No. 704,124. Patented July 8, 1902.

W. SCOTT.

PRINTING PRESS.

(Application filed June 15, 1898.)

(No Model.) 4 Sheets—Sheet 1.

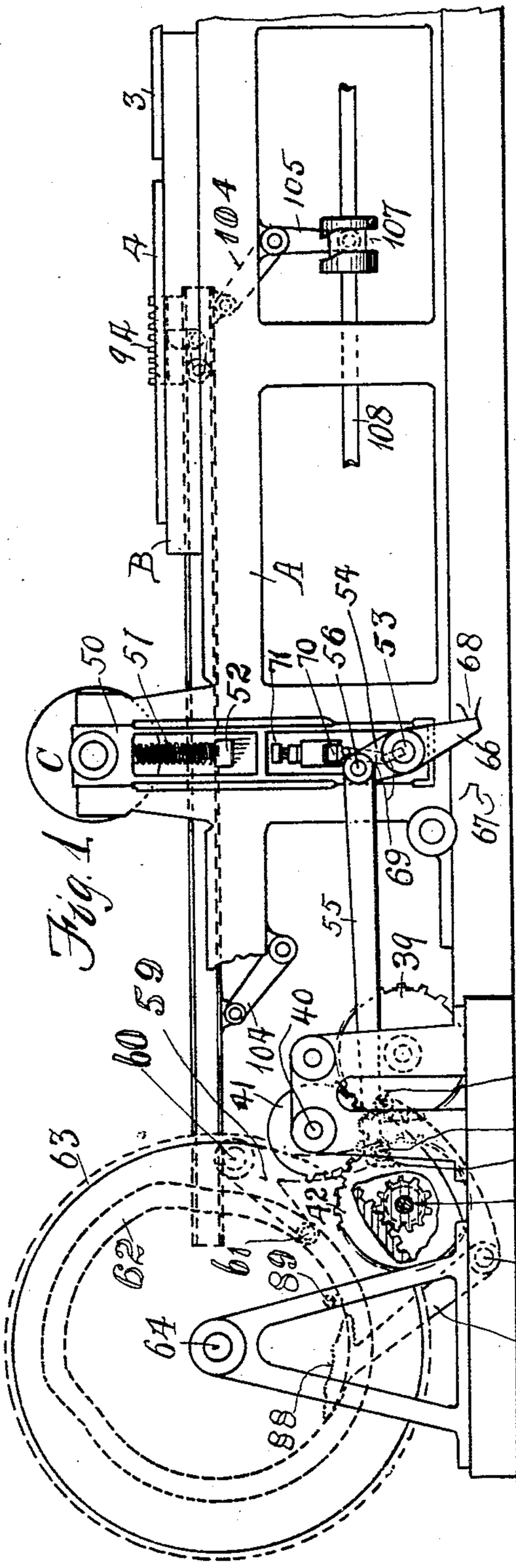

Fig. 1.

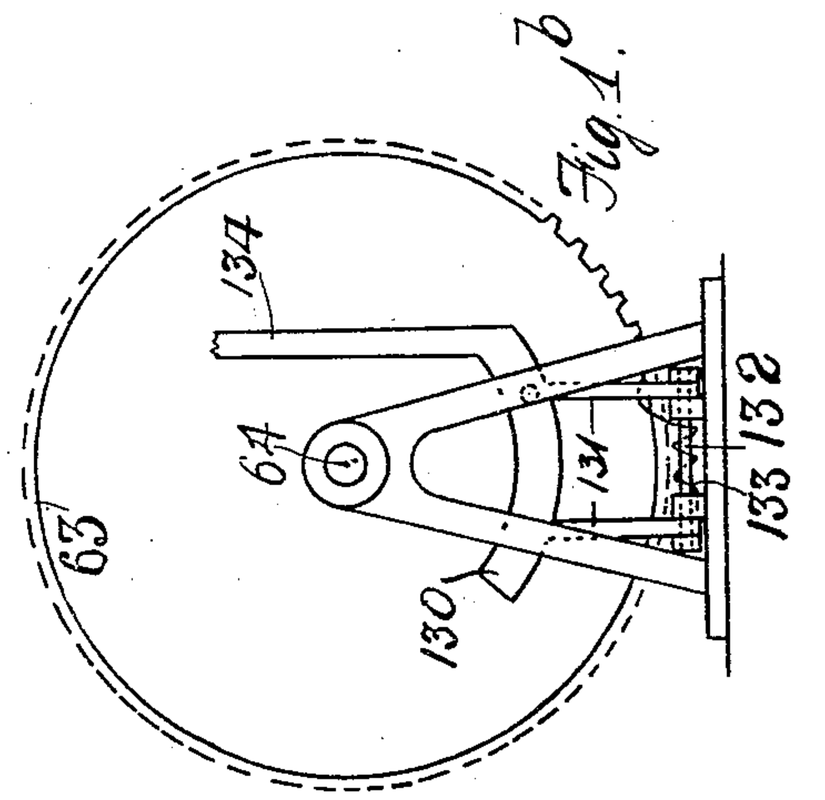

Fig. 1b

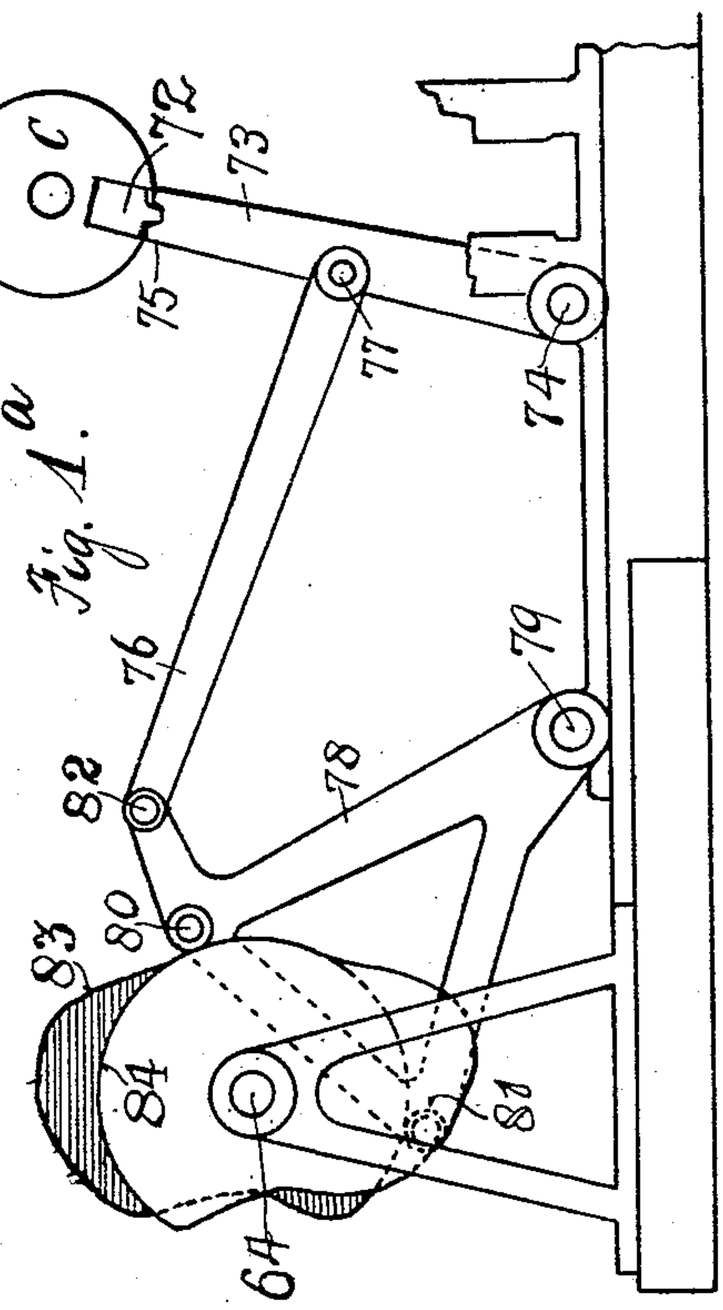

Fig. 1a

Witnesses
Geo. C. Fleming.
M. C. Clark

Inventor
Walter Scott,
By his Attorney
Richard W. Barkley.

