

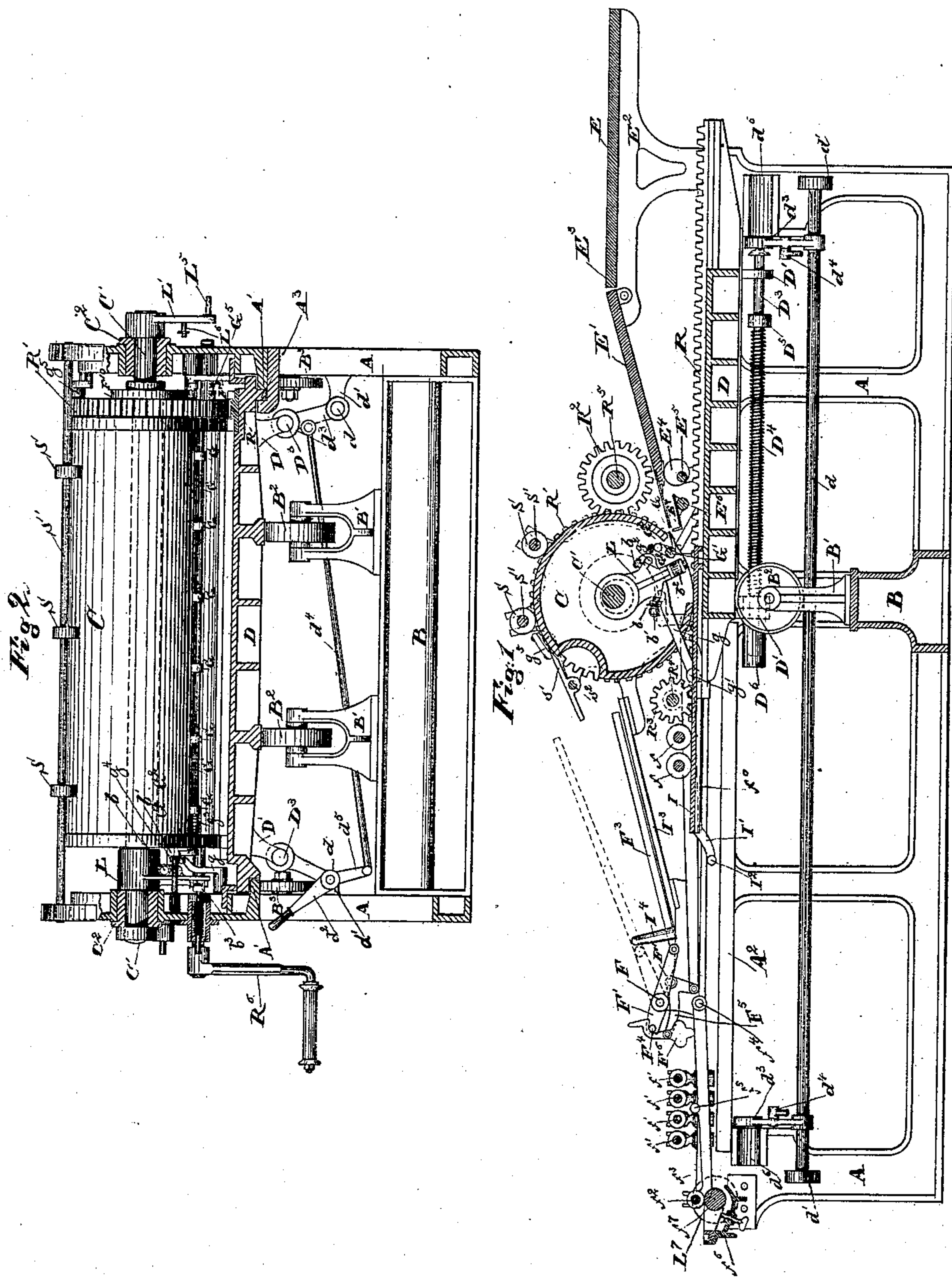
(No Model.)

3 Sheets—Sheet 1.

J. T. HAWKINS.
CYLINDER PRINTING MACHINE.

No. 333,070.

Patented Dec. 22, 1885.



Witnesses.
W. R. Jones.
Francis P. Reilly

Inventor.
John T. Hawkins
by Brodhead, King & Woodhues
Attorneys.

(No Model.)

