(No Model.) 7 Sheets—Sheet 1.

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PRINTING PRESS.

No. 574,207. Patented Dec. 29, 1896.

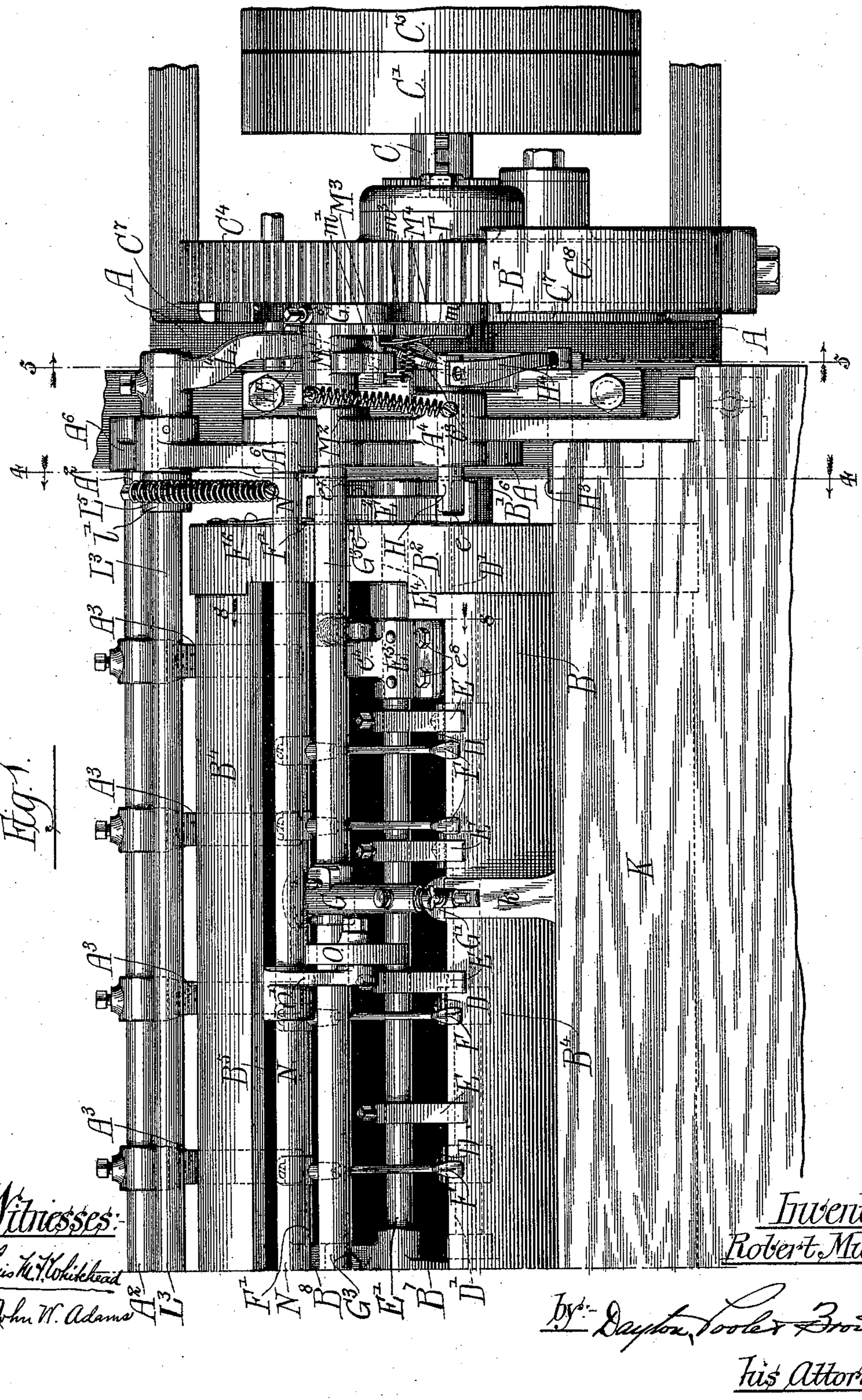

Fig. 1.

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John W. Adams

Inventor:
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by: Dayton, Looker & Brown
His Attorneys.

(No Model.) 7 Sheets—Sheet 2.

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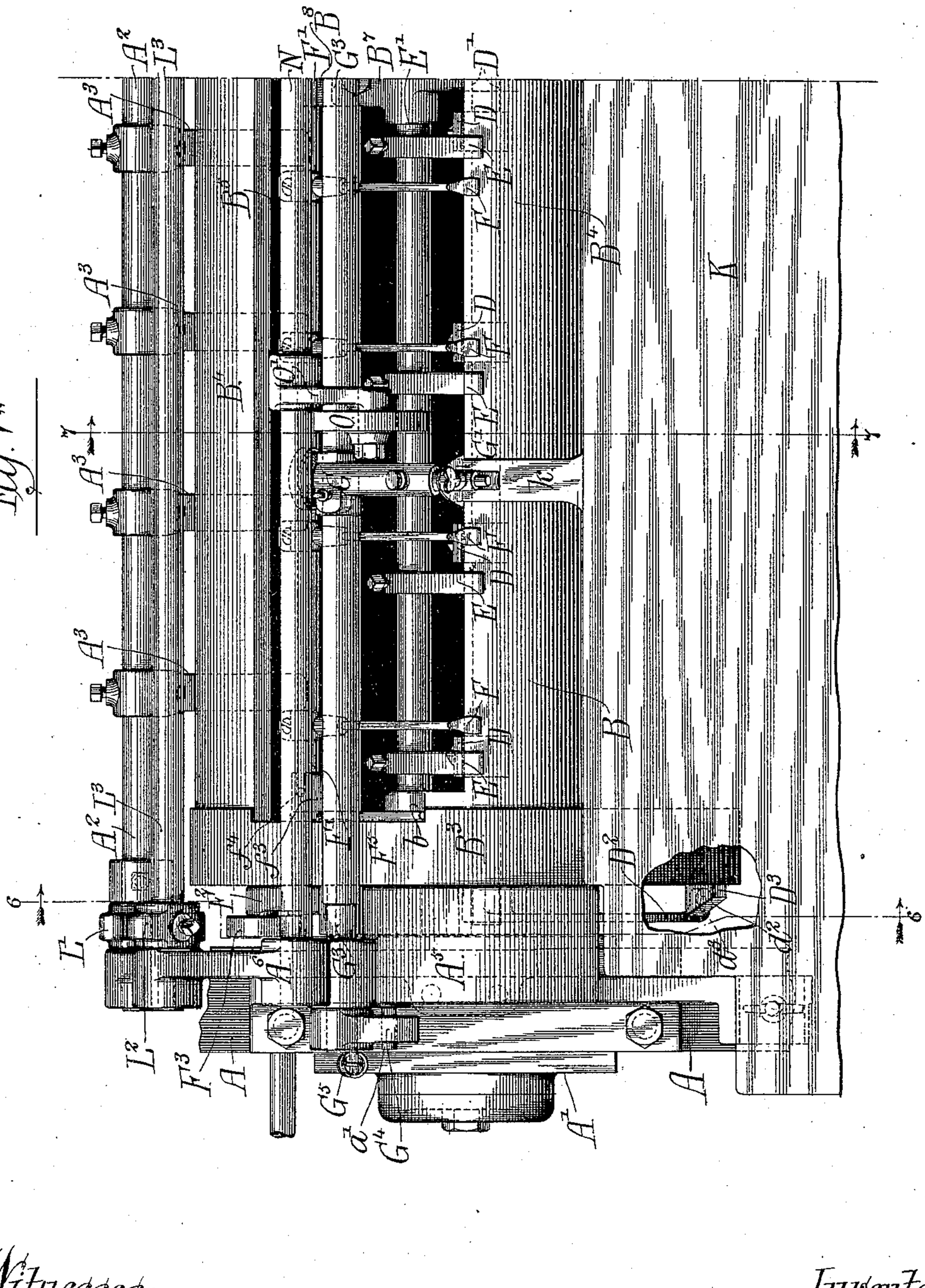
Fig. 1a.



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(No Model.) 7 Sheets—Sheet 3.

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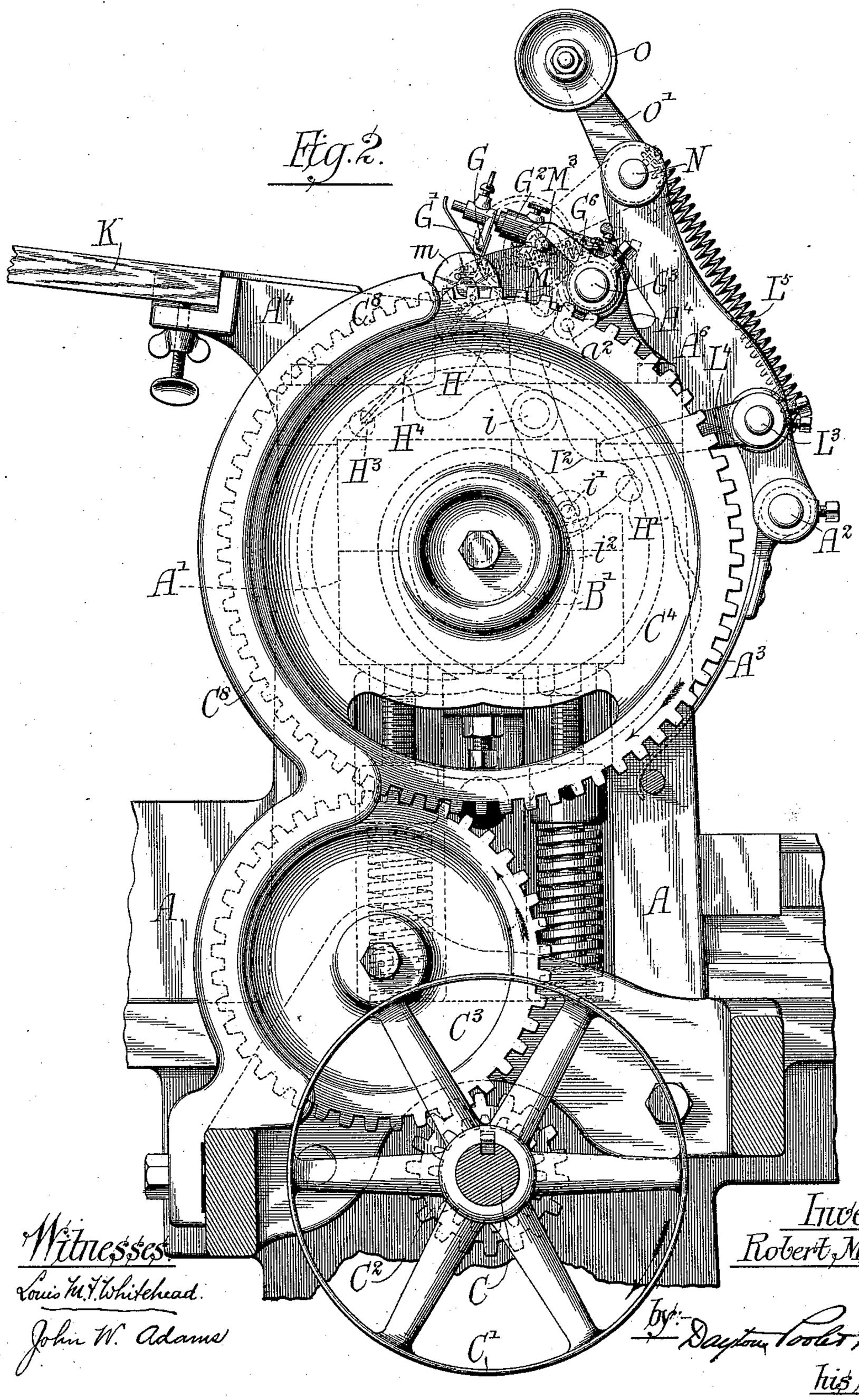
Fig. 2.



