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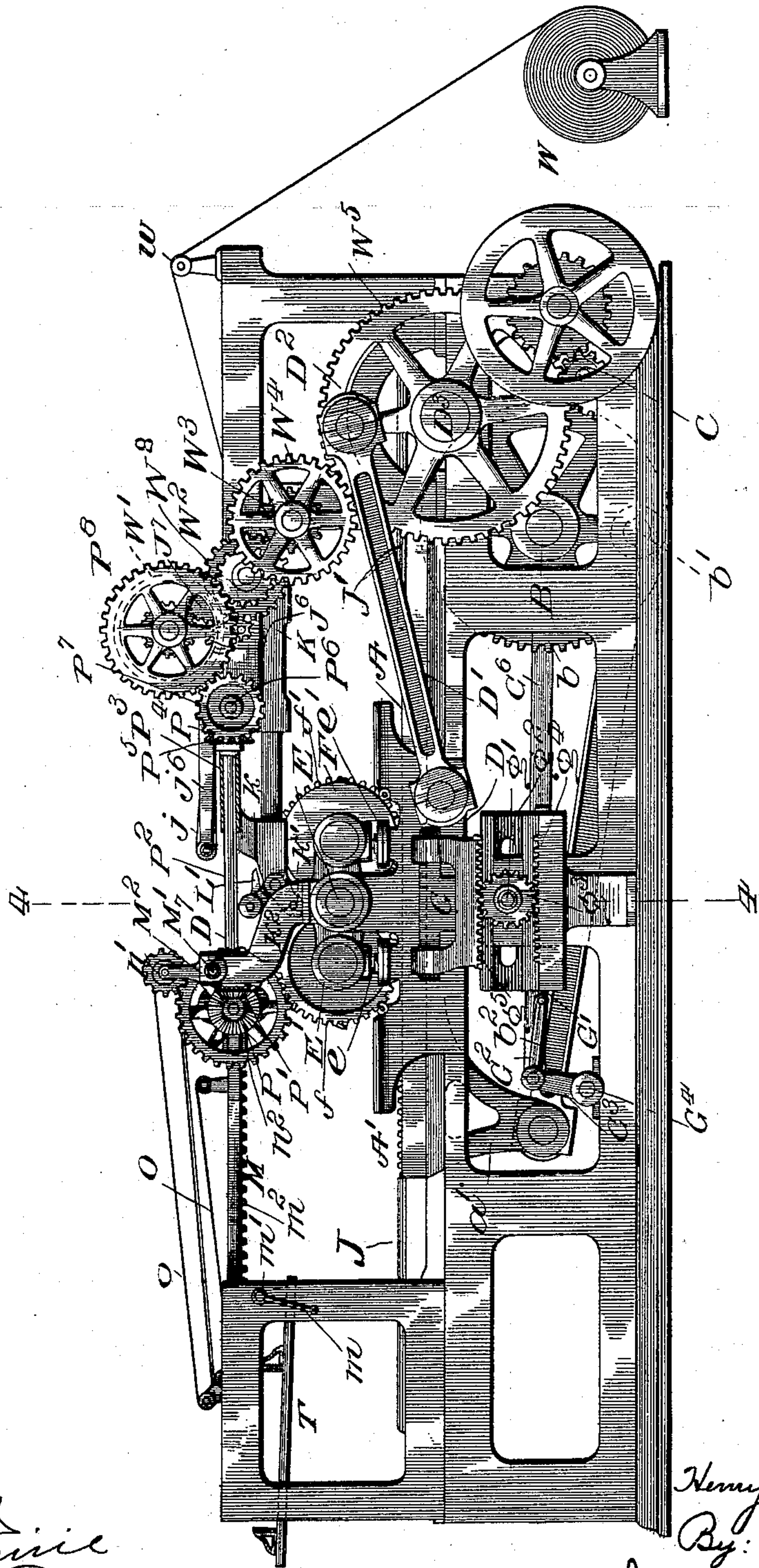
6 Sheets—Sheet 1.

H. F. BECHMAN.
PRINTING PRESS.

No. 604,293.

Patented May 17, 1898.

Fig. 1.



Witnesses

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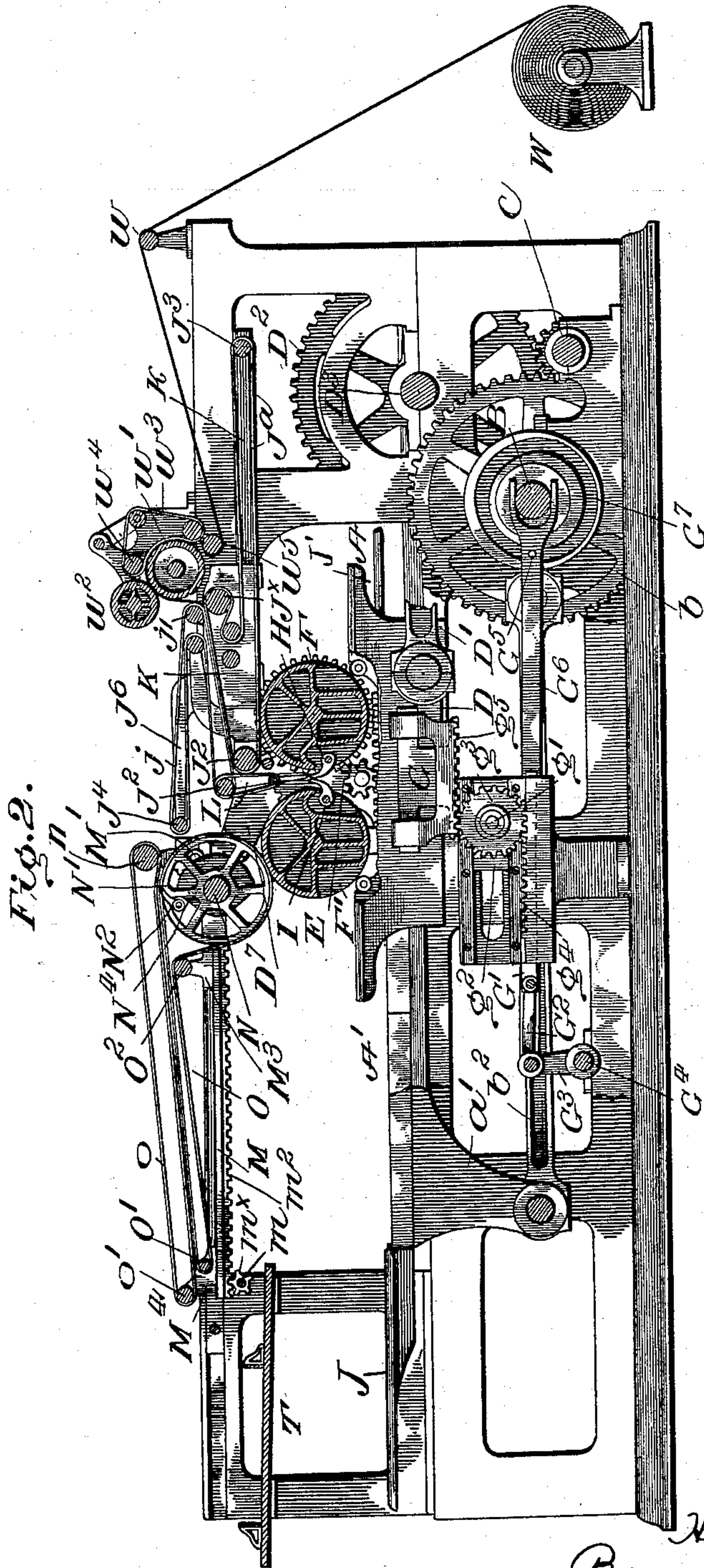
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H. F. BECHMAN.
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Witnesses

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(No Model.)

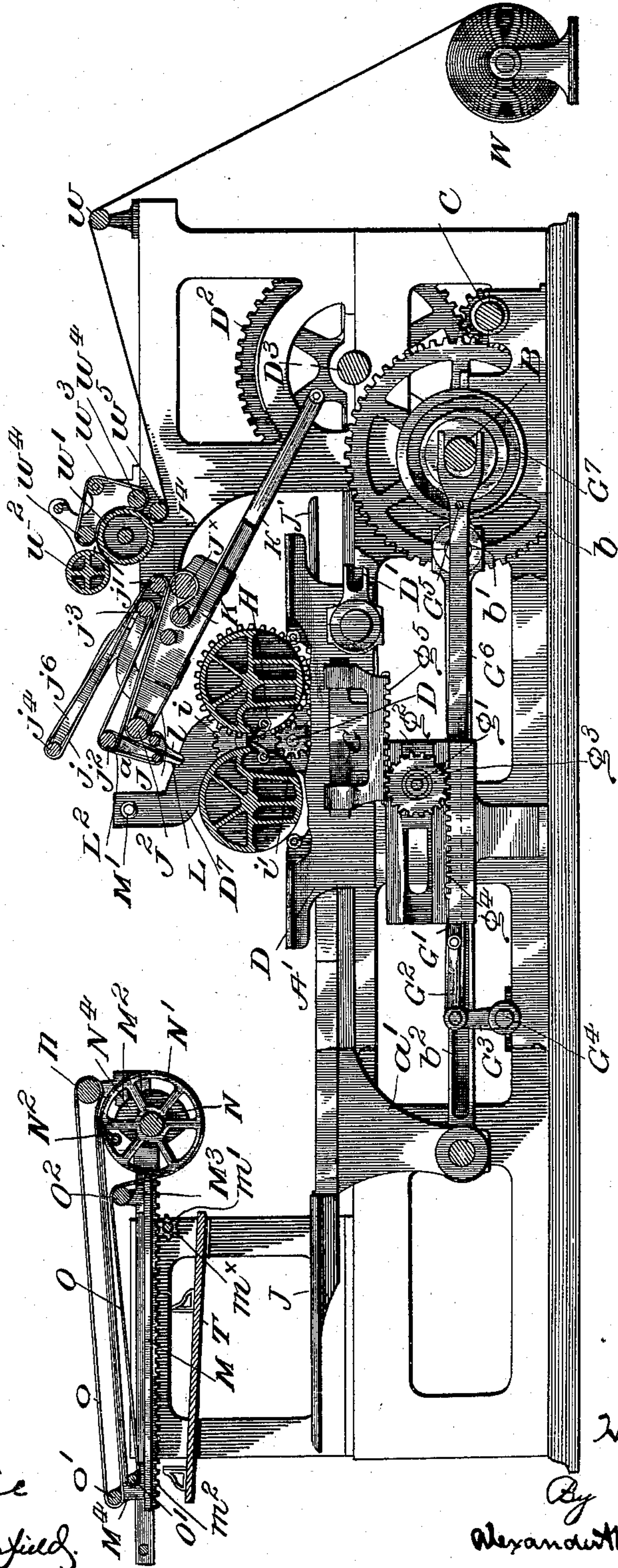
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FIG. 3.