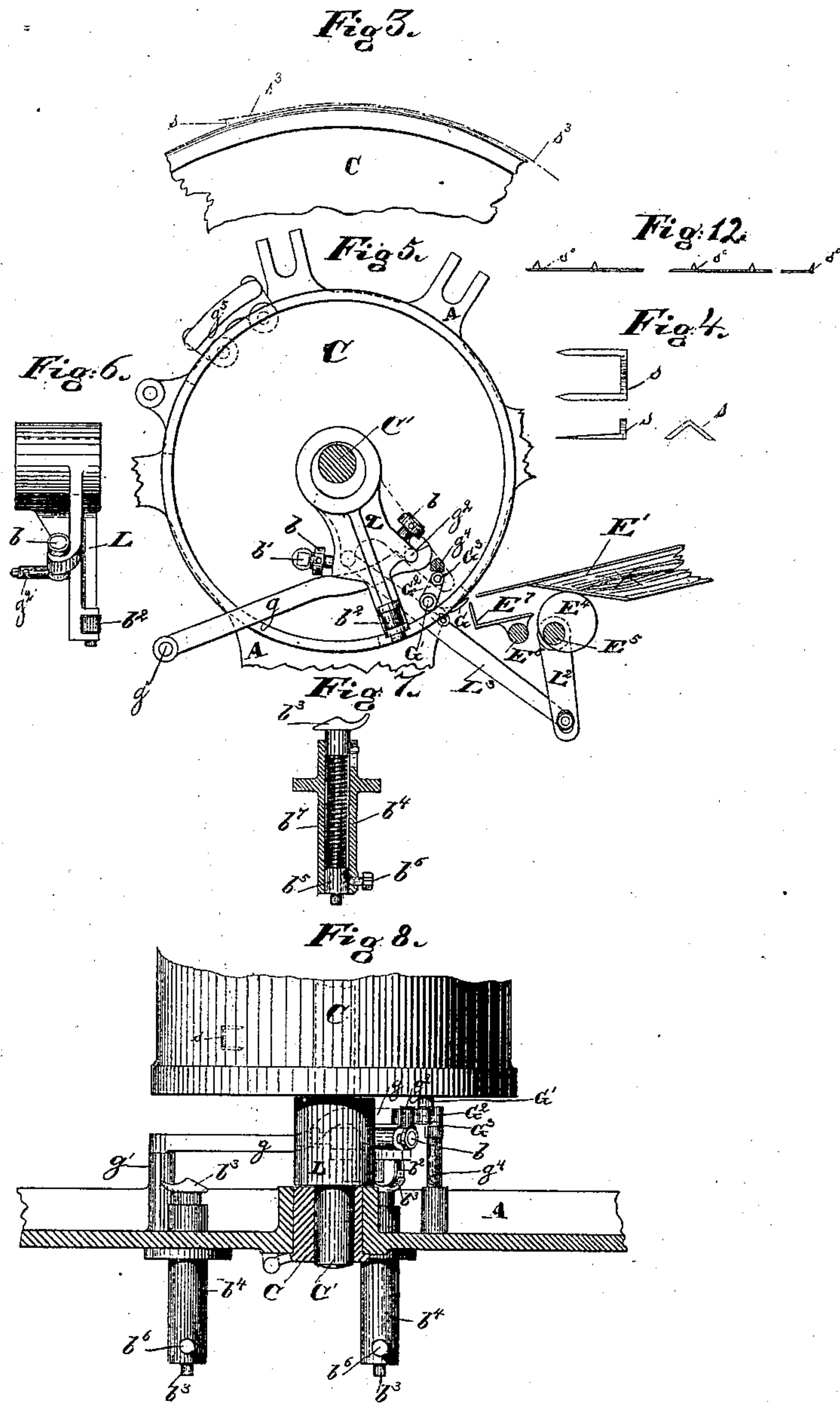
3 Sheets—Sheet 2.

J. T. HAWKINS.

CYLINDER PRINTING MACHINE.

No. 333,070.

Patented Dec. 22, 1885.



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(No Model.)

3 Sheets—Sheet 3.

J. T. HAWKINS.

CYLINDER PRINTING MACHINE.

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Fig 9.

