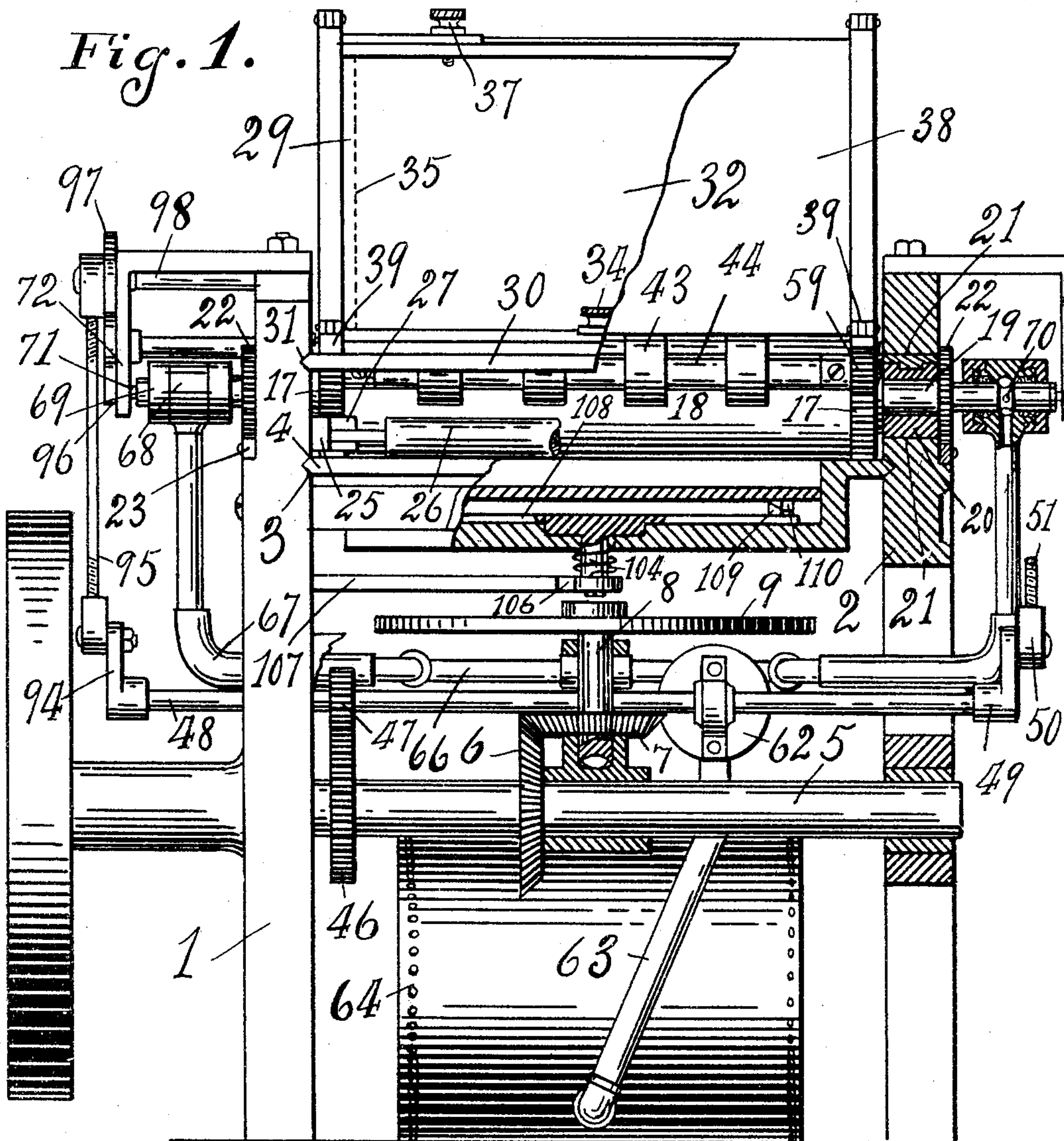
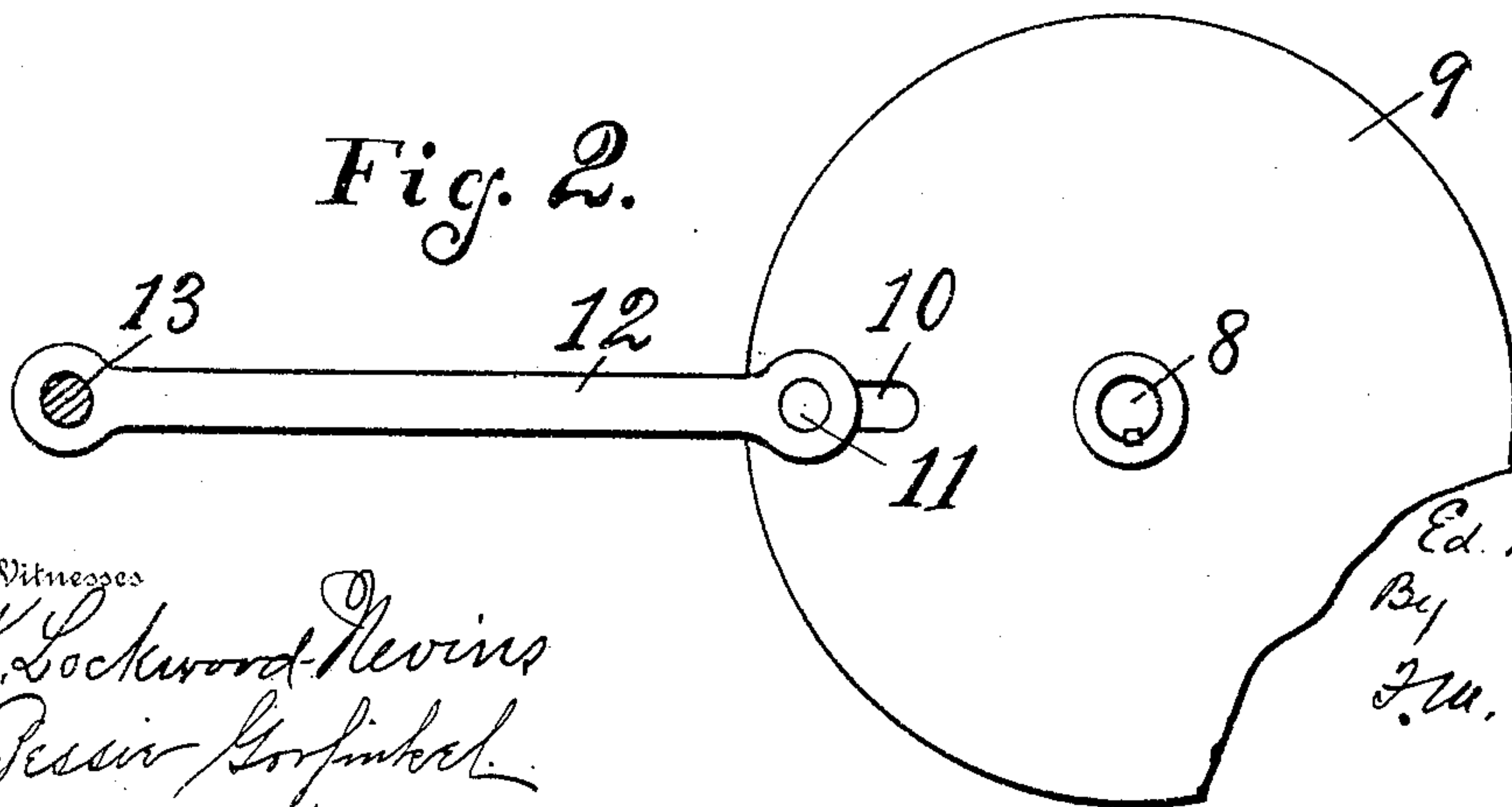


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PRINTING PRESS.  
APPLICATION FILED AUG. 3, 1904.