No. 704,124. Patented July 8, 1902.

W. SCOTT.

PRINTING PRESS.

(Application filed June 15, 1898.)

(No Model.) 4 Sheets—Sheet 2.

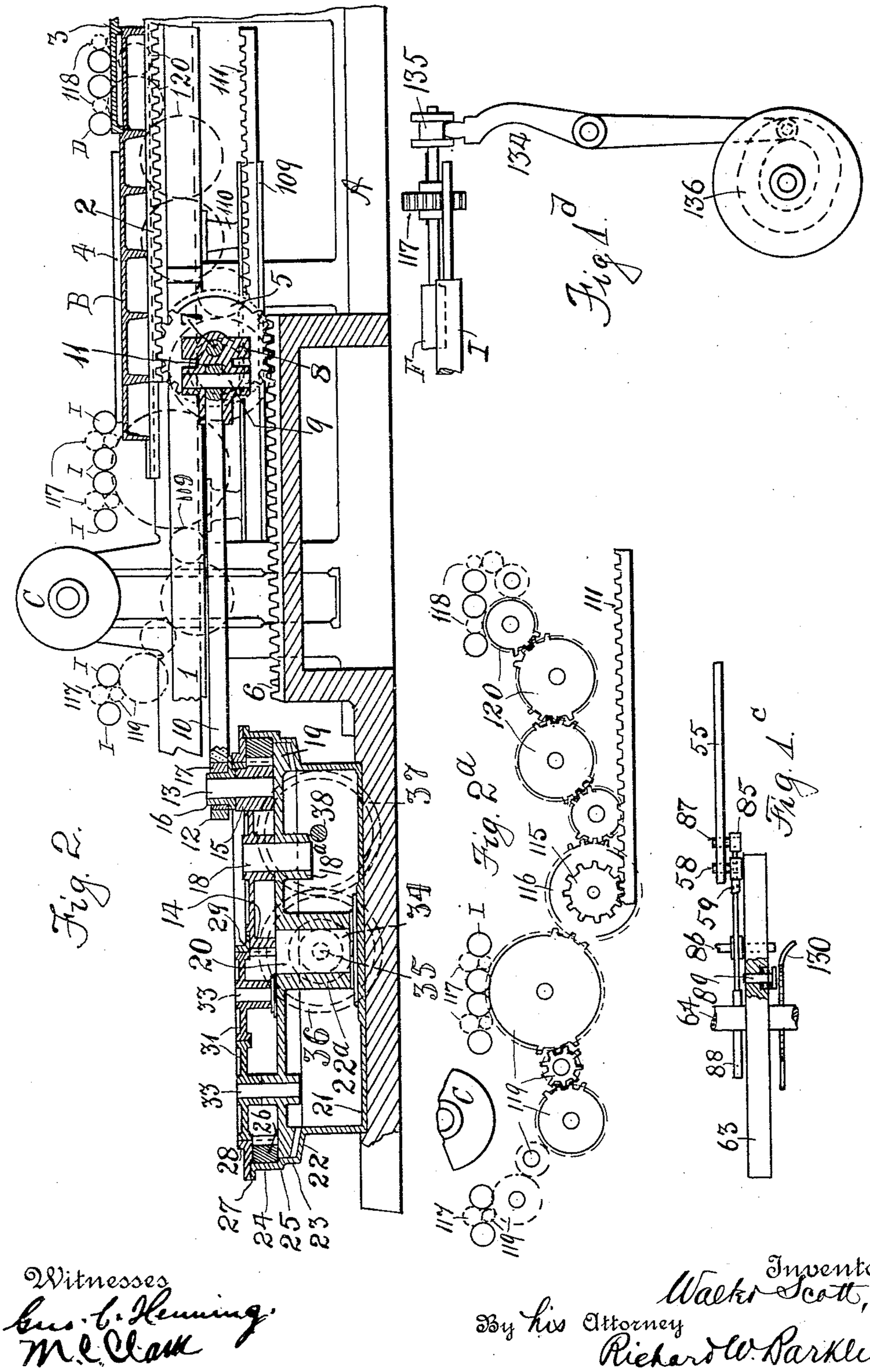

Fig. 2.

Fig. 2a.

Fig. 1c.

Witnesses
Geo. E. Hemming.
M. L. Clark

Inventor
Walter Scott,
By his Attorney
Richard W. Barkley.

No. 704,124. Patented July 8, 1902.

W. SCOTT.

PRINTING PRESS.

(Application filed June 15, 1898.)

(No Model.) 4 Sheets—Sheet 3.

