

(No Model.)

12 Sheets—Sheet 1.

F. MEISEL.  
ROTARY WEB PRINTING MACHINE.

No. 558,592.

Patented Apr. 21, 1896.

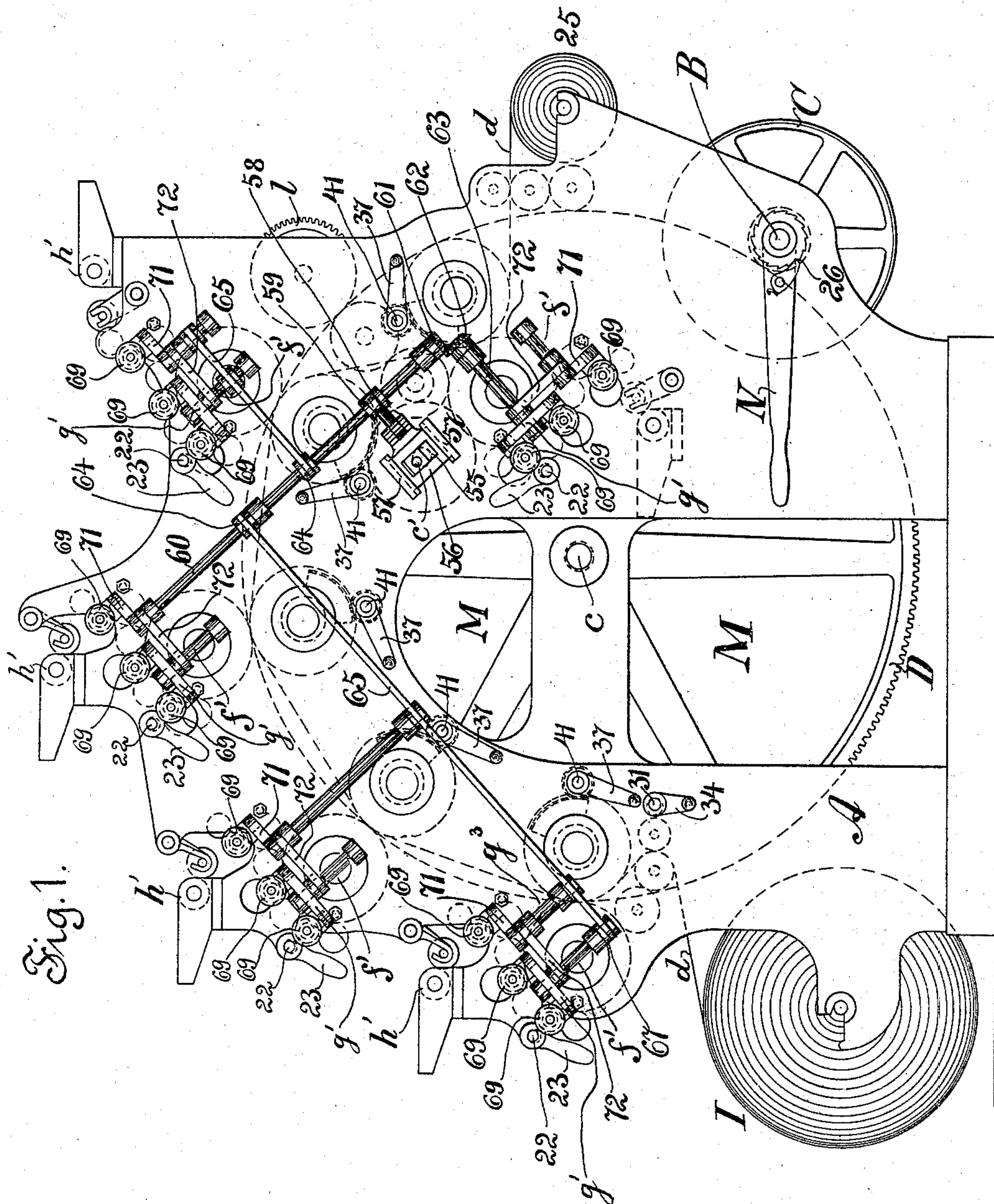


Fig. 1.