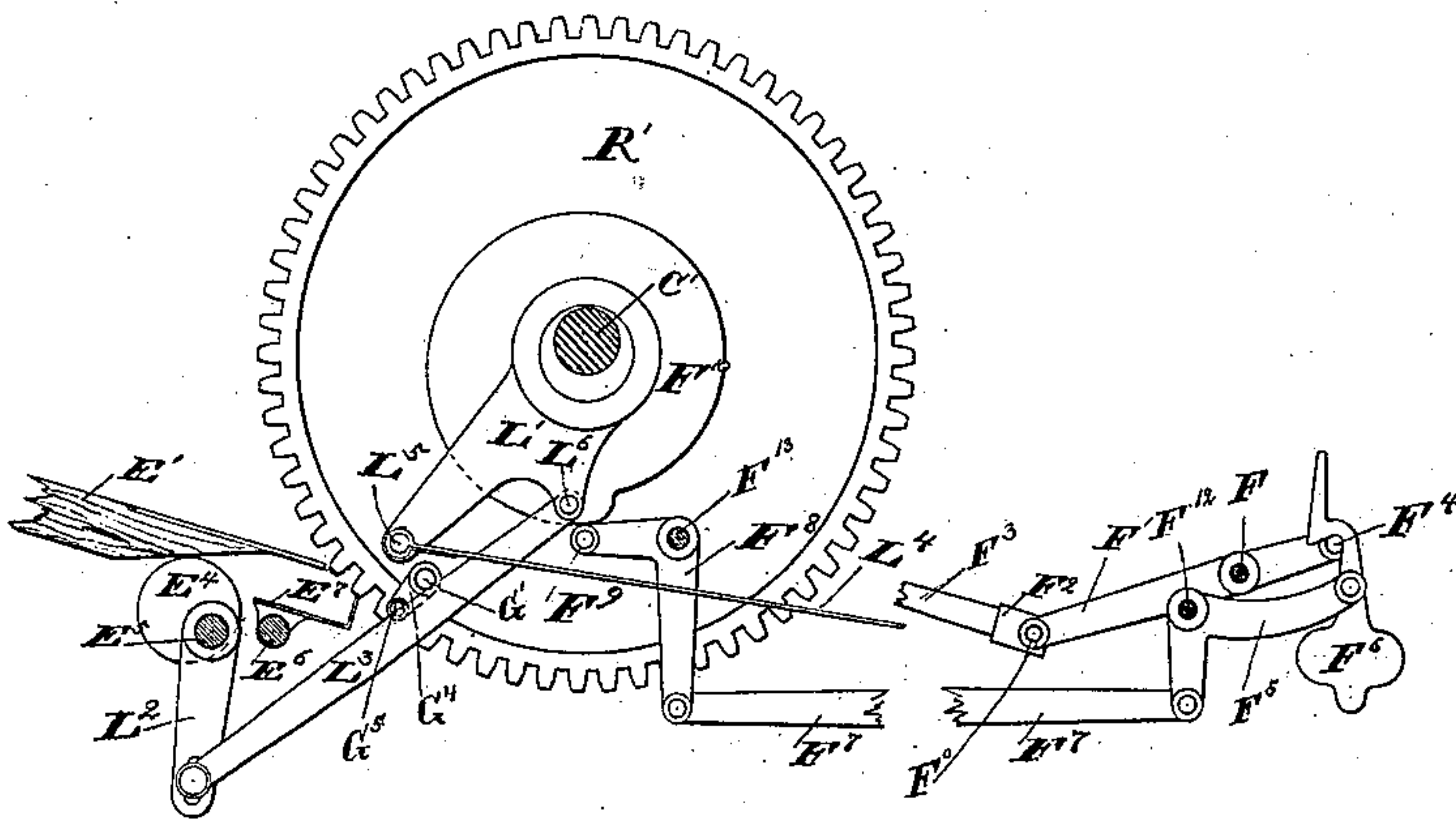


Fig: 11.

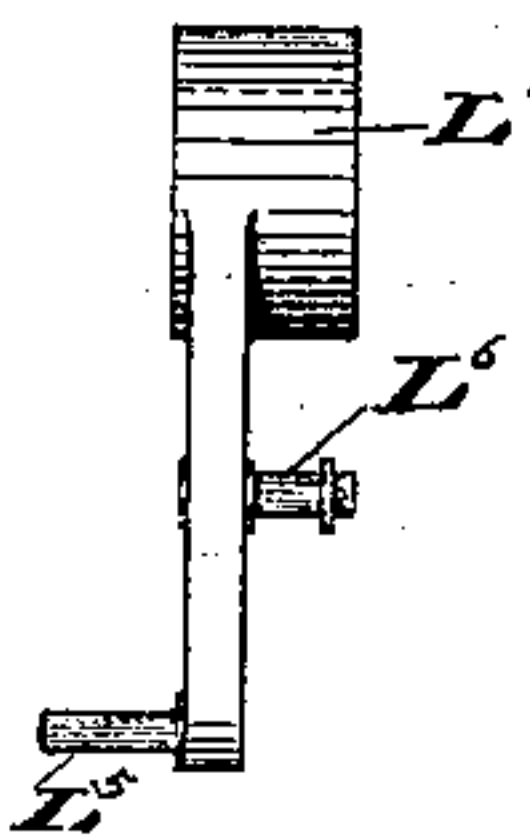
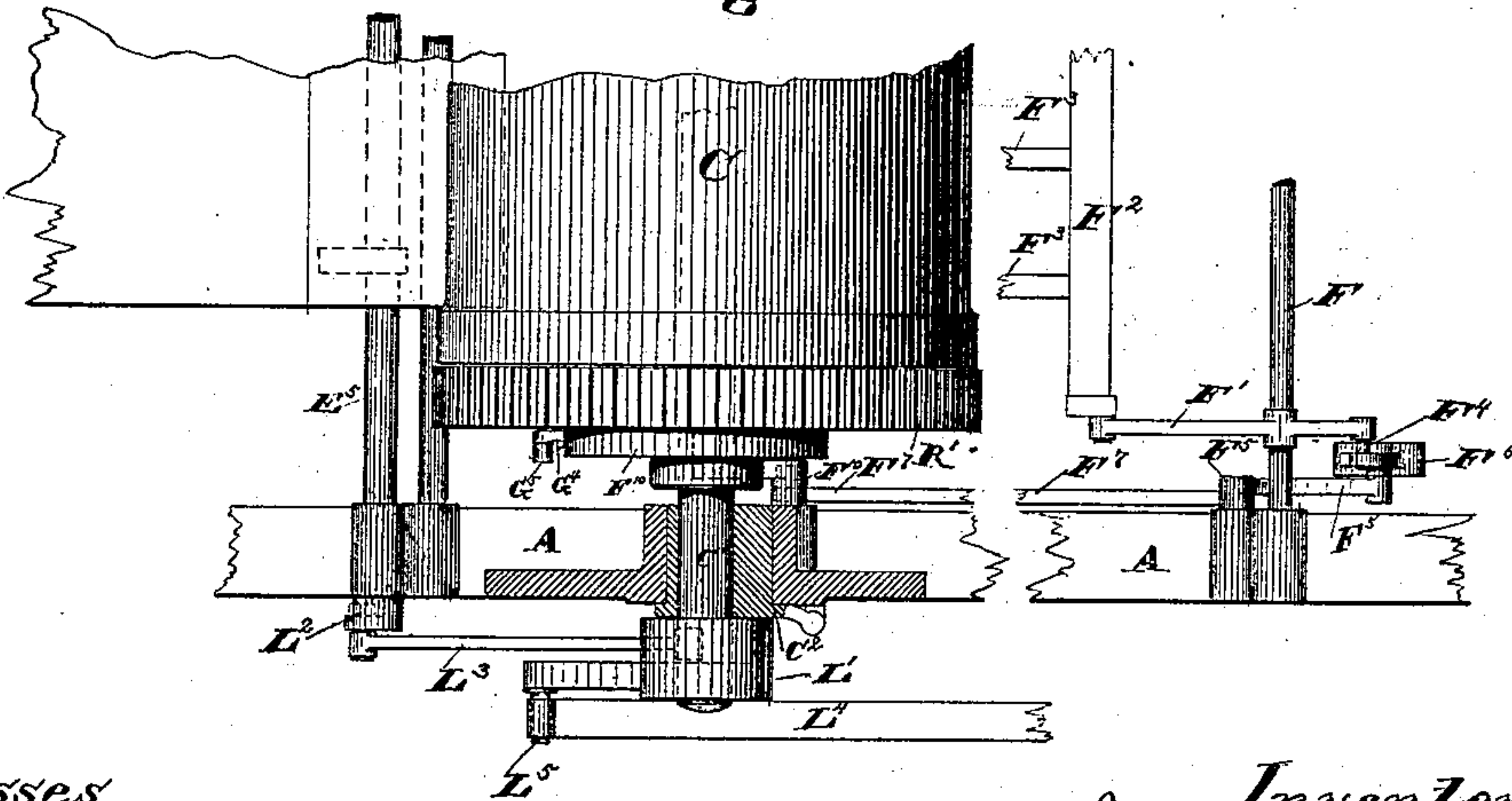


