(No Model.) 7 Sheets—Sheet 1.

S. F. MILLARD.

PLATE PRINTING MACHINE.

No. 359,513. Patented Mar. 15, 1887.

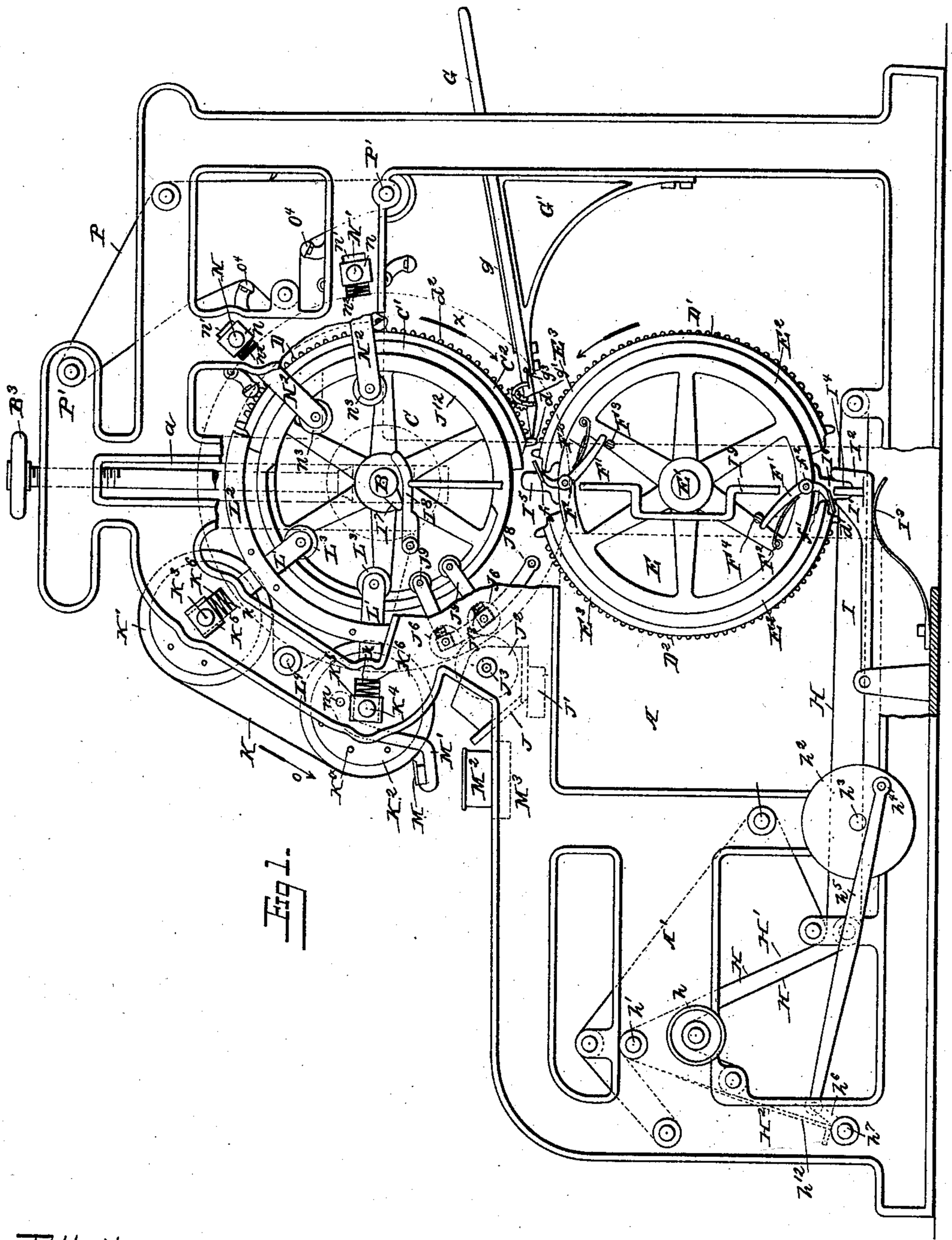

Fig 1.

Attests:
John G. Hinkel Jr
W. A. A. Knight

Inventor:
Samuel F. Millard
per Foster & Freeman
Attys

(No Model.) 7 Sheets—Sheet 2.

S. F. MILLARD.

PLATE PRINTING MACHINE.

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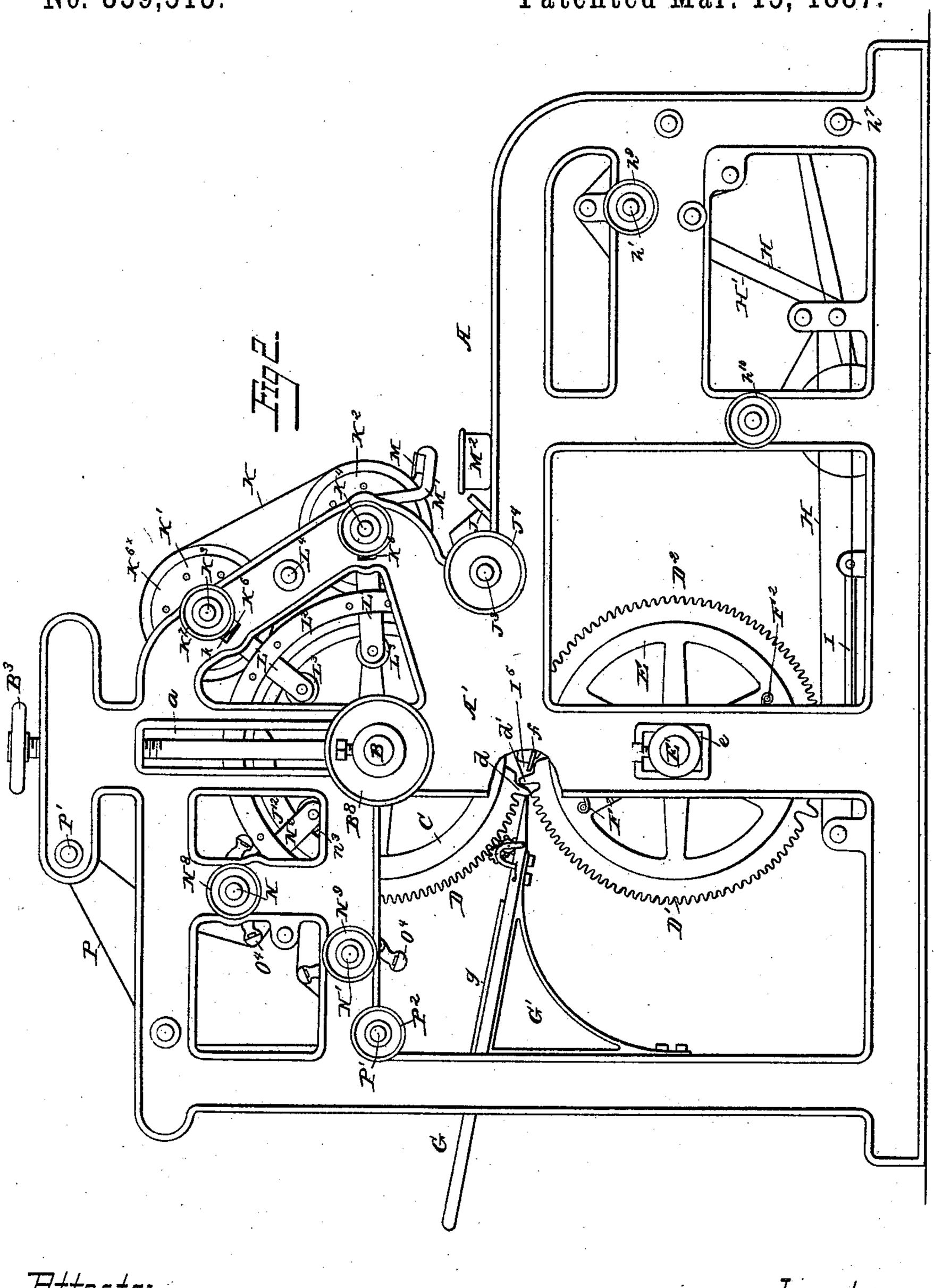

Fig 2.

Attests:
John G. Hinkel Jr
W. A. N. Knight.

Inventor:
Samuel F. Millard
Per Foster & Freeman
Attys

(No Model.) 7 Sheets—Sheet 3.

S. F. MILLARD.

PLATE PRINTING MACHINE.