Witnesses.  
A. D. G. M. M.  
A. E. Humiston

Inventor.  
Francis Meisel  
by P. E. Tschernacher  
Att'y



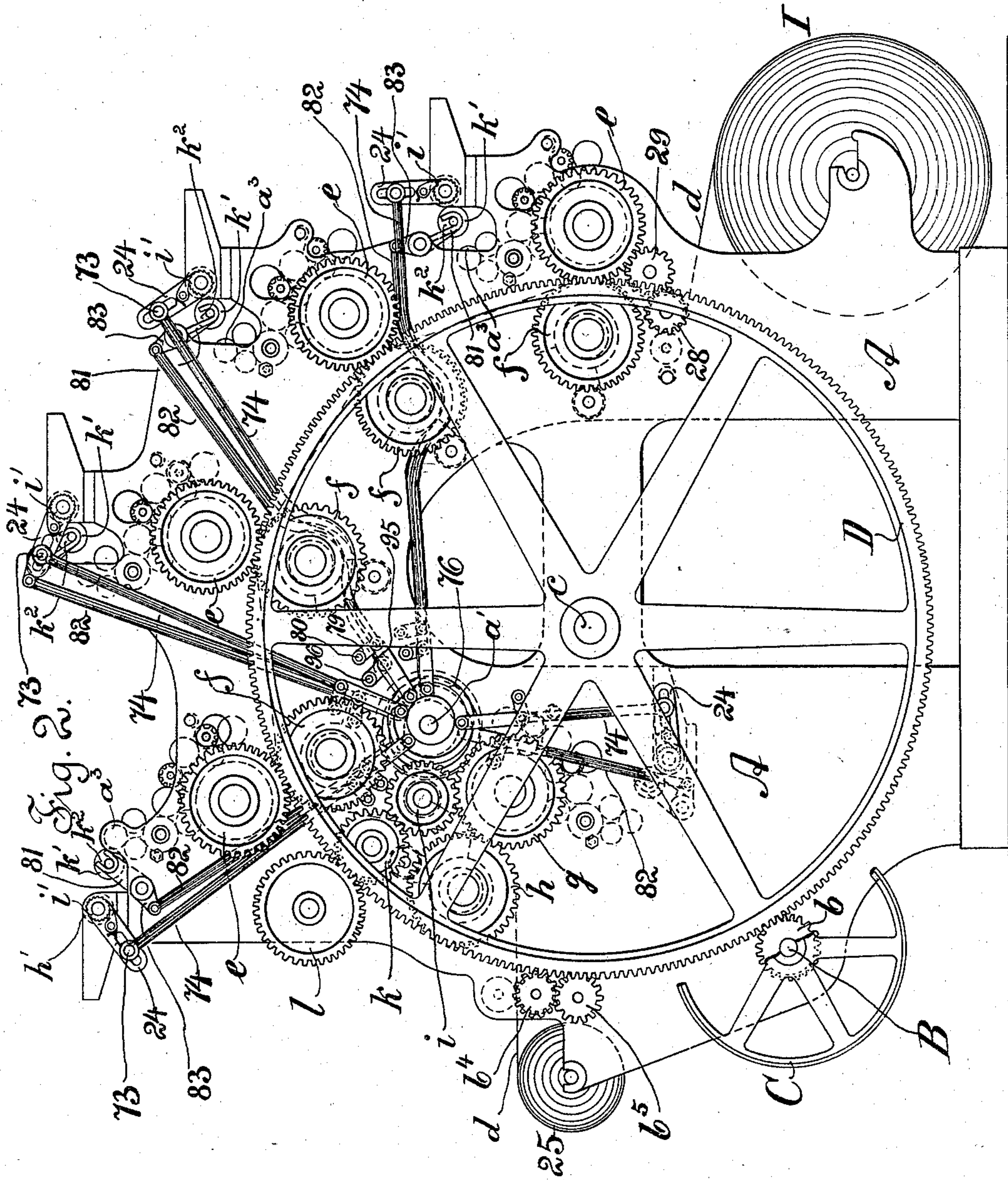
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Witnesses.  