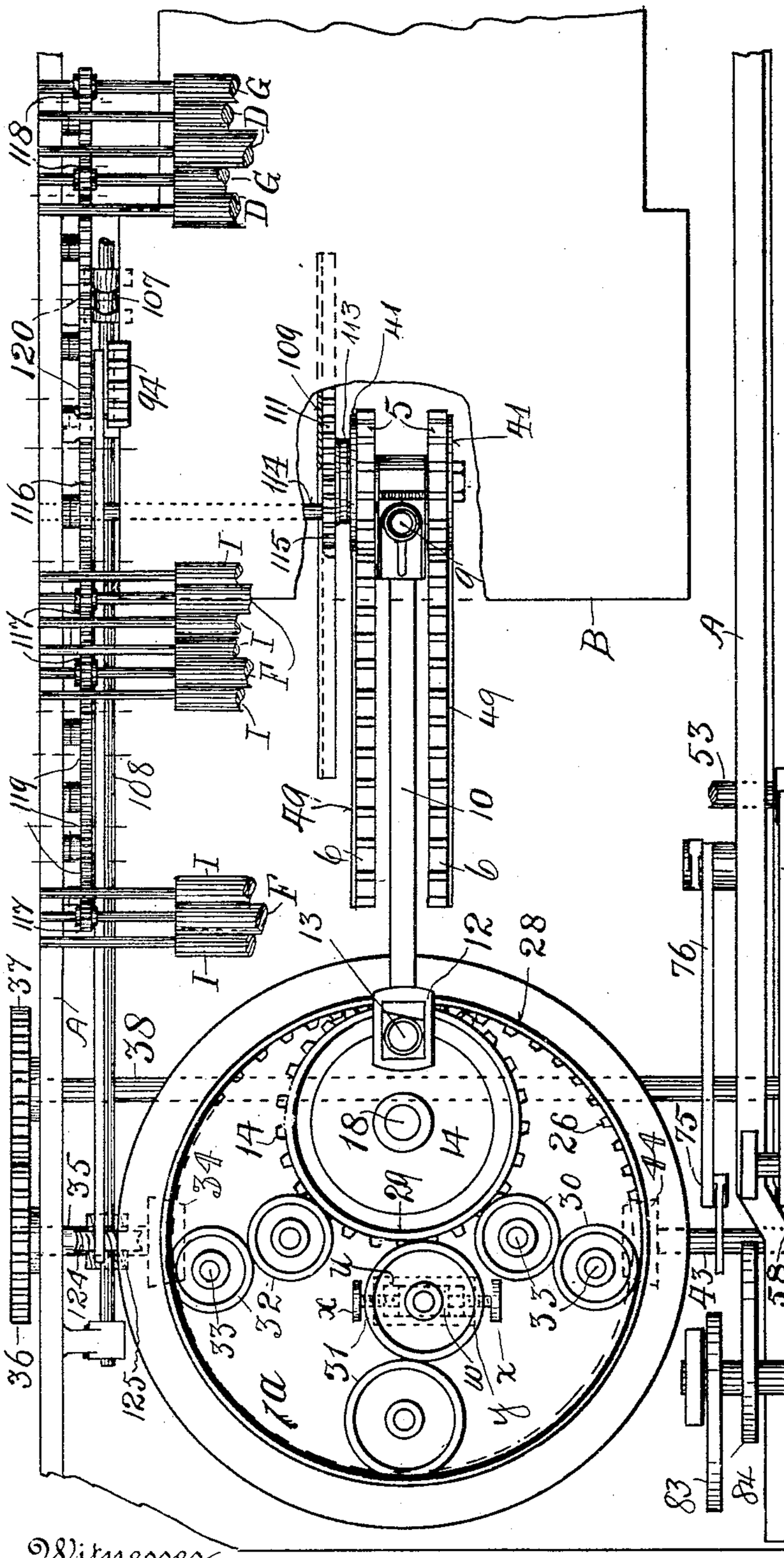

Fig. 3.

Witnesses
Geo. B. Fleming.
M. C. Clark

Inventor
Walter Scott,
By his Attorney
Richard C. Parkley.

No. 704,124. Patented July 8, 1902.

W. SCOTT.

PRINTING PRESS.

(Application filed June 15, 1898.)

(No Model.) 4 Sheets—Sheet 4.

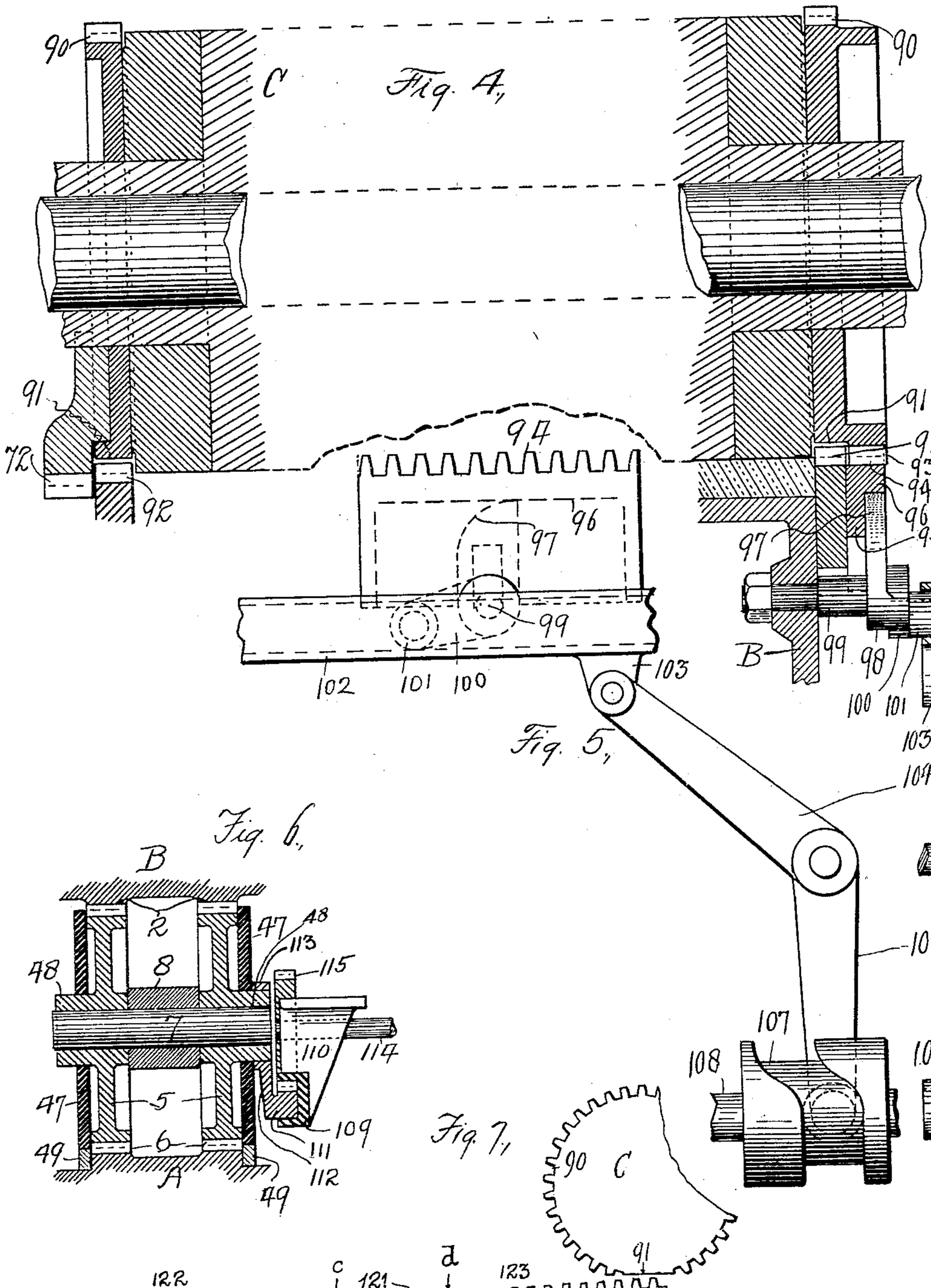

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

Witnesses
Frank Lyall
Paul Wiemp.

Inventor
Walter Scott,
By his Attorney
Richard W. Barkley.

UNITED STATES PATENT OFFICE.

WALTER SCOTT, OF PLAINFIELD, NEW JERSEY.

PRINTING-PRESS.

SPECIFICATION forming part of Letters Patent No. 704,124, dated July 8, 1902.

Application filed June 15, 1898. Serial No. 683,519. (No model.)

To all whom it may concern:

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

This invention relates, primarily, to means for giving a to-and-fro motion to the beds of cylinder printing-machines and for securing perfect register between the form and the paper on the cylinder; and it consists in features of construction, arrangements, and combinations of devices hereinafter described, and more particularly pointed out in the appended claims.