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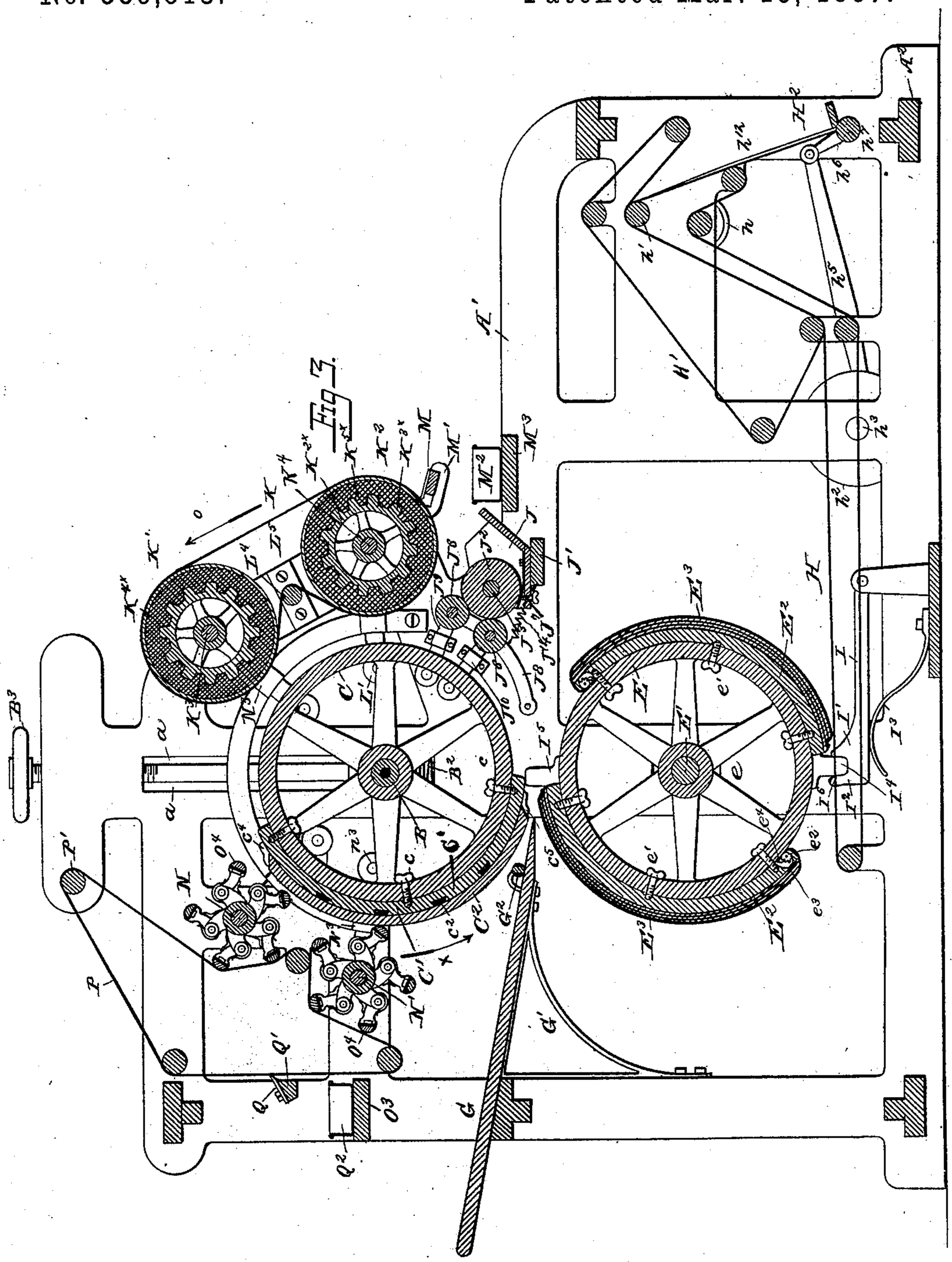


Attests:
John G. Thickell Jr
W. H. H. Kinglie-

Inventor:
Samuel F. Millard
per Foster & Freeman
Attys

(No Model.) 7 Sheets—Sheet 4.

S. F. MILLARD.

PLATE PRINTING MACHINE.

No. 359,513. Patented Mar. 15, 1887.

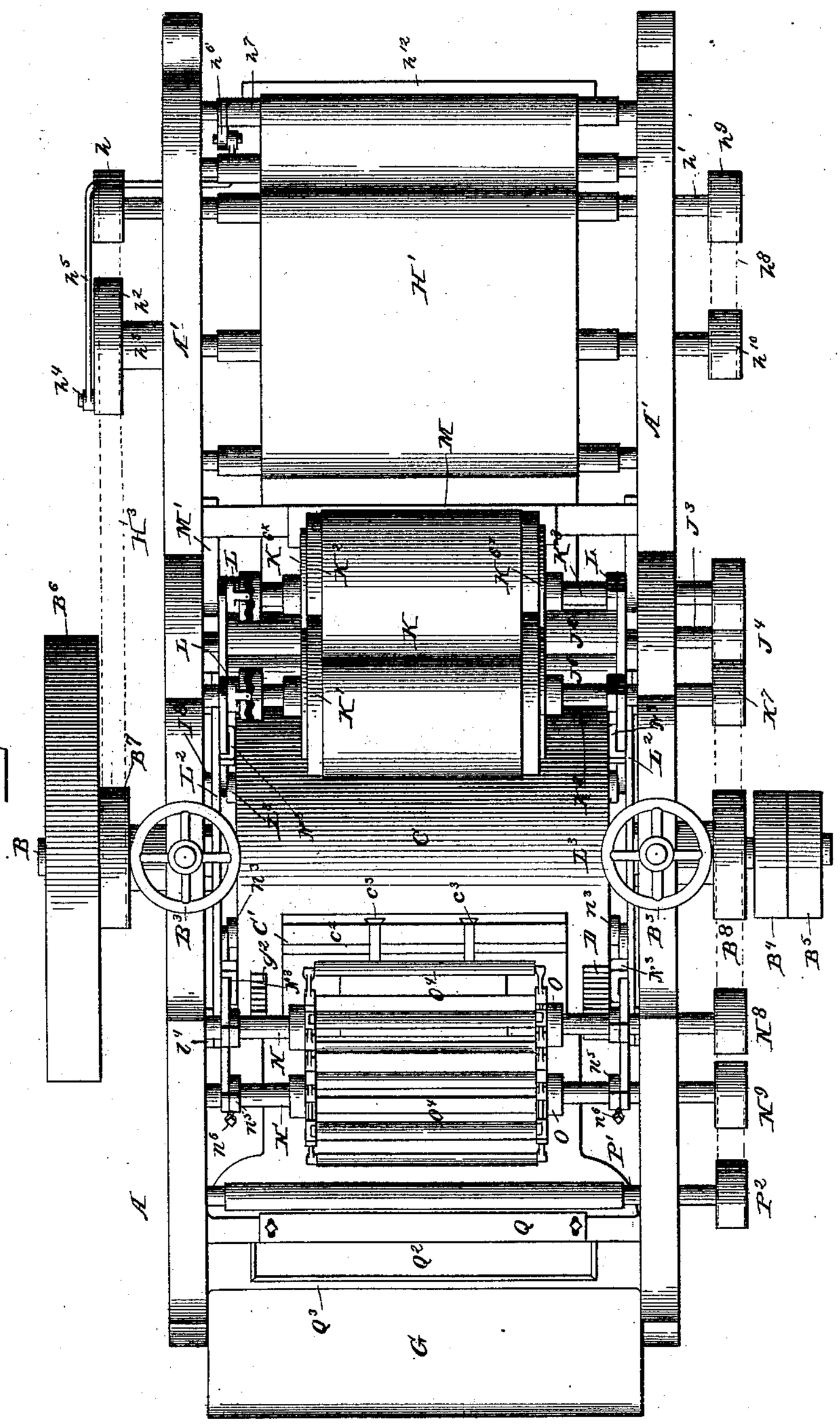


Fig. 4.

Attests:
John Y. Hutchyk
W. N. A. Knight

Inventor:
Samuel F. Millard
Dewey Foster & Freeman
Attys

(No Model.) 7 Sheets—Sheet 5.

S. F. MILLARD.

PLATE PRINTING MACHINE.

No. 359,513. Patented Mar. 15, 1887.

Fig 5.

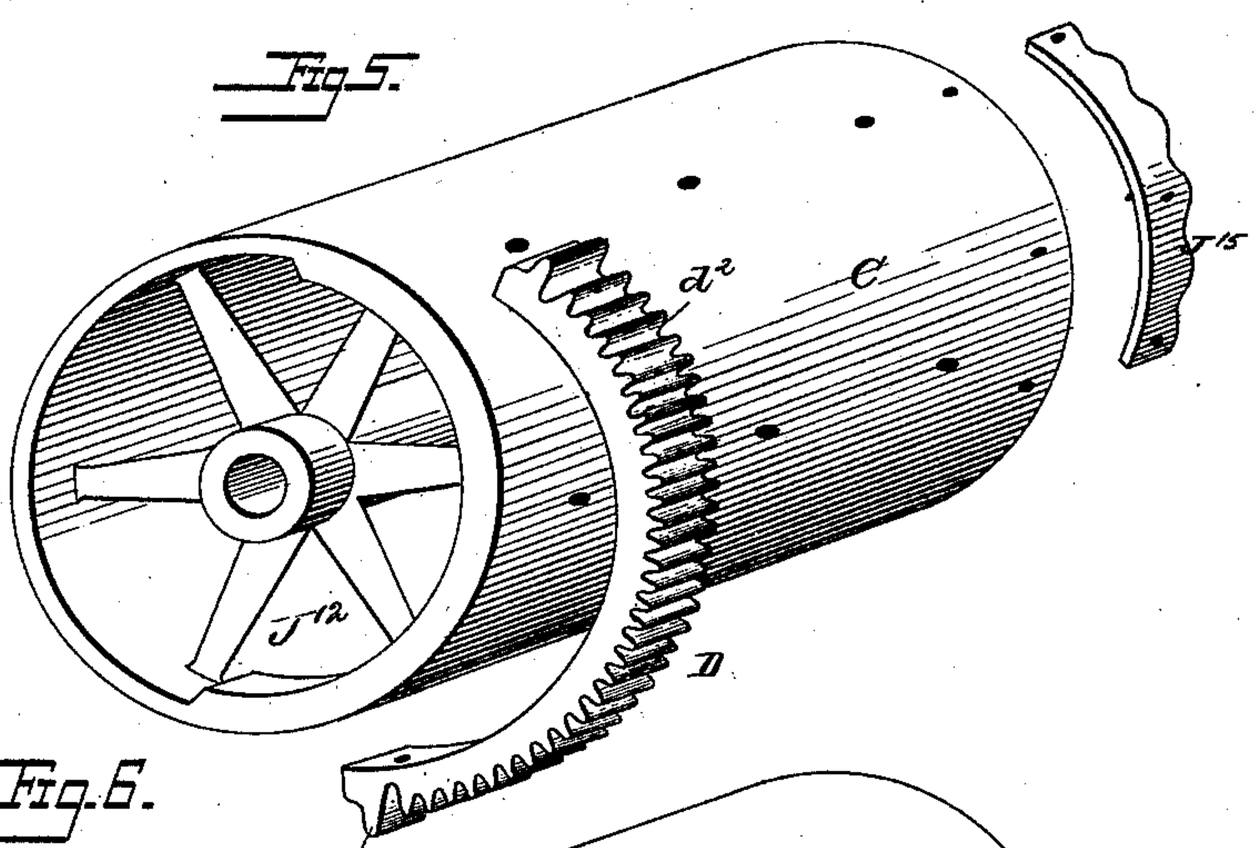


Fig. 6.