D. Spry.  
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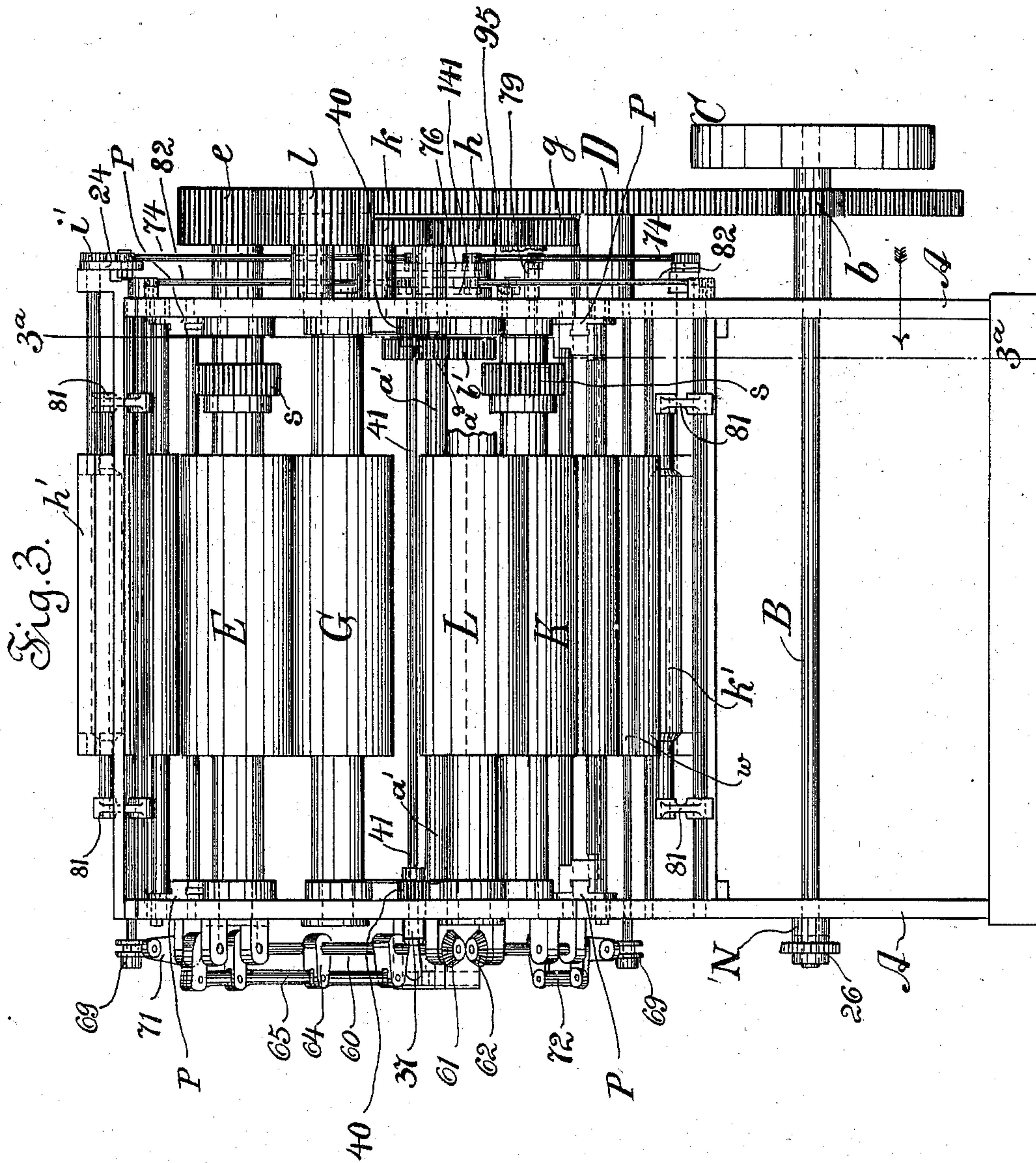
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Witnesses.  
A. E. Groom.  