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(No Model.) 7 Sheets—Sheet 4.

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Fig. 3.

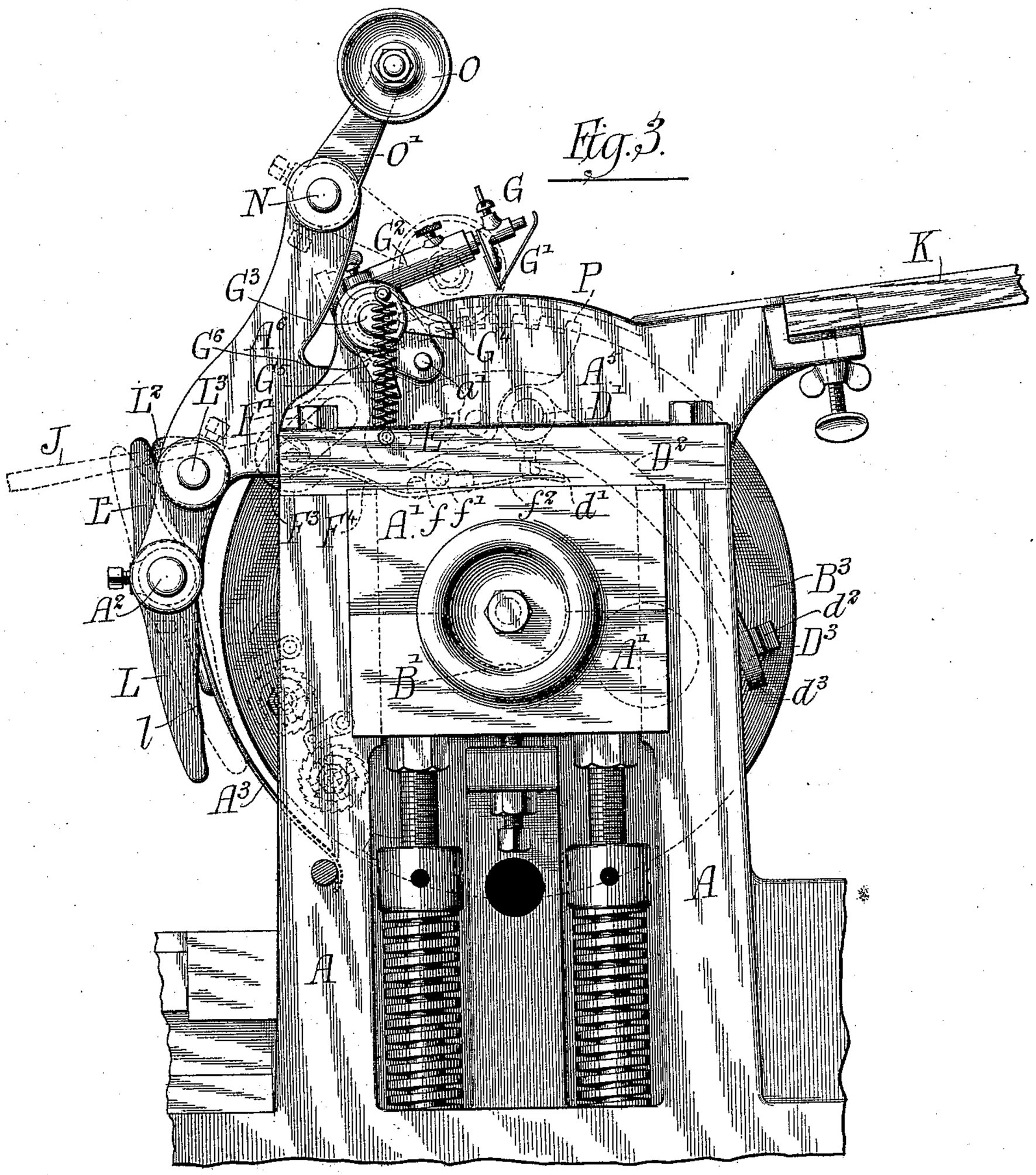


Fig. 15.

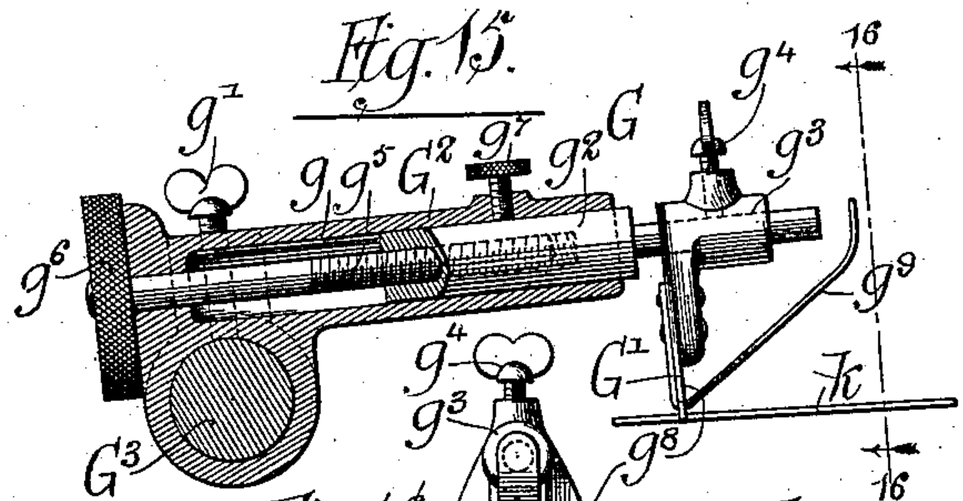
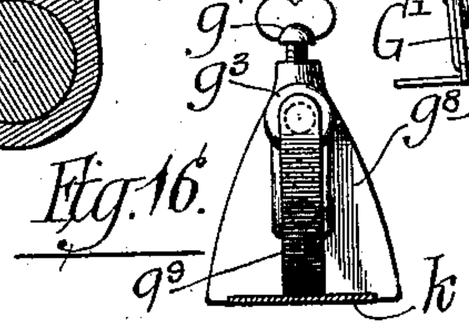


Fig. 16.



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(No Model.) 7 Sheets—Sheet 5.

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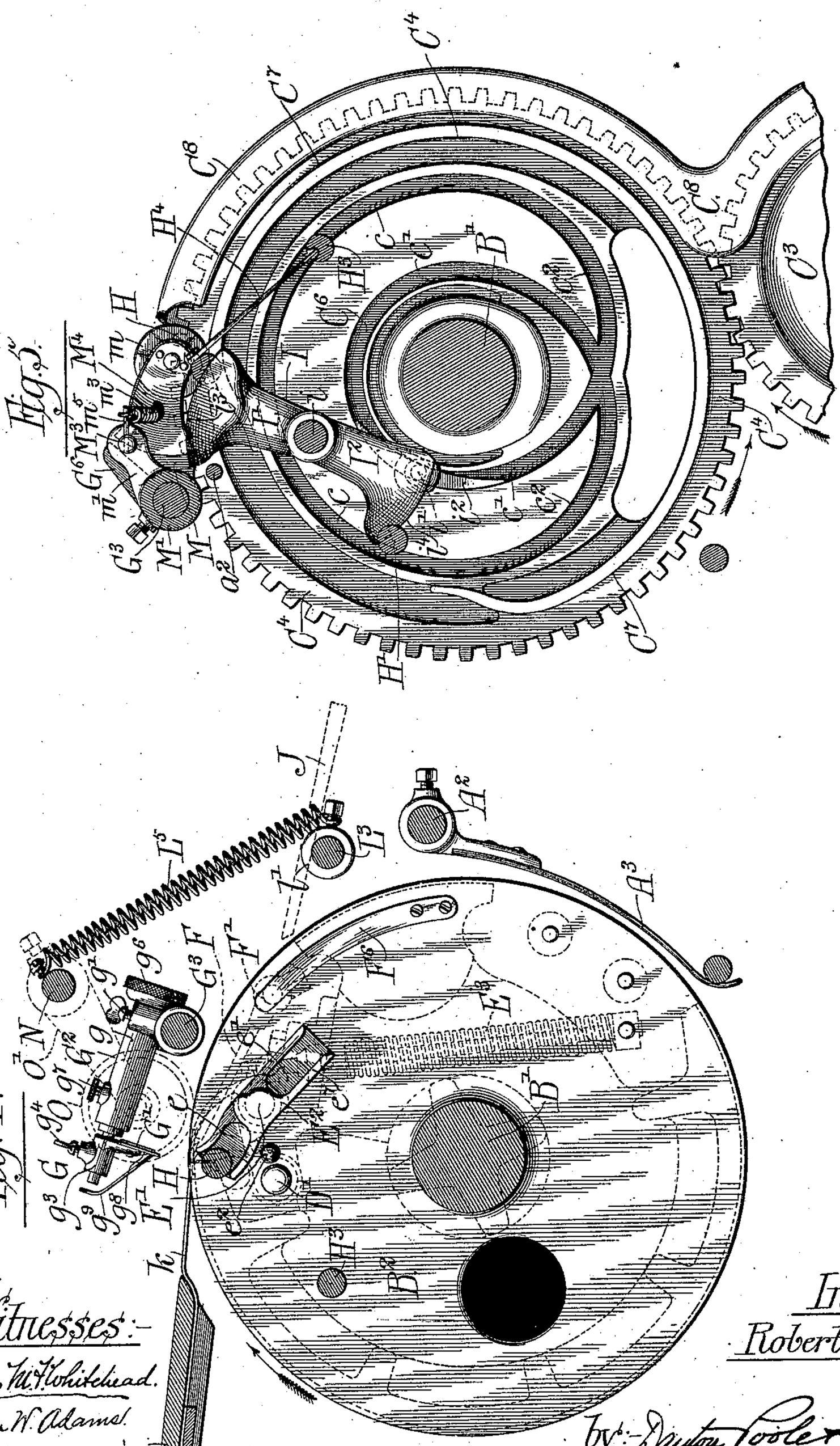

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(No Model.) 7 Sheets—Sheet 6.