Witnesses

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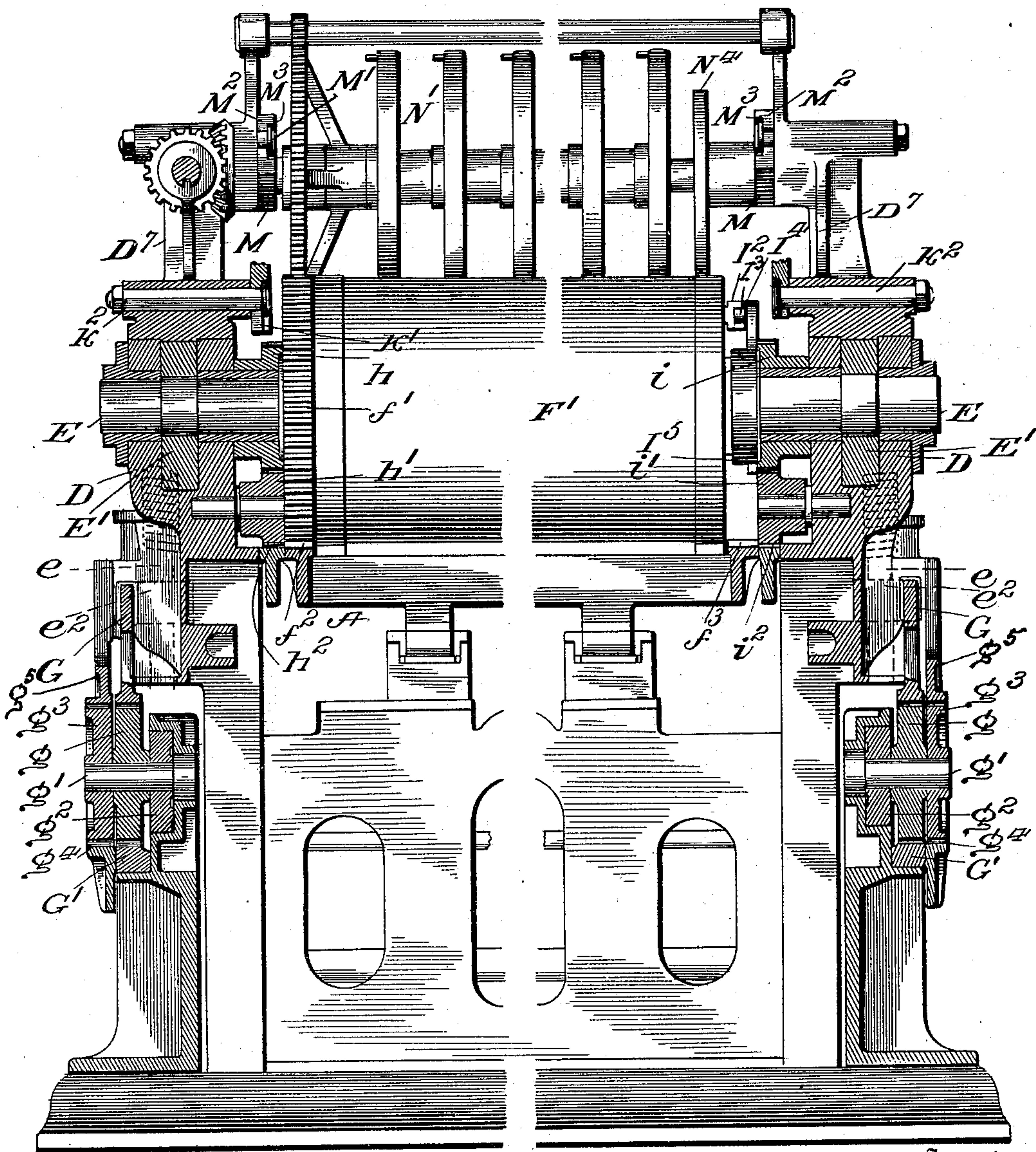
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Fig. 4.