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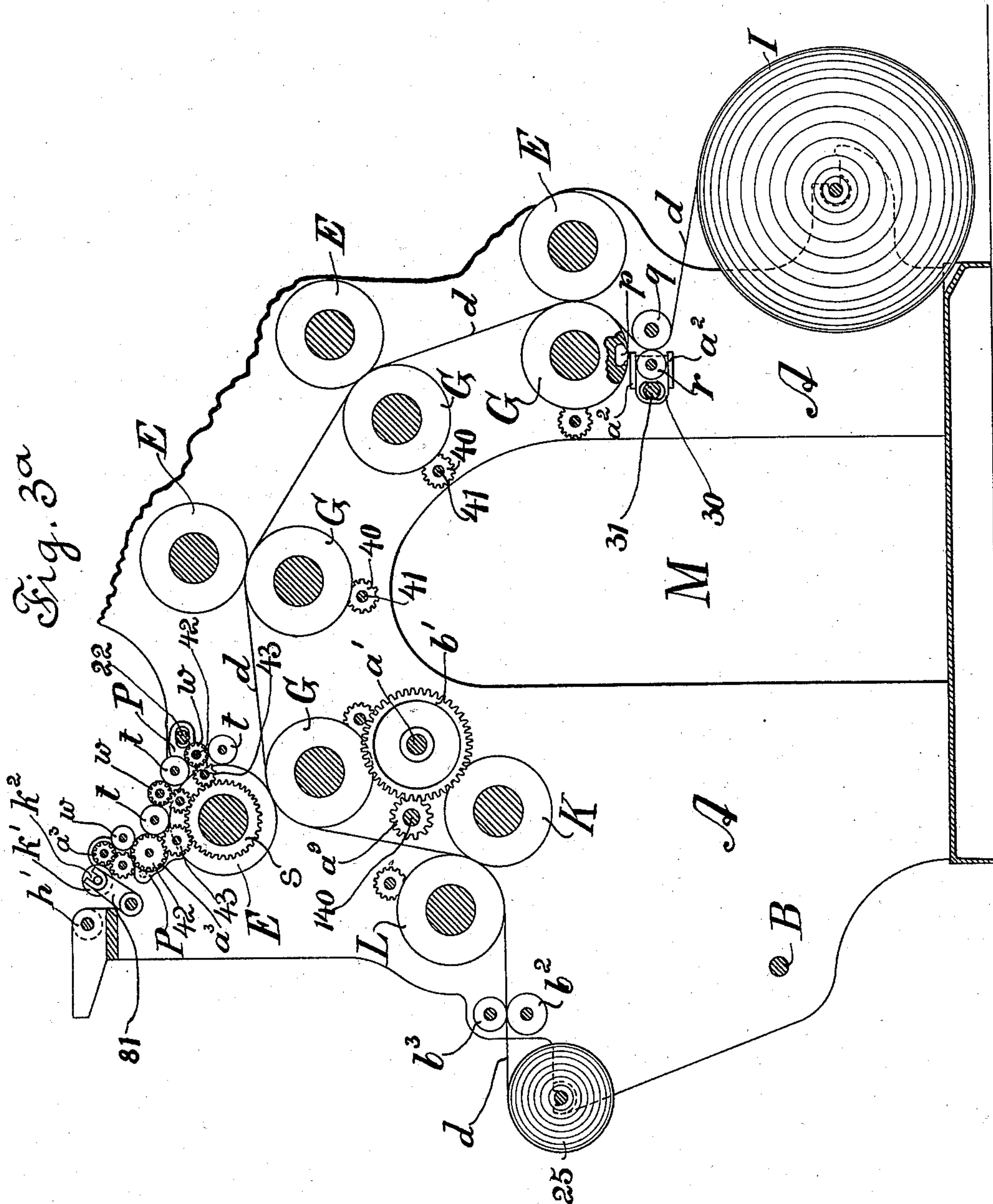
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F. MEISEL.  
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Patented Apr. 21, 1896.