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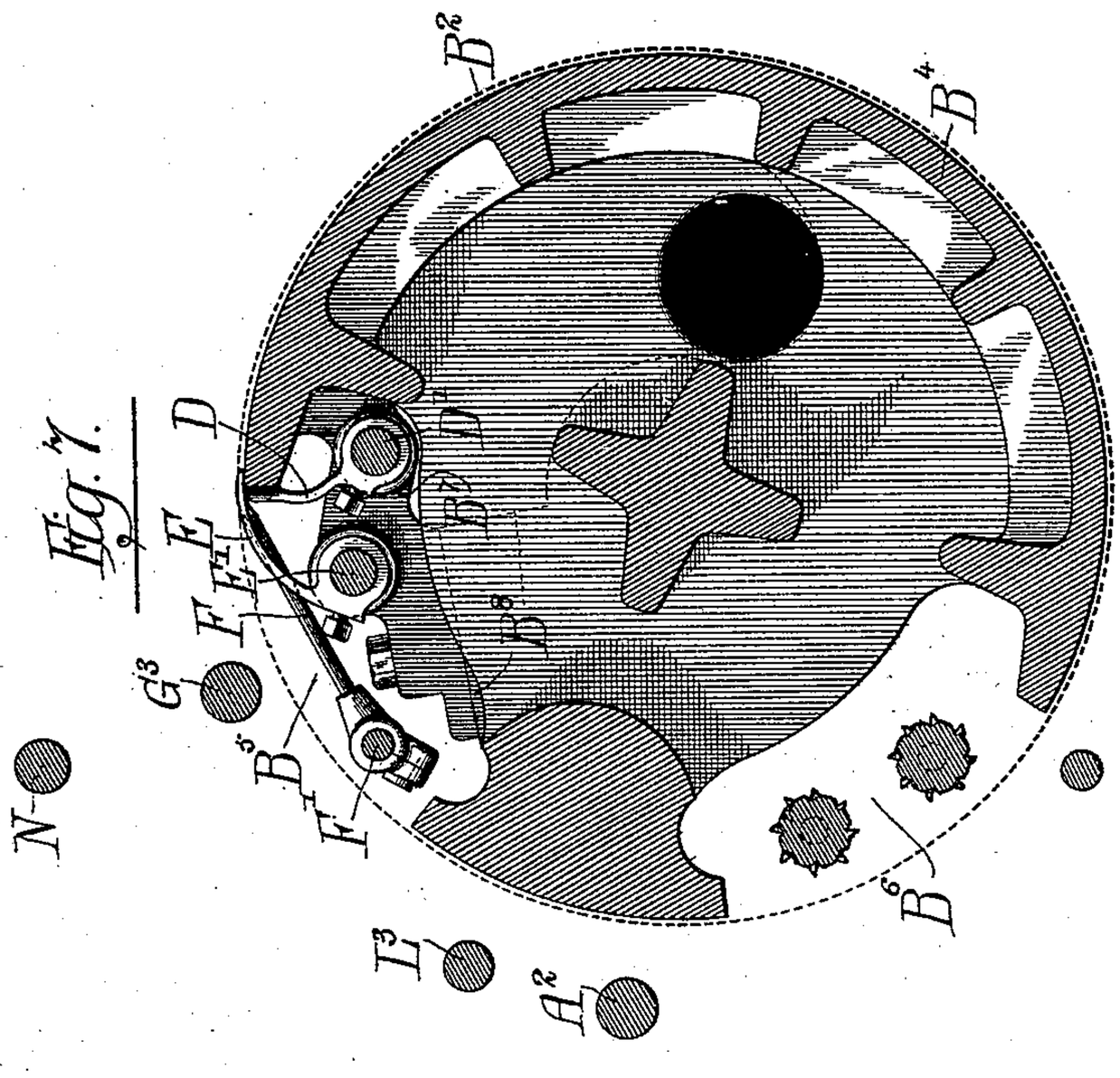

Fig. 7.

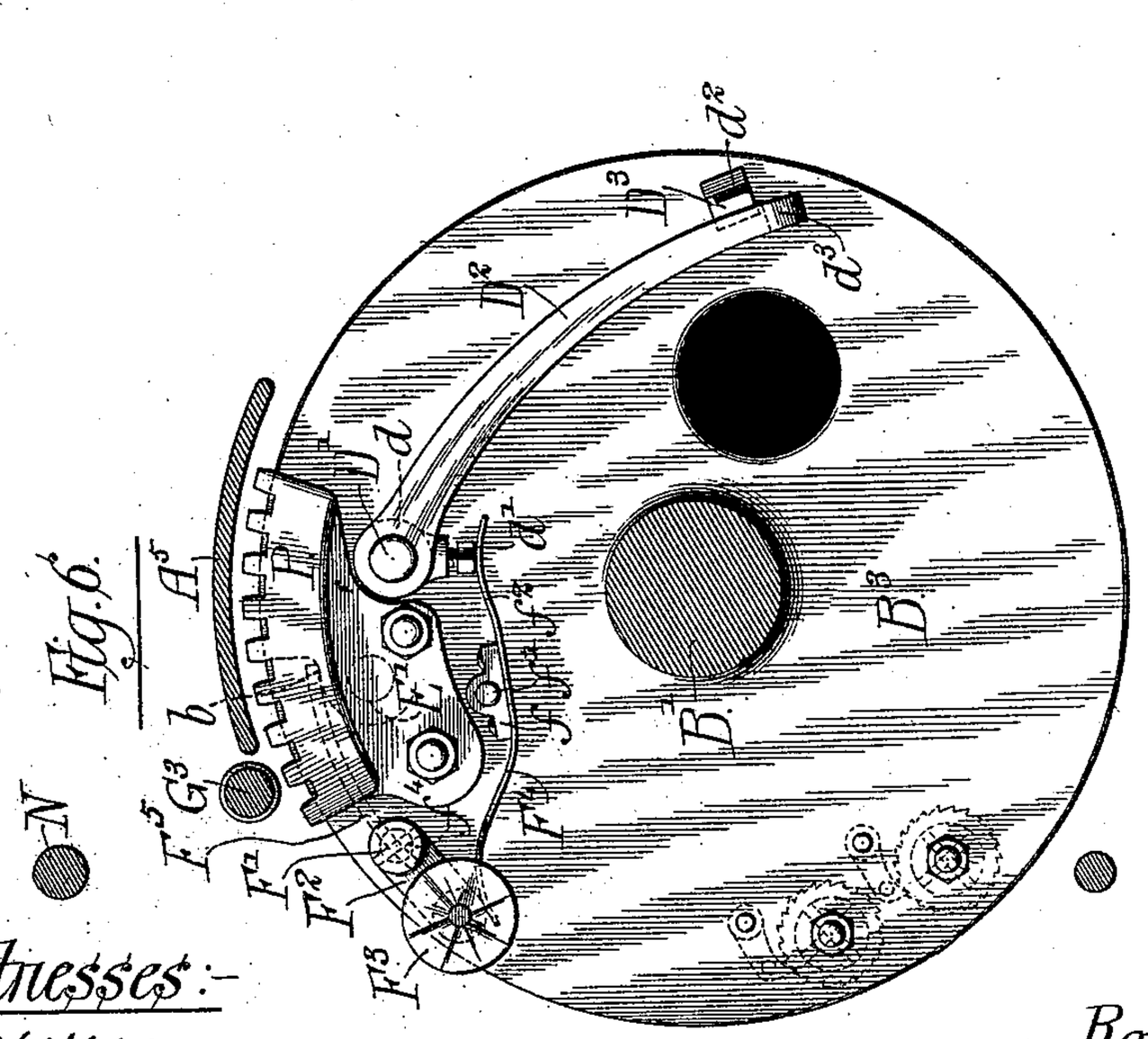

Fig. 6.

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his Attorneys:-

(No Model.) 7 Sheets—Sheet 7.

R. MIEHLE.

PRINTING PRESS.

No. 574,207. Patented Dec. 29, 1896.

Fig. 8.

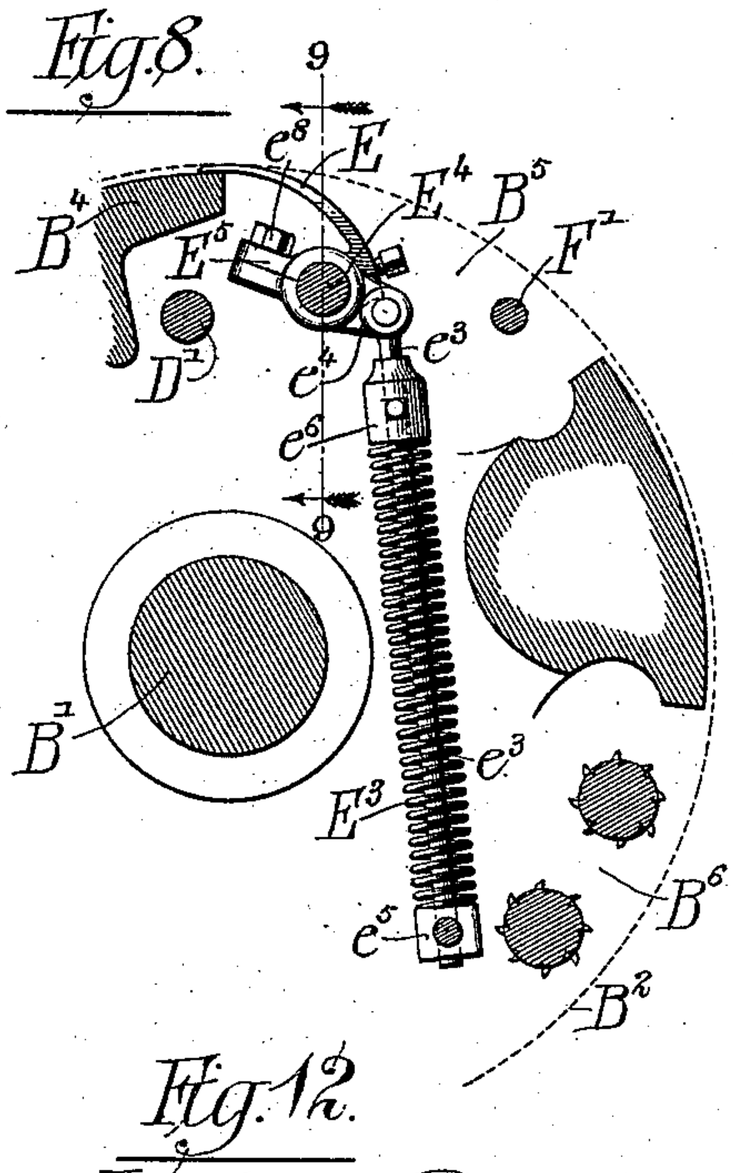

Fig. 9.