Witnesses

Witnesses
 In Testimony
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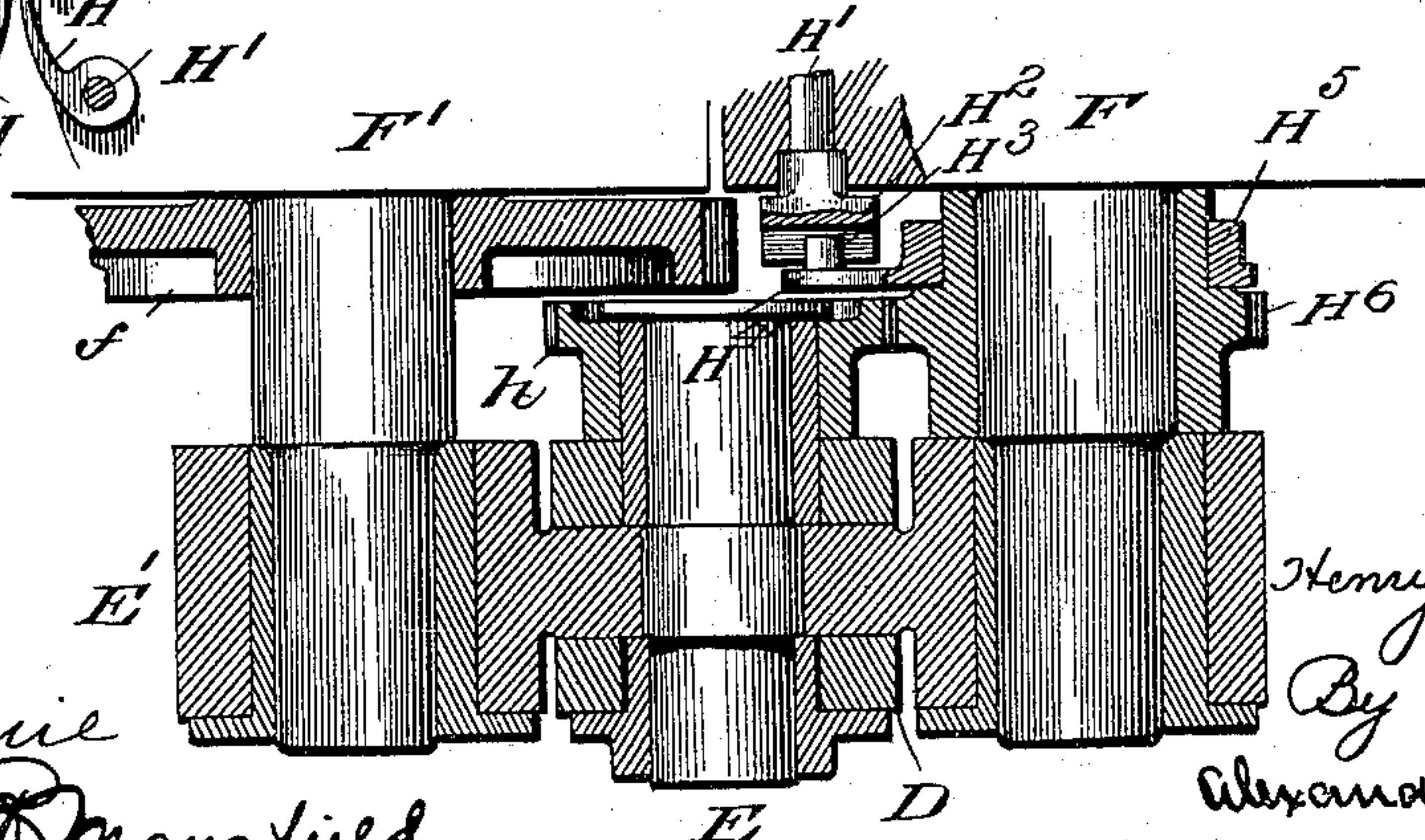
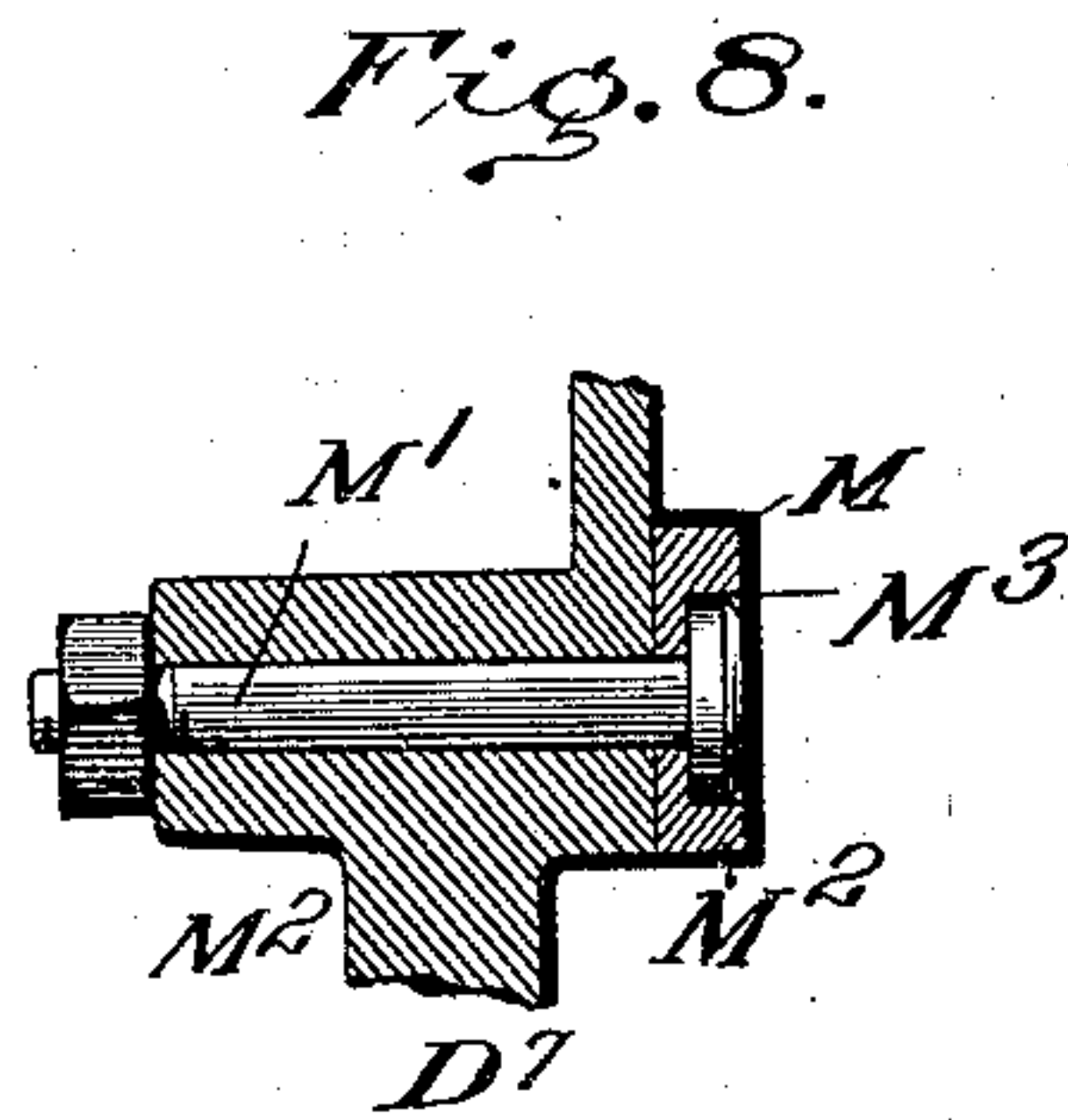