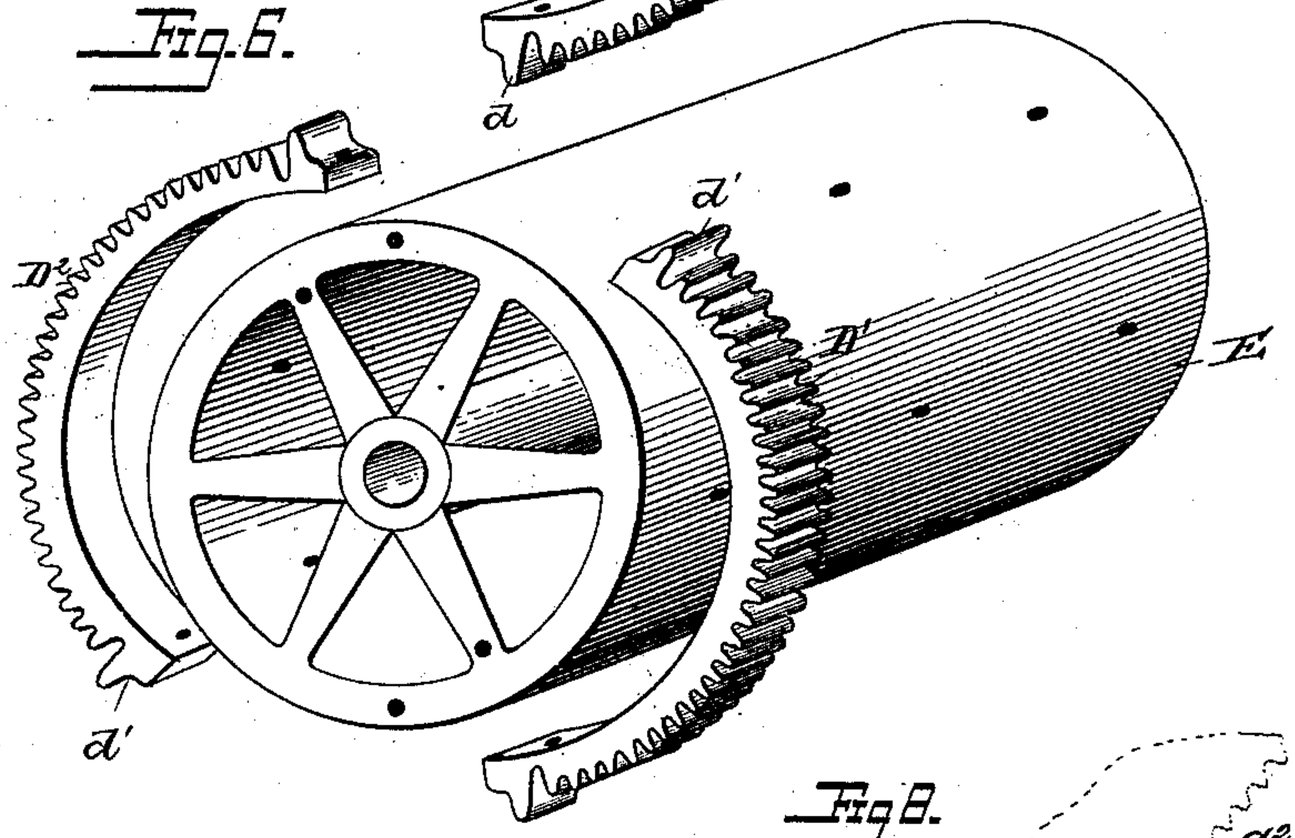


Fig 8.

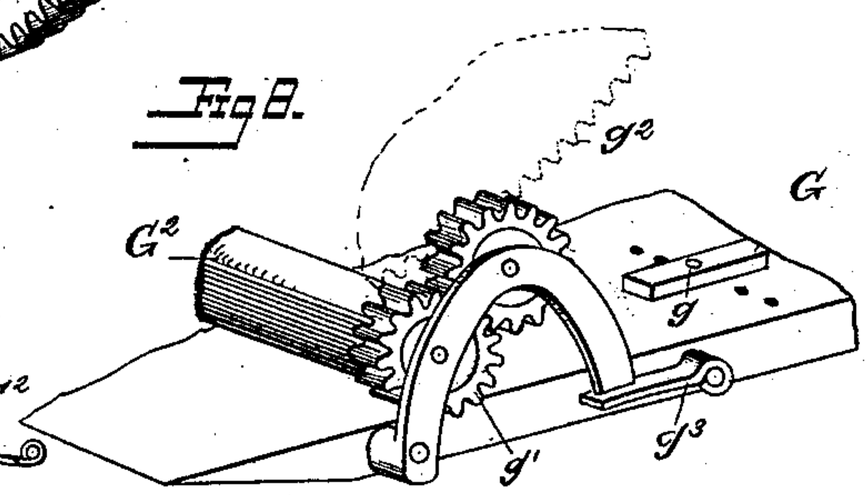


Fig. 7.

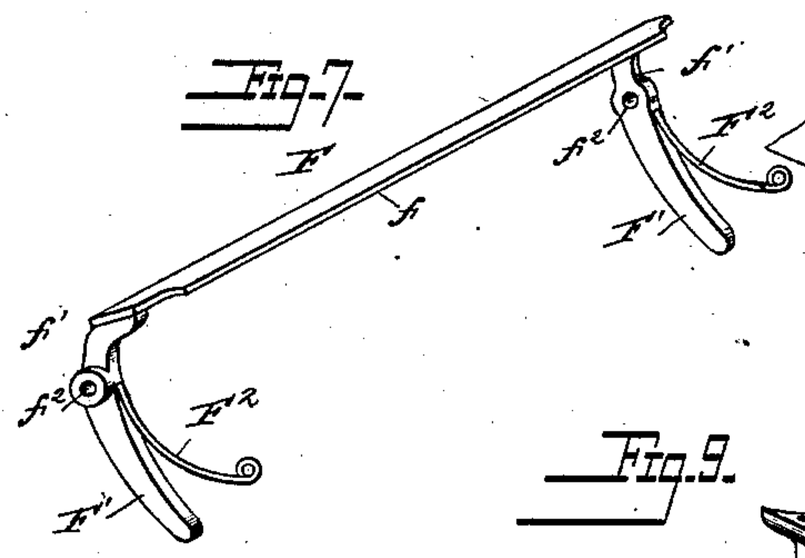
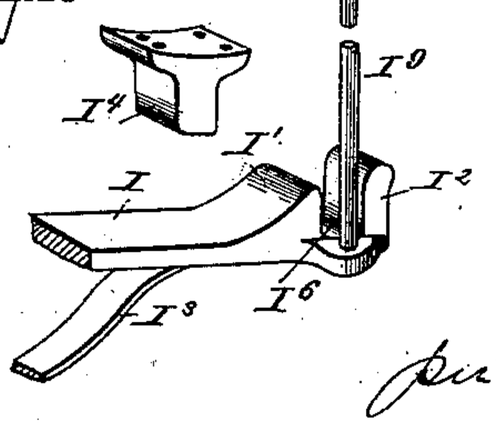


Fig. 9.



Attests:
John G. Hinkel Jr.
W. N. N. Knight-

Inventor:
Samuel F. Millard
per Foster & Freeman
Attys

(No Model.) 7 Sheets—Sheet 6.

S. F. MILLARD.

PLATE PRINTING MACHINE.

No. 359,513. Patented Mar. 15, 1887.

Fig 10.

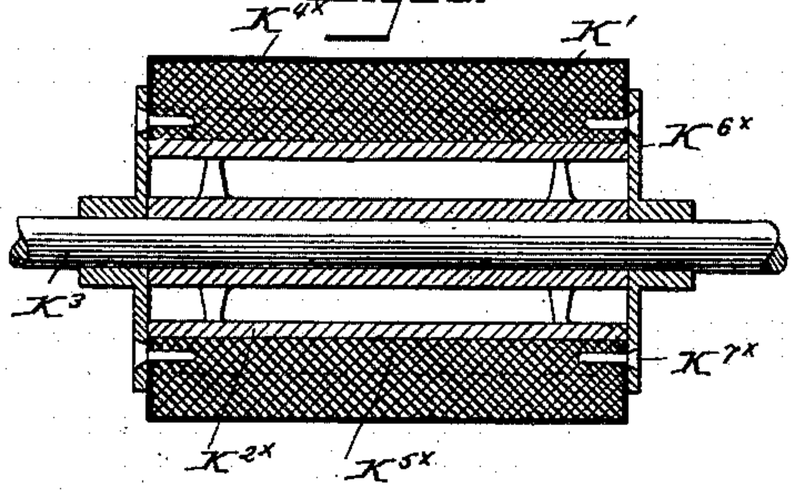


Fig 11.

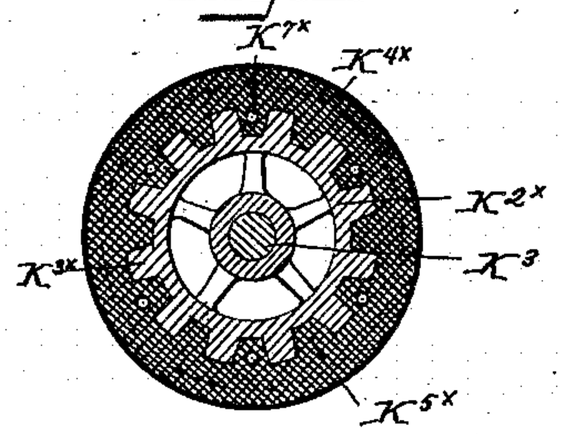


Fig 12.