The preferred form of the invention is illustrated in the accompanying drawings, forming part of this specification, in which—

Figure 1 is a partial side elevation of a machine in which the invention is embodied. Fig. 1^a is a side view of cylinder starting and stopping mechanism. Fig. 1^b is a detail view of means for tripping the impression mechanism. Fig. 1^c is a plan view of part of the last-mentioned mechanism. Fig. 1^d is a view of mechanism for vibrating rollers. Fig. 2 is a central vertical longitudinal sectional view of the bed-motion and mechanism for rotating the inking and distributing rolls. Fig. 2^a is a view of gearing shown in Fig. 2. Fig. 3 is a partial plan view, certain parts being omitted to show the more clearly the bed-motion and ink-roller-driving mechanism. Fig. 4 is a longitudinal sectional view of the impression-cylinder and certain mechanism for operating the same. Fig. 5 is a side view of part of the devices shown in the last-named figure. Fig. 6 is a cross-section of the rolling gears and racks for driving the bed and showing also other parts. Fig. 7 is a side view of a modified form of bed-rack for coaction with a cylinder-gear.

In the description of the machine illustrated in the drawings the same reference character will be used to designate the same part.

Reference A marks a suitable framework, which comprises side frames and cross bars or frames and which is shown only in part.

B designates a type-bed, which runs upon suitable guides or ways 1, of which ways some only are shown in part. 2 indicates rack-bars connected to or formed integrally with the bed B at the under side thereof and which extend longitudinally thereof.

3 is an ink table or plate at one end of the bed B, and 4 a form on the bed.

The bed B is moved to and fro by rolling gears or pinions 5, which mesh with the racks 2 on the bed and with racks 6 on the fixed framework A. The gears 5 are mounted on a shaft 7, being fast thereto by preference, and this shaft is carried by a head 8, being journaled therein by preference. The head 8 is provided with a vertical bore, in which a shaft 9 is secured. The head 8 is slotted horizontally across the bore for shaft 9 for the reception of one end of a connecting-rod 10, by which the head and parts attached thereto are moved to and fro. The rod 10 has an eye 11 or other means whereby it is connected with the rod 9, and at its other end the rod 10 is provided with a box 12 for connecting it adjustably with an upright stud 13. The stud 13 is supported on and carried by a planet-pinion 14, the stud being free, preferably, to rotate in a bearing 15 on said pinion. A bushing 16 may be interposed between the stud or pin 13 and the brasses or antifriction metal 17 in said box 12, and said bushing may be provided with a flange at its lower end for resting upon the top of the bearing 15. The pinion 14 is journaled upon a stud 18, which is suitably secured in a bearing 18^a, formed in or borne by a carrier-gear, as a webbed bevel-pinion 19. The bevel-gear 19 turns upon an upright stud 20, secured to the bottom of a casing 21, which in turn is secured to the base of frame A. The gear 19 is provided with a sleeve 22^a for coaction with the stud 20. The casing 21 is circular in plan, and its walls are flared outwardly at 22 to provide a race or track upon which the teeth of the bevel-gear 19 may run and be supported. Outside of the bevel-gear 19 the walls of the casing are again cylindrical at 23 and 24, the cylindrical portion 24 being of greater diameter than the portion 23. Said cylindrical portions 23 24 are connected by a horizontal part 25 of the casing, the top of part 25 being flush with or just above the flat top of the gear 19. An internal gear 26 rests upon this part 25 and meshes with the pinion 14, which

latter is shown as having a pitch-circle one-half of the diameter of the like circle of the internal gear 26. Above the top of the gear 26 the casing is provided with a horizontal external flange 27. An externally-flanged bearing-ring 28 is jogged down over the flange 27, and the ring 28, the casing, and the gear 26 are secured together and to the frame A, so as to be stationary or motionless. The gear 14 has an internally-flanged ring 29 secured to its top, the external diameter of the ring 29 being equal to the diameter of the pitch-circle of the gear 14, while the internal diameter of the ring 28 is equal to the diameter of the pitch-circle of the gear 26. The gear 19 has three sets or pairs of bearing disks or wheels 30, 31, and 32, journaled on studs 33, secured to or borne by the gear 19. These pairs of wheels are so disposed that their axes and the axes of the gears are not in one straight line, thus providing for the adjustment of the wheels touching the rings 28 and 29 to take up any wear. For this purpose the gear 19 may be provided with slots *u* to receive the journal-boxes *w* of one or more of the wheels 30 31 32 and with frames *y* for the screws *x* for adjusting such boxes. The members of each set of bearing-disks coact with each other and with the inner surface of ring 28 and the outer surface of the ring 29. In this way the strains are transmitted to or are borne by the ring 28 and the casing 21 and not by the studs or journals of the gears 14 and 19. There is thus no tendency on the parts of these gears to twist or bend their journals or studs.

The bevel-gear 19 is driven by a bevel-gear 34, which is fast on a horizontal shaft 35, journaled in the framework of the machine. The shaft 35 is rotated by means of a pinion 36, fast on a shaft 38, journaled in and extending across the framework to the other side of the machine, where the shaft has a pinion 39 fast thereto. A shorter shaft 40, journaled in the framework, is provided with a fast pinion 41, which meshes with the pinion 39, and with a pinion 42, fast on a shaft 43, journaled in the frame A. The shaft 43 has fast thereto a bevel-gear 44, which meshes with the gear 19, preferably at a point diametrically opposite the pinion 34. It is understood, of course, that the casing 21 is cut away or recessed to allow the gears 34 and 44 to mesh with gear 19 and that the parts are so proportioned that the gears 34 and 44 have the same speed. By driving the gear 19 from gears placed symmetrically thereabout undue strain upon its pivot or stud 20 is avoided. The shaft 40 is provided with fast and loose pulleys 45 and 46 for use with a driving-belt. (Not shown.)

The points of the teeth of the pinions 5 are prevented from running on the bottoms of the kerfs of the racks 6 by means of the disks or wheels 41, which are secured upon the hubs 42 of the gears 5, and by the tracks or ways 49, which are parallel to the racks 6. The diameter of the disks 41 is preferably the same as the diameter of the pitch-circle of the equal gears 5. The tracks 43 may be integral with the frame A or they may be attached thereto.

In the particular case shown in the drawings the pin or post 13 is at all times within the pitch-circle of the gear 26. This is the preferred arrangement, however, for it allows of a comparatively shallow gearing for driving the bed, and so decreases the height of the machine. It is obvious, however, in so far as certain features of my invention are concerned that the post 13 could be arranged with its axis intersecting the pitch-circle of the gear 26 at right angles to the plane thereof, in which case it would, with the described proportions between the gears 14 and 26, move in a straight line across the gear 19 and there would be no need for the vertical pivot 9 for the rod 10. In the particular case shown, however, the pivot 13 does not move in a straight line across the gear 19, but in two curved lines, one of which lies on one side of that diameter of the gear 19 which is parallel with the direction of motion of the bed and the other of which lies on the other side of that diameter; also, in so far as certain features of my invention are concerned the post 13 when at its greatest distance from the center of gear 19 could be outside of the pitch-circle of the gear 26. In every case, however, the bed is easily, powerfully, and slowly started, and the motion increases to a maximum rate of speed and decreases to a slow, easy, and powerful stop as the pin 13, pivots 9 and 20 come into line with each other.