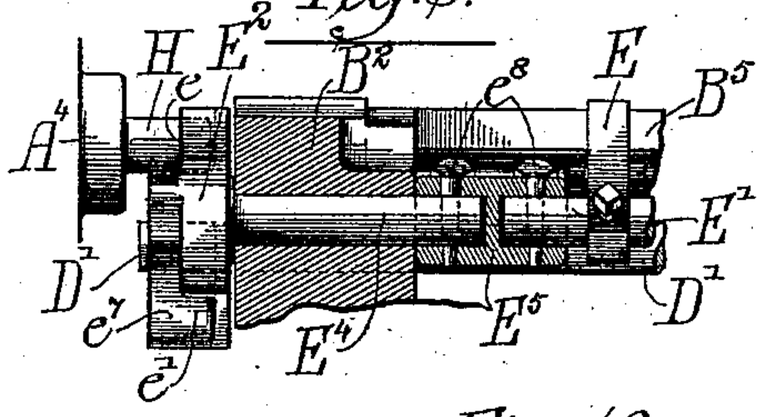

Fig. 10.

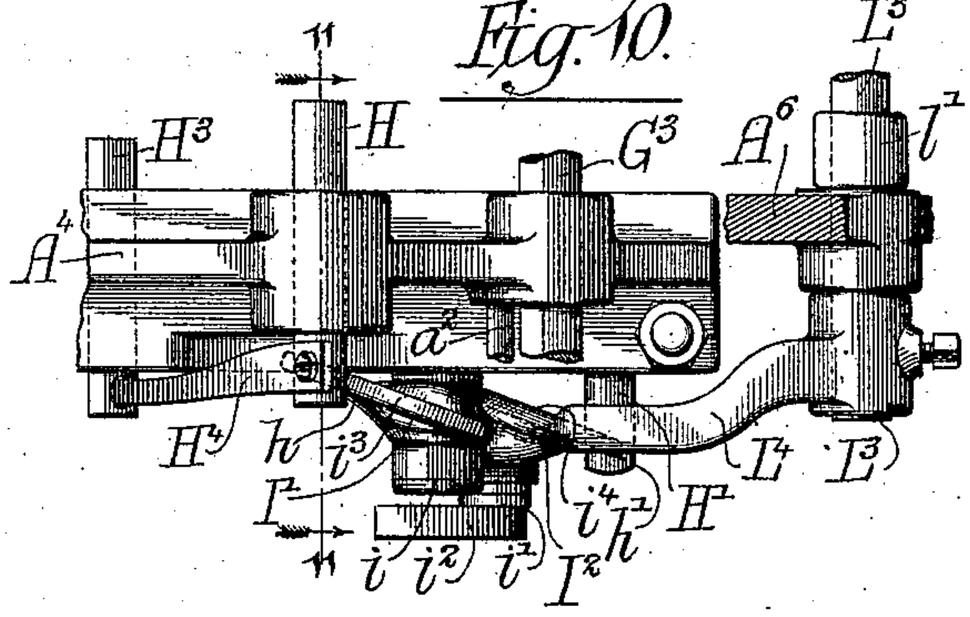

Fig. 12.

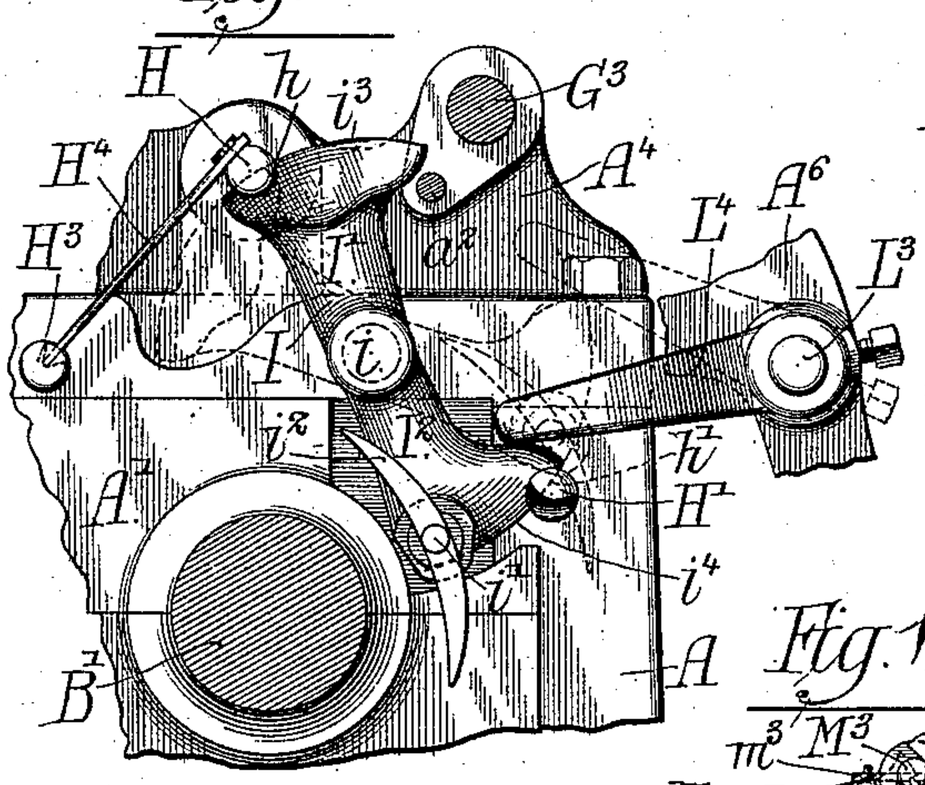

Fig. 11.

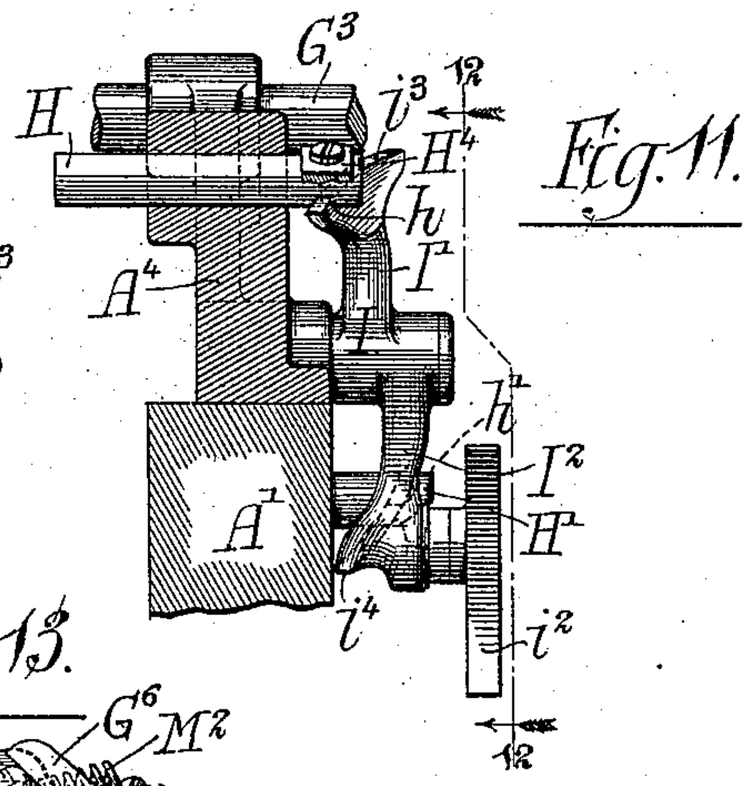

Fig. 13.

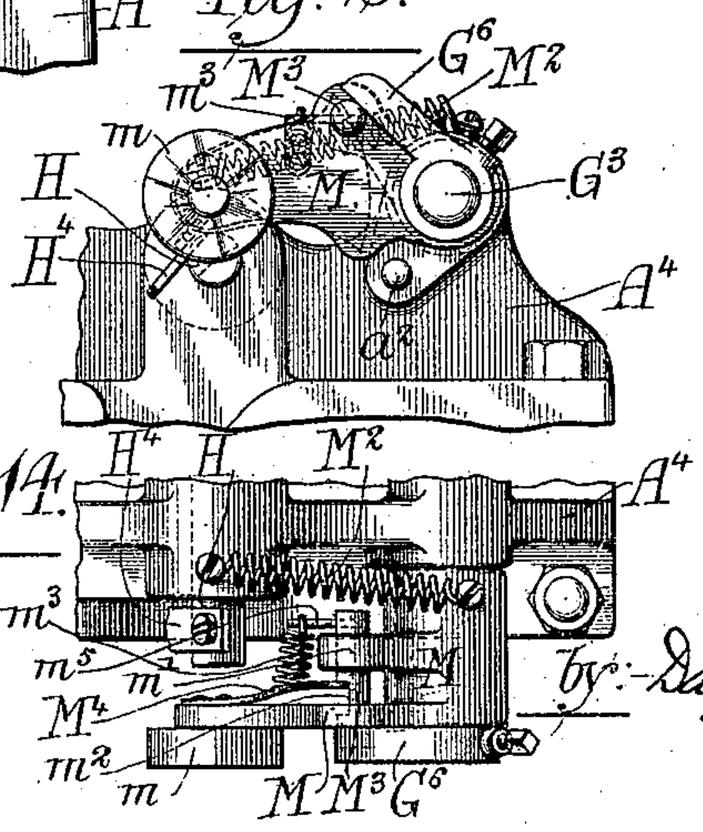

Fig. 14.

Witnesses:-
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John W. Adams.

Inventor:-
Robert Miehle.-
by:- Dayton, Cooler & Brown
his Attorneys.

UNITED STATES PATENT OFFICE.

ROBERT MIEHLE, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE MIEHLE PRINTING PRESS AND MANUFACTURING COMPANY, OF SAME PLACE.

PRINTING-PRESS.