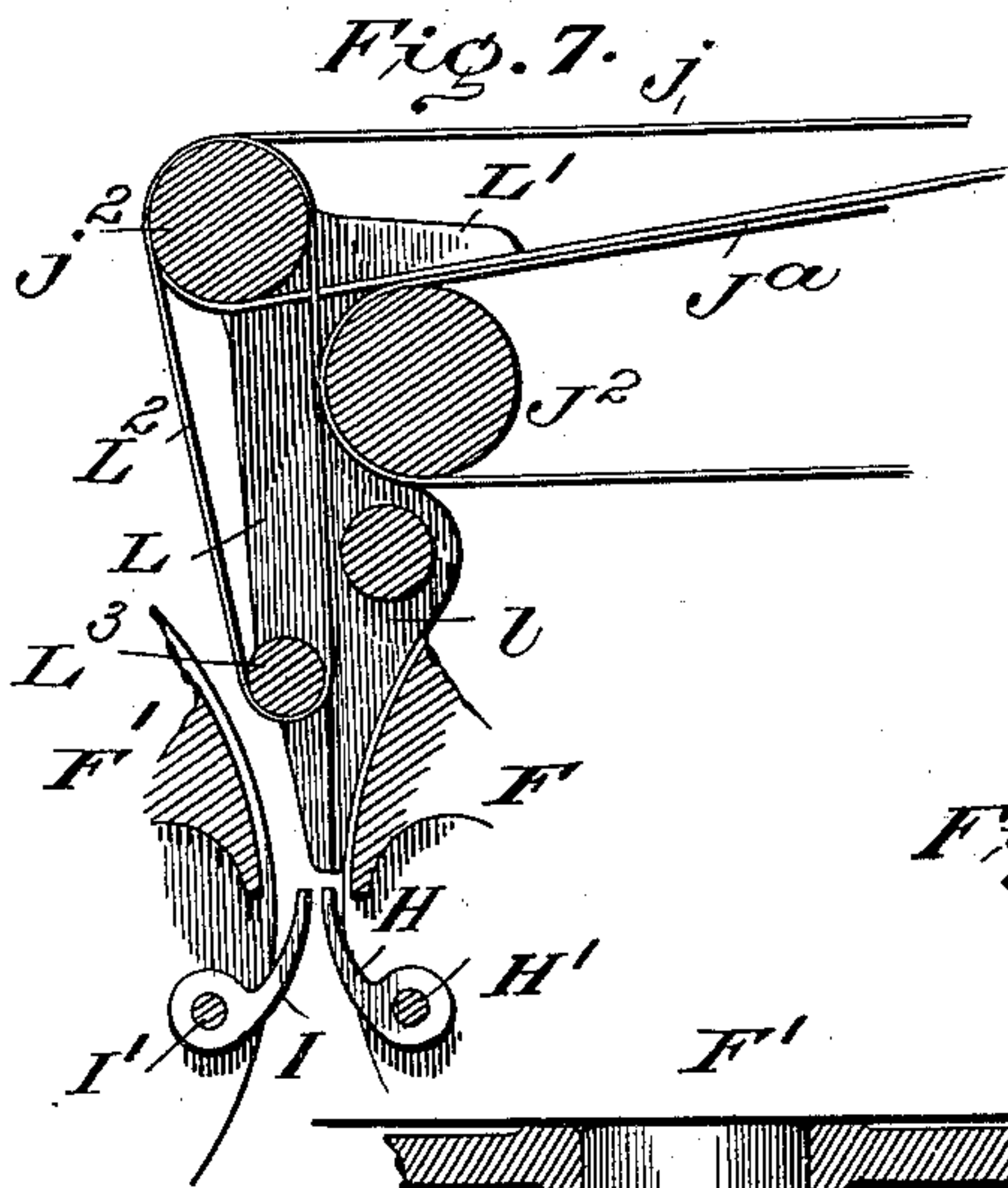
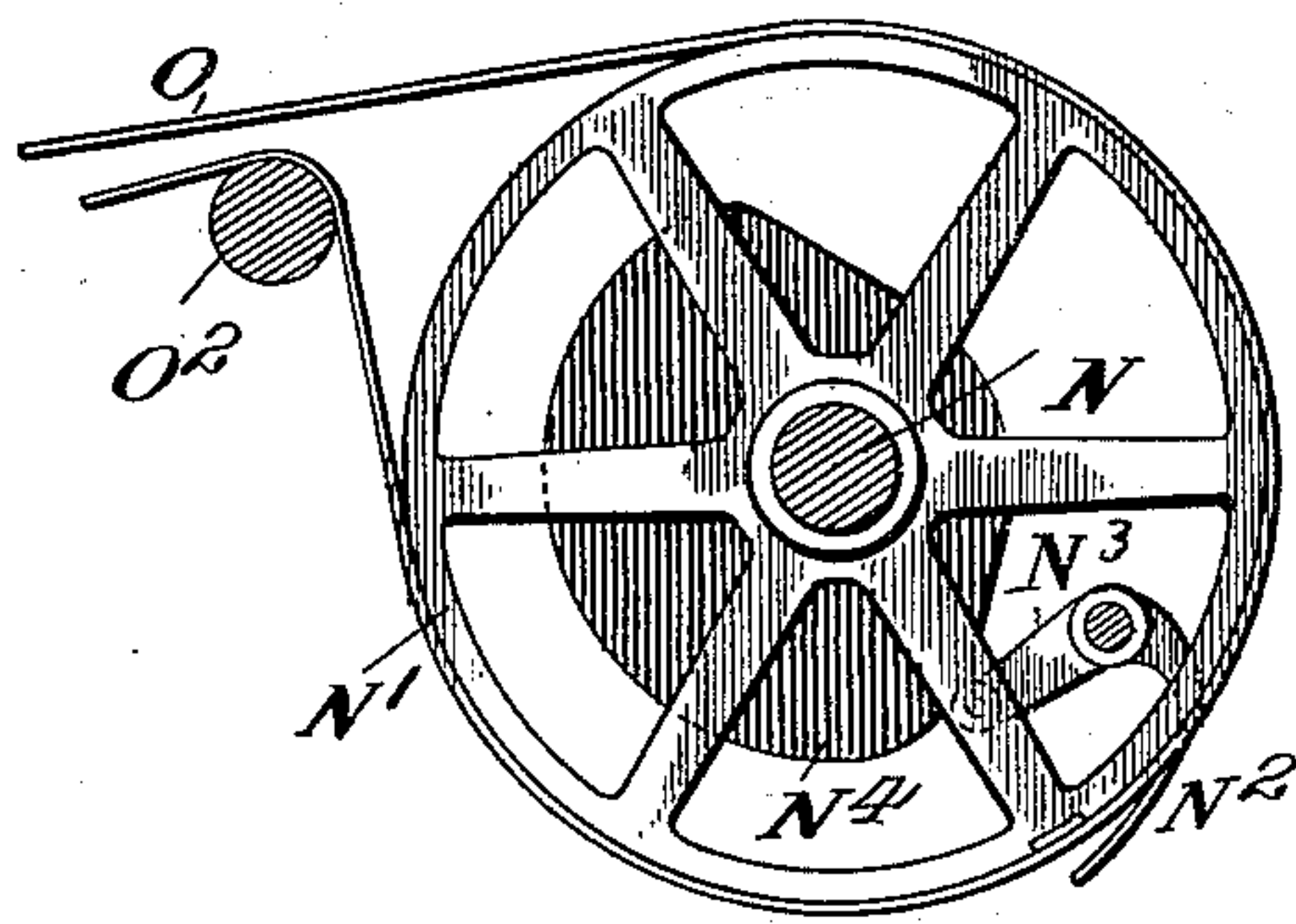
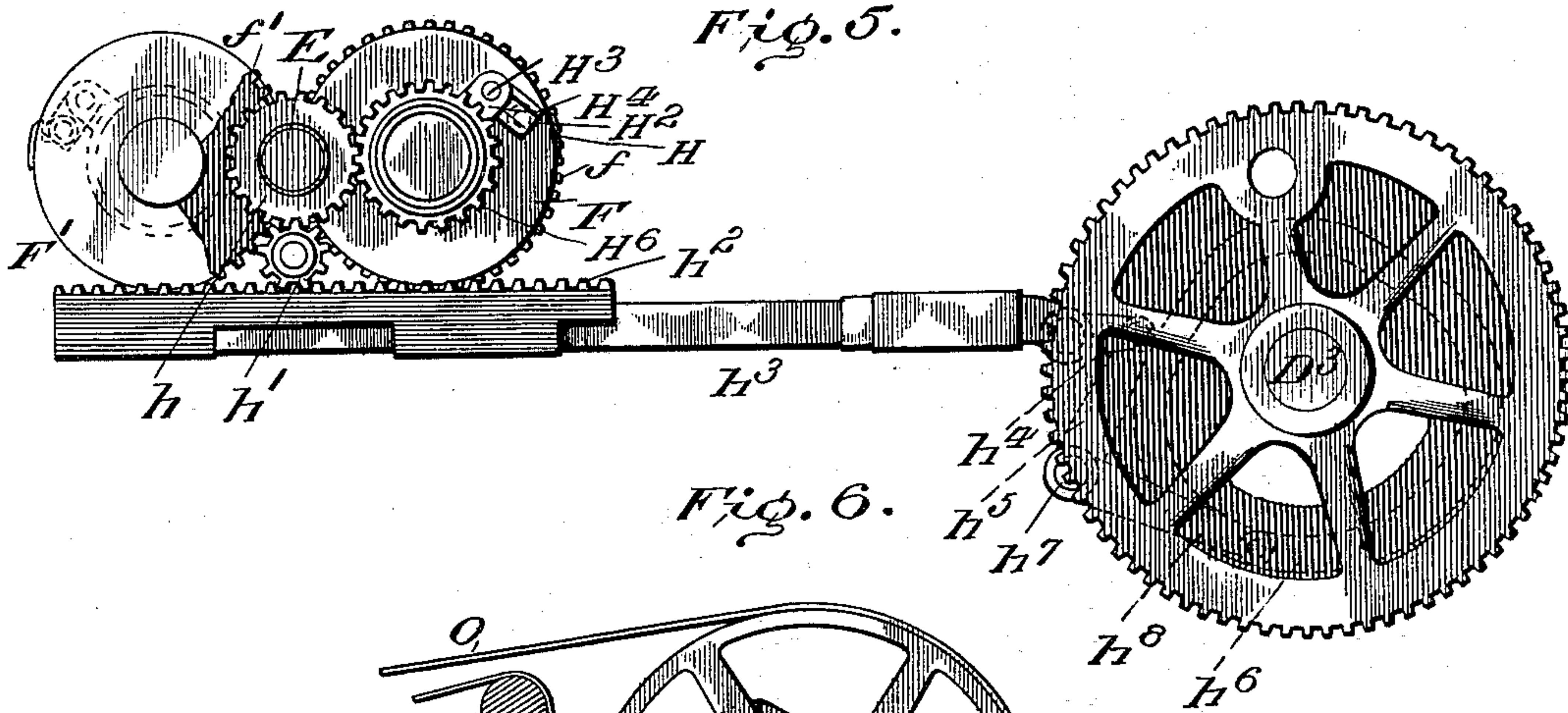
(No Model.)