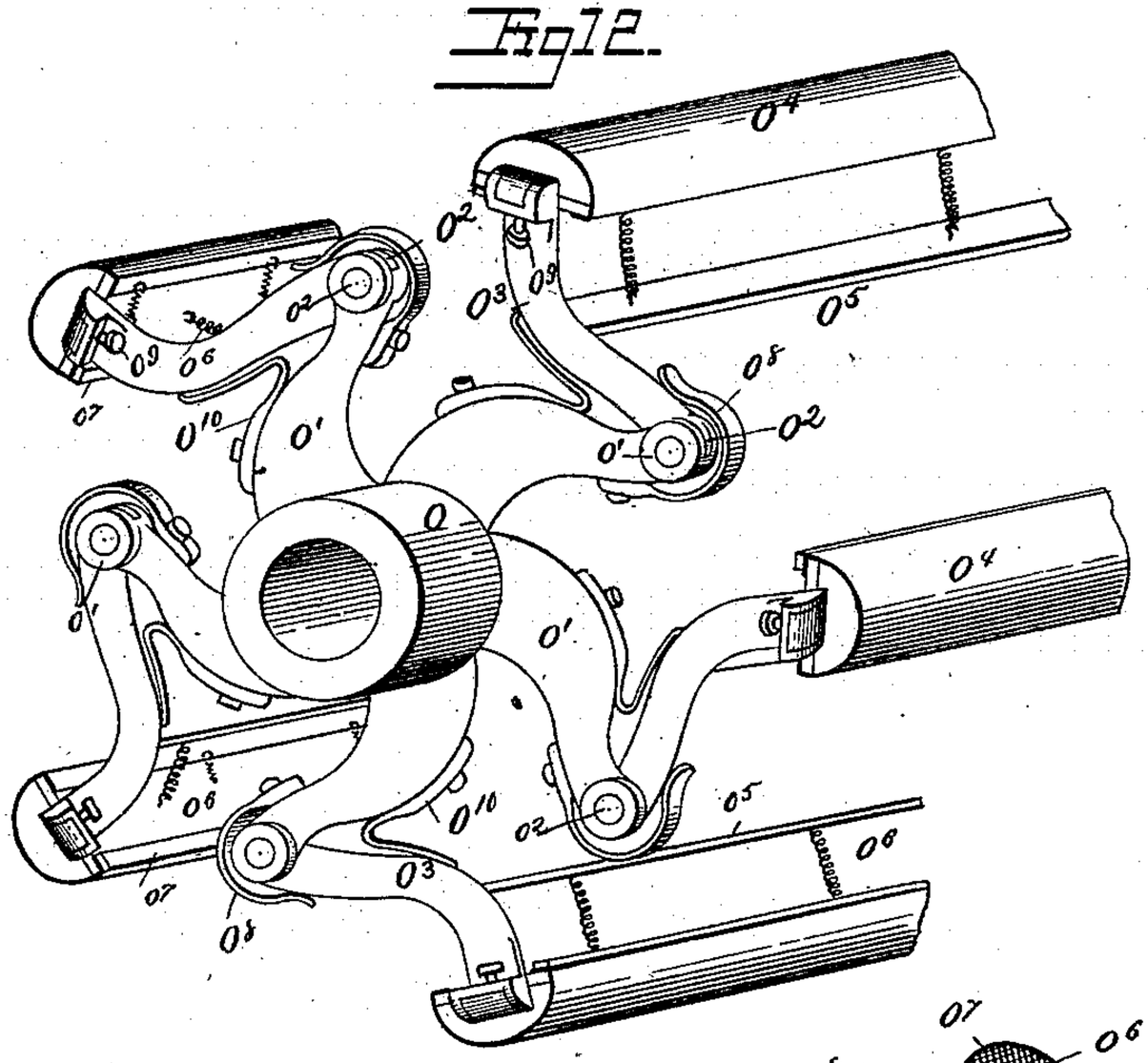


Fig 14.

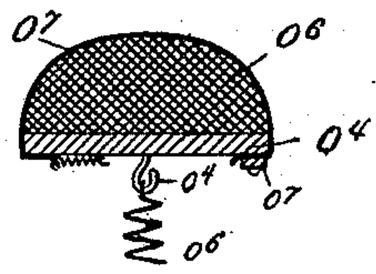
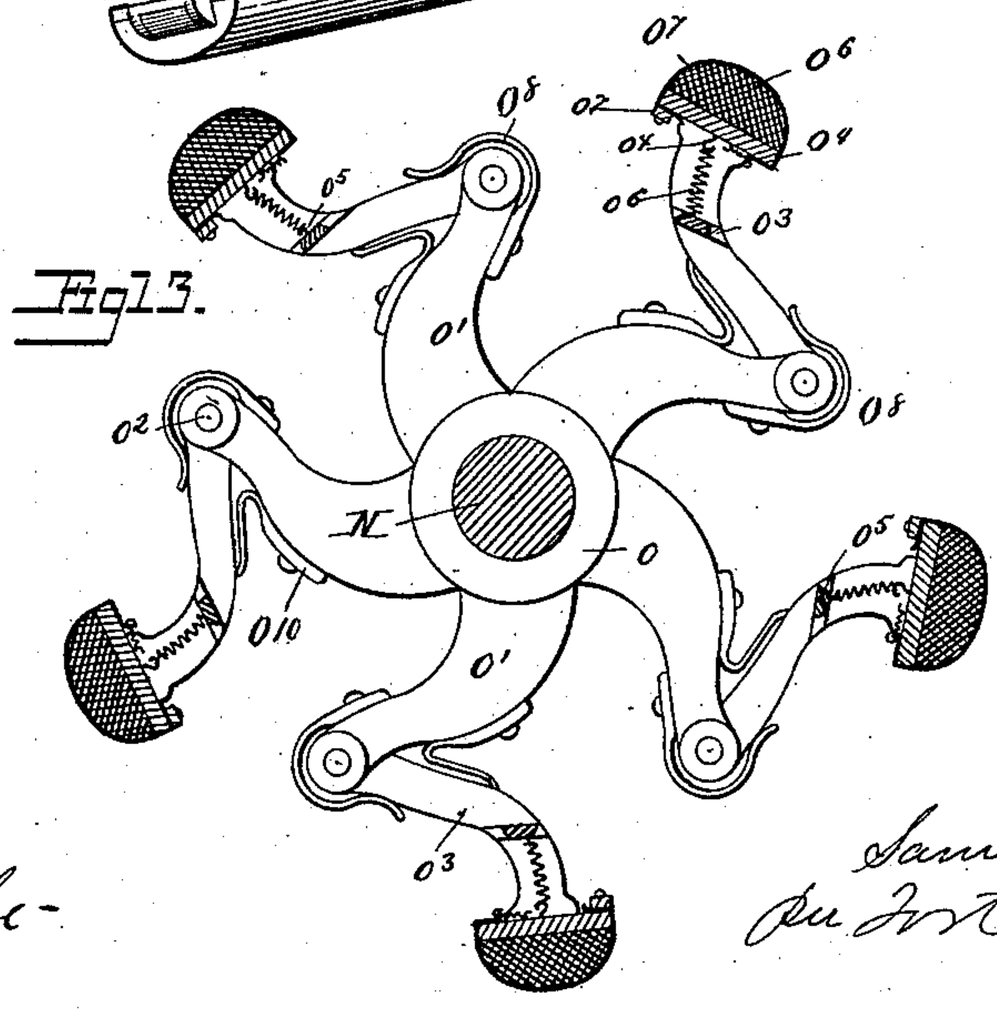


Fig 13.



Attests:
John G. Hinkel Jr
W. H. H. Knight

Inventor:
Samuel F. Millard
per Foster & Freeman
Attys

(No Model.) 7 Sheets—Sheet 7.

S. F. MILLARD.

PLATE PRINTING MACHINE.

No. 359,513. Patented Mar. 15, 1887.

Fig 15.

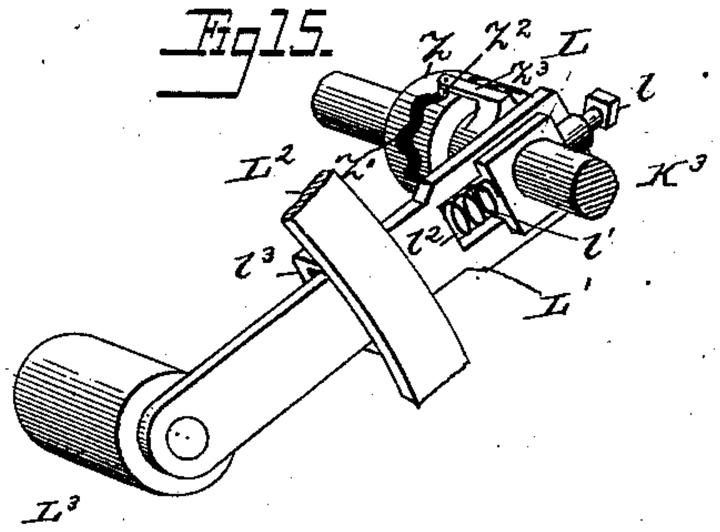


Fig 16.

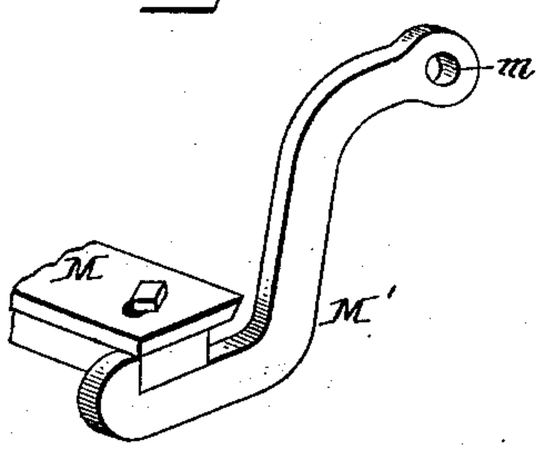


Fig 17.