SPECIFICATION forming part of Letters Patent No. 574,207, dated December 29, 1896.

Application filed February 21, 1893. Serial No. 463,268. (No model.)

To all whom it may concern:

Be it known that I, ROBERT MIEHLE, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Printing-Presses; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to printing-presses of that class embracing a rotary impression-cylinder and a flat type-bed and in which the impression-cylinder is moved toward and from the type-bed, and the parts are so arranged that the impression-cylinder is lifted free from the type-bed when the latter moves backwardly beneath the cylinder and is depressed to carry the paper against the type in the forward movement of the type-bed. In machines of this kind the paper is fed to the impression-cylinder, and the printing of the sheet is accomplished at every second rotation of the impression-cylinder; and this invention relates more especially to means for actuating the several operative parts carried by the impression-cylinder at proper times in the rotation thereof, the invention including also improvements in the tympan holding or clamping devices on the cylinder and other parts connected therewith.

The invention consists in the matters hereinafter described, and pointed out in the appended claims.

In the accompanying drawings, Figures 1 and 1ª together are a complete plan view of a printing-press cylinder embodying all the improvements which comprise the subject of this invention. Fig. 2 is an end elevation of my improved cylinder from the side on which the power for operating is applied, showing so much of a press as will illustrate the manner in which the cylinder is driven and its relation to adjacent parts. Fig. 3 is a similar view of the other end of the cylinder and adjacent parts of the press. Fig. 4 is a vertical sectional view on the line 4 4 of Fig. 1, looking in the direction indicated by the arrows, showing the tumbler on the end of the nipper-shaft, whereby said shaft and nippers are actuated, the guide for the sheets, its shaft, and the springs for retaining the sheet in proper position, and other operative parts in dotted lines. Fig. 5 is a vertical view on the line 5 5 of Fig. 1, looking in the direction of the arrows, showing the guide, the grip-pin cam-lever, the cam at the lower end thereof, the cam-groove in the gear-wheel, and the shoe which causes the cam-wheel to follow the cam-groove in the proper manner, also the pins for actuating which said cam-lever is primarily provided. Fig. 6 is a vertical sectional view of the cylinder on the line 6 6 of Fig. 1ª, looking in the direction indicated by the arrows and showing the lever for tightening the tympan-sheet clamps and the lug under which it is inserted to retain it in position, the roller and arm for operating the "shoo-flies," and the spring for supporting said wheel in position to be tripped by the cam-block on the guide-spring rod, and other operative parts in dotted lines, the relative positions of the various rods and shafts being also shown. Fig. 7 is a vertical sectional view on the line 7 7 of Fig. 1ª, looking in the direction indicated by the arrows, showing the tympan-sheet clamps, the nippers, the shoo-flies, and the shafts for adjusting the tympan-sheets. Fig. 8 is a partial sectional view on the line 8 8 of Fig. 1, looking in the direction indicated by the arrows, showing the nipper-fingers and the shaft on which they are carried and the spring for supplementing the action of the tumbler on said shaft, whereby it is primarily actuated. Fig. 9 is a partial sectional view on the line 9 9 of Fig. 8, showing the manner of coupling the section of the nipper-shaft carrying the nipper-fingers to the section thereof on which the tumbler is carried. Figs. 10, 11, and 12 are views showing in detail the grip-pin cam-lever, its method of attachment, and its relation to adjacent parts actuated thereby. Figs. 13 and 14 are similar detail views of the guide-arm and parts operating in connection therewith. Figs. 15 and 16 are details of the guide whereby the delivery of paper to the press is controlled.

In the said drawings all of the parts of the press are shown in the positions that they will occupy at the beginning of the printing operation just after the sheet has been grasped by

the gripping devices which hold it upon the impression-cylinder.

A clearer understanding of the mechanisms forming the subject of this invention will be facilitated by consideration of the fact that in a press of the kind herein shown, wherein two revolutions of the impression-cylinder are requisite for the printing of each sheet, the delivery of the sheet takes place during one revolution thereof, and the printing of the sheet, the delivery thereof from the cylinder, and the appropriate movements of the various parts incident to printing the sheet take place during the second revolution, and that the first revolution takes place while the type-bed and form thereon are moving backward beneath the cylinder preparatory to the making of the impression, and the second rotation takes place during the forward movement of the type-bed and form and when the cylinder is depressed to make the impression.

In the said drawings, A indicates the frame of the press, and B the impression-cylinder. The said cylinder is mounted in bearings A′ on the frame, and power for driving the cylinder and parts operating in connection therewith is imparted from the pulley-shaft C, driven by the pulley C′, supplied by means of the gear-wheel C^2, Fig. 2, attached to the driving-shaft, the idle-gear C^3, carried on a stud set in the frame, and the gear-wheel C^4, secured to the shaft B′, on which the cylinder is supported, said gear-wheel C^4 being located outside of the frame A and bearing A′ at one end of the machine. A loose pulley C^5 is shown as mounted on the main driving-shaft adjacent to the pulley C′, to which the driving-belt may be shifted when it is desired to stop the press. A guard C^8 is shown in the drawings as placed around the marginal parts of the gear-wheels C^3 C^4 for the protection of the operator, said guard being rigidly attached to the frame in the manner illustrated in the drawings.

The impression-cylinder illustrated is of common form, consisting of end walls or heads B^2 B^3 and an intermediate cylindric shell B^4, provided with longitudinal openings or slots B^5 B^6. The main parts carried by the cylinder are located in the openings or slot B^5 and consist of the clamps or grippers D D D for holding the edge of the tympan, the nippers E E E for holding the advance edge of the sheet to be printed, and the lifting-fingers or shoo-flies F F F, by which the advance edge of the sheet is lifted from the cylinder at the time of the delivery or discharge of the printed sheet. The grippers D D D are not moved excepting when it is desired to take out and replace the tympan-sheet, but the nippers E E and lifting-fingers F F are actuated at each second revolution of the impression-cylinder. Improved devices are herein shown for holding in place the grippers D D D, as well as for operating the nippers E E E and lifting-fingers F F F.

G G G are the stops or guide-fingers above the impression-cylinder, movable toward and from the same, said fingers being for the purpose of insuring the delivery by the person feeding the press of the sheets to be printed in the proper position to be caught by the nippers E E E, and said guide-fingers are for this purpose actuated by devices which lift the same and allow the advance of the sheet at the moment the advance edge of the same is caught by the nippers. The said nippers E E E, the lifting-fingers F F F, and guide-fingers G G G are all actuated at each alternate revolution of the impression-cylinder, and the devices for giving movement to these parts constitute the principal features of the mechanism illustrated. Improved features of construction are, however, also illustrated in the drawings for holding in place the tympan-sheet clamps or grippers D D D.

To first refer to the devices shown for supporting and holding in place the said grippers, these parts are made as follows: The tympan-grippers and parts supporting the same are more clearly shown in Figs. 1ª, 6, and 7. Said fingers are supported upon a shaft D′, extending longitudinally of the impression-cylinder, within the hollow interior thereof, and adjacent to the margin of the slot or opening B^5 at which the edge of the tympan is located and at which the advance edge of the sheets to be printed are located when gripped by the nippers, the said clamps D D D being attached to the shaft and extending outwardly therefrom in position to press against the radial surface of the side edge of the cylinder-shell B^4. The shaft D′ is mounted at its ends in bearing-apertures in the cylinder-heads B^2 B^3, terminating flush with or inside of the outer surface of the head B^2, but extending outside of the head B^3 for the attachment of an arm or lever D^2. The said shaft D′ has additional bearing at the middle of the cylinder in a bearing-plate B^7, secured to a transverse diaphragm or partition B^8 in the cylinder, as clearly seen in Fig. 7. The arm D^2 is arranged at right angles with the shaft or parallel with the face of the head B^3 and is made of thin spring metal, so that its free end may be moved a short distance toward and from the head, the arm being provided with a hub *d*, through which is inserted a set-screw *d′* for rigidly securing said arm to the shaft D′. Upon the outer face of the head B^3 is located a lug or projection D^3, adapted for engagement with the outer end of said arm D^2 when the grippers D D D are in position to hold or grip the edge of the tympan, these parts being so arranged that the arm D^2 will normally engage the said lug D^3, but may be sprung or bent outwardly to pass over the same when it is desired to release the grippers. The outer end of the said lug D^3 is preferably beveled or inclined, as seen at d^2, so that when the arm D^2 is swung inwardly toward the center of the cylinder and in a direction to bring the grippers against the edge of the tympan by pressure

applied to its free end said arm then striking the inclined surface d^2 will spring over the said lug and will thereafter engage the same without attention on the part of the operator to secure this end.

For releasing the gripping-fingers from the tympan it is only necessary to grasp the free end of the arm D^2 and press it outwardly until disengaged from the lug D^3, after which said arm may be moved to turn the shaft D′ and thereby swing the grippers away from the edge of the cylinder. An eye d^3 on the end of the lever D^2 enables the same to be easily grasped by the hand or by a suitable hooked implement.

To now refer to devices for supporting and actuating the nippers E E E, the sheet-lifters F F F, and sheet-guides G G G, it may first be stated that all these parts are actuated at proper intervals, to wit, at every second rotation of the impression-cylinder, through the medium of an actuating mechanism deriving motion from the gear-wheel C^2, the same being constructed as follows:

I, Figs. 1, 5, 10, 11, and 12, is an oscillating lever located between the machine-frame and said gear-wheel and mounted on a stud *i*, secured to the frame and extending outwardly therefrom. The lever I is pivoted centrally on the stud *i* and embraces two oppositely-extending arms I′ I^2 and a central hub, to which said arms are attached. At its end nearest the central axis of the wheel C^4 the lever I is provided with a stud or bearing-pin *i*′, carrying a curved guide-block i^2, which engages a cam-slot C^6, formed in the inner surface of the wheel C^4. The cam-groove C^6, as clearly shown in Fig. 5, is provided with outer and inner concentric parts *c c*′, which are connected with each other by spirally-deflected or obliquely-arranged parts c^2 c^3, which cross or intersect each other, so that the guide-piece i^2, which engages said groove, will in the rotation of the wheel move continuously in the groove and across the intersection of the two parts thereof, so that during one revolution of the wheel it will engage the outer concentric part *c* and in the next succeeding rotation it will engage the inner concentric part *c*′, thereby giving oscillatory movement to the lever I in such a manner that the lever will be moved in one direction at one rotation of the wheel and in the opposite direction at the next rotation thereof, or, in other words, will make one complete back-and-forth or oscillatory movement during two rotations of the wheel. The said lever I, thus moved by the action of the cam-groove C^6, serves to control the movements of the several operative parts above referred to, to wit, the sheet-nippers, sheet-lifters, and guides, as will hereinafter more fully appear in the detailed description of the devices by which said parts are directly actuated. The general construction by which the said nippers, sheet-lifters, and sheet-guides are immediately supported will now be described.