The shaft of the impression-cylinder C is journaled in suitable boxes in the slides 50, but one of which is shown. The cylinder C is held up by springs 51, which are interposed between studs 52 on the frame or screws in said studs and the top cross-pieces of the slides 50, as in Fig. 1. Near their lower ends the slides 50 have a rock-shaft 53 suitably journaled therein. The shaft 53 is provided with an arm 54, to which one end of a bar 55 is pivoted at 56, the other end of the bar 55 being provided with a gab-hook 57, adapted to engage over a pin 58 on a lever 59. The lever 59 is fulcrumed at 60 to the frame A and has an arm provided with an antifriction-roller or a stud 61, which works in a grooved cam 62. The cam 62 is formed in one face of a gear-wheel 63, carried by a shaft 64, which is journaled in the frame A. The gear 63 is driven by a gear 65 on the shaft 43, above named. The shaft 53 is provided with an arm 66, which is adapted to coact with two opposite stops 67 68 on the base of the frame A to limit the rocking motion of the shaft 53. At each side of the machine a toggle 69 connects the shaft 53 with an adjustable abutment 70 on the side frame. One member of each toggle is rigidly attached to the shaft 53, and the other member thereof bears pivotally at its end against the corre-

sponding abutment 70. The members of each toggle are suitably connected together. An adjustable stop 71 on the frame limits the downward motion of the slides 50.

The toggle mechanism above referred to for raising and lowering the impression-cylinder may be of any suitable construction—such, for example, as that shown and described in my Letters Patent of the United States, dated the 15th day of April, 1890, and bearing number 425,710.

The impression-cylinder is started and stopped by an independent starting and stopping mechanism of suitable construction—such, for instance, as that shown in my Letters Patent of the United States, granted October 3, 1893, and bearing number 505,961. The starting and stopping mechanism shown herein comprises a toothed segment 72, connected to the cylinder C; a starting and stopping bar 73, which is fulcrumed at 74 at one end to the frame A and whose other end is provided with a curved segmental rack 75, which is adapted to mesh with the curved rack 72; a link or connecting rod 76, which is pivoted at 77 to the arm or bar 73; a rocker bar or frame 78, which is pivoted to the frame A at 79 and is provided with two antifriction-rollers 80 81 and to which the rod 76 is pivoted at 82, and positive and negative cams 83 84, the positive cam coacting with the roller 81 and the negative cam with the roller 80 to move the frame 78 to and fro, said cams being fast on shaft 64 and being shaped to move the bar 73, as hereinafter described.

For the purpose of tripping the impression-cylinder means are provided for throwing the gab-hook 57 out of gear with the said pin 58. The particular means for this purpose, which are shown in the drawings, comprise a bent lever 85, fulcrumed at 86 on the frame A and provided at one end with a pin 87, which lies under the link 55 in position to raise the same, the cam 88 on the other end of the lever 85, said cam 88 being placed adjacent to the cam-gear 63, and a pin or stud 89, movable transversely of the gear 63 and so placed that it will when pushed out against the force of a returning spring come in contact with the cam 88 and depress that end of the lever 85 and raise the other end of said lever to cause the pin 87 to lift the bar 55 and free the hook 57 from the pin 58, whereupon the springs 51 raise the cylinder C. The weight of link or rod 55 when that rod bears on the pin 87 suffices to move the lever 85 on its fulcrum 86 to lower the hook 57 into the path of the pin 58 and so to reëngage the pin 58 and hook 57. The pin 89 is operated by a suitable lever mechanism and cam, as by a cam 130, carried by arms 131 of a rock-shaft 132, a spring 133 moving the cam 130 away from the gear 63 and a lever 134 moving it toward the gear.

The cylinder C is provided with spur-pinions 90 at the ends thereof, which pinions are mutilated or have certain teeth removed in whole and in part at 91, and the bed B is provided with racks 92 for intergearing with the pinions 90 to drive the cylinder. When the pinions 90 are in that position thereof which brings the mutilated portions thereof underneath, the racks 92 are clear of the gears and may move back and forth freely without moving the cylinder C, it being assumed that the cylinder starting and stopping mechanism hereinbefore referred to is inactive or inoperative. During the normal operation of the machine the cylinder C makes two complete revolutions to each forward or printing stroke of the bed B. For the purpose of carrying the cylinder C over from the first to the second revolution in such case a toothed segment or sector 93 is connected to the cylinder C at one end thereof and opposite or alongside the mutilation 91 of the gear 90 at that end of the cylinder C, and an up-and-down movable short section of straight rack 94 is provided and guided on that side of the bed B adjacent the segment 93, said rack 94 being alongside the corresponding rack 92 and at the central section of the bed B. This rack 94 may be raised and lowered in so far as certain features of my invention are concerned by any suitable means, or the rack 94 and operating parts may be wholly omitted and the cylinder C be carried over from the first to the second revolution thereof by any other suitable means—such, for example, as are claimed in my said Letters Patent, dated October 3, 1893. Referring to the drawings, the rack 94 is formed at the top edge of a plate 95, with which the lifting toe or cam 97 coacts underneath. The cam 97 is preferably so shaped or curved that it lifts the rack 94 and allows it to fall of its own weight as the cam moves from under it. The cam 97 is carried by a sleeve 98, which is loose or pivoted on a stud 99, secured to the side of the bed B. The sleeve 98 is also provided with an arm 100, which has an antifriction-roller 101, loosely mounted on a crank-pin on said arm. The roller 101 works in a channeled bar 102, which lies parallel to the direction of motion of the bed B and is provided with lugs 103 near the ends thereof. These lugs are shown underneath the bar 102 and are pivotally connected with bars or arms 104, which in turn are pivotally connected to the frame A and are of equal lengths between said pivots, thus providing a parallel motion for the bar 100. One of the bars 104 is provided with an extension 105, and this is provided with an antifriction-roller 106 at its free end. The roller 106 is engaged by a closed cam 107, fast on a rotatory shaft 108, which extends longitudinally of the machine and is driven as hereinafter described. The cam 107 swings the arm 105 to and fro in the direction of the length of the machine, the pivots of the arms 104 105 being horizontal and transverse of the machine and so causes the bar 102 to be raised and lowered. The bar 102 through the described connections causes the rack-plate 94

to be raised, and the weight of the plate brings it down whenever the cam 97 is rocked downwardly by the raising up of the bar 102, or the rack 94 may be moved up and down positively, as by replacing the cam 97 by an arm and link pivotally connected to each other and the link being similarly connected with the rack 94 to lift and lower the same in a manner similar to that in which the carrying-over rack in my Letters Patent No. 505,961 is raised and lowered.