6 SHEETS—SHEET 1.

*Fig. 1.**Fig. 2.*

Witnesses  
K. Lockwood Nevins  
Jesse G. Gunkel

Inventor  
Ed. N. Mills  
By  
J. W. Wright  
Attorney

No. 785,821.

PATENTED MAR. 28, 1905.

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6 SHEETS—SHEET 2.

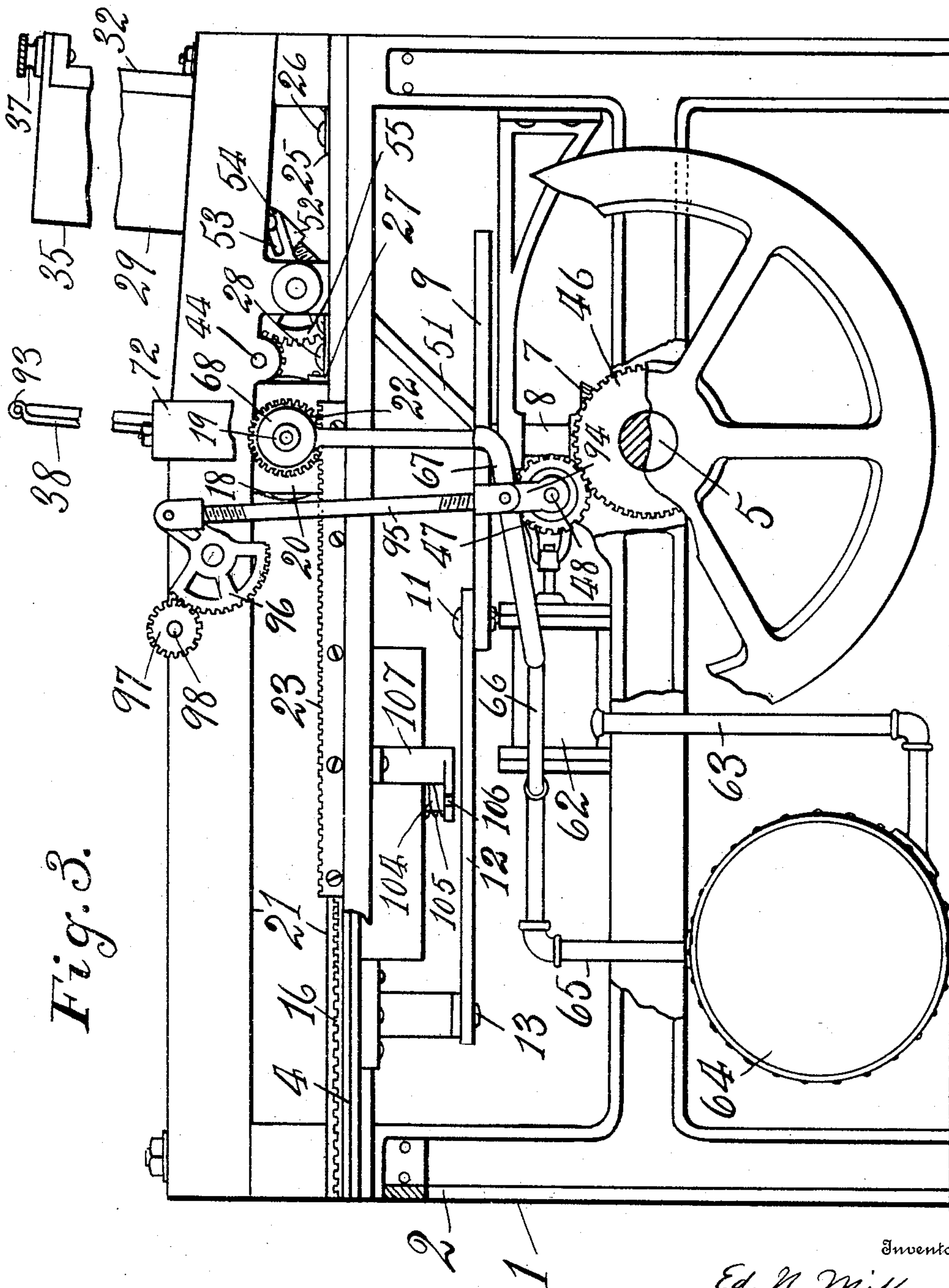


Fig. 3.