The nippers E E E are mounted on a shaft E′, having bearings at its opposite ends in the cylinder-heads B′ and B^2 and an intermediate bearing in the plate B^7. Attached to said shaft outside of the head B′ is a cross-head E^2, provided with opposite radial slots *e e*′. The cross-head E^2, together with the sliding pins H H′, mounted on the machine-frame and adapted to engage the cross-head at proper times, constitute devices by which the said shaft E′ is rocked or oscillated to throw the said nippers E into contact with and away from the surface of the cylinder. The said nippers are held against the cylinder and in position to grip the edge of the sheet by means of a spring E^3, Fig. 8, which acts upon the said shaft in a direction to hold the nippers against the cylinder or to hold the said nippers away from the cylinder, the rock-shaft having an oscillatory movement sufficient to enable the ends of the nippers when thrown backwardly to swing inside of the outer circumference of the cylinder, the oscillatory movement of the shaft in either direction being limited by a stop-pin or stud e^2, secured in the head B′ in position for contact of the cross-head E^2 therewith.

For holding the nippers at either limit of their oscillatory movement the spring E^3 is arranged to act by expansion on a rod e^3, which is pivoted to an arm e^4 on the said shaft E′, said rod e^3 having sliding engagement with a block e^5, pivoted on the inner face of the head B^2 in such position that the spring E^3 will be compressed when the nippers E E E are in their intermediate position and will be expanded when the nippers are at either limit of their throw. That is to say, the block e^5 forms a pivotal connection of the rod e^3 with the cylinder, which pivotal connection is located at a point approximately in alinement with the arm e^4 when the nippers are at an intermediate point in their throw, so that when the shaft is turned so as to carry the nippers and the said arm e^4 in either direction from their intermediate position the expansion of the spring will turn the shaft so as to carry the nippers either to the backward or forward limit of their throw. As constructed in detail the rod e^3 is provided with a block or collar e^6, located near its point of connection with the arm e^4, and the spring E^3 is placed around the rod e^3 and in compression between the collar e^6 and the pivot-block e^5, through which the rod e^3 is arranged to slide at its free end. This particular arrangement of the spring is, however, only one of a number of similar devices which may be applied to move the nippers in the manner described.

Motion is given to the sliding pins H H′ which actuate the cross-head E^2 from the oscillating lever I, hereinbefore referred to, by means as follows: The said parts, as clearly shown in Figs. 1, 4, 5, 10, 11, and 12, are mounted and slide endwise in bearing-apertures in the frame and are adapted to extend from the frame inwardly toward the cylinder

and outwardly toward the wheel C^1, the parts being so located as to be adjacent to the outer ends of the arms I' I^2 of said lever I, which lever is connected with the pins by means giving longitudinal movement to the pins when the lever is actuated, the same consisting in the construction illustrated of obliquely-arranged or spiral flanges i^3 i^4 on the ends of the arms I' I^2, which oblique or spiral flanges are adapted to engage notches h h' in the said pins H H', as clearly shown in the drawings, Figs. 11 and 12. The parts are so arranged, furthermore, that the pins H and H' will be oppositely moved. That is to say, when the pin H is at its inward position or thrown toward the cylinder-head the pin H' will be withdrawn, and movement of the lever I will draw the pin H outwardly and at the same time thrust the pin H' inwardly. Inasmuch as movement of the lever I in one direction only takes place at each complete rotation of the impression-cylinder it follows that during one rotation of the cylinder the pin H will be thrust inwardly into position to engage the cross-head E^2 and during the next rotation the pin H will be withdrawn and the pin H' thrust inwardly to engage said cross-head. The slot e of the cross-head E^2 is arranged to engage the pin H, which is located nearest the periphery of the cylinder, and the open end of said slot e is so located that when the nippers are thrown backwardly and held in that position by the spring E^3 the open end of said slot will be in position to engage the said pin H. Similarly the slot e' is so arranged that when the nippers are closed against the sheet and held in that position by the said spring the open end of said slot will be in position to engage the pin H'.

The actuation of the lever I and the movement of the pins H and H' inwardly and outwardly takes place when the cross-head is in the part of its revolution remote from the said pins, and the pin H, which acts in the slot e to close the grippers, is so located relatively to the sheet-feeding devices that the said pin will engage the cross-head and close the grippers against the edge of the sheet at that point in the rotation of the cylinder when the nippers are in position to engage the sheet at the proper point. Similarly the pin H' is arranged in position to engage the slot e' at that point in the revolution of the cylinder when it is necessary to release the sheet to secure its discharge from the cylinder. As shown in the drawings, Fig. 4, the parts are seen in the position which they occupy just after the nippers have been closed and the cross-head E^2 is leaving the pin H, said pin having by its engagement with the slot e turned the cross-head into the position shown. The cross-head remains in this position during the next rotation of the cylinder, the open end of the slot e' being in the position to engage the pin H', so as to release the sheet at the end of such rotation.

J J indicate the fly-fingers, on which the sheet is received, and said fly-fingers being located at the downwardly-moving side of the cylinder somewhat in advance of the point at which the sheet is received from the feed-table K, it follows that the release of the sheet will take place before its forward edge reaches the said fly-fingers.

The slot e is shown as being made somewhat curved instead of straight, the curvature being such that the outer ends of its side walls stand parallel, or nearly so, with the curved path of the pin instead of at a considerable inclination to such path, as would be the case if the slot were straight, so that the pin on being encountered by the cross-head will turn the latter, at first slowly, and more rapidly as the pin enters farther into the slot, thereby preventing objectionable shock or jar by contact of the rapidly-moving parts.

At one side of the cross-head E^2 the flange e^7, forming the side wall of the slots e e', is extended beyond the other side wall, as clearly seen in Figs. 1 and 9, and a third pin H^3, shorter than the pin H and adapted to engage said flange e^7 only, is connected and moves with the pin H, said pin H^3 being so located that it will be encountered by the cross-head E^2 before the same reaches the pin H. The purpose of said pin H^3 is by acting on the flange e^7 to bring the cross-head with certainty into position to engage the pin H and thereby prevent breakage of or injury to the parts in case the spring E^3 should have failed to properly return the cross-head into position to engagement with said pin H when last moved by the pin H'. The said pin H^3 is shown as connected with the pin H by means of an arm H^4, secured to the outer end of the pin H and entering a recess in the side of the pin H^3.

As an improved construction in the shaft E', supporting the nippers E, said shaft instead of being extended through the head B^2 and attached to the cross-head E^2 terminates within said head, and the cross-head E^2, as clearly seen in Fig. 9, is provided with a short shaft E^4, made integral with the said cross-head and long enough to extend through the said head B^2, said short shaft being connected with the main part of the shaft E' by a coupling-piece E^5, having sockets to receive the ends of the shafts E' and E^4 and suitable devices for holding the shafts in the sockets, herein shown as consisting of pins inserted through the parts. The advantage of this construction is that when it is desired to remove the cross-head E^2 this can be done by disconnecting the shaft-section E^4 at the coupling E^5, when the cross-head and the shaft-section attached thereto may be removed without disturbing the main part of the shaft E'. In the particular construction shown the arm e^4, upon which the spring E^3 acts, is formed integral with the coupling-piece E^5, as clearly seen in Fig. 1. Said coupling-piece is furthermore shown as having the form of a split sleeve and provided with flanges, through which are inserted bolts e^8 e^8

for clamping the parts of the coupling-piece against the ends of the shaft-sections to afford a more rigid connection between the same.

It will of course be understood that in the operation of the parts above referred to the pins H and H′, acting on the cross-head E^2, serve to turn or oscillate the shaft E′ for opening and closing the sheet-nippers E E E against the action of the spring E^3, which tends to hold said nippers either in their open or closed position, so that the actuating device described has no effect on the nippers except when the cross-head encounters the pins in the manner before stated.

To now refer to the devices for supporting and actuating the sheet-lifters F F F, these parts are made as follows: Said sheet-lifters have the form of relatively long fingers attached to the longitudinal shaft F′, which is mounted at its ends in the heads B^2 B^3 of the cylinder and to the end of which outside of the head B^3 are secured a rocking arm F^2, upon the end of which is mounted an anti-friction-roller F^3. The spring F^4, mounted on the cylinder-head, acts at its free end against the rocking arm F^2 in a direction to throw the lifting-fingers toward the outer surface of the impression-cylinder. An arm F^5, Figs. 1^a and 6, attached to the shaft F′ inside of the cylinder-head B^3 and resting on a shoulder *b*, formed at the end of the slot or opening in the cylinder, serves to limit the rotation of the shaft under the action of the spring F^4, and to thereby prevent the ends of the lifting-fingers pressing with too much force against the tympan, while leaving the said lifting-fingers free for adjustment or removal without reference to the action of the spring upon the shaft.

The spring F^4 illustrated contains improved features of construction in springs used for the same purpose, said spring F^4 being attached to a block *f*, which is pivoted, by means of a pivot-stud *f′*, to the cylinder-head, and the spring is provided with an arm f^2, extending beyond the pivot *f′* and adapted for engagement with a projecting part of or upon the shaft D′, which supports the tympan grippers or clamps D D, said projection in the particular instance illustrated consisting of the set-screw *d′*, which holds the arm D^2 on said shaft D′. These parts are so arranged that when the tympan is gripped by the clamps D D D the head of the set-screw *d′* (or other projecting part employed for this purpose) will engage the arm f^2 in a manner to hold the spring F^4 against the rocking arm F^2, or, in other words, so as to hold the said spring in operative position, the head of the set-screw (or projection) and the arm f^2 being, however, so located with reference to each other that when the rock-shaft D′ is turned to release the clamps or grippers from the tympan the arm f^2 will be disengaged and the spring F^4 allowed to fall away from the rocking arm F^2, or it will be out of operative position. The object of this construction is to enable the lifting-fingers to be thrown backward out of the way at the time the grippers are released for removing the tympan, it being obvious that when the arm D^2 of the gripper-shaft D′ is thrown outwardly for releasing the grippers the spring F^2 will at the same time be released, so that it will no longer exert its pressure on the shaft F′, and the latter shaft may be turned to throw the fingers backwardly away from the margin of the cylinder. The said lifting-fingers are actuated at the proper time for lifting the advance edge of the sheet preparatory to the discharge of the same by means acting on the rock-shaft F^2 as follows: L is an oscillating cam-arm located in the same vertical plane with the roller F^3 of the arm F^2 at one side of the impression-cylinder, said cam-lever being provided at its inner margin with a cam-surface *l*, in which said roller acts when the cam is thrown inwardly in position for contact with said roller. In the particular construction shown said lever L is pivotally mounted on a stationary rod A^2, which extends lengthwise of the impression-cylinder at the side thereof at which the sheets are discharged and which affords support for a plurality of curved sheet-guides A^3 A^3, which extend downwardly over the downwardly-moving face of the cylinder, as heretofore common. The cam-arm L is provided above its point of pivotal support with an upwardly-extending arm L′, adapted for engagement with a cam projection L^2, Figs. 1^a and 3, attached to a rock-shaft L^3, located above and parallel with the rod A^2. At its opposite end or that nearest the gear-wheel C^4 said rock-shaft L^2 is provided with a rigidly-attached rocking arm L^4, which extends inwardly from the shaft and is adapted to bear at its free end upon the lower part of the actuating-lever I, Figs. 2, 10, and 12.