6 Sheets—Sheet 5.

H. F. BECHMAN.
PRINTING PRESS.

No. 604,293.

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Witnesses

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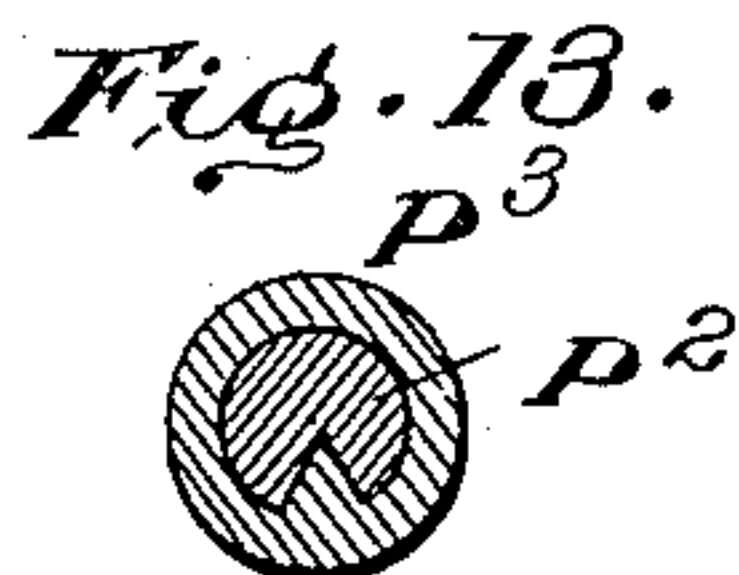
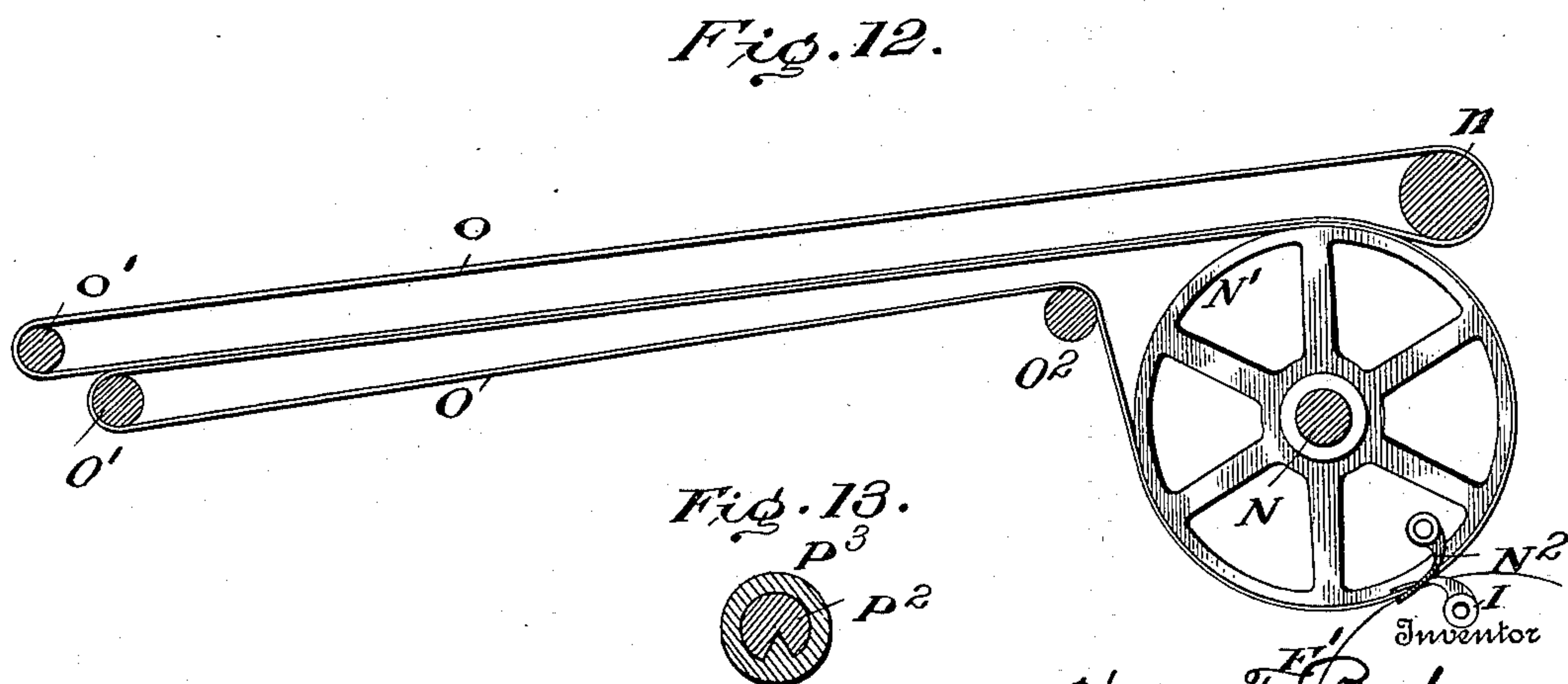
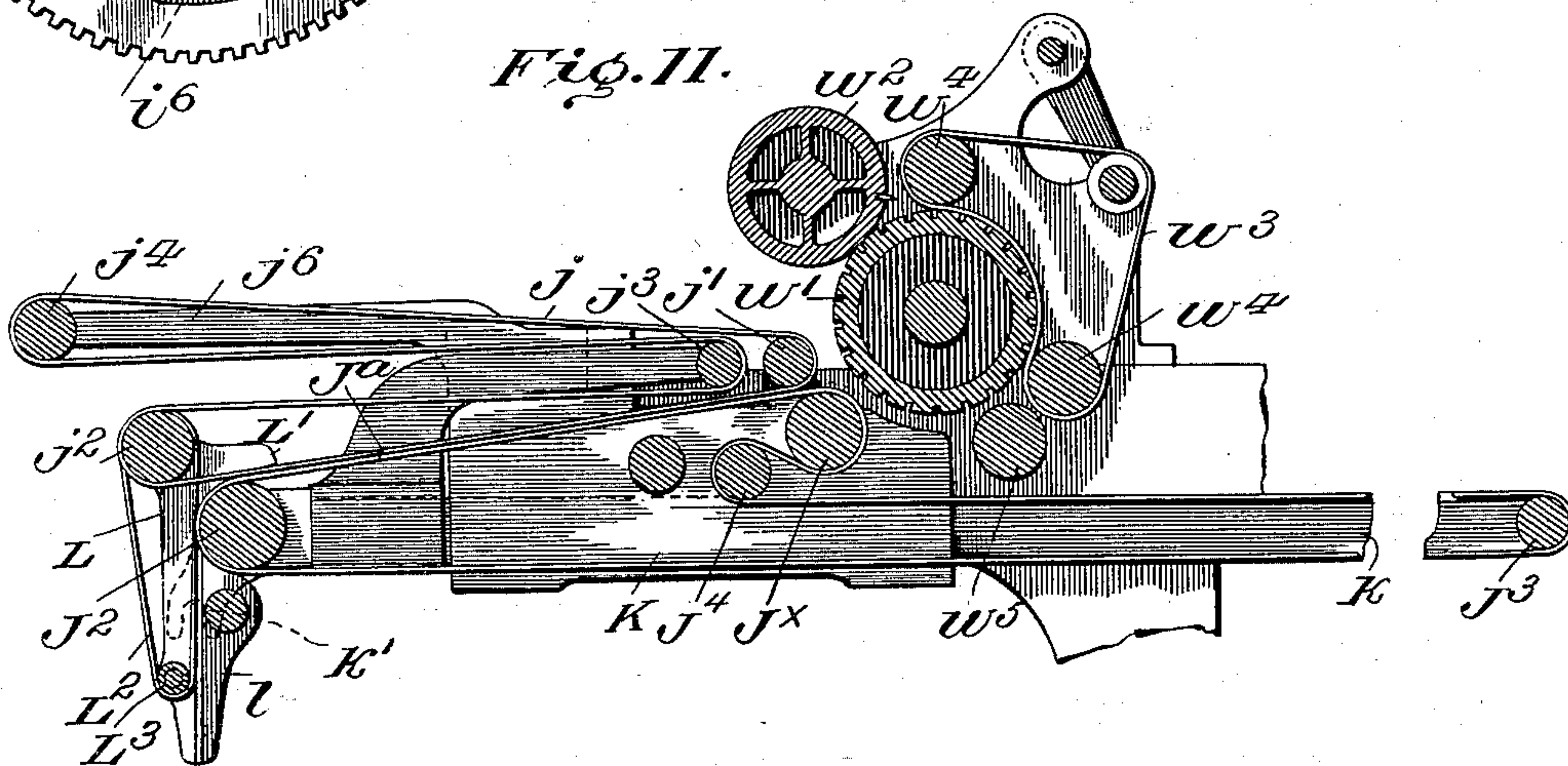
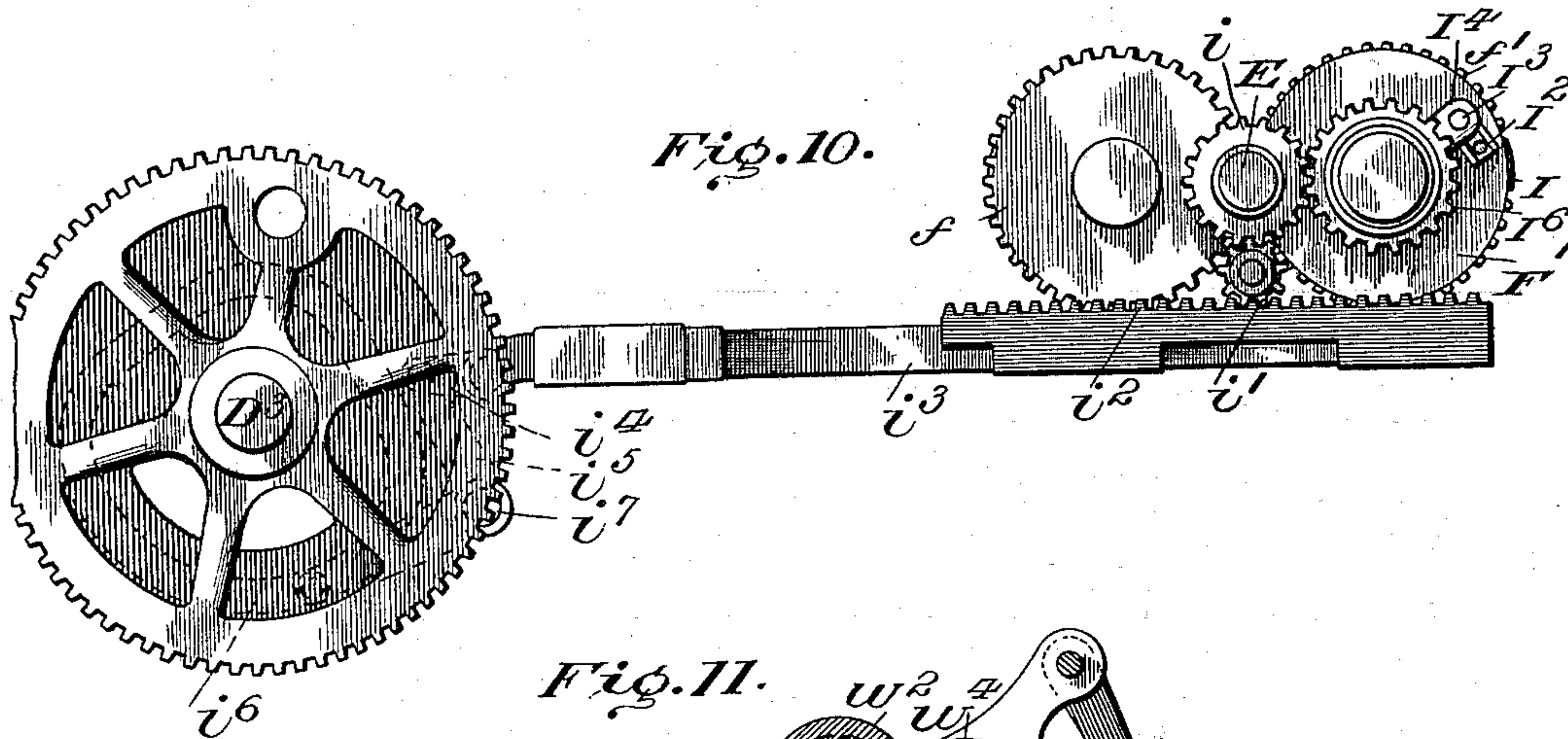
(No Model.)

6 Sheets—Sheet 6.

H. F. BECHMAN.
PRINTING PRESS.

No. 604,293.

Patented May 17, 1898.



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UNITED STATES PATENT OFFICE.

HENRY F. BECHMAN, OF BATTLE CREEK, MICHIGAN, ASSIGNOR TO THE
DUPLIX PRINTING PRESS COMPANY, OF SAME PLACE.

PRINTING-PRESS.

SPECIFICATION forming part of Letters Patent No. 604,293, dated May 17, 1898.

Application filed May 12, 1897. Serial No. 636,165. (No model.)

To all whom it may concern:

Be it known that I, HENRY F. BECHMAN, of Battle Creek, in the county of Calhoun and State of Michigan, have invented certain new and useful Improvements in Printing-Presses; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is a sheet-printing press of the perfecting type, and particularly is an improvement upon the printing-press shown in the United States Letters Patent to Joseph L. Cox, No. 539,356, dated May 14, 1895. The invention is a general reorganization of such press, however, and embodies what I believe to be some broadly new and useful features, particularly the feed mechanism, the delivery mechanism, the mechanisms and arrangements which enable the feed and delivery mechanisms to be drawn back out of the way while "making ready" the forms or padding the cylinders, the improved cylinder-throw-off mechanism, the improved gripper-tripping mechanism, and certain other novel and improved constructions and combinations of parts hereinafter described and claimed.