The form on the bed may be lithographic, letter-press, or other, and ink is conveyed to said form 4 by means of inking-rollers I, distributing-rollers D, ink-table E, (the fountain and ductor roller are not shown,) and the vibratory rollers F G. The vibratory rolls F G are moved endwise (vibrated) to and fro by any usual or suitable means (not shown) and are oscillated, preferably, by the following means: The frame A has a channeled guide-bar 109 fastened thereto, as by brackets 110, said channel-bar 109 being adjacent and parallel to the path in which the gears 5 reciprocate. A rack-bar 111 is mounted in the bar 109 and is moved to and fro endwise by the carriage-driving mechanism, to which it is connected by means of an arm 112, having an eye 113, fitting over the hub 48 of the nearest pinion 5. A transverse shaft 114, journaled in the frame A, extends near and over the rack-bar 111 and is there provided with a pinion 115, which meshes with the rack 111, the channel-bar 109 being suitably recessed or cut away to allow of the pinion intergearing with the rack. Near its other end the shaft 114 is provided with a spur-gear 116. The vibratory rolls F G are provided with spur-gears 117 118, which are driven from the oscillatory gear 116 by the trains of gears 119 120. The gears 117 118 are splined, Fig. 1[d], or otherwise attached to the shafts of the rolls F G, so as to allow these rolls to move to and fro endwise independently of the gears, which are so mounted in the frame of the machine as to have oscillatory motion only. Any ordinary means for moving the rollers F G endwise to vibrate them may be used, such as lever 134, which engages with a grooved collar 135 on the shaft of the roller and with a cam, as 136, on a rotating shaft, or gears 117 118 are fast to their shafts and are of a width sufficient to permit of the endwise movement of the shafts and the rolls without disengaging these gears from those with which they mesh and by which they are driven. The rolls F G are thus given an oscillatory motion and in turn drive the ink and distributing rolls I D correspondingly. The ink being spread on the table E by the rolls D is transferred by the table to the form-rolls I in front of and behind the cylinder C, and by these rolls I is transferred to the form 4. In so far as the driving of the rolls D F G I is concerned the rack-bar 111 is a prime mover from which they are driven or oscillated, whereby the type-bed is relieved of the duty of rotating said rolls. When printing from stone or aluminium by lithographic process, damping-rolls replace one set of inking-rolls, so as to dampen the printing-surface after an impression has been taken therefrom and before it is reinked.

For the purpose of perfecting the register and avoiding or preventing lost motion between the type-bed and the impression-cylinder the racks 92 are preferably formed as shown in Fig. 7—that is, the racks 121 are straight for a distance or length equal to the travel of the cylinder while down—*i. e.*, from *c* to *d*—and are bent upward at the end 122 thereof, which meshes with the gears 90 at the commencement of the forward or printing strokes of the bed B. The amount of the rise of the pitch-line of the rack 121 is equal, preferably, to the lift of the cylinder or the amount of the up-and-down motion of the cylinder. If desired, both ends 122 123 of the rack 121 may be bent up, and the bent-up ends may be straight or curved, according to the speeds of the bed and the cylinder in rising and falling.

Assuming that the parts are in the positions shown in Figs. 1, 2, and 3, their positions at the beginning of a printing-stroke of the bed, the operation of the parts is as follows: The fast pulley 45 drives the shaft 40, and this shaft, acting through the gears 41 42, shaft 43, pinions 65 63, shaft 64, and cams 83 84, operates the cylinder-starting mechanism, as lever 78, rod 76, lever 73, and toothed segment 72, and starts the cylinder to rotating, the directions of motion of the parts at this time being indicated by the arrows. At the same time the shaft 43 through the bevel-gear 44 and the shaft 40 through the pinions 41 39 drive the gear 19 in the direction indicated in Fig. 3 by the arrow *a*. The cylinder-lowering mechanism is operated by the cam 62 to lower the cylinder against the force of the springs 51 into position for its gears 90 and segment 93 to coact with the racks 92 94, the cylinder being started to rotate, as above stated, in order to bring the toothed portions of the gears 90 into mesh with the racks 92, after which the gear-segment 72 rolls out of mesh with the teeth 75 of the starting-arm 73. The rotation of gear 19 carries the pinion 14 along with it, and the engagement of the teeth of gear 14 with the teeth of the fixed internal gear 26 rotates the gear 14 and moves the stud or post 13 toward and to one side of the center of the gear 19, so that by the time the gear 19 has made one-quarter of a turn the stud 13 is at a distance from the center of the gear equal to its own distance from the pitch-circle of the gear 14, and by the time the gear 19 has made a half-turn the stud 13 is again at its farthest distance from the axis of the gear 19, but in a position diametrically opposite from its position in Fig. 3. During the movement of the stud from the position thereof shown in Fig. 3 to

its diametrically opposite position the rod 10, gears 5, and racks 2 6 start the bed with an increasing motion, which reaches its maximum when the gear has made a half-turn, after which the said motion decreases to nothing as the gear 14 completes its turn or the stud 13 reaches a point diametrically opposite its position in Fig. 3. As the gear 19 moves the pinion back to the position thereof shown in Fig. 3 the bed is moved back to the position thereof shown in Figs. 1, 2, and 3, as will be understood. During the forward stroke of the bed the vibratory distributing-rolls F G are driven continuously in the direction of the arrows *b* by the gears or pinions 117 118 119 120, the pinion 116, shaft 114, gear 115, and rack 111, the last being moved along by the bed-driving mechanism. Also during this stroke of the bed the cylinder makes two complete turns or revolutions, the rack 94 being raised by the cam 107, the levers 104 105, channel-bar 102, and cam 97 into position for coaction with the segment 93 to carry the cylinder C over from the first to the second revolution thereof, when the cut-away parts of the gears 90 are underneath the cylinder and over the racks 92. The cams 83 84 are so shaped and so placed that through the lever 78 and rod 76 the arm 73 is moved to the left in Fig. 1 far enough to be in position to roll into mesh with the toothed segment 72 and bring the cylinder C to rest at the completion of its second revolution. During the return stroke of the bed B the cylinder starting and stopping mechanism and the raising and lowering mechanism are motionless, their operating-levers 59 and 78 coacting at this time with the "dwells" of the cams 62 and 83 84. Also at this time the cam 107 (whose shaft 108 is provided with a worm-gear 124, driven by a worm 125 on the shaft 35) has operated the arm 105 and connections to the cam 97 to allow the rack-section 94 to move down so that it will pass below the segment 93. During the return stroke of the bed the rolls F G are driven by the prime mover or rack 111 and the described gearing interposed between and connecting the said prime mover and the rolls F G, and these rolls F G drive the rollers D I by frictional contact in the direction the opposite to that in which they were driven during the forward stroke of the bed. Thus it will be seen that the bar 111 moves to and fro with the rolling gears 5 and the type-bed B and that the rollers D F G I are driven by the rack-bar 111, thus reversing their rotation in unison with the reciprocation of the type-bed B.

Obviously the stud 20 may be omitted and the gear 19 may revolve on the track 22, or it may fill the lower part of the casing and be supported thereby and by track 22 also. Many other changes may be made in parts and elements of combinations without departing from the spirit of my invention, which is not, therefore, limited to the form thereof shown in the drawings and hereinbefore described.

No claim is made herein to any combination drawn upon the mechanism shown in the drawings and above described for operating the inking-rollers I and distributing-rollers D, nor to the arrangement of the inking or form rollers at each side of the impression-cylinder and taking ink from one and the same ink table or plate, for the said subject-matter forms the basis of claims in my pending application for Letters Patent of the United States filed April 27, 1901, Serial No. 57,739, which application is a division of this application. I do not, therefore, abandon or dedicate to the public any part of the inking mechanism herein shown and above described, but claim the same in said divisional application.