Fig. 10.



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UNITED STATES PATENT OFFICE.

JOHN T. HAWKINS, OF TAUNTON, MASSACHUSETTS.

CYLINDER PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 333,070, dated December 22, 1885.

Application filed March 15, 1884. Serial No. 124,297. (No model.)

To all whom it may concern:

Be it known that I, JOHN T. HAWKINS, of Taunton, in the county of Bristol and State of Massachusetts, have invented certain new and useful Improvements in Cylinder Printing-Machines, which improvements are fully set forth and illustrated in the following specification and accompanying drawings.

The principal object of the invention is to provide a cylinder-press of substantial, cheap, and durable construction, which shall automatically deliver the sheets and be self-inking while operated by hand with a minimum of effort in its operation.

The novel features in this machine consist, principally, of the means employed to automatically raise and lower the impression-cylinder, to deliver the sheet, to operate the cylinder-grippers, to operate the fountain-roller, and to vary the power required on the hand-crank to suit the strength of the operator, or weight of form and speed of press.

In the accompanying drawings, Figure 1 is a longitudinal vertical section through the center of the machine. Fig. 2 is an elevation from the right-hand end of Fig. 1, partly in section. Fig. 3 is a section of a portion of the printing-surface of the cylinder, showing the sheet in broken lines resting upon it, and the means employed to support the tail of the sheet slightly away from contact for purposes of delivery, as hereinafter described. Fig. 4 is in three views a sheet-support, upon which the tail of the sheet is supported for purposes of delivery, as hereinafter explained. Fig. 5 is an end view of the cylinder, (from the left hand of Fig. 2,) and of the automatic apparatus for elevating the feed-board, operating the cylinder-grippers, and raising and lowering the cylinder. Fig. 6 is a side view of the lever L, Figs. 1, 2, and 5. Fig. 7 is a sectional view of one of the spring-catches for holding the lever L in place during either the printing or non-printing stroke of the bed.

Fig. 8 is a view in plan of the parts shown in Fig. 5, omitting the apparatus for raising and lowering the feed-board and the front guides. Fig. 9 is an end view of the cylinder, showing the apparatus for automatically operating a portion of the delivery apparatus and the ink-fountain roller, and raising and lowering the feed-board. Fig. 10 is a view in

plan of the same. Fig. 11 is a side view of the lever L' shown in Figs. 2, 9, and 10. Fig. 12 shows a modification of Fig. 4.

In said drawings the several parts are respectively indicated by letters, as follows:

A are the main frames.

B is the main cross stay or girder, immediately under the impression-cylinder.

C is the impression-cylinder.

D is the type-bed.