Referring to the drawings, Figure 1 is a side elevation of the complete press with the cylinders in central position, a sheet having been half-printed by the right-hand cylinder. Fig. 2 is a longitudinal sectional view of the press, showing parts in side elevation and the cylinders in position to receive an imprinted sheet. Fig. 3 is a similar section showing the press ready for forms or make-up, the feed and delivery mechanisms being shifted out of the way. Fig. 4 is an enlarged vertical section on line 4 4, Fig. 1. Fig. 5 is a detail view of the mechanism for operating the grippers on the first impression-cylinder. Fig. 6 is a detail view of the delivery gripper mechanism detached. Fig. 7 is an enlarged view of the sheet-guiding devices. Fig. 8 is a detail view of the detachable connection between the delivery-frame and cylinder-carriage. Fig. 9 is a detail horizontal section taken through the bearings of the impression-cylinders, showing the mechanism for operating the grippers on the

first impression-cylinder. Fig. 10 is a detail view of the mechanism for operating the grippers on the second impression-cylinder. Fig. 11 is an enlarged view of the paper-feed rolls and tapes. Fig. 12 is a detail view of the delivery-tapes. Fig. 13 is a cross-sectional view of the telescoping shaft.

Referring to the drawings, A A' designate a pair of reciprocating type-beds rigidly connected, or one large bed capable of holding two forms, mounted upon suitable rollers and reciprocated by means of pitmen b^2 , connected at one end to hangers a' , depending from the bed, and at the other end to wrist-pins b' on crank-wheels b between the main side frames, mounted on a transverse shaft B, which is driven from main shaft C by suitable gearing.

Attached to and reciprocating with the beds are ink-distributing tables J J', to which ink is supplied from fountains at the opposite ends of the press, substantially as described in said patent.

Mounted on the side frames of the press are reciprocating carriers D, which are reciprocated back and forth oppositely to the beds by means of pitmen D', connected to crank-wheels D² on shaft D³, also driven from shaft C by suitable gearing, as shown.

The throw-off mechanism.—Mounted on each carrier D is a short oscillatory bar E', supported upon a short stout shaft E, journaled in the carrier. In the opposite ends of bars E are bearings for the shafts or trunnions of the impression-cylinders F F', which are alternately thrown off and on impression by oscillating the bars E' by means of screws e , underlying the ends of the bars and contained in vertical sockets in the carriers D. Screws e are provided with adjusting-nuts e' and pinions e^2 , and are turned by means of a rack-bar G, substantially as described in said Cox patent; but instead of operating bar G by a race-cam driven from the cylinders I operate it independently of the cylinders, as follows: Bar G is provided on its lower edge with a rack which meshes with a gear g , loosely mounted on a stub-shaft g' , fixed to a sliding plate g^2 , which is guided in a suitably-constructed bracket on the main frame, as shown. On the outer end of shaft g' is

another gear g^3 , which meshes with a lower stationary rack g^4 on the frame and an upper rack g^5 , rigidly fastened to the carrier D, as shown. By this construction the plate g^2 and gear g are reciprocated with the gear g^3 , which rolls back and forth with the carriage, and therefore gear g will not shift the rack G unless its uniform rotation with gear g^3 is prevented; but if the rotation of gear g in relation to gear g^3 is retarded or accelerated it will shift bar G forward or backward and cause it to turn screws e , so as to oscillate bar E', as is evident. The gearing g is thus retarded or accelerated at the proper times by means of a rack G', lying under gear g and meshing therewith, which at desired times is shifted forward or back, so as to change the relative rotation of gear g with gear g^3 . Bar G' is shifted by means of a link G², connected to an arm G³ on a rock-shaft G⁴, operated by a crank-arm thereon and pitman G⁶ from a race-cam G⁷ on the shaft B, as shown in Fig. 2.

The bar E' and its operating devices are duplicated on both sides of the press, so that both ends of the cylinders are operated uniformly.

The parts are so timed that cylinder F operates only on bed A and during the stroke of the cylinders away from the feed, while cylinder F' operates only on bed A' and when the cylinders travel toward the feed, the bars E' being oscillated at the proper times, so as to throw the cylinders off impression accordingly.

The cylinder gripper mechanism.—The cylinders are provided at opposite ends with the usual cylinder-gears $f f'$, meshing with racks $f^2 f^3$, fixed on the beds, as shown, so as to keep each cylinder in exact unison with the bed, the teeth of the gears being sufficiently long to prevent the cylinders getting out of track when they are thrown off impression. Cylinder F has a set of gripping-fingers H, mounted on a shaft H', having a T-head H² on one end, which is adapted to be engaged by a pin H³ on an arm H⁴, attached to a ring H⁵, fixed on the hub of a gear H⁶, loosely mounted on the shaft of cylinder F between the end of cylinder and bar E'. Gear H⁶ meshes with a small gear h , loosely mounted on the inner end of stub-shaft E, and it in turn meshes with a small pinion h' on a pin fastened to the carrier, which pinion rolls over and meshes with a sliding rack h^2 , supported on the main frame and shifted at the proper times, so as to cause the gearing to shift pin H³ and cause it to engage T-head H² and open or close the gripper-fingers at the proper time. Rack h^2 is shifted by means of rod h^3 , link h^4 , and crank-lever h^5 on a stub-shaft h^7 , which has an arm h^8 , provided with a friction-roller, engaging a race-cam h^6 on the shaft D³, as more clearly shown in Fig. 5. Cylinder F' has a set of gripping-fingers I on a rod I', having a T-head I² on its end, adapted to be engaged by a pin I³ on an arm I⁴ of a ring I⁵, fixed to the hub

of a gear I⁶, loosely mounted on the shaft of cylinder F' and meshing with a gear i , loosely mounted on the inner end of the other stub-shaft E and meshing with a small pinion i' , mounted on the carrier and meshing with a sliding rack i^2 , supported on the main frame and operated by means of a rod i^3 , link i^4 , and crank-arm i^5 on a stub-shaft i^7 , said crank-arm engaging a race-cam i^6 on shaft D³. (See Fig. 10.)

It should be noted that the gripper-operating mechanisms for the respective cylinders are at opposite sides of the press.

The feed mechanism.—As shown, the press is adapted to operate on sheets cut from a web and automatically fed. The web is led in from roll W over guide-roller w to and under a guide-roller w^5 , up, over, and partially around a feeding and cutting cylinder w' and under the male cutting-cylinder w^2 , cylinder w' being assisted in feeding the web by means of endless tapes w^3 , running over suitably-disposed rollers w^4 , as shown. The cutting-cylinder w^2 is driven by a gear W', meshing with an intermediate gear W², connected to a gear W³, which meshes into a pinion W³ on the hub of a gear W⁴, mounted on the side frame and meshing with a gear W⁵ on the periphery of one of the crank-wheels D². The size of the sheets are varied by means of a "changeable" gear, such as is shown in Fig. 3 of said Cox's patent. Cylinder w' and tape-rollers W⁴ may be driven by suitable gearing from cylinder w^2 . The cylinder w' is peripherally grooved, and cylinder w^2 is arranged so that its blade will always register with some slot in cylinder w' , and by varying the speed of rotation of cylinder w' the length of the sheets fed in and severed from the web can be varied, this mechanism being substantially like that described in Cox's patent aforesaid, needing no further description here. From the cutting-cylinders the sheets, or the web almost severed, is directed between the rollers J^x j' into the feed-tapes J^a j . The rollers J^x j' are journaled in brackets K, swiveled on the main frame and provided with guides for reciprocating bars k , the front ends of which are provided with hook-castings k' , adapted to catch on clamp-bolts k^2 , attached to upstanding brackets on the carriers D, and thus cause the bars k to reciprocate back and forth with the cylinders. On bars k are journaled a front roller J² and a rear roller J³. Tapes J^a run from roller J^x down and forward to roller J², back to roller J³, and then forward to a roller J⁴, journaled on bracket K, and then up to and around roller J^x.

The arrangement of the rollers J² J³ on the sliding bars k compensates for the travel of roller J² with the cylinders, because roller J³ forms a loop in the tapes, which gives up or takes up the tapes as the loop formed by roller J² is enlarged or diminished by its movement. Consequently the line of the tapes J^a between rollers J^x J² is maintained at a uniform tension and driven at a uniform speed,

notwithstanding the alternate shortening and lengthening of such line by the movement of roller J^2 . The tapes J^a are driven by roller J^x , which is driven by an intermediate gear J^6 , meshing with a gear J^7 on cylinder w^1 .

The upper set of tapes j run from roller j' , parallel with tapes J^a , down to and under a roller or set of tape-rollers j^2 , journaled in brackets mounted on the sliding bars k , thence forward to and over a roller j^3 , mounted on brackets on bars k and lying near roller j' , then back to and over a roller j^4 , also journaled in brackets j^6 , attached to brackets K , and then forward to the roller j' again. (See Fig. 11.) The rollers $j^2 j^3$ being movable, the loop formed by roller j^3 is increased or diminished proportionately to the diminishing or lengthening of the loop formed by roller j^2 , so that the tapes j are kept at a uniform tension and move at uniform speed between the rollers $j' j^2$ like the tapes J^a , notwithstanding the movement of the rollers j^2 . This peculiar system of feeding-tapes provided with compensating loops, so that they can take a sheet from a stationary point and transfer it to the moving cylinders at a moving point, is an important feature of the invention. The tapes j are driven from roller j' , which is driven by gears from roller J^x , as is also roller J^4 .