Witnesses

K. Lockwood Nevins.  
Jessie Gorfinkel

Inventor

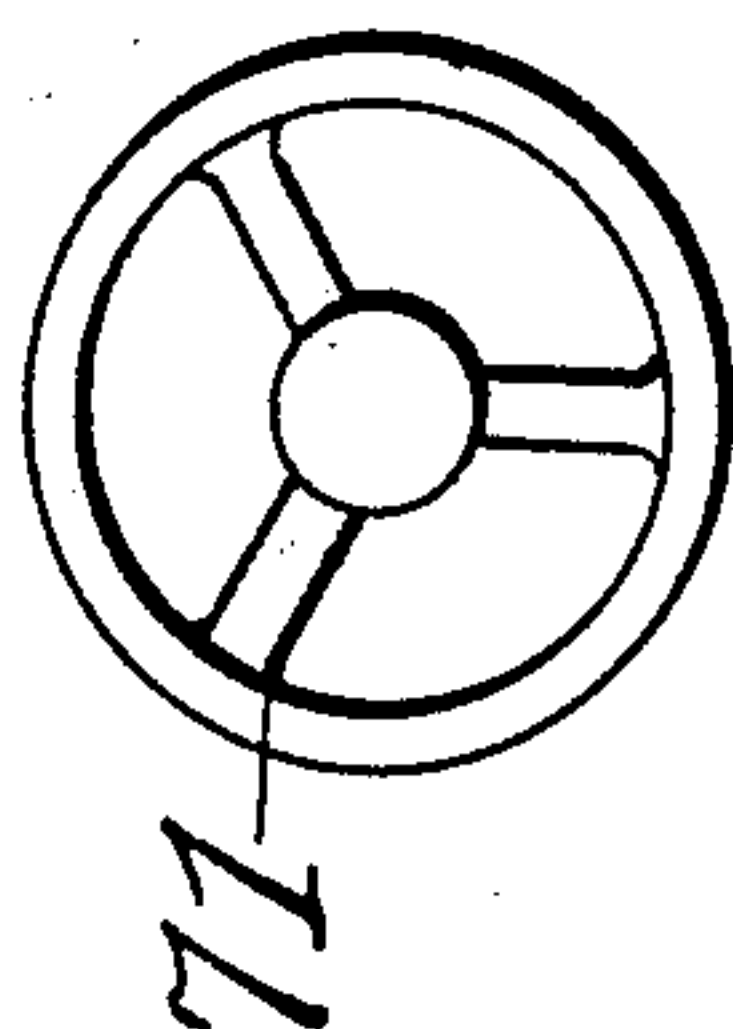
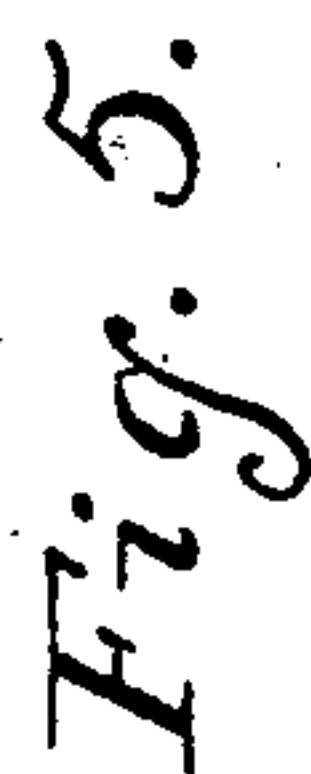
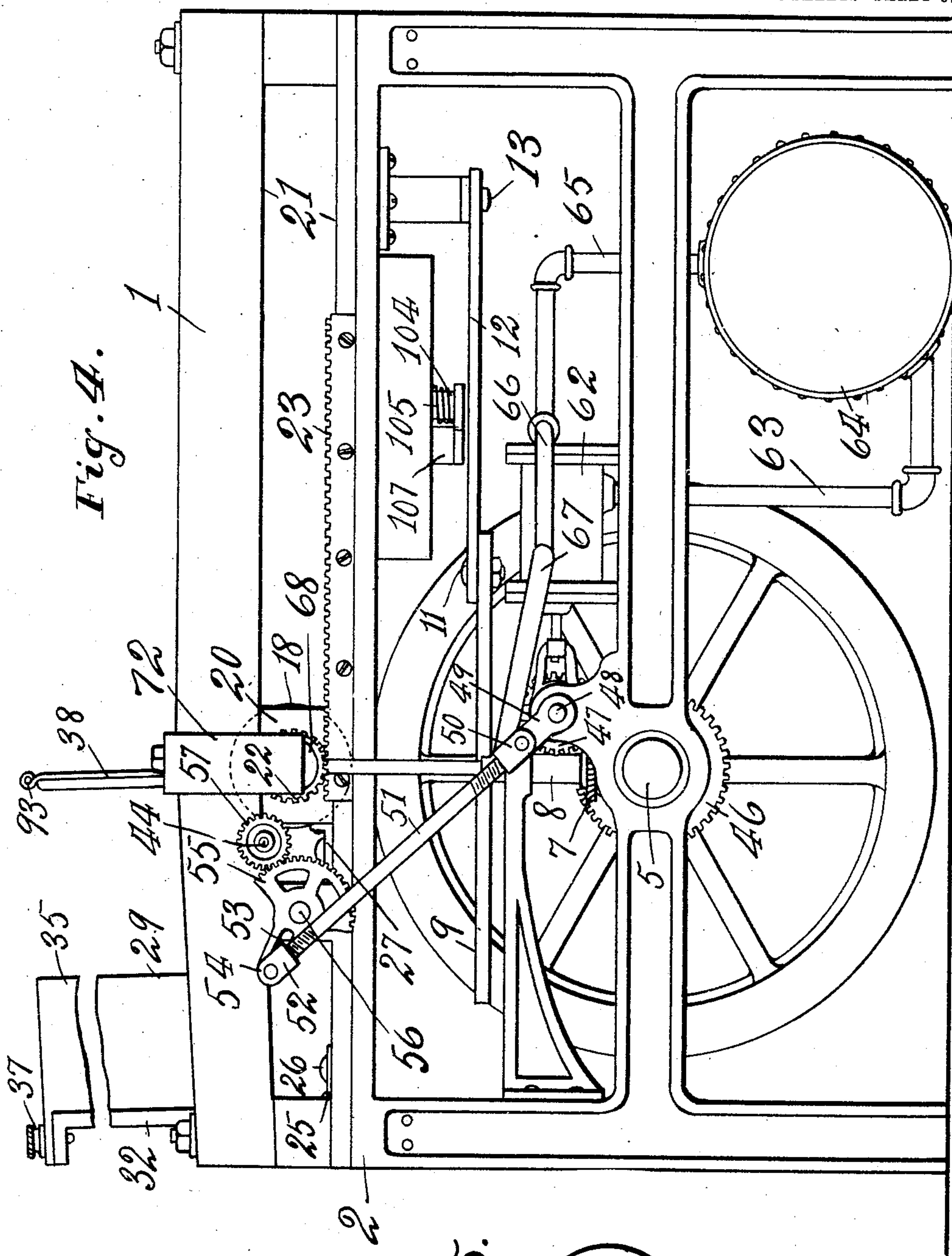
Ed. N. Mills

By  
F. M. Wright,  
Attorney



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PRINTING PRESS.  
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6 SHEETS—SHEET 3.



Witnesses  
K. Lockwood Nevins  
Jessie G. Finkbeil.