B' are brackets carrying two rollers for support of the type-bed in its central parts.

B² are rollers running on the under side of the bed.

B³ are rollers running on studs in the frames A, upon which the outer edges of the bed run.

R is a toothed rack secured to the bed D.

R' is a toothed gear secured to the cylinder C and engaging the rack R.

R² is a toothed pinion carried on shaft R⁴, journaled in the frames A, and engaging the rack R.

R³ is a toothed pinion carried on a shaft, R⁵, also journaled in the frames A, and engaging the toothed wheel R'. Upon either shaft R⁴ or R⁵ a hand-crank, R⁶, may be placed.

Pinions R² and R³ are made of different proportions, so that greater or less leverage may be exerted by the operator through the crank R⁶, as may be desired by him, in the one case making more turns of, and with less pressure on, the crank R⁶ to an evolution of the machine than with the other, thus offering the opportunity to somewhat vary the force required in proportion to the muscular strength of the operator, the weight of the type-form, or the speed at which the press is to be run. Pinions R² and R³ may either one be slipped out of gear laterally when the other is to be used. There are stops for limiting the motion of the type-bed D at the ends of the stroke. (Not shown.)

E is a platform for the paper, and E' the feed-board hinged at E³ in the brackets E².

E⁴ are a pair of eccentric cams secured to a shaft, E⁵, journaled in the frames A, upon which the free end of the feed-board rests.

E⁶ is a shaft journaled in the frames A, to which are secured the sheet guides or gages E⁷.

F is a rock-shaft journaled in the frames A. Upon shaft F are secured a pair of levers, F'. Pivoted in the long arms of levers F' by a

stop-joint, F^0 , is a bar, F^2 , carrying a series of fingers, F^3 , the bar F^2 and fingers F^3 resembling the ordinary oscillating fly. The short arm of lever F^1 carries the stud F^4 .

5 F^5 is a bell-crank lever oscillating upon a stud fixed in the frames A. Pivoted to the horizontal arm of bell-crank F^5 is a weighted hook-catch, F^6 , engaging at the proper times the stud F^4 . To the vertical arm of bell-crank lever F^5 is articulated a connecting-rod, F^7 , whose other end is similarly articulated to the vertical arm of another bell-crank, F^8 , which oscillates upon a stud, F^{13} , fixed in the frames A. The horizontal arm of bell-crank F^8 carries a roller, F^9 , which engages a cam, F^{10} , secured to the wheel R' .

10 I is the ink-plate secured to the bed D. Projecting from the ink-plate I is a bracket, I^1 , carrying a roller, I^2 , which engages the lower end of the weighted hook-catch F^6 on the retrograde or non-printing stroke of the bed D, operating to disengage the hook F^6 from the stud or pinion F^4 .

15 I^3 is the receiving-board upon which the printed sheets are delivered.

I^4 is an adjustable sheet-stop slotted at the proper places to allow the fingers F^3 to pass downward through them.

20 The letters f indicate the form-rollers, and $f' f'$ the angle distributing-rollers. The ink ductor-roller f^2 is carried in the levers f^3 . The levers f^3 oscillate upon the stud f^4 , fixed in the frames A. The levers f^3 carry rollers f^5 , which ride upon inclines on the sides of ink-plate I. (Shown in dotted line f^0 , Fig. 1.)

25 The letter f^6 indicates the ink-fountain, and f^7 the fountain-roller. The cylinder C runs loosely upon eccentric journals formed on the rock-shaft C' .

30 C^2 are eccentric bushes or boxes in which the rock-shaft C' is journaled, made eccentrically for the purpose of adjusting the impression, as shown in the application filed by me December 26, 1883, bearing the Serial number 115,603. Secured to the rock-shaft C' is a double-armed lever, L' . To a stud, L^6 , in the short arm of lever L' is connected a lever, L^2 , (which latter is secured to the rock-shaft E^3), by a connecting-rod, L^3 . To a stud, L^5 , in the long arm of lever L' is articulated a strap or belt, L^4 , Fig. 9. The strap L^4 encircles a ratchet-pulley, L^7 , secured to the fountain-roller f^7 (shown in dotted lines, Fig. 1) in the usual well-known way. To the other end of the rock-shaft C' is secured a lever, L . The lever L carries two adjustable impact-screws, b , having each a disk of leather or other yielding substance let into its head. Fixed in the end of the cylinder C is a stud, b' . The lever 35 L carries at its free end a roller, b^2 . The inner ends of the spring-catches b^3 engage the rollers b^2 automatically. The spring-catches b^3 are caused to slide within sockets b^4 , which are secured to the frames A. In the outer ends 40 of the sockets b^4 are adjustable bushes b^5 , held in place by set-screws b^6 , for adjusting the tension of the springs b^7 . The roller b^2 de-

presses the catches b^3 within their sockets in engaging their inclined surfaces, and rests within the concave portion of said catches. 70

G are the grippers, secured to a rock-shaft, G' , journaled at the ends of the cylinder C. On one end of rock-shaft G' is secured a lever, G^2 , carrying a roller, G^3 . On the other end of rock-shaft G' is secured another lever, G^4 , 75 carrying a roller, G^5 . A curved lever, g , is fulcrumed to the side frame, A, at g' . Carried on a stud in the lever L is a roller, g^2 , which engages the upper curved surface of the hooked slot in the end of the lever g . The roller G^3 engages the under curved surface of the lever g . A coiled spring, g^3 , on the gripper-shaft G' acts to close the grippers. A stud, g^4 , extends from the frames A, to engage also the roller G^3 when the cylinder is at rest 80 in position to receive a sheet, holding the grippers open until allowed to close by the first movement of the cylinder on the printing-stroke.