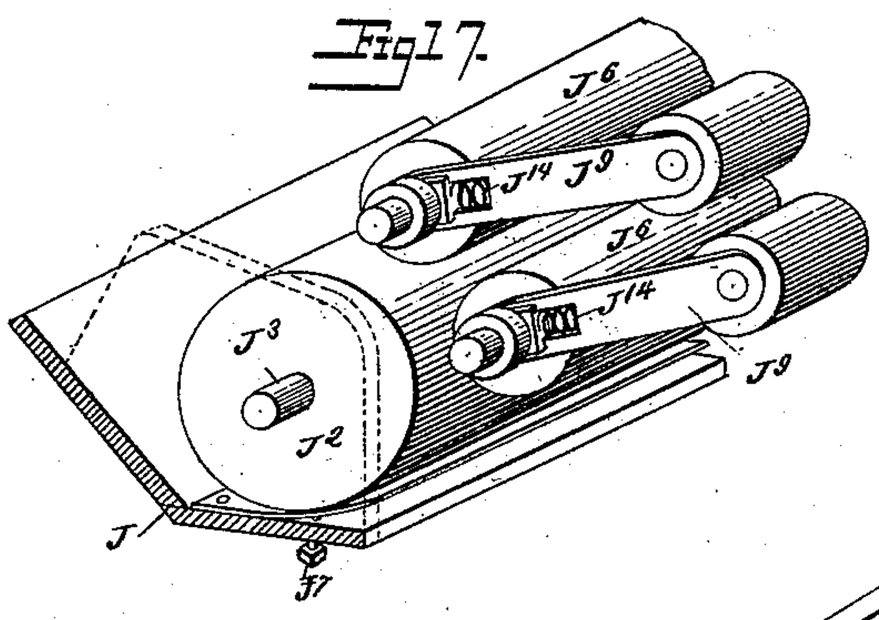


Fig 19.

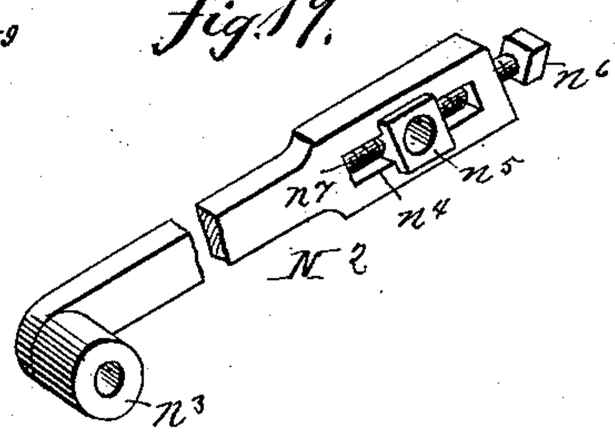
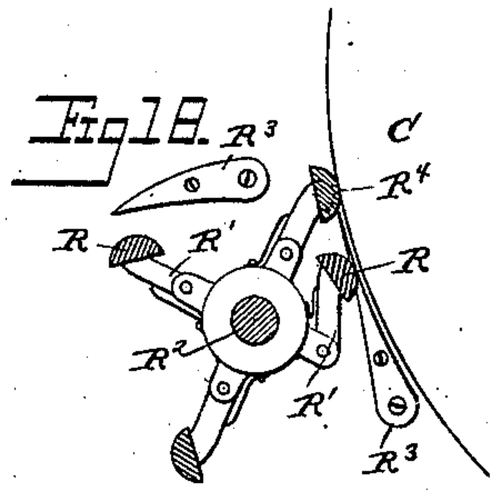


Fig 18.



Attests:
John G. Hinkel
W. H. H. Knight

Inventor:
Samuel F. Millard
Dick Foster & Brennan
Attys

UNITED STATES PATENT OFFICE.

SAMUEL F. MILLARD, OF NEW YORK, N. Y.

PLATE-PRINTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 359,513, dated March 15, 1887.

Application filed May 12, 1886. Serial No. 202,012 (No model.)

To all whom it may concern:

Be it known that I, SAMUEL F. MILLARD, a citizen of the United States, and a resident of the city, county, and State of New York, have invented a new and useful Improvement in Plate-Printing Machines, of which the following is a specification.

My invention relates to improvements in plate-printing machines; and it consists, essentially, in a device of the class named having a construction and arrangement of parts substantially such as is hereinafter described, and illustrated in the accompanying drawings, wherein—

Figures 1 and 2 represent elevations, partly in section, of opposite sides of a plate-printing press constructed in accordance with my invention. Fig. 3 represents a central vertical longitudinal section thereof. Fig. 4 represents a plan view thereof, partly in section, to show interior parts. Figs. 5 and 6 represent detail views of the plate and impression-cylinders detached from the press. Figs. 7 and 8 represent detached detail views of the sheet gripping and feeding mechanism. Fig. 9 represents a detached detail view of the cylinder stop mechanism. Figs. 10 and 11 represent, respectively, a longitudinal and a transverse sectional view of one of the wiper-belt rollers. Figs. 12 to 14, inclusive, represent detached detail views of the plate-polisher. Fig. 15 represents a detail perspective view of one of the arms that draw the wiper and polisher rollers toward the plate-cylinder. Fig. 16 represents a detail view of the means employed to hold the wiper-belt scraper-knife in connection with said belt. Fig. 17 represents a detached detail view of the plate-inking roller and the means employed to bring said roller into engagement with the ink-fountain to receive ink and the plate to deposit said ink thereon. Fig. 18 represents a detached detail view of a beater employed to fill the engraved lines of the plate. Fig. 19 is a detached view of parts of the operating mechanism.

Referring to the drawings, in which similar letters of reference denote similar parts, I will proceed to describe a plate-printing press constructed and operating in accordance with my invention.

In said press, A designates the frame, of metal, and consisting in sides A′, held at a suitable distance from each other and in parallel planes by transversely-extending rails A^2. I preferably form the sides A′ each in a single casting, providing each with suitable apertures to receive the journal-boxes of the several operating-shafts, hereinafter described. The cylinders and other operating parts of the press are driven by the main shaft B, which is journaled in adjustable boxes placed and operated in slots *a* in the sides A′ by springs B^2 and screws B^3, for a purpose hereinafter set forth. This shaft is provided at its opposite ends, respectively, with fast and loose pulleys B^4 B^5, balance or fly wheel B^6, for operating and controlling the motion of said shaft, and pulleys B^7 B^8, for imparting motion to certain parts of the press, hereinafter set forth.

The plate-cylinder C, which is mounted upon and receives rotary motion in the direction of the arrow *x* from the shaft B, is, in the main, similar in construction to those employed in machines of this class—that is to say, hollow and provided with means for heating, by gas or otherwise, the engraved plate secured thereto. If desired, the periphery of this cylinder may be formed in two sections that extend in planes of unequal radius to form a projecting bed, to which the engraved plate may be secured. I prefer, however, to form the body of said cylinder of the same diameter throughout, and to employ therewith a removable and adjustable plate-receiving bed, C′, having its surface concentric with the surface of the cylinder and secured thereto in any desired manner, but preferably by thumb-screws *c*, that pass outwardly through the cylinder sides and enter screw-threaded apertures formed in the bed C′, by which construction the adjustment of said bed to different desired portions of the cylinder may be quickly effected. I provide the outer surface of said bed C′ with a series of longitudinal and transverse grooves, c^2 c^3, dovetail in cross-section, for the reception of movable clamp c^4, that, in conjunction with a fixed clamp, c^5, projecting from the bed C′, operates to hold the engraved plate C^2 in position for operation.

I provide one end of the cylinder C with a gear-segment, D, which may or may not be removable and adjustable, the end teeth, *d d′*,

of which are of greater length than the remaining tooth, d^2, of said segment, for a purpose hereinafter to be described.

The teeth of the segment D engage similar teeth formed upon segments D' D^2, secured to one end upon opposite sides of the impression-cylinder E, which is mounted upon a shaft, E', journaled in boxes *e* in the sides A', below the plate cylinder.

The cylinder E is in form somewhat similar to those employed in machines of this class—*i. e.*, consisting of a hollow body or shell suitably supported from the shaft E upon spokes.

I provide the cylinder E with projecting impression-beds E^2, which may, if desired, be made integral with the body thereof. I prefer, however, to make such beds removable and adjustable, and to secure them to the cylinder by screws e', that pass outward through the sides of said cylinder and engage screw-threaded apertures formed in the beds.

The blankets E^3, with which the impression-beds are provided, may consist of any preferred material, and as in plate printing great pressure is applied to the impression-bed, it is important that said blankets be stretched very tightly and evenly over the surfaces of said beds. To accomplish this end, I provide that said blankets shall each be secured at one end, preferably that at which the grippers operate, to the end of its impression-bed in any desired manner, and at its opposite end be turned over the end of said bed and secured to a roller, e^2, that extends transversely of said bed within a recess or groove, e^3, formed in the lower surface thereof. This roller is provided at one end with a squared portion to receive an operating-wrench, and is held against backward rotation by a pawl, e^4, that is pivoted to the bed and engages a series of teeth formed in the roller.

I provide each of the impression-beds, at its forward beveled edge, with a gripper, F, which consists in a flat knife-edge bar, *f*, secured at its ends to the upper ends, *f'*, of bent or bell-crank levers F', fulcrumed at f^2 to the opposite ends of the impression-cylinder, near the periphery thereof. The bar *f* of said grippers is normally held in engagement with the impression-beds by springs F^2, preferably leaf-springs, that are secured to the ends of the impression-cylinder below and bearing against the arms f^3 of the levers F', which arms engage, at the proper moments for opening said grippers to receive and release sheets of paper, studs F^3 F^4, that project inwardly from the frame A', above and below the journal-bearings of the impression-cylinder.