Inventor  
Ed. N. Mills  
By  
J. M. Wright,  
Attorney

E. N. MILLS.  
PRINTING PRESS.  
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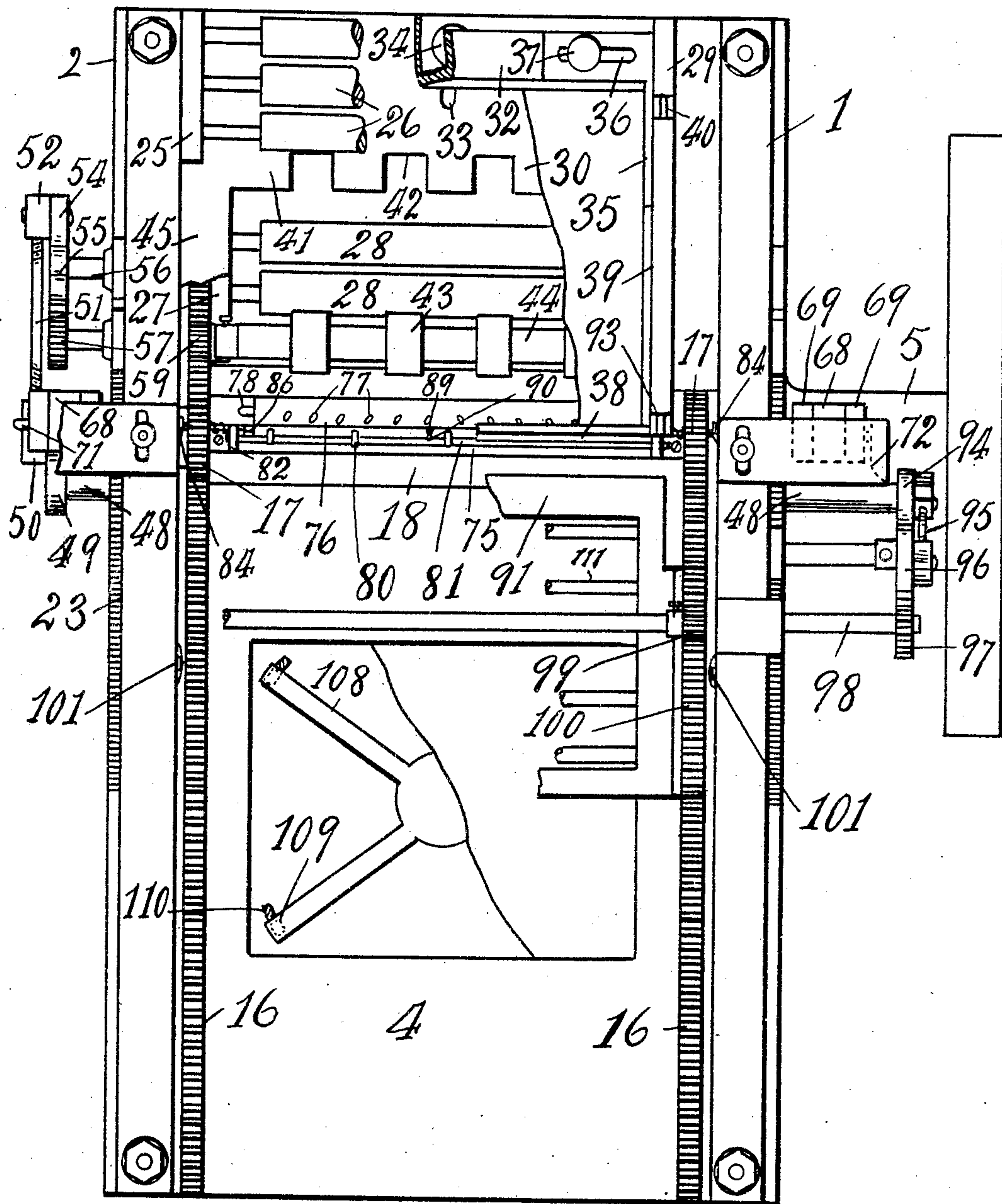


Fig. 6.