The operation of the lever g is—while the roller g^2 is passing along said lever's upper surface—to depress the roller G^3 , then in contact with its under surface, and thus to open the grippers G wide enough to insure their passing under the sheet, and then allowing 85 them to gradually close again to the small distance which they remain open, at which time the cylinder C has reached the end of its rotation and the roller G^3 rests upon the stud g^4 . The cam g^5 is secured to the frame A, engaging, at the proper time, a roller, G^5 , carried on a lever, G^4 , secured to the end of the gripper-shaft G' , to release the sheet for delivery.

90 $S S$ are pressure-rollers carried on shafts in the frames A, so placed as to run on the unprinted margins of the sheet, and by their weight keep the sheet in contact with the cylinder, or its covering, during the retrograde stroke, or during the delivery of the sheet. Small double-pointed staple-like pieces 95 $s s$ are stuck in the tympan-sheet, usually covering the blanket or packing of the cylinder, in a row across the cylinder, so as to be just in position to have the tail of the sheet rest upon them, and thus elevate the tail of the sheet from the cylinder. The pointed legs of the sheet-supports s are made to pass between the tympan-sheet and packing or blanket, and the pressure of the former upon the latter secures them in place. They may be placed 100 anywhere on the circumference of the cylinder, as may be required by the length of sheet to be printed. These sheet-supports may be made as one continuous thin strip of metal, with points turned up which pierce and protrude upward through the tympan-sheet, as shown at s^0 in Fig. 12, the flat portion being held between the cylinder-blanket and tympan-sheet, as with the horizontal part of the 105 staple-like pieces s . I do not confine myself to any particular form of this support, so long as it has points or parts protruding above the tympan-sheet, while the whole is held in posi-

tion by means of a tightly-drawn tympan over such portions as do not protrude through it.

A series of stripper-fingers, s' , are secured to a stationary rod, s^2 , which in turn is secured at the ends to the frame. The points of these fingers are so placed, close to the cylinder C, that when the cylinder is in position to commence to deliver the sheet the tail end, as supported on the sheet-supports s or s^0 , will enter upon them and be stripped by them from the cylinder as it rotates on the non-printing stroke. The sheet is shown in broken line at s^3 , Fig. 3.

In brackets D' , depending from the under side of the type-bed D, slide two spring-rods, D^3 , on which are wound helical springs D^4 , adjusted in tension by the collar D^5 . One end of the spring-rods D^3 slides, in bushes D^6 , which in turn slide in the brackets D' , so that one spring D^4 on each rod serves to resist the momentum on both ends of the stroke. The shaft d is journaled in brackets d' , extending from one of the frames A, to which shaft are secured two levers, d^3 and d^5 , carrying on their free ends circular enlargements, as shown. Two connecting-rods, d^4 , articulated at one end each to the levers d^3 , and at the other end to the double-ended levers d^5 on the other side of the press, also carry on their upper free ends circular enlargements, as shown. To one of the levers d^5 is secured, or forming a part of it, a handle, d^2 , so placed as to be convenient to the feeder.

Attached to one of the frames A, at each end, is a cylindrical hollow bracket or stop, d^6 , sufficiently large in the opening to allow the head of the rod D^3 at one end, or the bush D^6 at the other end, to pass freely through them, when the free ends of the levers d^3 or d^5 are not placed over them. When the free ends of the levers d^3 or d^5 are placed over the openings through the stops d^6 , the spring-rod D^3 at one end and the bush D^6 at the other come in contact with them, making them, together with the brackets d^6 , serve as stops to compress the springs D^4 . In this way the press may be run with or without springs by the proper placing of the handle d^2 . The type-bed slides upon ways A' , cast on the frames A, except immediately under the cylinder, where the four rollers B^2 and B^3 receive the force of the impression. The bed is guided laterally and its parallelism preserved by the guide A^2 and the edge of one of the ways A' , a tongue of metal, A^3 , being planed upon the under side of the bed to engage the two.