It will be observed that the plate and impression-cylinders are substantially of the same diameter—that the former has constant rotary motion in the direction of the arrow *x*, and, through the rack-segments D D' D^2, imparts an intermittent rotary motion to the impression-cylinder E, whereby the impression-beds, preferably two in number, are successively brought into position to receive sheets to be printed, which are fed thereto from a feed-board, G, that rests upon brackets G', secured to the frame of the machine, and is provided with a suitable side gage, *g*, to properly register each sheet before said sheet is grasped by the grippers F.

If desired, the forward lower edge of the feed-board may be provided with a register-gripper to engage the lower edge of each sheet, and at the proper moment to move said sheet forward and into positive engagement with the grippers F of the compression-cylinder. This gripper consists in a roller, G^2, having an elastic or resilient cover and mounted upon a shaft journaled in bearings which are formed in curved plates that are pivoted at one end to the edges of the feed-board and bear at their opposite edges upon springs g^3, secured to said board. These plates project from the upper surface of said feed-board, near the lower end thereof. This roller is flattened upon opposite sides, and is provided at one end with a gear-wheel, *g'*, that is engaged by gear-segments g^2, secured to the plate-cylinder, and by which said roller is partially rotated at the proper moment to bring the lower edge of the sheet to be printed in reach of the grippers F. It will be observed that the journal-bearings of said roller G^2 have a slight oscillating or rocking motion, and that said bearings are normally held at their highest point by the springs g^3, and are depressed by their operating-segments to bring the rollers into contact with the sheet only at the moment of feeding said sheet forward to the grippers F, after which said roller is again raised, to permit the forward movement of said sheet to the impression-cylinder.

After the sheet has been printed it is deposited upon a carrying-belt, H, that operates, for a portion of its length, below the impression-cylinder, by which belt, in conjunction with a belt, H', it is carried to the fly H^2.

The belts H H' are mounted upon suitable rollers in the manner shown in the drawings, motion being imparted thereto from the pulley B^7 of the shaft B by a belt, H^3, that passes over said pulley B^7, and thence extends about a pulley, *h*, mounted upon the shaft of one of the rollers *h'* of the belt H, and also about a pulley, h^2, that is mounted upon a stud, h^3, projecting from the frame and provided with a crank-pin, h^4, connected by a rod, h^5, with a crank-arm, h^6, that projects from the rock-shaft h^7 of the fly H^2, which shaft is journaled in the frame at the rear of the machine. The belt H' receives motion through a crossed belt, h^8, that connects a pulley, h^9, upon the shaft of the roller *h'* with a similar pulley, h^{10}, mounted upon the shaft of the roller h^{11}, that operates the belt H.

If desired, the carriers H H' may consist of narrow tapes. The fly H^2 is of the ordinary construction—*i. e.*, consists of a rock-shaft, h^7, provided with projecting fingers h^{12}.

As hereinbefore stated, the impression-cylinder has intermittent rotary motion imparted

thereto by the continuously-rotating plate-cylinder through the gear-segments D D′ D², such motion necessitating the provision of means for stopping the rotation of said impression-cylinder at and in the proper moment and position to receive the sheet to be printed, for holding said cylinder against rotation, and for again starting it in forward rotation at the proper moment and in unison with the plate-cylinder. I accomplish these ends by and in the following-described means and manner, viz:

I designates an arm that is hinged at one end to one of the sides A′ in rear of the impression-cylinder, and projects thence to a point below said cylinder at the end opposite that containing the segments D′ D², and is provided at said point with upwardly-projecting lugs I′ I², placed a short distance apart and normally held by a spring, I³, below the arm I in the track of lugs I⁴ I⁵, that project from opposite sides of the cylinder at points near the side edges of the impression-beds thereon, so that when said cylinder is rotated one or the other of said lugs I⁴ I⁵ will strike against the beveled side edge of the rearmost lug, I′, which is somewhat shorter than its companion, I², and depress and pass over said lug to and against the lug I², at which moment the arm I will, by the spring I³, be forced upward, thus holding the lug I⁴ or I⁵ within the space I⁶, between said lugs I′ I², and the cylinder stationary. Simultaneously with the above-described action of the arm I the gear-segment D upon the plate-cylinder will be released from the segments D′ or D² of the impression-cylinder and carried forward or around by the rotation of cylinder C until its forward long tooth, *d*, is about to come into contact with the corresponding tooth of either of the segments D′ D², at which moment a cam, I⁷, upon the main shaft will strike a cam-lever, I⁸, pivoted to the frame, depress the same, and thereby, through a rigid bar, I⁹, extending between the lever I⁸ and arm I, depress the latter, and thus release the impression-cylinder from said arm I.

Forward rotation of the plate-cylinder will bring its gear-segment into engagement with the gear-segment D′ or D² of the impression-cylinder, rotating said cylinder until it is again brought to rest in the above-described manner.

The engraved plate is supplied with ink from a fountain, J, that is secured to a transverse bar, J′, extending from side to side of the frame. This fountain is provided with the usual fountain-roller, J², mounted upon a shaft, J³, that is journaled in the ends of the fountain J and provided with a pulley, J⁴, rotated by a belt, hereinafter described. The quantity of ink delivered by the fountain-roller J² to the form-roller J⁶ is determined by the usual adjusting-plate and screws, J⁷, of the fountain.

The form-roller J⁶ receives ink from the roller J² and deposits the same directly upon the engraved plate without the intervention of distributing-rollers commonly employed in machines of this class. To this end I journal the roller J⁶ in the outer ends of rock-levers J⁸, hinged at their opposite ends to the frame A′. I move said levers forward and backward to bring the roller J⁶ into alternate engagement with the engraved plate on cylinder C and the fountain-roller in the following manner:

J⁹ designates arms that have an adjustable spring-connection with said levers J⁸, and extend thence forward through guide-loops J¹⁰, secured to the sides A′, and are provided at their forward ends with inwardly-projecting rollers J², that extend into the ends of the hollow plate-cylinder and in the track of cam-plates J¹², secured to the inner surface of said cylinder, at each end thereof and in line with the impression-bed secured thereon, whereby, when said cylinder is rotated, the rollers J⁶ are brought into contact with the engraved plate with greater or less force, according to the extent to which the springs J¹³ of the arms J⁹ are compressed.

J¹⁴ designates the springs by which the rollers J⁶ are returned to and held in contact with the fountain-roller, said springs extending between the rock-levers J⁸ and bar J′, to which the fountain is secured.

If desired, a vibratory movement laterally may be imparted to the roller J⁶ by any suitable means, but preferably by plates J¹⁵, Fig. 5, secured to the outer surface of the plate-cylinder, at one or both ends thereof, and provided with corrugated outer edges that come into contact with the arms J⁹ of the roller J⁶, and operate to move said roller laterally.

In order to wipe and polish the inked plate and thus prepare it for printing, I provide the following-described devices, one of which, the wiper, consists in a belt, K, of suitable soft and flexible material, preferably of calf-skin, that passes about rollers K′ K², which are mounted upon shafts K³ K⁴, journaled in adjustable boxes K⁵, that operate in apertures K⁶ in the sides A′. These boxes are normally held at their extreme outer limit of movement by springs *k*, that are placed within the apertures between the boxes K⁵ and inner ends of said apertures. Motion is imparted to said wiper-belt through a pulley, K⁷, mounted upon the upper shaft, K⁸, and driven from the main shaft through the driving-belt. In practice, the belt-carrying rollers K′ K² have motion toward and from the plate cylinder, to bring the belt K into contact with the engraved printing-plate, to remove ink from the face thereof. I insure such movement by and in the following-described means and manner, viz: Upon the shaft K³ K⁴, at each end of the rollers K′ K², is placed a box, L, that, when said shafts are in position, are placed and adjusted back and forth by an adjusting-screw, *l*, and spring *l′* in slots *l²*, formed in the outer ends of longitudinally-moving bars L′, that move in guide-loops or straps *l³*, secured to a curved bar, L², attached by brackets *l⁴* to the sides A′. The

inner end of each of the bars L′ is provided with a laterally-projecting roller, L^3, that extends into the cylinder C at its ends and in the track of the cam-plates J^{12}, hereinbefore referred to, by which said rollers K′ K^2 are drawn toward the plate-cylinder against the action of the springs *k*, which, when the rollers L^3 are released from the cam-plates J^{12}, operate to return said rollers to their normal position.

I have found by practice that a wiper-belt under great strain or tension produces better results than one in which such strain or tension is but slight; also, that a belt constantly held in great tension is in a short time rendered comparatively useless thereby.

To meet the requirements of the one and avoid the objectionable features of the other of the above-stated results, I provide that the tension applied to the belt K shall be variable—that is to say, greater when said belt is in contact with the engraved plate than when in its normal position, as will be presently explained. I have also found that a cylindrical wiper rapidly rotated while in contact with the engraved plate produces better results than could possibly be produced by the dragging action of a belt against said plate. I therefore provide that said belt K, when in contact with the plate, shall fulfill the functions of a roller.

I accomplish the above ends by the use of a tension-roller, L^4, which extends in front of the belt K and intermediate of and near the forward sides of the rollers K′ K^2, from side to side of the machine, and is journaled in adjustable brackets L^5, secured to said sides. The roller L^4, as is apparent, may be moved backward or forward, by adjusting its brackets L^5, and be held at any desired point to impart a greater or less degree of tension to the belt K, the roller-bearings of which are, as is above described, drawn forward, thereby doubling the belt K over said roller L^4, thus increasing the tension of said belt. It will be understood that the roller L^4 is to be adjusted back and forth only when it is desired to impart a greater or less degree of tension to said belt, and that said roller normally rotates at a fixed point. By this construction I am enabled to give any desired degree of tension to the belt K, it only being necessary to move the roller L^4 rearward to produce the desired result; also, as will be observed, the belt K assumes, as regards the plate, the character and action of rollers, inasmuch as it is in contact with the plate only at the points immediately between the rollers K′ K^2 and said plate. Again, by the described arrangement and operation of the belt K, a wiping motion, somewhat similar to that performed by hand, is imparted to the plate, inasmuch as said belt, at the point in front of the lower roller, K^2, operates as the first cloth in a printer's hand to wipe the principal part of the ink from the surface of the plate, and at the point in front of the upper roller as the final wiping-cloth, to prepare said plate for polishing.