Mounted on brackets attached to the front ends of bars k are vertically-disposed sheet-guiding fingers L , the former depending beneath roller j^2 and the latter hanging beneath roller J^2 , so that the sheet fed down between tapes $J^a j$ is directed by said fingers down directly between the cylinders $F F'$ in position to be nipped by the grippers H on cylinder F when they come nearest to cylinder F' . (See Fig. 2.) Fingers L are also provided with forwardly-projecting guides L' on their upper ends, which extend partly over roller J^2 and will deflect the infed sheet down between the fingers. To facilitate the down feed of the sheet, endless tapes L^2 may be run over roller j^2 and over tape-pulleys L^3 on the fingers L , as shown, so that the sheets will be continually combed down toward the cylinders and kept smooth.

In practice the sheets are not wholly severed from the web, and the cylinder F , traveling slightly faster than the web-feed, breaks the sheet loose from the web after its grippers have caught it.

The delivery mechanism.— $M M$ designate a pair of sliding bars which are guided in ways m in standards on the side frames of the press at the rear end thereof. On the front ends of bars M are castings M^2 , which are slotted to slip over clamp-bolts M' , attached to brackets D^7 on the carriers D , the heads of the bolts M' resting in countersinks M^3 in the castings, (see detail Fig. 8,) so as to prevent the bars M slipping out of place during the operation of the press.

In castings M^2 is journaled the shaft N of a transfer-reel N' , provided with a set of grip-

ping-fingers N^2 . The shaft carrying fingers N^2 has a trip N^3 on one end, which presses against the periphery of a cam-disk N^4 , fixed to one bar M beside the end of the reel and so shaped that the fingers are closed at the proper time to take a sheet from cylinder F' and opened at the proper time to deliver such sheet into the delivery-tapes $O o$. Tapes O run over reel N' , back to and over a roller O' , journaled on castings M^4 on the rear ends of bars M , thence back over a roller O^2 , journaled in brackets M^3 on bars M beside the reel, and thence around the reel N' , as shown. Tapes o run from a roller n , journaled in extensions of castings M^2 and lying close to the front side of reel N , but above the axis thereof, back to and under a roller o' , journaled in the castings M^3 , slightly behind roller O' , and thence back to roller n , as shown.

The whole system of delivery-tapes and rollers is reciprocated back and forth with the cylinders during the operation of the press.

The reel N is driven by means of a bevel-gear P , mounted on one end of its shaft and meshing with a bevel-gear P' on a sliding shaft P^2 , journaled in the adjoining bracket D^7 and telescoping into a hollow shaft P^3 , journaled in a suitable extension of the feed-mechanism supports on the main frame, shafts $P^2 P^3$ being keyed or splined, so that shaft P^2 can reciprocate in shaft P^3 while being rotated thereby. Shaft P^3 is driven by a bevel-gear P^4 , meshing with another bevel-gear P^5 on a stub-shaft P^6 , on which is a pinion P^7 , meshing with a gear P^8 on the cutting-cylinder w^2 , as shown. By this means reel N' and tapes O are driven continuously during the operation of the press. The tapes o are driven by roller n , which has a pinion n' on one end meshing with a gear n^2 on reel N' , as shown.

When the pressman is making ready, the bolts M' are loosened and the bars $M M$, with the delivery-tapes and rollers, are drawn back to the position indicated in Fig. 3 by means of small pinions m^x on a shaft m' in both of the supporting-standards, pinions m^x meshing with racks m^2 on the lower edge of the bars M . Shaft m' can be turned by means of a detachable crank m at will. Also, when making ready the feed mechanism is disengaged from the carriers by loosening the clamping-bolts k^2 , then running the cylinders over to the feed end of press, so as to push the bars k as far forward as possible, and then the whole feed system of tapes is tilted up into the position shown in Fig. 3, clearing the feed devices from the cylinders. While thus freed from the feed and delivery mechanisms the cylinders can be reciprocated at will, so as to allow their blankets to be packed readily and the forms to be made ready. It will be readily seen from Fig. 3 that the press possesses exceptional advantages in having the feed and delivery mechanisms so arranged as to be out of the way when making ready, facilitating this operation and allowing the

forms or blankets to be packed readily, as desired.

Operation: After making ready the feed mechanism is attached to the carriers and the delivery mechanism also, as described. The press is then started up, and the sheets are fed down to the cylinder F by tapes J^a j and fingers L l, as described. When the cylinders are at the crank end of the press, they are both "thrown off," being raised clear of the type; but as they start toward the delivery end of press the fingers on cylinders F nip the sheet hanging in fingers L l, and as cylinder F moves peripherally faster than the tapes the sheet is broken from the web, and at same time bars E' are oscillated, so as to lower cylinder F on impression, and it prints the sheet upon the forms of type on bed A and is thrown off impression again before reaching the forms on bed A', over which it passes. When the cylinders reach the delivery end of their stroke, the grippers on cylinder F' nip the sheet, while those on F release it, and as the cylinders start back cylinder F is thrown on impression and perfects the sheet on the forms on bed A' and is then thrown off before reaching bed A, over which it also passes. When the cylinders have completed about three-fourths of their return stroke, the grippers on cylinder F' release the sheet, but simultaneously the grippers or reel N' take it, and the perfected sheet is carried up and delivered to tapes O o, which carry it back over the table T and deliver it thereon upon the next return movement of the cylinders.

It will be observed that the cylinder F takes and transfers the sheets at substantially the opposite ends of its stroke and while the cylinders are on dead-centers. I am enabled to effect this by the improved gripper mechanism described and by the improved feeding devices. It should also be observed that in this case the cylinders oscillate, and I do not attempt to rotate them continuously or only in one direction, thus doing away with the need of jumping-racks.

The improved gripper-actuating mechanism enables me to operate the grippers with certainty at any point or time desired, and the improved throw-off mechanism enables me to oscillate bars E' with certainty at any point or time desired.

By moving the beds oppositely to the cylinders the linear movement of the cylinders is shortened; but the movable beds are not essentials to the present invention.

Having thus described my invention, what I therefore claim as new, and desire to secure by Letters Patent thereon, is—

1. The combination of the reciprocating carriers and the gripper-cylinder journaled thereon; with an extensible and contractible reciprocating feed mechanism adapted to feed sheets to the cylinder for the purpose and substantially as described.

2. The combination in a printing-press of a reciprocating impression gripper-cylinder, a

stationary sheet-supply, and a reciprocating feed mechanism having one part connected to and reciprocating horizontally with the cylinder and adapted to take sheets from the stationary table and deliver them to the cylinder as it travels.

3. The combination with a pair of reciprocating gripper-cylinders, and a stationary feeding mechanism, of a secondary feed mechanism having one part connected to and reciprocating with the cylinders and adapted to transfer sheets from the stationary feed to the moving cylinders, substantially as and for the purpose set forth.

4. The combination in a printing-press of a pair of reciprocating carriers and impression-cylinders mounted thereon and a stationary sheet-supply; with a feed mechanism having one part attached to the carriers and another part to the frame, and adapted to take sheets from the stationary supply and deliver them to the cylinders while moving, substantially as and for the purpose described.

5. In a printing-press the combination of a pair of reciprocating oscillating impression-cylinders, and a pair of oppositely-reciprocating type-beds, with a reciprocating feed mechanism moving with the cylinders, and adapted to take sheets automatically severed from the web, or otherwise delivered thereto, and deliver them to one of the impression-cylinders as it travels, and means for transferring sheets from one cylinder to the other, substantially as described.

6. The combination of the reciprocating carriers and the cylinder journaled thereon; with an extensible and contractible feed mechanism adapted to feed sheets to the cylinder, said mechanism being so connected to the carriers that it can be detached therefrom and swung up out of the way when making ready the press, all substantially as and for the purpose set forth.

7. In a printing-press the combination of a reciprocating type-bed, or pair of reciprocating type-beds, and a pair of oppositely-reciprocating oscillating impression-cylinders so arranged that sheets printed on one side upon one of the cylinders may be directly transferred to the other cylinder and printed on the other side, with a feeding mechanism reciprocating with the cylinders and adapted to take sheets automatically severed from the web, or otherwise delivered thereto, and deliver them to one of the impression-cylinders as it travels.

8. In a printing-press the combination of a reciprocating type-bed with a pair of oppositely-reciprocating oscillating gripper impression-cylinders, so arranged and actuated by suitable mechanism that sheets printed on one side upon one cylinder may be directly transferred to the other cylinder and printed on the other side.

9. The combination of a pair of reciprocating, oscillating cylinders, and a stationary mechanism for feeding a web and severing it

into sheets; with an extensible and contractible feed mechanism substantially as described, adapted to take the sheets from the cutting mechanism and deliver them to the nearest cylinder while it travels, and means for transferring sheets from one cylinder to the other for the purpose and substantially as described.

10. The combination of a pair of reciprocating carriers, a pair of oscillating cylinders journaled thereon, and means for transferring sheets from one cylinder to the other; with guide-fingers and tape-guide rollers mounted on the carriers and moving with the cylinder; a stationary sheet-feeding mechanism mounted on the main frame, tape-guide rollers beside said sheet-feeding mechanism; and a system of endless tapes for carrying sheets from the stationary tape-guide rollers to the guide-rollers on the carriers, and mechanism for looping the tapes in proper manner to compensate for the movement of the carriers, all substantially as and for the purpose set forth.

11. The combination of a reciprocating oscillating impression-cylinder; a set of tape rollers and guides connected to and moving with the cylinder, adapted to deliver sheets thereto, and a set of tape-rollers mounted on the frame, with endless tapes extending from the stationary rollers to the movable rollers for carrying sheets from the former to the latter, and guides, and means for looping said tapes so as to compensate for the movement of the movable rollers, for the purpose and substantially as described.

