders for seizing the paper, fixed cams or other mechanism for operating the gripper rollers of the respective cylinders to transfer the head of the sheet from one to the other of said cylinders, a cam head intercepting the path of

the gripper roller of the feed cylinder as it approaches the stop point but independently movable to close the grippers of the feed cylinder simultaneously with the starting of the same, a shaft and cam thereon for operating the said gripper cam head, a clutch connected to said shaft having a single stop point, and a clutch operating cam geared in definite relation to the movement of the form bed and impression cylinder.

11. The combination in a printing press, of an oscillating impression cylinder having permanent driven connection with the form bed, auxiliary paper feeding and delivering cylinders to which the stop motion mechanism is applied, grippers on said cylinders for seizing the paper, fixed cams for operating the gripper rollers of the feed and impression cylinders to transfer the head of the sheet from the one to the other thereof, a cam head intercepting the path of the gripper roller of the feed cylinder as it approaches the stop point but independently movable to close the grippers of the feed cylinder simultaneously with the starting of the same, a cam head independently movable to intercept or to clear the path of the gripper roller of the impression cylinder as the grippers thereon approach the point adjacent the delivering cylinder, a gripper operating cam rotative on the shaft of the delivering cylinder to vary the time of action of the grippers thereon and connected with the impression cylinder cam head to co-operate such action therewith in the manner specified, a shaft and cams thereon for operating the said cam heads, a clutch connected to the cam shaft having a single stop point, and a clutch operating cam geared in definite relation to the movement of the form bed and impression cylinder.

12. The combination with the feed table and feed cylinder, of the pivoted registering gage, the cam head for closing the feed cylinder grippers, and a connecting rod between the cam head and the pivoted registering gage (or a rock arm thereof) for the purposes set forth.

13. The combination in a printing machine, with a stop cylinder, and stop motion mechanism substantially as described, of a pawl operating cam head therefor, and a gripper operating cam head combined in one, and a shaft and cam thereon for operating the combined cam heads at definite intervals with relation to a driving shaft of the machine.

14. The combination with the stop cylinder, the pawl thereon and the loose ratchet disk of the stop motion mechanism, of the rock shaft 97, on the cylinder, the pawl operating arm 98, and spring sustained tail piece 102, thereof fixed to the rock shaft, and the independently movable cam head 100, and cam arm 99, also fixed to said rock shaft.

15. The combination in a printing machine of an impression cylinder oscillating continuously, and an auxiliary paper carrying cylinder moving intermittently in conjunction with

and transferring the sheet directly to the impression cylinder for the purposes described.

16. The combination in a printing machine of an impression cylinder oscillating continuously, and an auxiliary paper feeding cylinder, and an auxiliary paper delivering cylinder, both moving intermittently in conjunction with and transferring and receiving the sheet directly to and from the impression cylinder.

17. The combination in a printing machine of an impression cylinder and its gear, a form bed, a paper feeding cylinder having a loose gear in mesh with the impression cylinder gear and means for connecting the loose gear to the feeding cylinder whereby the two cylinders revolve together, substantially as described.

18. The combination in a printing machine, of a form bed, a driver, an impression cylinder and its gear in constant mesh with its driver, a paper feeding cylinder having a loose gear in mesh with the impression cylinder gear and means for connecting the loose gear to the feeding cylinder whereby the two cylinders revolve together, substantially as described.

19. The combination in a printing machine, of an impression cylinder with grippers and its gear, a form bed, a paper feeding cylinder with grippers having a loose gear in mesh with the impression cylinder gear, means for rendering the feeding cylinder grippers inoperative, and a connecting device connecting the loose gear to the feeding cylinder whereby the two cylinders revolve together, substantially as described.

20. The combination in a printing machine, of an impression cylinder and its gear, a form bed, a paper feeding cylinder having a loose gear in mesh with the impression cylinder gear, means for connecting the loose gear to the feeding cylinder, and raising and lowering mechanism for the impression cylinder, substantially as described.

21. The combination in a printing machine, of an impression cylinder and its gear, a form

bed, a paper feeding cylinder having a loose gear in mesh with the impression cylinder gear, means for connecting the loose gear with the feeding cylinder, and a delivery cylinder cooperating with the impression cylinder, substantially as described.

22. The combination in a printing machine, of an impression cylinder and its gear, a form bed, a paper feeding cylinder having a loose gear in mesh with the impression cylinder gear, means for connecting the loose gear with the feeding cylinder, a delivery cylinder cooperating with the impression cylinder and gear between said delivery cylinder and said feeding cylinder, substantially as described.

23. The combination in a printing machine, of an impression cylinder with grippers, a form bed, a paper feeding cylinder having grippers for seizing the paper and delivering it to the grippers of the impression cylinder, and a stop mechanism for the feeding cylinder, substantially as described.

24. The combination in a printing machine, of an impression cylinder, a form bed, a paper feeding cylinder, a delivery cylinder driven from the feeding cylinder, and a stop mechanism for the feeding cylinder, substantially as described.

25. The combination in a printing machine, of a cylinder having periods of rest, a disk having a stop cam carried with the cylinder, and a yielding roller bearing constantly upon said disk to cooperate with the cam to overcome the momentum of the cylinder, substantially as described.

26. The combination in a printing machine, of a cylinder having periods of rest, a stop cam carried with the cylinder, a yielding roller cooperating with the stop cam, an abutment also carried with the cylinder, and a movable stop coacting with said abutment to hold the cylinder against rearward movement, substantially as described.

JOHN BROOKS.

Witnesses:

CHAS. W. FORBES,
H. F. PARKER.