The belt moves in the direction indicated by the arrow *o* and against the edge of a scraper-knife, M, that extends transversely of the belt K, and is secured at its ends in swinging brackets M′, hinged at *m* to the sides A′. This knife bears against the belt upon its outside and directly above an ink-receptable, M^2, secured to a bar, M^3, that extends from side to side of the machine. It will be observed that the belt in front of the lower roller performs the first wiping action directly after ink has been applied to the plate, and that the belt before passing to the upper roller is scraped, the ink therefrom passing to the receptacle M^2, whereby said belt presents a comparatively clean surface at said upper roller to finish the wiping process.

I preferably make the surface of each of the rollers K′ K^2 highly elastic, whereby inequalities of adjustment of said rollers, due to the adjustment of the plate-cylinder C, shall not operate to prevent the perfect action of the wiper-belt, as well as to avoid undue straining or stretching of said belt by such adjustment of the plate-cylinder. To these ends I provide each of said rollers with a core, $K^{2\times}$, preferably of metal, provided upon its periphery with a series of longitudinally-extending ribs, $K^{3\times}$, and surround said core with an envelope, $K^{4\times}$, of resilient or elastic material, preferably rubber, having internal ribs, $K^{5\times}$, that engage the ribs $K^{3\times}$ of the core.

$K^{6\times}$ designates plates placed upon the shafts of the rollers K′ K^2, at each end thereof, and secured to said shafts and rollers, respectively, by screws $K^{7\times}$.

Although shown in connection with a rotary press, it will be understood that the wipers herein described will work equally well upon a press having a reciprocating impression-bed, it only being necessary to impart rotary motion to the shafts of said wiper.

I provide that the belt K shall have lateral vibratory motion, whereby it moves upon the surfaces of the engraved plate in a zigzag course or direction. To this end I provide the wiper shafts K^3 K^4 at one end with rollers Z, having zigzag peripheral grooves Z′, that receive small rollers Z^2, which are mounted upon pins projecting downwardly from arms Z^3, secured to the boxes L, (see Fig. 15,) whereby when said shafts K^3 K^4 (which are loosely mounted in their journal-boxes) are rotated they are caused to move back and forth in longitudinal direction and, as will be understood, to operate said belt K in the course named as regards the plate C^2.

I provide that the engraved plate after passing the wipers shall be polished and prepared for printing by devices that in action very closely approach that exerted by the human arm and hand, as I have found by practice that such, when properly performed, produce the finest results. These devices I will now proceed to describe.

N N′ designate the polisher-shafts, that are journaled in sliding boxes *n*, operating in slots

n', formed in the sides A' above and in front of the plate-cylinder. These boxes are normally held against the outer ends of the slots by springs n^2, that are inserted between the opposite ends of said slots and the boxes n therein, and are drawn inward to bring the polishers into engagement with the engraved plate by longitudinally-moving arms N^2, that slide in guide loops or straps N^3, secured to the curved bars L^2 at the sides of the machine.

The arms N^2 are provided at their inner ends with laterally-projecting rollers n^3, that extend into the end of the plate-cylinder and are engaged by the cam-segments J^{12} therein. The opposite outer ends of said arms N^2 are slotted at n^4 and provided with adjustable boxes n^5, operated by screws n^6 and springs n^7, and by which the shafts N N' are connected to said arms N^2. So far as described, the construction and operation of the shafts N N' and arms N^2 are similar to that of the roller-shafts K^3 K^4, arms L, and roller L' of the wiper-belt, and shown in Fig. 15. In operation said shafts N N' move toward or from the plate-cylinder, according as the engraved plate is presented to or withdrawn from the polishers. I provide each of the shafts N N' near its opposite ends with hubs O, provided with outwardly-projecting curved arms O', having their outer ends slotted to provide lugs o', between which I place and pivot, by pins o^2, lugs O^2, formed upon the inner ends of arms O^3, having bifurcated outer ends that receive the ends of padded bars O^4. O^5 designates bars the ends of which take under lugs o^3, formed upon the inner faces of the arms O', and said bars operate through hooks o^4 o^5, projecting, respectively, from said bar O^5 and the pad-bars, and springs o^6 to hold said pad-bars in position. I provide the bars O^4 upon their outer faces with pads, preferably having a resilient or elastic body, O^6—as, for instance, rubber—covered and held in position by an outer coat, O^7, of calf-skin, that passes over the inner edges of each of the bars O^4, and is secured to the back thereof at one side by strips o^7, held in position by screws and at the other by springs, as shown.

While preferring the above-described material for and method of constructing the polishing-pad, I yet do not desire to limit myself solely thereto, as different material or forms may be used. I prefer that the arms O^3 shall extend from the arms O' at substantially the angle shown in Fig. 12, and I therefore secure curved springs O^8 to the rear edges of the arms O', the outer ends of which form bearing-points for adjusting-screws O^9, that project inwardly from the outer ends of the arms O^4.

O^{10} designates bent leaf-springs that are secured at one end to the outer edges of the arms O^4 near the points at which the arms O^4 O' are hinged together, and extend over said joints to and bear against the edges of said arms O'. By this construction it will be observed that the pad-bars O^4 have great elasticity imparted thereto, and that such elasticity may be increased or diminished at will, for the purpose of bringing the polishing-pads into contact with the engraved plate with greater or less force, as desired.

As before stated, I preferably employ two polishers having the construction described, the pad-bars O^4 of each of which may, if desired, be set at an angle with their supporting-shafts, whereby a "draw-stroke" will be given to the engraved plate by said bars. One or both of the polisher-shafts N N' may be provided with pulleys N^8 N^9 and driven by a belt from the power-shaft. I provide that the polishing-pads be kept free from ink by causing the pads thereof to rotate against the outer surface of a cleaning-belt, P, mounted upon rollers P', journaled in the frame of the machine and rotated by a pulley, P^2, secured upon the shaft of one of said rollers, and a driving-belt.

Q designates a dull-edged scraper-knife that is secured to a bar, Q', extending from side to side of the machine at the front thereof. This knife bears against the belt P, to remove ink therefrom and deposit the same in a receptacle, Q^2, secured to the bar Q^3.

One of the rollers P' of the belt P is adapted to be used as a tension-roller to impart any desired degree of tension to said belt. The polisher herein described may be advantageously used in connection with presses having construction different from that shown herein, it only being necessary to impart rotary motion to the shafts thereof.

If desired, the rollers K' K^2 of the wiper may be placed and operate at an angle with the axis of the plate-cylinder, to insure perfect filling of the engraved lines of the plate; or beaters may be employed for this purpose, such beaters consisting in padded bars R, similar to the bars O^4 of the polisher, and secured to and operated by spring-pressed arms R', hinged to a rotatable shaft, R^2, journaled in the frame immediately above the ink-fountain and adapted to strike against the plate when in operation by cams R^3, secured to the frame and lying in the track of lugs R^4, projecting from the arms R'.

In operation, the plate-cylinder C is adjusted nearer to or farther from the impression-cylinder E, by its adjusting screws and springs B^2 B^3, to suit different thicknesses of paper or kinds of ink to be used, and the beds of the impression-cylinder provided with blankets properly adjusted. Paper is placed upon the feed-board G and a sheet fed below the register-roller G^2 against the same. The press is now started, the plate-cylinder in its rotation first operating, through its gear-segment g^2, the register-gripper or feed-roller G^2, feeding the sheet below the same forward below the raised bar f of one of the grippers F of the impression-cylinder. The gear-segment D of the plate-cylinder is next brought into engagement with one or the other of the segments D' D^2 of the impression-cylinder, rotating said cylinder, and bringing the sheet of paper now held by the grippers F on the impression-bed

into contact with the engraved plate of the cylinder C. The plate and impression cylinders now move in unison until the latter has made a half-revolution, when one of its lugs I^4 I^5 will come into contact with the beveled lug I′ of the arm I, depress said arm, and pass into the space I^6 and against the lug I^2, and thus operate to stop the motion of said cylinder. At the same moment the spring I^3 will force the arm I upward to normal position. At the moment of coming to rest the levers F′ of each of the grippers F will be in contact with the studs F^3 F^4, and said grippers open to release the sheet already printed, which passes to the carrier-belt and fly, and to receive a fresh sheet from the feed-board. The continuous forward rotation of the plate-cylinder will bring its engraved plate C^2 successively into contact with the inking-roller J^6, wiper-belt K, and polishing-bars O^4, each of which will in turn be drawn forward and into engagement with the engraved plate by the cams J^{12} of the plate-cylinder, as hereinbefore described. The cylinder will now again operate the register or feed-roller G^2, and at the same moment will depress the arm I through its cam I^7 and the hinged cam-lever I^8 and connecting-rod I^9. One of the gear-segments of the impression-cylinder, now free to rotate, is now engaged by the gear-segment of the plate-cylinder and the operation above described repeated.

It will be understood that the plate-receiving bed C′ of the cylinder C and impression-beds of cylinder E may be, through their adjusting devices, moved to different desired parts of said cylinders; also, that the plate C^2 of the one and blankets E^3 of the other may be adjusted upon their respective beds. I deem these features of great importance, as thereby, in connection with vertical adjustment of the plate-cylinder, I am enabled to fully and easily control the action of said parts.

In printing from engraved plates it is necessary, in order to produce good results, that the sheets be first dampened. Usually, this has been done by hand, such resulting, in the majority of instances, in irregularly dampened sheets—that is to say, some parts of said sheets having a greater degree of moisture than others, by which said sheets are rendered liable to be smeared by the plate. I have found that automatic dampening of the sheets produces better results, and to this end the register-roller G^2 may be cylindrical in cross-section, and have a cover of spongy or porous material adapted to receive moisture from a suitable source and to impart such moisture to the sheets. When employed in this capacity, the roller G^2 requires to be continuously rotated.