What I claim herein, and desire to secure by Letters Patent of the United States, is—

1. The combination of a horizontally-disposed rotatory gear, a plurality of gears meshing therewith to drive the same, a planet-gear journaled thereon, a fixed gear meshing with and rotating the planet-gear, a reciprocatory bed connected with and operated by the planet-gear, and a casing surrounding the first-named gear.

2. The combination of a horizontally-disposed rotatory webbed gear, gears meshing therewith at opposite points thereof for driving the same, a planet-gear journaled on the first-named gear, a fixed gear meshing with and rotating the planet-gear, a reciprocatory bed connected with and operated by the planet-gear, and a casing surrounding the first-named gear.

3. The combination of a rotatory gear, means for driving it, a planet-gear journaled on said gear, a fixed internal gear meshing with said planet-gear, a casing surrounding the first-named gear and to which the said internal gear is fixed, bearers on the said fixed, planet, and first-named gears for transmitting the pressures to said casing, and a reciprocating bed connected with and operated by said planet-gear.

4. The combination of a bevel-gear, means for driving it, a planet-gear journaled on said gear, a fixed internal gear meshing with the planet-gear, a casing surrounding the first-named gear and to which the internal gear is fixed, bearers on said fixed, planet and bevel gears for transmitting pressures to the casing, and a reciprocatory bed connected to and driven by said planet-gear.

5. The combination of a fixed casing provided with a flaring race or track, a bevel-gear within said casing and having its teeth bearing on said raceway or track, a planet-gear journaled on said bevel-gear, an internal gear fixed to said casing and meshing with said planet-gear, a to-and-fro movable bed, and mechanism intermediate and connecting said planet-gear and said bed.

6. The combination of a fixed casing provided with a flaring ring, a bevel-gear within the casing and having its teeth above said flaring ring, bevel-gears at opposite sides of said casing passing through openings therein and driving said first-named bevel-gear, a planet-gear connected to said first-named bevel-gear, an internal gear meshing with said planet-gear and fixed to said casing, and a reciprocatory bed connected to and driven by said planet-gear.

7. The combination of a driven bevel-gear, a bevel-gear for driving it, a spur-gear journaled on said driven bevel-gear eccentrically thereof, an internal gear meshing with said spur-gear, a fixed casing inclosing said driven bevel-gear and said spur and internal gears, a bearing-ring, said ring, casing and internal gear being fast together, a bearing-ring fast on said spur-gear and coacting with said first-named bearing-ring, bearing-wheels journaled on the driven bevel-gear and coacting with said bearing-rings, and a bed connected with said spur-gear and driven thereby.

8. The combination of a reciprocatory bed, a rack thereunder, a rolling gear meshing with said rack and with a fixed rack on the frame, a head pivotally connected with the horizontal axis of said gear, a vertical pivot on said head, a rod connected with said vertical pivot, a planet-gear having a vertical axis and provided with a stud or post to which said rod is pivotally connected, and a fixed gear meshing with said planet-gear.

9. The combination of a casing provided with a flaring part and with a cylindrical portion above said part and with a shoulder or offset above said cylindrical portion and with a flanged cylindrical part above said shoulder, a webbed bevel-gear within said casing and having its teeth over said flaring part and its top flush with or below said shoulder, an internal gear secured in said casing and resting on said shoulder, a spur-gear journaled on said bevel-gear eccentrically thereof and meshing with said internal gear, bearing-rings on said internal and said spur gears, and bearing-wheels journaled on said bevel-gear and coacting with said rings, with means for driving said bevel-gear.

10. The combination of a reciprocatory bed, a casing having a flaring ring with a cylindrical part above said ring and a shoulder or flange above said cylindrical part and a flanged cylindrical top above said shoulder, a webbed bevel-gear within said casing with its teeth above said flaring ring and its top flush with or below said shoulder, an internal gear fast to said casing and resting on said shoulder, a spur-gear journaled on said bevel-gear eccentrically thereof and meshing with said internal gear, driving bevel-gears symmetrically placed about said casing and engaging with the first-named bevel-gear through openings in said casing, and a reciprocatory bed connected to and driven by said spur-gear.

11. The combination of a reciprocatory bed, a casing having a flaring ring, a cylindrical part above said ring, a shoulder or flange above said cylindrical part, and a flanged cylindrical top above said shoulder, a webbed bevel-gear within said casing with its teeth above said flaring ring and its top flush with or below said shoulder, an internal gear fixed within said casing and resting on said shoulder, a spur-gear journaled on said bevel-gear eccentrically thereof and meshing with said internal gear, driving bevel-gears placed symmetrically about said casing and engaging with the first-named bevel-gear through openings in said casing, bearing-rings on said internal and said spur gears, bearing-wheels journaled on said webbed bevel-gear and coacting with said rings, and connections between said bed and said spur-gear for driving the bed.

12. The combination of a two-revolution stop impression-cylinder, a mutilated gear thereon, a rack fixed on said bed for coaction with said gear, a segment-gear on said cylinder opposite the mutilated part of said gear, a movable rack of said bed for coaction with said segment-gear, a movable cam on said bed for operating said movable rack, and means on the framework of the machine for operating said cam, said means being connected with and operating or controlling said cam at all points in the motion of the bed.

13. In a two-revolution stop-cylinder press in which the impression-cylinder is "carried over" from the first to the second revolution by means of a segment-gear and a movable rack, the combination of the cylinder, a segment-gear, a movable rack, means on the bed for operating said rack, said means being provided with an arm, a channel-bar for coaction with said arm, and means for moving said bar at right angles to its length.

14. In a two-revolution stop-cylinder press, in which the impression-cylinder is "carried over" from the first to the second revolution thereof by means of a segment-gear and a movable rack, the combination of the cylinder, a segment-gear, a movable rack, a movable cam on the bed for coaction with said rack, and means on the framework of the machine for operating said cam, said means controlling said cam at all points in the traverse of the bed.

15. In a printing-press, the combination of a rising and falling cylinder, a gear connected thereto, a reciprocating bed, and a rack on said bed for coaction with said gear, said rack having an end section thereof inclined upwardly to coact with said gear as the cylinder is moved in a vertical direction.

16. In a printing-press, the combination of a rising and falling cylinder, a gear connected thereto, a reciprocating bed, and a rack on said bed for coaction with said gear, said rack having each end section thereof inclined upwardly to coact with said gear as the cylinder is moved up and down.

17. The combination of a two-revolution impression-cylinder, a mutilated gear thereon, a reciprocating bed, a rack fixed on said bed for coaction with said gear, a segment-gear on said cylinder opposite the mutilated part of said gear, a movable rack on said bed for coaction with said segment, and positive means for operating said movable rack, said positive means being continuously connected with and preventing accidental motion of said movable rack.

18. The combination of a two-revolution impression-cylinder, a mutilated gear thereon, a reciprocating bed, a fixed rack on said bed for coaction with said gear, a segment-gear on said cylinder opposite the mutilated part of said gear, a rack movable on the bed for coaction with said segment-gear, a controlling-bar on the fixed frame, and connections from said controlling-bar to said movable rack, with means for operating said controlling-bar.

19. The combination of an impression-cylinder which turns twice while the bed travels in one direction and is at rest while the bed is returning in the other direction, a reciprocating bed, and mechanism for raising the cylinder as the bed nears the end of its printing stroke and lowering the cylinder after the bed begins its printing stroke.