Witnesses  
K. Lockwood-Nevins  
Cesar G. Finkler

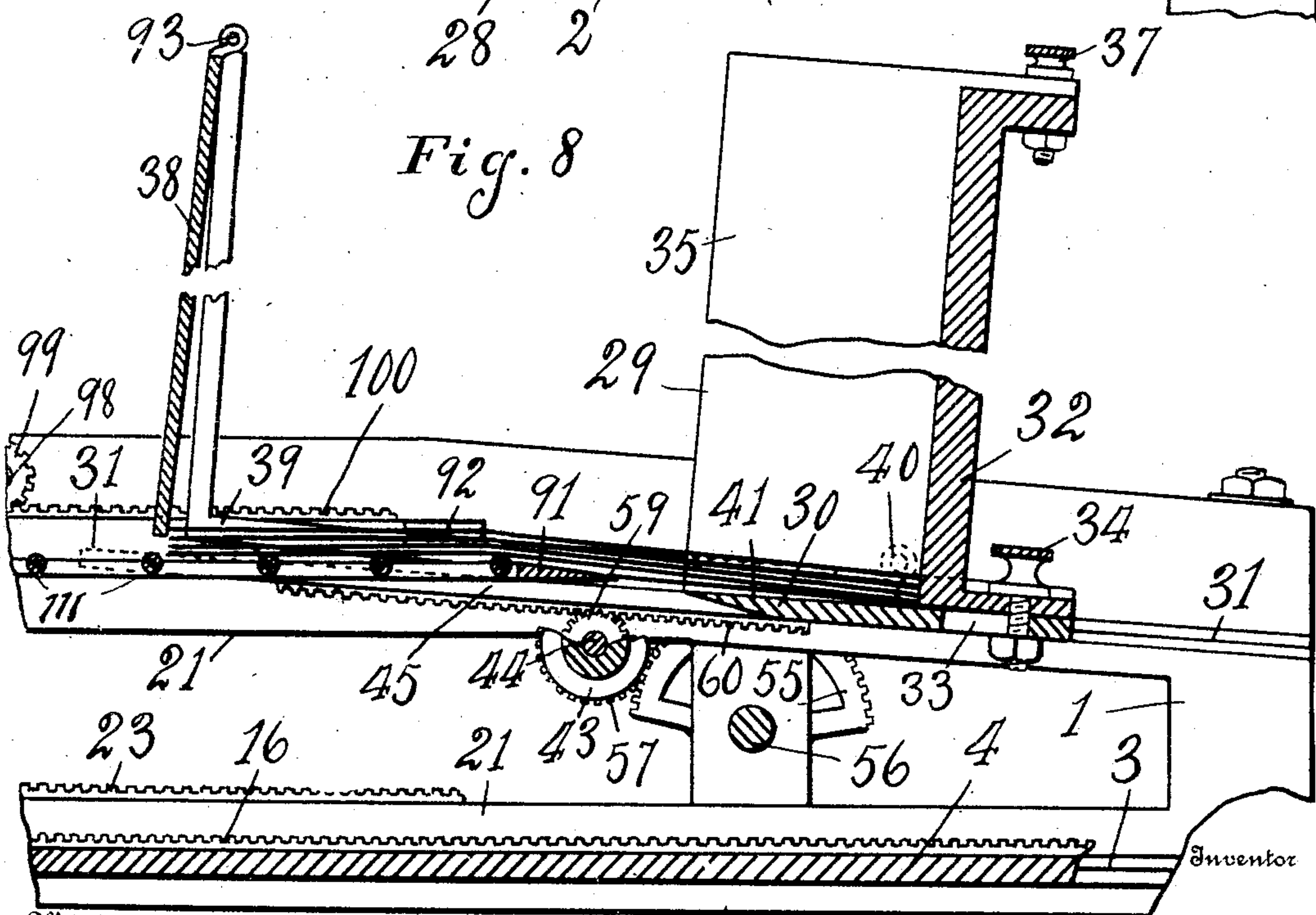
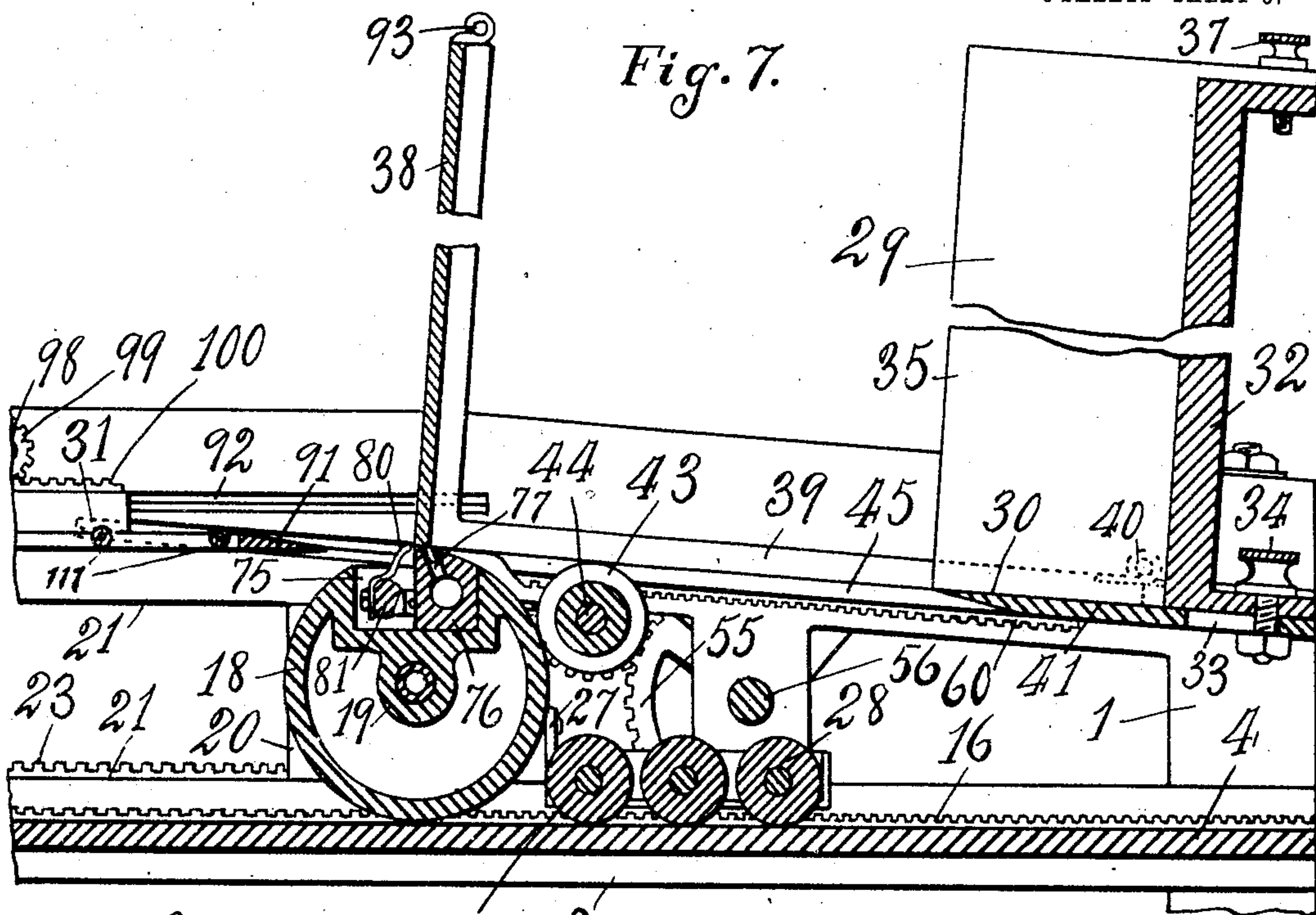
Inventor  
Ed. N. Mills  
By J. W. Wright  
Attorney



E. N. MILLS.  
PRINTING PRESS.

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6 SHEETS—SHEET 5.