Without limiting myself to the precise construction and arrangement of parts shown, I claim—

1. In a plate-printing press, the combination of a continuously-rotating plate-receiving cylinder having a removable plate-receiving bed with an intermittently-rotating impression-cylinder, said cylinders having diameters of equal length, substantially as described.

2. The combination of a continuously-rotating plate-cylinder having a removable plate-receiving bed with an intermittently rotating impression-cylinder having a diameter equal in length to that of the plate-cylinder and means, substantially as described, for operating said cylinders in unison at stated periods of time, as and for the purpose specified.

3. In a plate-printing press, the combination, with a continuously-rotating plate-cylinder and an intermittently-rotating impression-cylinder driven thereby, of a gear-segment secured to said plate-cylinder and provided at its opposite ends with gear-teeth of greater length than its remaining gear-teeth to engage similar gear-segments upon the impression-cylinder to rotate the cylinders in unison at stated periods, substantially as described.

4. An intermittently-rotating cylinder having projecting lugs, as I^4 I^5, in combination with a hinged arm having lugs I′ I^2 and means, substantially as described, to cause said lugs to engage and bring said cylinder to rest, as and for the purpose specified.

5. A hinged arm having upwardly-projecting lugs and operating-spring, in combination with an intermittently-rotating impression-cylinder having projecting lugs, substantially as described.

6. An intermittently-rotating impression-cylinder having impression-beds, gear-segments, and projecting lugs, in combination with a hinged arm having lugs and means, substantially as described, to bring said arm into engagement with said cylinder at stated periods of time, as and for the purpose specified.

7. A hinged arm having upwardly-projecting lugs to engage an intermittently-rotating cylinder and means, substantially as described, for depressing said arm to release said cylinder, as herein set forth.

8. In a plate-printing press, a hinged arm, I, having projecting lugs and supporting-spring, in combination with an intermittently-rotating impression-cylinder and a releasing cam and rod, substantially as described.

9. The combination of the main or driving shaft having a cam-block with a cam-lever, a connecting-rod, a hinged arm having lugs, and the intermittently-rotating impression-cylinder of a plate-printing press.

10. In a plate-printing press, the combination of the main or driving shaft provided with a cam-block, and the continuously-rotating plate-cylinder mounted on said shaft, with a cam-lever, as I^8, rod, as I^9, hinged arm I, having projecting lugs, and an intermittently-rotating impression-cylinder, substantially as described.

11. A plate-receiving cylinder provided with apertures, a movable impression-bed thereon having apertures and peripheral grooves, an engraved plate, and means, substantially as de-

scribed, for adjusting said bed and plate, as and for the purpose set forth.

12. In a plate-printing press, and in combination, a plate-receiving cylinder, an engraved plate thereon, a vibrating form-inking roller, and means, substantially as described, to bring said roller successively into contact with the engraved plate and ink-fountain, and to impart longitudinal vibration to said form-inking roller, as and for the purpose set forth.

13. In a plate-printing press, a continuously-rotating plate-receiving cylinder, an engraved plate thereon, and the roller-moving cams secured to said cylinder, in combination with longitudinally-moving arms, which are hinged to the arms that support the form-inking roller, and said form-inking roller, substantially as described.

14. In a plate-printing press, a continuously-rotating cylinder, an engraved plate thereon, and roller-moving cams secured to said cylinder, in combination with the fountain-roller, the form-inking roller, and connections, substantially as described, between said cams and form-roller to move said roller successively into contact with the cylinder and fountain-roller and to impart longitudinal vibration thereto, as and for the purpose specified.

15. In a plate-printing press, a plate-wiper belt having intermittent variable tension greatest at the moment of contact with the plate, substantially as described.

16. A continuously-rotating cylinder, an engraved plate thereon, a wiper-belt therefor, laterally-moving rollers supporting said belt, and a stationary tension-roller to impart an intermittent variable tension to said belt, substantially as described.

17. In a plate-printing press, a continuously-moving wiper-belt having variable tension, in combination with a continuously-rotating plate-cylinder, an engraved plate thereon, and means, substantially as described, for bringing said belt into contact with said plate at two points, as and for the purpose specified.

18. In a plate-printing press, a continuously-moving wiper-belt having variable tension, in combination with a continuously-rotating plate-cylinder, an engraved plate thereon, and means, substantially as described, to cause said belt to assume the character of cylinders as regards said plate, as and for the purpose specified.

19. A wiper having laterally-moving rotatable rollers, a continuously-moving belt mounted thereon, and an adjustable stationary tension-roller to impart an intermittent variable tension to said belt, substantially as described.

20. A wiper having rotatable rollers journaled in movable bearings, and a belt mounted upon said rollers and provided with means, substantially as described, to impart a variable tension to said belt, as and for the purpose specified.

21. A wiper having rotatable resilient rollers, a belt having variable tension mounted thereon and operated thereby, and means, substantially as described, to bring said belt into contact with the plate of a plate-printing press, as and for the purpose set forth.

22. The combination of a rotatable plate-cylinder having cams J^{12} with longitudinally-moving wiper-controlling arms L′, adjustable boxes thereon, wiper-rollers K′ K^2, wiper-belt K, and means, substantially as described, to impart variable tension to said belt, as and for the purpose specified.

23. A wiper having rollers provided with metallic cores and elastic or resilient covers, in combination with longitudinally-moving arms L′, having adjustable boxes to receive the shafts of said rollers, rollers L^3, and the cam J^{12} of the plate-cylinder, substantially as described.

24. In a plate-printing press, a continuously-moving wiper-belt having laterally-vibrating supporting-rollers and a stationary tension-roller to impart an intermittent variable tension to said belt, in combination with a scraper-knife, M, and an ink-receptacle, M^2, substantially as described.

25. The combination of a wiper-belt mounted upon rollers journaled in movable spring-pressed boxes K^5, operated by arms L′, with a tension-roller, L^4, substantially as described.

26. In a plate-printing press, the frame and a curved bar, L^2, secured thereto and provided with guide-loops l^3, in combination with longitudinally-moving bars L′, having adjustable boxes L, and rollers L^3, wiper-rollers K′ K^2, wiper-belt K, and plate-cylinder, substantially as described.

27. In a plate printing press, a polisher having outwardly spring-pressed and padded arms hinged to a rotatable shaft, substantially as described.

28. A plate-polisher consisting of a rotatable shaft, disks secured thereto and provided with fixed radial arms, and movable arms hinged to said fixed arms and provided with padded bars, substantially as described, for the purpose specified.

29. A plate-polisher having a rotatable shaft, disks secured thereto and provided with fixed radial arms, movable arms having padded bars hinged to said fixed arms, and means, substantially as described, for operating said movable arms outwardly from said fixed arms.

30. A plate-polisher having a rotatable shaft, disks secured thereto and provided with fixed radial arms, movable arms hinged to said fixed arms, springs to impart elasticity to said movable arms, and adjusting-screws to limit the movement thereof, substantially as described.

31. A plate-polisher having a rotatable shaft, movable journal-boxes therefor, disks secured thereto and provided with fixed radial arms, movable arms hinged thereto and provided with springs, and adjusting-screws, in combination with means, substantially as described, for adjusting said polisher nearer to or farther from the plate-cylinder, as and for the purpose set forth.

32. A plate-polisher having a rotatable shaft, disks secured thereto and provided with fixed radial arms, movable arms hinged thereto and provided with padded bars O^4, and adjusting springs and screws, in combination with longitudinally-moving arms N^2, having rollers N^3, and the plate-cylinder, substantially as described.

33. The combination of a rotatable plate-polisher having shafts provided with fixed and movable arms and adjusting springs and screws, in combination with a belt, P, substantially as described.

34. The combination of a rotatable polisher having a shaft provided with fixed and movable arms and adjusting springs and screws therefor, a belt, P, to remove ink from said polisher, and a scraper-knife, Q, to clean said belt, substantially as described.

35. A plate-polisher having a padded bar provided with a resilient body, O^6, a flexible cover therefor, O^7, securing-hooks o^4 o^5, bar O^5, and the movable spring-press arms O^3, substantially as described.

36. In a plate-printing press, and in combination, a cylinder, a feed-board, an intermittently-rotating feed-roller having an elastic cover, oscillating bearings for said roller, and gear-connections, substantially as described, between said roller and the cylinder, as and for the purpose set forth.

37. An intermittently-rotating feed or register roller having an elastic cover provided with flattened sides, gear-wheel secured to said roller, and oscillating or rocking journal-bearings to support said roller, in combination with the feed-table and a gear-segment secured to the plate-cylinder, substantially as described.

38. The combination of the intermittently-rotating impression-cylinder with sheet-grippers having levers F and single knife-edged bars *f*, and springs F^2, with studs F^3 F^4, secured to the frame A′, substantially as described.

39. The combination of the gripper F, secured to the impression-cylinder, with an intermittently-rotating feed or register roller, G^2, having resilient cover, substantially as described.

40. A wiper-belt, laterally-vibrating supporting-shafts and rollers therefor, and a stationary tension-roller to impart an intermittent variable tension to said belt, in combination with cam-connections, substantially as described, connected to the wiper-shafts to impart longitudinal motion thereto, as and for the purpose set forth.

41. In a plate-printing press, a wiper-belt, as K, its rollers K′ K^2, and shafts K^3 K^4, in combination with a roller, Z, having zigzag groove *h*′, and means, substantially as described, for vibrating said shafts longitudinally, as and for the purpose specified.

42. The combination of a wiper-belt, K, having rollers K′ K^2, and shafts K^3 K^4, provided with zigzag grooved roller Z, with the boxes L and arms Z^3 projecting therefrom and provided with friction-rollers Z^2, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SAMUEL F. MILLARD.

Witnesses:
WILLIAM N. WALSH,
JEREMIAH C. AHEARN.