20. In a printing-press in which the impression-cylinder is raised and lowered, the combination of the impression-cylinder, slides in which it is journaled, a rock-shaft journaled in said slides, toggle-joints connecting said slide and the fixed framework, adjusting-screws on the fixed framework, springs 51, cam 62, and connections from said cam to said shaft for rocking it.

21. In a printing-press in which the impression-cylinder revolves twice during one stroke of the bed and stops during the return stroke of the bed, the combination of the impression-cylinder, a gear thereon a portion of which is cut away or omitted, means for raising and lowering the cylinder, a reciprocating bed, a rack on said bed for coaction with said gear, said rack having its end portions inclined upwardly to conform to the rise and fall of the cylinder, and means for carrying over the cylinder from the first to the second revolutions thereof.

22. In a printing-press, the combination of an impression-cylinder, means for raising and lowering said cylinder relatively to the fixed framework, a reciprocating bed, a rack on said bed having an end portion thereof inclined upwardly, a mutilated gear on said cylinder, and means for starting and stopping said cylinder.

23. In a two-revolution stop-cylinder printing-press, the combination of the impression-cylinder, a segment-gear thereon, a rack movable up and down on the bed, said rack being provided with an overhang, a cam for coaction with said overhang, an arm connected with said cam, a channel-bar for operating said arm, and means for operating said channel-bar.

24. The combination of a horizontally-disposed rotatory gear, a planet-gear thereon, a fixed gear meshing with said planet-gear, a reciprocating bed, a pitman connected through a vertical axis with said bed, and a post or stud on said planet-gear, wholly within the pitch-circle thereof, with which said pitman is connected, whereby the pitman lies closely above the planet and the fixed gears.

25. The combination of a rotating carrier, a planet-gear journaled thereon, a fixed gear meshing with the planet-gear, a reciprocating bed connected to and operated by the planet-gear, coacting bearing-rings on said planet and said fixed gears, bearing-wheels journaled on said carrier and coacting with said rings, and means for adjusting the position of certain of said bearing-wheels to take up wear and play.

26. The combination of a carrier rotating in a horizontal plane, a planet-gear journaled thereon, a fixed gear meshing with said planet-gear, a reciprocatory bed connected to and operated by said planet-gear, and coacting bearing-rings on said fixed and said planet gears.

27. The combination of a carrier rotating in a horizontal plane, a planet-gear journaled thereon, a fixed gear meshing with said planet-gear, a reciprocatory bed connected to and operated by the planet-gear, coacting bearing-rings on said planet and fixed gears, and bearing-wheels journaled on said carrier and coacting with said rings.

28. The combination of a carrier rotating in a horizontal plane, a planet-gear journaled thereon, a fixed gear meshing with said planet-gear, a reciprocatory bed, a pitman connected through a vertical axis with said bed, a post on said planet-gear wholly within the pitch-circle thereof and with which said pitman is connected pivotally, coacting bearing-rings on said fixed and planet gears, and bearing-wheels journaled on said carrier and coacting with said rings.

29. The combination of a carrier rotating in a horizontal plane, a planet-gear journaled thereon, a fixed internal gear meshing with said planet-gear, a reciprocatory bed, a pitman connected through a vertical axis with said bed, a post on said planet-gear wholly within the pitch-circle of the planet-gear, said pitman being pivotally connected with said post, and coacting bearing-rings on said fixed and planet gears.

30. The combination of a horizontally-disposed driven bevel-gear, a circular raceway rigidly connected with the fixed framework, the teeth of said bevel-gear sliding on said raceway, an internal gear rigidly connected to the fixed framework, a planet-gear journaled on said bevel-gear, a reciprocatory bed, a post on said planet-gear wholly inside the pitch-circle thereof, means having a vertical pivot interposed between and connecting said post and bed, and coacting bearing-rings on said planet and internal gears.

31. The combination of a horizontally-disposed driven bevel-gear, a circular raceway rigidly connected with the fixed framework, the teeth of said bevel-gear sliding on said raceway, an internal gear rigidly connected with the fixed framework, a planet-gear journaled on said bevel-gear, a reciprocatory bed, a post on said planet-gear wholly within the pitch-circle thereof, means having a vertical pivot interposed between and connecting said post and bed, coacting bearing-rings on said planet and internal gears, and bearing-wheels journaled on said bevel-gear and coacting with said rings.

32. The combination of a carrier rotating in a horizontal plane, a planet-gear journaled thereon, a fixed gear meshing with said planet-gear, a reciprocatory bed having a rack thereon, a rolling gear meshing with said rack and with a rack on the fixed frame of the machine, a head in which said rolling gear is journaled, a post on said planet-gear wholly within the pitch-circle thereof, a pitman pivotally connected with said post and also connected with said head by a vertical pivot, and coacting bearing-rings on said planet and fixed gears.

33. The combination of a carrier rotating in a horizontal plane, a planet-gear journaled thereon, a fixed gear meshing with said planet-gear, a reciprocatory bed, a rolling gear meshing with racks on the bed and framework of the machine, a head in which said rolling gear is journaled, a post on said planet-gear wholly within the pitch-circle thereof, a pitman pivotally connected with said post and with a vertical axis on said head, coacting bearing-rings on said planet and fixed gears, and bearing-wheels journaled on the said carrier and coacting with said rings.

34. The combination of a rotating gear, a planet-gear carried thereby, a gear fixed to the frame of the machine and meshing with the said planet-gear, a reciprocatory bed connected to and operated by said planet-gear, a bearer fixed on the frame concentrically with the said fixed gear, and a bearer fixed on the planet-gear concentrically thereof and contacting with the first-named bearer.

35. The combination of a casing fixed to the framework of the machine, a rotating gear therein, a planet-gear journaled on the said gear, a fixed gear fastened to said casing, a fixed bearer concentric with said fixed gear and fastened thereto, a bearer concentric with and fast on the planet-gear, and a reciprocatory bed connected to and operated by the planet-gear, whereby the thrust of the bed when turning or reversing is sustained by the fixed bearer.

36. The combination of a rotating gear, a planet-gear journaled thereon, a gear fixed to the framework of the machine and meshing with the planet-gear, a stud on the planet-gear, a reciprocatory bed, a rod connecting the bed and stud, a bearer fast to the framework concentric with the fixed gear, and a bearer fast on the planet-gear concentrically thereof and coacting with the bearer first named, whereby the thrust of the bed in turning or reversing is taken by the fixed bearer on the framework of the machine.

37. The combination of a rotary gear, two driving-gears set opposite each other and meshing with said gear, a planet-gear carried by the first-named gear, a gear fixed to the framework of the machine, and meshing with said planet-gear, a reciprocatory bed connected to and operated by said planet-gear, a bearer fixed to the framework of the machine concentric with said fixed gear, and a bearer on the planet-gear and concentric therewith and coacting with the first-named bearer.

38. The combination of a fixed casing provided with a race or track, a gear running on said race or track, a planet-gear journaled on said running-gear, an internal gear fixed to said casing and meshing with said planet-gear, a to-and-fro movable bed, and means interposed between and connecting said bed and planet-gear.

Signed at New York, in the county of New York and State of New York, this 27th day of May, A. D. 1898.

WALTER SCOTT.

Witnesses:
RICHARD W. BARKLEY,
CHAS. A. BRODEN.