Witnesses

H. Lockwood Nevins  
Per G. G. G. G.

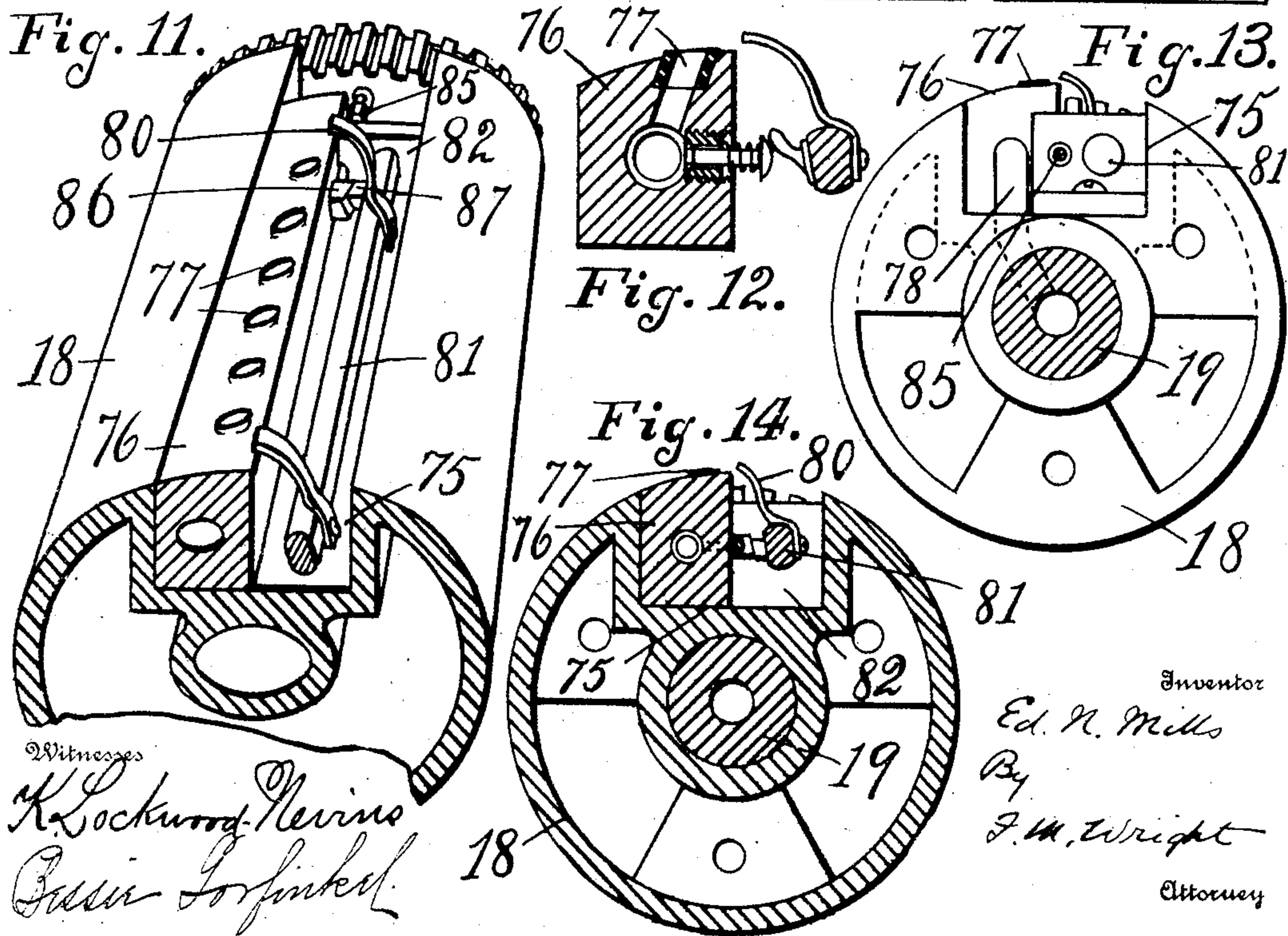
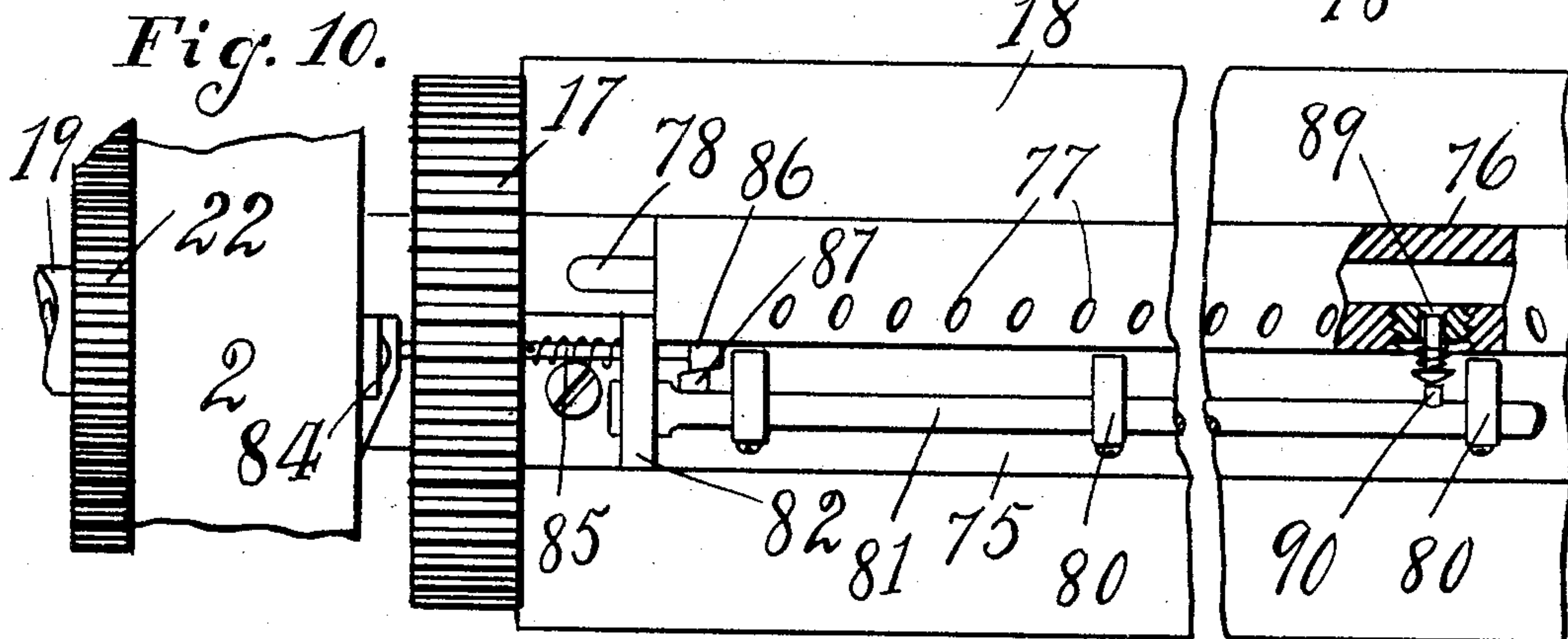
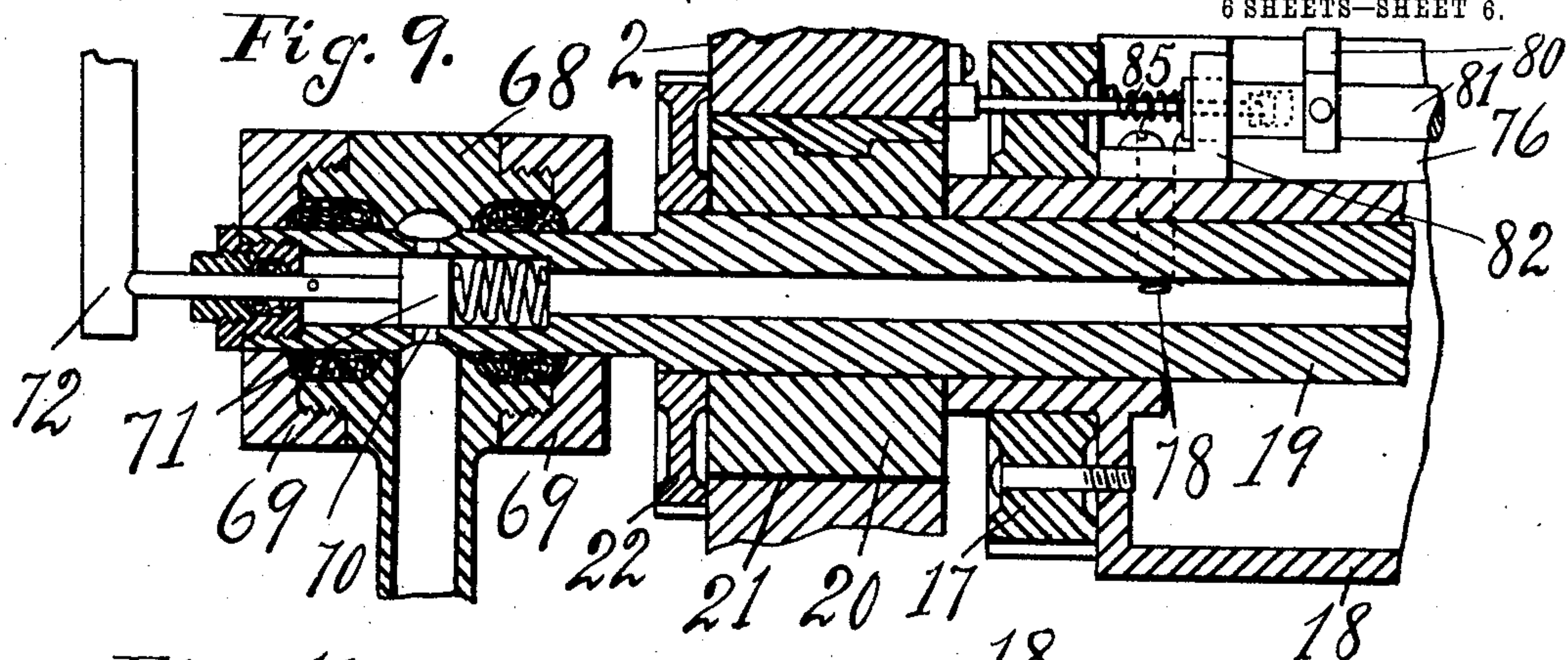
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Ed. N. Mills  
By F. W. Wright  
Attorney