A coiled spring L^5, attached at one end to a collar *l′* on the shaft L^3 and at its opposite end to an adjacent stationary part of the machine, tends to turn said shaft in a direction to hold the arm L^4 constantly in contact with the actuating-lever I, so that when said actuating-lever is moved or oscillated corresponding movement will be transmitted to the shaft L^3 and the cam-arm L will be thrown toward or from the cylinder. Inasmuch as the said actuating-lever I is thrown inwardly and outwardly in alternate rotations of the cylinder, it follows that the cam-arm L will be thrown into position to act upon the rocking arm F^2 of the lifting-finger shaft at every alternate rotation of the impression-cylinder. The said lever being located in the position to engage and move the rocking arm F^2 as the advance edge of the sheet of paper approaches the fly-fingers J, it follows that the sheet-lifters will be actuated to free the advance edge of the sheet from the cylinder before the said

advance edge of the sheet reaches the fly-fingers, so that the sheet will be properly delivered thereto.

To facilitate the removal of the shoo-fly shaft F′ from the cylinder, a special construction is provided, as follows: The said shaft, instead of being extended through the cylinder-head B^3, terminates inside of said cylinder-head, and the arm F^2 is attached to a short shaft-section, which passes through said head B^3 and is provided on its inner end with a socketed coupling-piece f^3, which is provided with a socket for the end of the shaft F′, said socket being provided in one side with an open slot adapted for engagement with a pin or stud f^4 on the said shaft F′. As herein shown, the arm F^5, by which the rotary movement of the shaft is limited, is secured in the coupling-piece f^3. At its opposite end or that adjacent to the cylinder-head B^2 the shaft F′ passes through a bearing-aperture in said head and is held from endwise movement by means of a leaf-spring F^6, attached to the outer face of the head and covering the bearing-aperture therein, as clearly seen in Figs. 1 and 4. The spring F^6, in connection with the socketed coupling-piece f^3, affords a convenient means of quickly removing and replacing the shaft F′, it being obvious that by thrusting said shaft endwise through the head B^2 the shaft may, by the yielding of the spring F^6, allow its opposite end to be disengaged from the socket f^3, after which the shaft can be drawn inwardly through the head B^2 until disengaged therefrom, when it will be entirely free and may be removed from the cylinder.

To now refer to the guide-fingers G, the parts for supporting and operating the same are made as follows: Said guide-fingers, which are indicated as a whole by G, consist of vertical parts G′, which form strips for the advance edge of the sheets, and horizontal arms G^2, which support said vertical parts and which are attached to a horizontal rock-shaft G^3, which is mounted at its ends on the machine-frame and extends over the top of the impression-cylinder.

As shown in the accompanying drawings, a bearing for the rock-shaft G^3 at the end of the cylinder nearest the gear-wheel C^4 is formed in a block A^4, which is attached to the top of the main frame and affords support for one side of the feed-table K and also affords bearings for the pin H, hereinbefore described. Bearing for the opposite end of the shaft G^3 is afforded by a similar block A^5, which affords support for the feed-table at one side of the machine. Outside of said block A^5 the shaft is provided with rigid arms G^4 and G^6, secured to the same by means of a collar encircling the shaft, and attached to said arm or its collar is a coiled spring G^5, the opposite end of which is attached to the machine-frame and which acts by its tension to turn the shaft G^3 in a direction to carry the guide-fingers toward the cylinder. The turning of the shaft in this direction is, however, limited by a stop-pin a', secured in the block A^5 in position for contact with the arm G^4, said pin also acting by contact of the arm G^6 therewith to limit the movement of the shaft in the opposite direction when the guide-fingers are thrown backwardly. At the opposite end of the machine, or that adjacent to the gear-wheel C^4, are located devices for actuating the shaft G^3 so as to lift the fingers against the action of the spring G^5, the same being shown in Figs. 1, 2, 13, and 14 and being constructed as follows: M is an actuating-arm mounted concentrically with the shaft G^3 outside of the block A^4 and herein shown as being pivotally supported on the shaft itself by means of a hub M′, surrounding the said shaft. Attached to said shaft G^3 outside of the actuating-arm M is an arm G^6, which is rigidly attached to said shaft and serves as a means of communicating oscillatory movement thereto. The actuating-arm M has an oscillatory movement upon its pivotal support, produced in the construction shown by means of a peripheral cam-surface C^7 on the wheel C^4, Figs. 1 and 5, adapted for engagement with an antifriction-roller m on the outer end of said actuating-arm M. The said arm M is held in position for engagement of the roller with the cam-surface C^7 by means of a coiled spring M^2, secured at one end to the sleeve M′ and at its opposite end to the block A^4, Figs. 13 and 14, said spring tending to throw the free end of the said arm M downwardly or inwardly toward the center of the wheel C^4. The inward movement of the said arm is limited by a stop-pin a^2, secured in the block A^4 in position to engage the lower edge of the said arm M. The action of the cam-surface C^7 on the oscillating arm M will obviously have the effect of moving and oscillating said arm once at each rotation of the cylinder, and in order to enable said arm to move the rock-shaft G^3 at desired times, to wit, at every second rotation of the cylinder, devices actuated by the oscillating actuating-lever I are provided for producing engagement of the arm M with the arm G^6 at proper times, the same being constructed as follows: Mounted in the arm M is a sliding pin M^3, which is adapted to be thrust outwardly past the outer face of the arm into position to engage the arm G^6 or to be withdrawn inside of the face of said arm, so as to avoid contact with the said arm G^6, the parts being so arranged that when the said pin is advanced to engage the arm G^6 the latter arm will move with the actuating-arm M as the latter is lifted, but when the pin is withdrawn the arm M may be oscillated without affecting the arm G^6 or the rock-shaft to which it is attached. The pin M^3 is shown as supported or guided at its outer end in the arm M and at its inner end by engagement with a guide-arm m', attached to the sleeve M′. The pin M^3 is provided at a point inside of the arm M with a notch m^2, forming a shoulder which is engaged by the free end of the leaf-spring M^4, which is attached to the inner face of the arm M and

acts against the pin in a direction to force or carry the same inward or out of the path of the arm G^6. The end of the spring M^4 may have positive engagement with the pin M^3, in which case the pin will in all instances be moved with the arm, but as a better construction the notch m^2 is made of a width equal to or greater than the stroke of the pin and the spring engages only the shoulder formed at the inner end of the notch, being held in contact therewith by means of a second coiled spring m^3, attached at one end to the spring M^4 and at its opposite end to a stud m^5 in the said pin M^3, this construction enabling the free end of the spring M^4 to be carried forward without moving the pin M^3 in case there is any obstruction to prevent the forward movement of said pin. The said spring M^4 is made of considerable width vertically at its end adjacent to the pin M^3, and is so located, as clearly seen in Fig. 5, relatively to the oblique flange i^3 of the actuating-arm I, Fig. 1, that said flange may press against or act on the inner face of the spring, the parts being so arranged that when the lower end of the actuating-lever is thrown outwardly away from the center of the cam the oblique flange acting on said spring M^4 will thrust the latter outward, thereby moving endwise the pin M^3 into position to engage the arm G^6. This movement of the pin would be accomplished equally well if the spring M^4 were positively connected with the pin M^3, but connection of the spring with said pin by means of the secondary coiled spring m^3 is desirable in order to prevent breakage of the parts if by accident the pin were prevented from moving outwardly at the time the spring is moved in the manner described.

The guide-fingers G when depressed operate in the usual manner as stops or gages to determine the position of the forward edge of the sheets to be printed as the same are fed to the cylinder by the attendant, and the fingers are lifted to allow the advance of the sheets when the sheets are gripped by the nippers and carried forward with the cylinder. The actuating-arm I being moved in a direction to throw outwardly the pin M^3 at every alternate rotation of the cylinder only it follows that the pin M^3 will be actuated, for the purpose stated, at the beginning of that revolution of the cylinder during which the impression is made, it being obvious that when the cam-surface C^7 lifts the arm M during the succeeding rotation of the cylinder, or that during which the type-bed is moving backwardly from beneath it, the lever I will have been moved so as to allow the spring M^4 to retract the pin, so that the oscillation of the arm M will take place without affecting the guide-fingers, which will be held by the action of the spring G^5 in their depressed position and in contact with the fingers k k on the feed-table.

As an improved construction in the guide-fingers G and means for adjusting the same, these parts are constructed as follows, and as more clearly shown in Figs. 15 and 16: The arm G^2, which, as before stated, supports the vertical part G′ of the finger, consists of a tubular part g, which is attached directly to the shaft G^3 by means of a set-screw g' or otherwise, and a rod g^2, which fits or slides within the tubular part g, and the outer end of which is reduced in size to receive a sliding sleeve g^3, to which the vertical part G′ of the finger is directly attached, said sleeve being clamped on the outer end of the rod g^2 by means of a set-screw g^4, inserted through the sleeve, as shown. The enlarged part of the rod g^2 is made hollow and provided with interior screw-threads which are engaged by exterior screw-threads on an adjusting-screw g^5, which passes through the closed end of the tubular part g, and is provided with a milled head or thumb-piece g^6, by which the screw-shaft may be turned to give longitudinal movement to the rod g^2. A set-screw g^7, inserted through the tubular part g, affords a means of rigidly securing the rod g^2 in any position at which it may be adjusted. The vertical part G′ of the guide-finger consists, as herein shown, of a metal plate g^8, made wider at its lower than at its upper end and secured to the collar g^3, by which it is attached to the rod g^2. Said plate is made wider at its lower end than the finger k of the feed-table and is notched or recessed to receive said finger, Fig. 16, so that the said plate extends downwardly below the top surface of the said finger at the side of the latter to avoid possibility of the edge of the sheet of paper which is brought against the finger from passing between the said plate g^8 and the finger k, except when the plate is lifted free from the said finger. An oblique guide-finger g^9 extends from the lower margin of the plate g^8 upwardly and outwardly preferably to a point opposite the rod g^2, said guide-finger serving to direct or guide the advance edge of the paper, as it is thrust toward the plate g^8, downwardly into contact with the finger k, thereby bringing the advance edge of the paper with certainty into position adjacent to the impression-cylinder and most favorable for its being gripped by the sheet-nippers. Said guide-finger g^9 is shown as consisting of a strip of sheet metal attached at the rear of the plate g^8 and extending downwardly to the bottom thereof and through a notch in the lower margin of the said plate, from which notch it extends upwardly in an inclined position, as hereinbefore stated.