Operation: It will be seen that the general plan of this machine is that of a gripper-cylinder carrying the sheets and operating as the impression-cylinder thereto oscillating upon its axis, geared directly to the bed and operated by the crank R^6 , placed upon either of the shafts R^4 or R^5 , by giving the crank R^6 as many turns in each direction as may be necessary, in one case the cylinder C being driven through the medium of the bed, and in the other case the bed being driven through the

medium of the cylinder. The stops on the frames (mentioned above, but not shown,) limit exactly the excursions of the bed in both directions. The cylinder runs freely on the rock-shaft C' . The object of the springs D^4 is to absorb the momentum of the bed at the ends of the stroke, and to give up again their stored power to assist the operator in starting the bed on its succeeding stroke. Taking the various parts in the positions shown in the several figures, the grippers G, as in Figs. 1 and 5, are partially open and the roller G^3 resting upon the under side of the stud g^4 . Upon the starting of the cylinder upon the printing-stroke the roller G^3 leaves the stud g^4 , allowing the grippers G to close upon a sheet, the feed-board E' being at this point raised, so that the sheet clears the guides E' by virtue of the positions of the lever L' and the connecting-rod L^3 . After the cylinder C has made about three-quarters of a revolution, during which the printing is done, the stud b' engages with the right-hand screw-stop b , carried in lever L, and carries the rock-shaft C' and its attached levers L and L' through nearly a quarter of a revolution, causing the roller b^2 of lever L to pass from the left-hand one of the spring-stops b^3 to the right-hand one just as the bed arrives at the other extreme of its motion, when the left-hand spring-stop b^3 holds it in that position. While the rock-shaft C' is in the position shown in the figures the surface of the cylinder will, by the throw of the eccentric part of the rock-shaft C' , on which the cylinder C runs, being vertically downward, clear the stripper-fingers s' and the cam g^5 sufficient to allow the roller G^5 to clear the cam g^5 , and thus not release the sheet during the printing-stroke. By the rotation of the rock-shaft C' through a quarter-revolution at the conclusion of the printing-stroke, however, the eccentricity of the rock-shaft C' , while having raised the cylinder C, so as to clear the type for the retrograde stroke of the bed, will also have brought the cylinder C, and with it the roller G^5 on the gripper-shaft lever G^4 , into such position that when passing the cam on the retrograde or non-printing revolution of the cylinder the roller G^5 will engage the cam g^5 and release the head of the sheet at the proper time to allow it to pass down the stripper-fingers s' . In this construction the sheet is delivered tail first, as stripped from the cylinder by the stripper-fingers s' , the sheet being held up at the tail by the supports s or s^0 , so as to insure its entering upon the fingers s' , the rollers SS insuring sufficient frictional contact between the sheet and the cylinder-surface or its covering to insure the sheet passing down upon the receiving-board I^3 , where it is stopped by the sheet-stop I^4 . During the passage of the lever L through the arc described to the left from the one to the other of the spring-stops the lever g drops, so that the roller g^2 passes out of the hook at the end of the lever g . A stop-pin (not shown) in the frame of the ma-

chine prevents the lever g from dropping too low to be engaged by the roller g^2 . The movement of the rock-shaft C' at the end of the printing-stroke also allows the feed-board E' to drop, allowing the guides E^7 to project above it, so that during the retrograde stroke the feeder may place the next sheet in position against the guides E^7 by the time the retrograde stroke is completed. At the completion of about three-quarters of a retrograde revolution of the cylinder the stop b' in the cylinder C comes in contact with the left-hand screw-stop b in the lever L , and carries the lever L and rock-shaft C' through one-quarter revolution to the right, causing roller b^2 to pass from the left-hand to the right-hand spring-stop b^3 , which brings the parts again in the position shown in the figures, with the cylinder C down in place to make contact with the form for the next sheet. While passing through this one-quarter revolution to the right, the roller g^2 engages the concave surface on the upper side of lever g , depressing it or holding it down while the roller G^3 on the gripper-shaft lever G^2 engages the convex surface on the under side of the lever g , operating to open the grippers, while the cylinder C is completing the final part of its retrograde revolution, and finally landing the roller G^3 under and resting against the stud g^4 , preparatory to receiving another sheet upon starting again on the printing-stroke. During the above-described operations the strap L^4 operates the fountain-roller f^7 , and the cam F^{10} operates the sheet-leveling fingers F^2 as follows: With the parts in the position shown, the fingers F^3 will lie upon the bank of delivered sheets upon the receiving-board I^3 . During the printing-stroke the cam F^{10} , through the connecting parts already described, allows the weighted hook-catch F^6 to drop, and thus raise the fingers F^3 into the position shown in dotted lines, so that the next sheet may pass down under them and upon the receiving-board I^3 , or the pile of sheets thereon, the roller I^2 on the adjustable bracket I' having meanwhile passed clear of the lower end of the weighted hook F^6 without striking it. The fingers F^3 will therefore remain in this position during so much of the retrograde revolution of the cylinder as suffices to carry the sheet down until the tail comes in contact with the stop I^4 , when the roller I^2 is so located—the weight of the hook F^6 being now at its lowest position—that the roller I^2 engages said hook at the moment the tail of the sheet reaches the stop I^4 , tripping the hook F^6 from the pin F^4 , and allowing the fingers F^3 to drop upon the sheet and spread it out evenly upon the board I^3 , where said fingers remain until the completion of the retrograde stroke, during which the cam F^{10} again raises the hook F^6 , so that it again engages the pin F^4 .