12. In a feed mechanism for printing-presses, the combination of a reciprocating impression-cylinder, guide-fingers and tape-rollers connected to and moving with the cylinder, tape-rollers mounted on a stationary support adapted to receive sheets of paper; endless tapes for carrying sheets from the stationary to the movable tape-rollers; and rollers movable with the cylinder-carriers and actuated by the latter, and forming loops in the endless tapes compensating for the travel of the cylinder, all substantially as and for the purpose described.

13. The combination in a printing-press of a pair of reciprocating carriers and impression-cylinders mounted thereon and a stationary sheet-supply; with a feed mechanism adapted to take sheets from the stationary supply and deliver them to the cylinders while moving; said feed mechanism being so connected to the carriers that it can be detached therefrom and swung out of the way when making ready, all substantially as and for the purpose set forth.

14. The combination of a reciprocating oscillating cylinder, a reel traveling with the cylinder, having grippers adapted to take the sheet from said cylinder, and the systems of endless tapes moving with the reel and cylinder for delivering the printed sheets, substantially as and for the purpose described.

15. In a printing-press the combination of type-beds, a pair of cylinders, screws and rack-bars for raising and lowering said cylinders, a pinion engaging the rack-bar, a sliding rack engaging the pinion, and means for shifting said rack, for the purpose and substantially as described.

16. The combination of an impression-cylinder, a screw for throwing said cylinder on or off impression, and a sliding bar having a rack engaging a pinion on the screw; with a movable rack-bar, a pinion meshing with said rack-bar and with a rack on the lower edge of said sliding bar, and mechanism for shifting the lower rack-bar for the purpose and substantially as described.

17. The combination of a reciprocating cylinder-carrier and a cylinder mounted thereon, a screw for raising and lowering the cylinder having a pinion; and a sliding rack-bar engaging said pinion; with an adjustable rack supported on the frame of the machine, a pinion meshing with said adjustable rack and with teeth on said rack-bar, means for lineally moving said pinion, and means for shifting the adjustable rack so as to compel the pinion to shift the rack-bar, for the purpose and substantially as described.

18. In a printing-press the combination of type-beds; a pair of reciprocating carriers; a pair of cylinders mounted on said carriers; a fixed and a sliding rack-bar mounted on the carrier; and means operated by the movable rack, for alternately throwing said cylinder on and off impression; with a fixed and movable rack on the frame; a pair of pinions interposed between said pairs of racks; and means for shifting the lower movable rack-bar so as to cause the pinion meshing therewith and with the upper movable rack-bar, to shift the latter, for the purpose and substantially as described.

19. In a printing-press the combination of a pair of reciprocating carriers, a pair of oscillating cylinders mounted thereon; screws for raising and lowering said cylinders, provided with pinions; a sliding rack-bar meshing with said pinions and having a rack on its lower edge; a fixed rack also mounted on the carrier beside the movable rack; a fixed and a movable rack lying below the carrier-racks; a pinion meshing with both said fixed racks; a loose pinion meshing with both said movable racks; and means for shifting the lower movable bar, all substantially as and for the purpose set forth.

20. The combination of a reciprocating carrier, a cylinder mounted thereon, a rotatable screw for raising and lowering said cylinder, a sliding rack-bar for rotating said screw, and a fixed rack-bar beside the sliding rack-bar, all mounted on the carrier; with a stationary rack-bar and an adjustable rack-bar mounted on the frame; a pair of pinions mounted loosely on a stub-shaft and respectively meshing with the fixed and stationary rack-bars, and the sliding and adjustable rack-bars,

and means for shifting said adjustable rack-bar, all substantially as and for the purpose set forth.

21. In a printing-press the combination of type-beds, a pair of oscillating bars, a pair of cylinders mounted on opposite ends of said bars, screws and rack-bars for oscillating said bars, a pinion engaging the rack-bar, a sliding rack engaging the pinion, and means for shifting said rack, for the purpose and substantially as described.

22. In a printing-press the combination of type-beds; a pair of oscillating bars mounted on reciprocating carriers; a pair of cylinders mounted on opposite ends of said bars; with a fixed and a sliding rack-bar mounted on the carrier; and means operated by the movable rack, for oscillating said bars; a fixed and movable rack on the frame; a pair of pinions interposed between said pairs of racks; and means for shifting the lower movable rack-bar so as to cause the pinion meshing therewith and with the upper movable rack-bar, to shift the latter, for the purpose and substantially as described.

23. In a printing-press the combination of a pair of reciprocating carriers, oscillating cylinder-supporting bars mounted thereon; screws for oscillating said bars, provided with pinions; a sliding rack-bar meshing with said pinions and having a rack on its lower edge; a fixed rack also mounted on the carrier beside the movable rack; a fixed and a movable rack lying below the carrier-racks; a pinion meshing with both said fixed racks; a loose pinion meshing with both said movable racks; and means for shifting the lower movable bar, all substantially as and for the purpose set forth.

24. The combination of a pair of type-beds, a pair of reciprocating carriers, an oscillating bar on each carrier, and a pair of cylinders journaled in said oscillating bars; screws for oscillating said bars, pinions on the screws, a rack-bar on each carrier engaging the screw-pinions and having a rack on its lower edge also; and a fixed rack on each carrier beside the movable rack; with a fixed and a movable rack mounted on the frame below the carrier; a sliding plate mounted in guides and provided with a stub-shaft overlying the lower racks; a pair of pinions on said stub-shaft respectively meshing with the upper and lower fixed racks, and the upper and lower movable racks, and means for shifting said lower movable rack, all substantially as and for the purpose set forth.

25. The combination with the reciprocating cylinder, the sheet-guide fingers traveling therewith, and the tape-guides J^2, J^3 also moving with the cylinder; the stationary tape-guides J', J^4 , and the endless carrier-tapes J , running over rollers J', J^2, J^3, J^4 , all for the purpose and substantially as described.

26. The combination with the reciprocating cylinder, the sheet-guide fingers traveling therewith, and the tape-guides J^2, J^3 , also mov-

ing with the cylinder; the stationary tape-guides J', J^4 , and the endless carrier-tapes J , running over rollers J', J^2, J^3, J^4 ; with the tape-guides j^2, j^3 also moving with the cylinder, the stationary guides j', j^4 , and the endless tapes j running over guides j', j^2, j^3, j^4 , all substantially as and for the purpose described.

27. The combination with the cylinder and its reciprocating carriers, the sliding bars detachably connected to the carrier, and the castings supporting said bars pivoted on the main frame, with the tape-guides J^2, J^3, j^2, j^3 mounted on said bars; and the tape-guides J', J^4, j', j^4 , mounted on said castings, the endless tapes J running over guides J', J^2, J^3, J^4 , and the endless tapes j running over guides j', j^2, j^3, j^4 , all substantially as and for the purpose described.

28. The combination of a pair of type-beds, a pair of oscillating gripper impression-cylinders arranged side by side, and respectively operating on the beds; with mechanism for delivering a sheet to the gripper of the first impression-cylinder; mechanism for causing the grippers of the first cylinder to release the sheet when it has made one revolution, mechanism for causing the grippers of the second cylinder to catch the sheet as it is released from the first cylinder, and to release it after it is perfected; and means for throwing the cylinders off and on impression alternately so that they print only on the proper beds and on alternate strokes, all substantially as and for the purpose set forth.

29. The combination of a pair of type-beds, a pair of reciprocating oscillating impression-cylinders arranged side by side, and mechanism for throwing the cylinders alternately on and off impression so that they print on alternate strokes; with mechanism for feeding a sheet of paper to the first cylinder at a point between the cylinders, during the back stroke thereof, mechanism for shifting the grippers on the cylinders when they are at the end of their back stroke so that the first cylinder releases the sheet while the second cylinder catches it, and mechanism for taking the sheet from the second cylinder, all substantially as and for the purpose described.

30. The combination of the reciprocating carriers, the cylinder journaled thereon; the bars detachably fastened to the carriers, the reel mounted on said carriers provided with grippers adapted to strip a sheet from said cylinder; and the system of tape-guides and tapes carried by said bars for delivering the printed sheets from the reel, all substantially as and for the purpose described.

31. The combination of the reciprocating cylinder, the reel mounted above the same and traveling therewith provided with gripper-fingers adapted to strip the sheets from the cylinder; and the upper and lower sets of endless tapes for delivering the sheet from the reel, the lower tapes running around the reel, and means for driving said reel and tapes

independently of the cylinder, substantially as and for the purpose set forth.

32. The combination of the reciprocating carriers, the cylinder journaled therein, the 5 reel moving with the carriers and provided with grippers adapted to take the sheets from the cylinder; with the telescopic shaft, one section thereof being journaled in bearings on the carriers and driving the reel by bevel- 10 gearing, and the other section thereof being journaled in a stationary bearing and driven by gearing, substantially as and for the purpose described.

33. In a printing-press the combination of 15 a pair of beds, a pair of reciprocating carriers, and a pair of cylinders respectively cooperating with the beds, with a sheet-feeding mechanism moving with the carriers adapted to

supply sheets to the cylinders while they are traveling, and a delivery mechanism also 20 moving with the carriers and adapted to remove the sheets while the cylinders travel, said movable feed and delivery mechanisms being respectively detachable from the carriers at will, so that they can be moved back 25 out of the way when making ready the press, all substantially as and for the purpose described.

In testimony that I claim the foregoing as my own I affix my signature in presence of 30 two witnesses.

HENRY F. BECHMAN.

In presence of—

JAMES BOUGHTON,
IRVING L. STONE.