N indicates a horizontal shaft extending longitudinally over the top of the impression-cylinder and which affords a support for the feed-roller O, which is mounted on the end of an oscillating arm O′, having bearing upon said shaft N. Said feed-roller is mounted loosely on the end of the arm O′ and said arm swings freely on the shaft N, the said feed-

roller being intended to act by gravity on the surface of the paper, so as to press the same against the impression-cylinder and thereby insure its being fed forward upon the said fingers after the sheet-nippers have released its forward or advance edge. Said shaft N is shown as supported at its opposite ends in blocks A^6 A^6, which are attached to the machine-frame and form also supports and bearings for the rod A^2 and the shaft L^3.

The gear-segment P (shown in Fig. 6) is attached to the head B^3 for the purpose of securing registry of the impression-cylinder with the type-bed, this being a feature heretofore common and forming no part of the present invention. The bracket A^5 is shown in Figs. 1^a, 3, and 6 as being extended inwardly over the said segment for the protection of the operator.

I claim as my invention—

1. The combination with an impression-cylinder, the sheet-nippers thereof, and an oscillating shaft supporting said nippers, of actuating mechanism for the nippers, comprising a wheel which turns with the impression-cylinder and is provided with a cam-groove which encircles the wheel twice, an actuating-lever which is given oscillatory movement by the action of said cam-groove, and actuating connections between said shaft and said lever at opposite sides of the pivot of the latter embracing oblique flanges at opposite ends of the lever, whereby the shaft is turned in one direction or the other at each movement of the lever, substantially as described.

2. The combination with an impression-cylinder, the sheet-nippers and lifting-fingers thereof, and oscillating shafts supporting said nippers and fingers, of actuating mechanism for said shafts, comprising a wheel which turns with the cylinder and is provided with a single cam-groove which encircles the wheel twice, an actuating-lever which is given oscillatory movement by the action of said cam-groove, actuating connections between one end of said lever and the lifting-finger shaft, and actuating connections between the parts of said actuating-lever at opposite sides of its pivot and the said nipper-shaft, whereby said shafts are given motion from the actuating-lever, substantially as described.

3. The combination with an impression-cylinder and the sheet-nippers thereof, of a shaft supporting the said nippers, a spring applied to hold the nippers at the opposite limits of their movement, a slotted cross-head attached to said shaft, sliding pins on the machine-frame adapted to engage the said cross-head, and means for actuating said pins comprising a wheel turning with the cylinder and provided with a cam-groove which encircles the wheel twice, and an oscillating lever actuated by said cam-groove, said oscillating lever being provided with oblique flanges acting to give longitudinal movement to the pins when the lever is oscillated, substantially as described.

4. The combination with an impression-cylinder and the sheet-nippers thereof, of a rock-shaft supporting the nippers, and a cross-head for actuating the rock-shaft located outside of the cylinder-head, said rock-shaft comprising a separate shaft-section attached to the cross-head and passing through the cylinder-head and which is journaled in the cylinder-head and is made not larger at its inner than at its outer part, and a coupling-piece located inside of the head and to which the main part of the shaft and the said separate section are detachably secured, said coupling-piece being larger in diameter than the cross-head section and bearing against the inner face of the cylinder-head, substantially as described.

5. The combination with an impression-cylinder and the lifting-fingers thereof, of a rock-shaft supporting the lifting-fingers, a spring applied to throw the lifting-fingers toward the cylinder, a rocking arm rigidly attached to the rock-shaft, a movable cam-lever adapted to engage said arm, and means for actuating said cam-lever comprising a wheel turning with the cylinder and provided with a cam-groove which encircles the wheel twice, an oscillating lever moved by said groove, a rock-shaft provided with a rigid arm engaging said lever and with a cam projection engaging said cam-lever, and a spring acting on the said rock-shaft to hold the rigid arm thereof in contact with said oscillating lever, substantially as described.

6. The combination with an impression-cylinder, the tympan-clamps thereof and the lifting-fingers thereof, of a shaft supporting said tympan-clamps, a rock-shaft supporting the lifting-fingers, a rigid arm attached to said lifting-finger shaft and a spring acting on said arm for throwing the lifting-fingers toward the cylinder, said spring being movably supported on the cylinder, and means, moved by the tympan-clamp shaft and acting on the spring to hold the same in operative position when the tympan-clamps are in position to grip the tympan, substantially as described.

7. The combination with an impression-cylinder and the tympan-gripping fingers and sheet-lifting fingers thereof, of a rock-shaft supporting the gripping-fingers, a rock-shaft supporting the sheet-lifting fingers, a rocking arm attached to the shaft of the lifting-fingers, a leaf-spring acting on said rocking arm and pivotally connected with the cylinder, an arm attached to said spring, and a projection on the gripping-finger rock-shaft acting on said arm to hold the said spring in operative position when the gripping-fingers are engaged with the tympan, substantially as described.

8. The combination with an impression-cylinder and the sheet-nippers and lifting-fin-

gers thereof, of means for actuating the nippers comprising a rock-shaft supporting the same, a slotted cross-head on the rock-shaft, sliding pins engaging the said cross-head, a cam provided with a cam-groove which encircles the same twice, and an oscillating lever moved by the action of the cam-groove, and giving motion to said sliding pins, and means for actuating the lifting-fingers comprising a rock-shaft supporting the same, a rocking arm on the rock-shaft, a movable cam-arm adapted to engage said rocking arm, and a rock-shaft provided with a cam projection which acts on the said cam-lever and with a rigid arm which engages the said oscillating lever, substantially as described.

9. The combination with an impression-cylinder, of guide-fingers, a rock-shaft supporting the same, and means for actuating the rock-shaft comprising an oscillating actuating-arm on the frame, a cam turning with the cylinder and giving oscillatory movement to the said actuating-arm, and means operating to produce engagement of the said actuating-arm with the rock-shaft at every alternate rotation of the cylinder, substantially as described.

10. The combination with an impression-cylinder, the guide-fingers thereof and a rock-shaft supporting the same, of means for actuating the rock-shaft comprising a spring applied to throw the fingers toward the cylinder, an oscillating actuating-arm provided with a sliding pin, a rigid arm on the rock-shaft adapted for engagement with said pin, a cam turning with the cylinder and acting on the said actuating-arm to give oscillatory movement thereto, and means for actuating said sliding pin constructed to shift the same into position for engagement with the said arm on the rock-shaft at each alternate rotation of the cylinder, substantially as described.

11. The combination with an impression-cylinder and the sheet-guides thereof, of a rock-shaft supporting said guides, and an actuating device for the rock-shaft embracing an oscillating, actuating-arm, an arm on the rock-shaft and means for periodically engaging the actuating-arm with the arm on the rock-shaft, comprising a wheel which turns with the cylinder and is provided with a cam-groove encircling the same twice, and an oscillating lever which is actuated by the said cam-groove, and the movement of which determines the time at which the actuating-arm is engaged with the arm on the rock-shaft and the guide-fingers are lifted, substantially as described.

12. The combination with an impression-cylinder and the guide-fingers thereof, of a rock-shaft supporting the guide-fingers, a spring throwing the guide-fingers toward the cylinder, an oscillating actuating-arm, a cam turning with the cylinder and operating said actuating-arm, a rigid arm on the rock-shaft adjacent to the actuating-arm, a sliding pin on said actuating-arm, a wheel turning with the cylinder and provided with a cam-groove which encircles it twice, and an oscillating lever moved by said cam-groove and adapted to actuate said sliding pin in the actuating-arm, substantially as described.

13. The combination with an impression-cylinder and the guide-fingers thereof, of a rock-shaft supporting the guide-fingers, an oscillating actuating-arm, a cam turning with the cylinder and moving said actuating-arm, a rigid arm on the rock-shaft adjacent to the actuating-arm, a sliding pin in the said actuating-arm, a spring applied to move said sliding pin in one direction and means for moving the pin comprising a wheel turning with the cylinder and provided with a cam-groove which encircles it twice, and an oscillating lever which is actuated by said cam-groove and operates to move said pin against the action of said spring, substantially as described.

14. The combination with an impression-cylinder and sheet-guides, of a rock-shaft supporting the guides, a spring turning the rock-shaft in one direction, a rigid arm on the rock-shaft, an oscillating actuating-arm, a cam turning with the cylinder and moving said actuating-arm, a sliding pin in the actuating-arm adapted to engage the said rigid arm on the rock-shaft, a wheel provided with a cam-groove which encircles it twice, and an oscillating lever operated by the cam-groove and provided with an inclined or oblique flange through the medium of which motion is given to said sliding pin, substantially as described.

15. The combination with an impression-cylinder and sheet-guides, of a rock-shaft supporting the sheet-guides, an oscillating arm for giving movement to said shaft, a rigid arm attached to the shaft adjacent to said oscillating arm, a sliding pin in the oscillating arm adapted for engagement with the said rigid arm on the shaft, a spring holding the said pin normally free from said rigid arm, means acting against the said spring and having spring or elastic connection with the pin for advancing the same into position to engage said rigid arm on the rock-shaft, substantially as described.

16. The combination with an impression-cylinder, the sheet-nippers thereof and sheet-guides, of a rock-shaft supporting the nippers, a spring applied to hold the rock-shaft at either limit of its movement, a slotted cross-head on the rock-shaft, sliding pins in the machine-frame adapted to engage said cross-head, a wheel turning with the cylinder and provided with a cam-groove which encircles it twice, an oscillating lever provided with oblique flanges which give endwise movement to the said sliding pins, a rock-shaft supporting the sheet-guides, an oscillating actuating-arm for giving movement to said rock-shaft, a sliding pin in said actuating-arm through

the medium of which motion is given to the guide-fingers, and a spring tending to hold the said sliding pin out of operative position, the said oblique flange on the said oscillating lever being adapted to transmit motion also to said sliding pin in the actuating-arm, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

ROBERT MIEHLE.

Witnesses:
TAYLOR E. BROWN,
C. CLARENCE POOLE.