It will be seen that in the construction of this machine the transverse webs of the frames A are all turned inward, leaving a smooth flat appearance upon the outside, in close imitation

of a hollow box-frame, while in reality such construction is no more expensive or difficult than the customary arrangements in which the transverse webs are turned outward. The object is to simulate a box-frame and give the machine a more solid and substantial design without incurring the much greater expense of a hollow-cored box-frame; but to such construction I herein make no claim.

I do not herein claim the buffer springs herein shown, as the same now form the subject of another application for Letters Patent, Serial No. 164,555, filed May 6, 1885; nor do I herein claim the sheet-delivery apparatus, consisting of the receiving-board I^3 , fingers F^3 , and attached parts, for automatically delivering and flattening the sheets on said receiving-board, as such delivery apparatus now forms the subject of another application for Letters Patent, Serial No. 169,353, filed June 22, 1885; nor do I herein claim the means or method shown for delivering the sheet tail first upon the retrograde or non-printing revolution of the impression-cylinder.

Having thus fully described my said improvements as of my invention, I claim—

1. In a hand-operated cylinder printing-machine driven by means of a crank, as R^6 , the combination, substantially as described, with a cylinder, as C , and a reciprocating type-bed, as D , geared thereto, of driving-pinions of different diameters, to be actuated by said crank, whereby the power required to operate the machine may be varied to conform, measurably, to the strength of the operator, the weight of the form, or the speed at which the machine may be run, substantially as set forth.

2. In an oscillating cylinder printing-machine, the combination of parts, substantially as described, for the purpose of automatically lowering and raising the impression-cylinder to and from the type-surface, consisting of an eccentric rock-shaft, as C' , carrying said cylinder, a lever, as L , secured to said rock-shaft, and a stud, as b' , fixed in the said cylinder, said stud impinging upon the said lever to rotate said rock-shaft during a portion of the cylinder's rotation in either direction, substantially as set forth.

3. In an oscillating-cylinder printing-machine, the combination of parts, substantially as described, for lowering and raising the cylinder to and from the type-surface, and automatically holding it in either position through the necessary periods of the cylinder's rotation, consisting of a cylinder, as C , rotating freely upon an oscillating rock-shaft, as C' , a lever, as L , secured to said rock-shaft, and carrying a roller, as b^2 , on its extremity, and two spring-catches, as b^3 , located, as described, to engage said roller, substantially as set forth.

4. In an oscillating-cylinder printing-machine, the combination of parts, substantially as described, for opening and closing the cylinder-grippers for the reception of the sheet, consisting of an oscillating rock-shaft, as C' , a lever, as L , secured to said rock-shaft, and

carrying a stud and roller, as g^2 , a bent lever, as g , pivoted at one end to a fixed part of the machine, and having a hook formed on its free end, a lever on the end of the gripper-shaft, as G^2 , carrying a roller, as G^3 , a helical or other spring arranged to operate or close the grippers, as g^3 , and a stud, as g^4 , secured to the frame or other fixed part of the machine, substantially as set forth.

10 5. In an oscillating-cylinder printing-machine, the combination of the following-named parts: a cylinder, as C , and an eccentric rock-shaft upon which it freely rotates, a stationary cam, as g^5 , a gripper-shaft, as G^4 , and a lever-arm, as G^4 , secured thereto and provided with a roller, as G^5 , whereby said cylinder's center of oscillation is so changed in position as to keep
15 said roller out of contact with said cam during the cylinder's printing revolution, but in
20 contact with said cam during the cylinder's non-printing revolution, so that said cam only opens the cylinder-grippers upon said gripper-shaft when the sheets are to be delivered, substantially as and for the purposes set
25 forth.

30 6. In an oscillating-cylinder printing-machine, the combination of parts for raising and lowering the feed-board, consisting of a cylinder, as C , running freely upon an oscillating rock-shaft, as C' , a lever, as L , secured to one end of said rock-shaft, a stud, as b' , attached to said cylinder, engaging said lever, a lever, as L' , secured to the other end of said

rock-shaft, and a connecting-rod, as L^3 , pivoted to said lever at one end, and at the other end to a lever, as L^2 , secured to a rock-shaft, as E^5 , carrying-cams, as E^4 , upon which a feed-board, as E' , rests, substantially as set forth. 35

7. In an oscillating-cylinder printing-machine, means for rotating the ink-fountain roller, substantially as described, consisting of a cylinder, as C , running freely upon an oscillating rock-shaft, as C' , a lever, as L , secured to one end of said rock-shaft, a stud, as b' , attached to said cylinder, engaging said lever, a lever, as L' , secured to the other end of said rock-shaft, and a strap, as L^4 , articulated to the free end of said lever, leading to and inwrapping a pulley on the axis of the fountain-roller f' , substantially as set forth. 40
45
50

8. In a cylinder printing-machine, in combination with an impression-cylinder, sheet-supports, as $s s^0$, portions of which are entered between said cylinder's tympan-sheet and packing, and portions of which protrude above the tympan-sheet, said supports being held in place by the tightening of said tympan-sheet upon them, whereby the tail edge of the sheet is elevated from contact with said cylinder, in aid of the delivery of the sheet by said edge, substantially as and for the purposes set forth. 55
60

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Witnesses:

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