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PRINTING PRESS.  
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6 SHEETS—SHEET 6.





# UNITED STATES PATENT OFFICE.

EDWARD N. MILLS, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR OF ONE-HALF TO N. H. SMITH, OF SAN FRANCISCO, CALIFORNIA.

## PRINTING-PRESS.

SPECIFICATION forming part of Letters Patent No. 785,821, dated March 28, 1905.

Application filed August 3, 1904. Serial No. 219,283.

*To all whom it may concern:*

Be it known that I, EDWARD N. MILLS, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Printing-Presses, of which the following is a specification.

My invention relates to improvements in printing-presses, the object of my invention being to provide means for taking the paper from the feed-box directly onto the impression-cylinder without any intermediate mechanism; also, to provide means for relieving the lowest sheet of a pile from the way of the superincumbent sheets, thus preventing the accidental tearing of thin paper which occasionally happens with feeding devices at present in use; also, to provide means for taking the paper onto the cylinder through the medium of an exhaust, and in doing so to economize the amount of suction necessary and the power required to produce such suction.

My invention therefore resides in the novel construction, combination, and arrangement of parts for the above ends hereinafter fully specified, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a rear view, partly broken away, of the press. Fig. 2 is a broken detail view of the disk for reciprocating the bed. Fig. 3 is a side elevation, partly broken away, of the press. Fig. 4 is a side elevation of the other side of the press. Fig. 5 is a detail of the controller-valve for the suction. Fig. 6 is a broken plan view of the press. Fig. 7 is an enlarged longitudinal section, partly broken away, of the feed-box and the parts immediately adjacent thereto. Fig. 8 is a similar view of the parts in a different position. Fig. 9 is an enlarged longitudinal section of the end of the impression-cylinder. Fig. 10 is an enlarged broken plan view thereof. Fig. 11 is an enlarged broken perspective view of said impression-cylinder. Fig. 12 is a cross-section of the vacuum-conduit through one of the suction-holes. Fig. 13 is a section through the shaft of the impression-cylinder at the end

thereof, the gear being removed. Fig. 14 is a cross-section of the impression-cylinder. 50

1 represents a suitable frame having side pieces 2 and grooves 3 in said side pieces in which the bed 4 reciprocates. 5 represents the driving-shaft, on which is secured a miter-gear 6, meshing with a miter-gear 7 on a vertical shaft 8, having secured on its upper end a disk 9, having therein a slot 10. In said slot is a pin 11, attached to a horizontal pitman 12, carrying at its other end a pin 13, attached to the under side of the bed 4. By reason of this construction the bed is reciprocated by the revolution of the shaft 5. Said bed carries on each side a rack 16, with which mesh gear-wheels 17, secured upon the ends of the cylinder 18. Said cylinder has a shaft 19, the ends of which are mounted in boxes 20, which slide in guides 21, formed upon the frame 1. On the ends of said shaft 19, outside said boxes, are mounted smaller gear-wheels 22, which mesh with stationary racks 23, mounted upon the frame. The effect of this construction is that when the bed is moved longitudinally in one direction the cylinder rotates and also moves bodily in the opposite direction. 60

Upon the rear end of the frame are secured boxes 25 for the stationary inking-rollers 26, of which there are here shown three in number, which inking-rollers deposit ink upon the bed as it passes beneath them, and secured to the boxes 20 of the cylinder are extensions 27, in which are pivoted the distributing-rollers 28, which distribute over the bed the ink brought by the bed from the inking-rollers. This construction, however, forms no part of my present invention. 75 80 85

The paper-feed box 29 comprises a bottom 30, which slides in grooves 31 in the main frame, a back piece 32, adjustable forward and backward on said bottom by means of a slot 33 and thumb-screw 34, side walls 35, adjustable on said back piece by means of slots 36 and thumb-screws 37, and a front wall 38, having horizontal arms 39, hinged, as shown at 40, to the bottom 30. Said bottom is cut away in the middle and at its front portion, and the rear portion 41 of the bottom is still 90 95



further cut away at its front edge in a number of recesses 42, corresponding in number and position with rollers 43 on a shaft 44. Upon the narrow strips 45, left by cutting

5 out the middle of the bottom, rest the arms 39.

The forward motion of the paper-feed box is accompanied by a slightly upward motion, which is given to it by making the groove 31 incline slightly upward—for instance, three-  
10 quarters of an inch to a foot, which inclination, however, may be varied more or less as may be found necessary. The box is moved backward and forward by the following construction: Upon the main shaft is mounted a  
15 gear-wheel 46, which meshes with a pinion 47 upon a counter-shaft 48, extending transversely or parallel with the main shaft, upon one end of which shaft 48 is secured a crank 49, to which is secured a socket 50, receiving  
20 a pitman 51, the other end of which is secured in a socket 52. The ends of the pitman 51 are threaded right and left, so that by turning said pitman in said sockets its working length can be increased or diminished, as required.  
25 The outer socket 52 is secured by a slotted connection 53 to an arm 54 of a segmental gear 55, mounted upon a shaft 56, having its bearing in the frame 1. This segmental gear meshes with a pinion 57 on the shaft 44. This  
30 pinion 57 drives the shaft 44, which carries two spur-wheels 59, which engage two racks 60, secured upon the under sides of the strips 45, forming part of the bottom of the feed-box, so that by the revolution of said pinion  
35 said racks and the feed-box are caused to move longitudinally.

The sheets of paper placed in the box rest at their rear upon that part 41 of the bottom which is not cut out and at their front portion  
40 upon the aforesaid rollers 43, covered with rubber, so that the extreme front edge of the lowest sheet of paper is free. This edge is caused to be separated from the edges of the remaining sheets by the following  
45 mechanism: 62 is a vacuum-pump driven from the shaft 48. From said pump leads a pipe 63 to a vacuum-tank 64, from which leads a pipe 65, having branches 66, which are connected by flexible pipes 67 with boxes 68, se-  
50 cured upon the ends of the hollow cylinder-shaft 19, each box 68 having at each end a stuffing-box 69. The shaft 19 is perforated, as shown at 70, where it is surrounded by the box 68, and air is at the proper time sucked  
55 out of the cylinder-shaft through a spring-actuated valve 71 at each end of the cylinder operated by means of an adjustable wedge 72 in the movement of the cylinder.

The cylinder has a longitudinal recess 75,  
60 which receives a vacuum-conduit 76, having a number of openings 77 on its upper side to suck the air through, the openings being arranged obliquely, as shown, and this vacuum-conduit is connected at the ends by pipes 78

with the interior of the shaft 19, and is there- 65 fore connected, when the valves 71 are open, with the hose leading to the vacuum-tank. Now when the cylinder has arrived at the proper place underneath the edge of the lowest sheet of paper the wedges 72 impinge upon 70 the ends of the valves 71 and force them inward, opening the valves and creating a suction to the pump. This suction takes place when the front edge of the sheet of paper is immediately over the holes 77, and the suction 75 through said holes therefore draws down the edge of the paper onto the vacuum-conduit. Then when the valves 71 are closed again sufficient exhaust remains in the vacuum-conduit 76 to hold the edge of the paper firmly 80 onto said conduit. The oblique holes 77 in said vacuum-conduit are formed by short rubber tubes which project slightly above the surface of the conduit and on the ends of which the sheet of paper rests. These short tubes 85 absolutely insure a connection between the exhaust and paper without leakage and unaffected by the presence of bits of paper or other foreign particles upon the cylinder. Being of rubber, no mark is left upon the 90 paper. Immediately afterward gripper-fingers 80 descend upon the edge of the paper. These gripper-fingers extend upwardly from a transverse gripper-bar 81, having bearings in boxes 82 in the recess 75, and the fin- 95 gers extend from said bar upward and rearwardly toward the edge of the vacuum-conduit 76. Before said conduit was connected with exhaust by the opening of the valves 71 said fingers were raised by the engagement 100 of wedges 84 with spring-actuated stems 85, having on their ends wedges 86, engaging wedges 87 on the gripper-bar; but as soon as the edge of the sheet has been drawn down by suction onto the vacuum-conduit the 105 wedges 86 are withdrawn from the wedges 87, and the gripper-fingers 80 drop by gravity onto the edge of the sheet. Springs may be used to assist gravity, if desired. The vacuum being now no longer needed in the conduit 76, it is opened to the atmosphere by a valve 89, which is engaged by a finger 90, extending from said gripper-bar, operating as the gripper-fingers descend. The cylinder and feed-box now move forward together, the 115 sheets of paper all moving on the rollers 43; but the weight of all the other sheets of paper presses upon the lowermost sheet, the edge of which has been grasped by the gripper-fingers. To free said lowermost sheet from this 120 weight, there is provided a lifter-separator 91, which slides in grooves 92 in the frame above the guideways 21, which separator moves in the opposite direction to the feed-box and its advancing edge passes beneath the superim- 125 pressed sheets and raises them from off the lowest sheet. It is for this reason that the front of the box is made to swing from the



hinges 93. This separator is actuated in like manner as the feed-box and from the same shaft 48, but from the other end of said shaft, by a crank 94, pitman 95, segment 96, gear 5 97, shaft 98, spur-wheels 99, and racks 100 on the separator. The separator 91 carries rollers 111, upon which the sheets of paper roll as the feed-box moves over the separator. By this means the weight of the upper sheets is 10 entirely removed from the lowest sheet, so that the latter can readily be taken by the cylinder, its edge being held by the gripper-fingers. At the proper place in the movement of the cylinder after the sheet has been printed these fingers are operated to release the 15 sheet by means of wedges 101 engaging the stems 85, and the sheet is delivered from the press.

The mechanism here shown for raising and 20 lowering the platen, which, however, forms no part of my present invention, consists of a short vertical shaft 104 in the bed, controlled by a spring 105 and having at its lower end an arm 106, engaged by a stationary projection 25 107 on the frame, the upper end of the shaft having a plurality of arms 108, carrying at their ends wedges 109, engaging wedges 110 depending from the bed. It is evident that the turning of the shaft 104 raises or lowers 30 the platen.

I claim—

1. In a printing-press, a feed-box, a separating-carriage having an advancing edge to be interposed between the lowest sheet and the 35 superincumbent sheets and rollers behind said edge upon which said superincumbent sheets travel, a suction device for drawing down the lowest sheet of the pile, and means for moving said feed-box and separating-carriage to- 40 ward each other, substantially as described.

2. In a printing-press, a suction-cylinder having suction-holes for the paper, and short rubber tubes in said holes projecting slightly above the surface of the cylinder, in combi- 45 nation with means for producing an exhaust in said cylinder, substantially as described.

3. A printing-press having a reciprocating rotary impression-cylinder with suction-holes in its periphery, a feed-box for holding the 50 sheets of paper, means for moving the feed-box and cylinder in harmony so that the front edge of the paper in the feed-box is brought over the suction-holes, at the beginning of the reciprocation of the cylinder, means for ex-

hausting the cylinder, means for moving the 55 cylinder and feed-box in the same general direction of the machine from the position in which the front edge of the paper is brought over the suction-holes, means for guiding said cylinder and feed-box in their movements 60 whereby they are separated vertically while moving in the same general direction, a separator, and means for moving the separator in the opposite direction to the feed-box and between the bottom of the feed-box and the cyl- 65 inder, substantially as described.

4. In a printing-press, in combination with the frame of the press, a feed-box movable over said frame, rollers revolving on a shaft in stationary bearings in said frame below said 70 feed-box, the bottom of said feed-box being cut away at its front portion and the front edge of the rear portion of the box being cut away to form recesses to pass around said 75 rollers as the box moves forward, in combination with means for taking the lower sheet from the feed-box, and means for raising the superincumbent sheets therefrom, substantially as described.

5. In a printing-press, in combination, a 80 frame, a box moving longitudinally over said frame, the bottom of the box being cut away at its front portion, rollers on a shaft in stationary bearings over which rollers the box moves, the front edge of the rear portion of 85 the bottom being cut away to form recesses, the front of the box being supported upon arms pivoted near the rear side of the box, whereby said front can swing upwardly, means for taking the lowest sheet from the 90 box to the impression-cylinder, and means for raising the remaining sheets, substantially as described.

6. In a printing-press, in combination, a 95 feed-box sliding in suitable guides, and having a rack secured thereto, a spur-gear engaging said rack and means for operating said spur-gear comprising a segment-gear having a slot- 100 ted arm a pitman connected with said arm and means for reciprocating said pitman, substantially as described.

In witness whereof I have hereunto set my hand in the presence of two subscribing witnesses.

EDWARD N. MILLS.

Witnesses:

FRANCIS M. WRIGHT,  
BESSIE GORFINKEL.