Witnesses.  
A. D. Spruill.  
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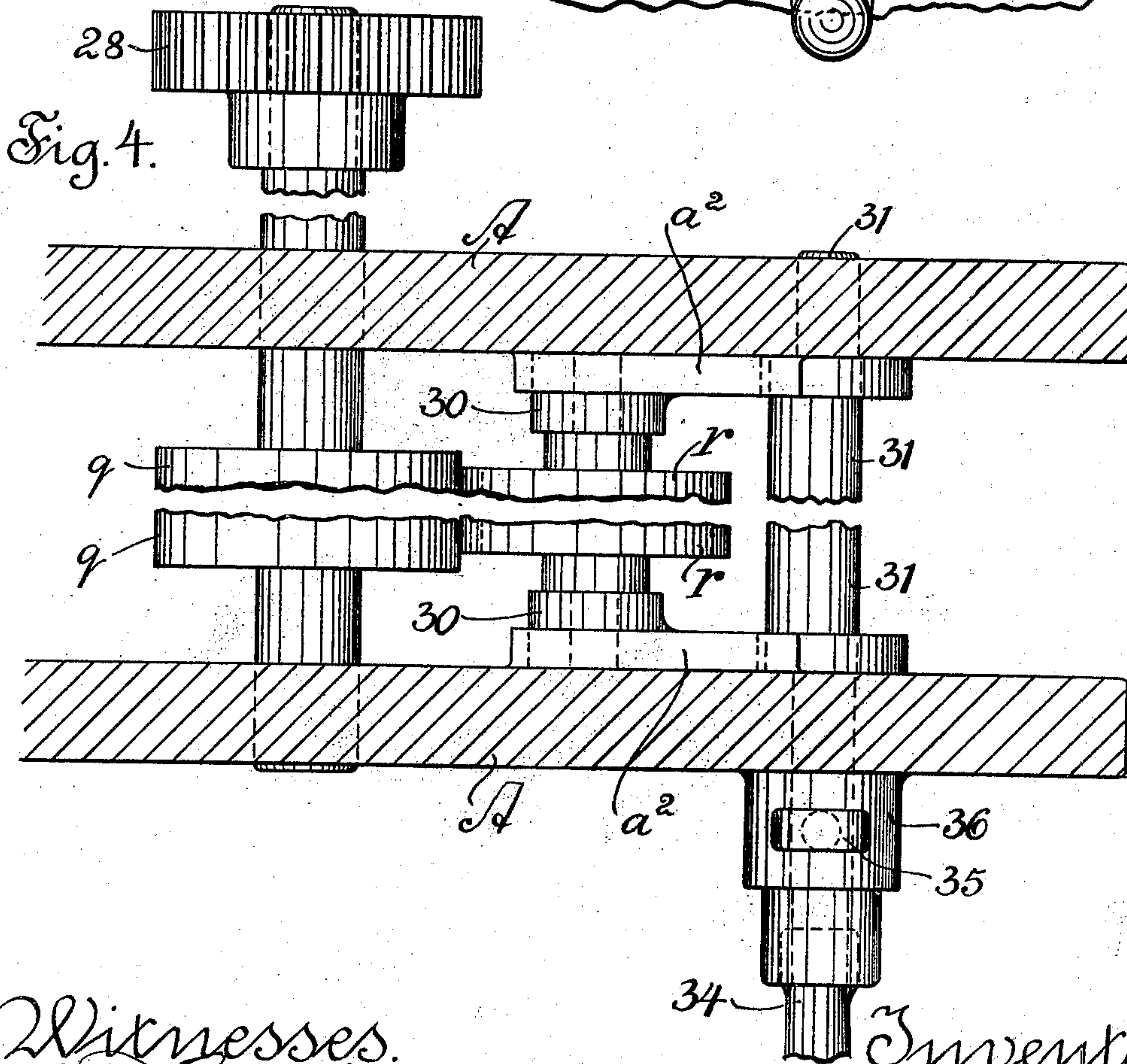
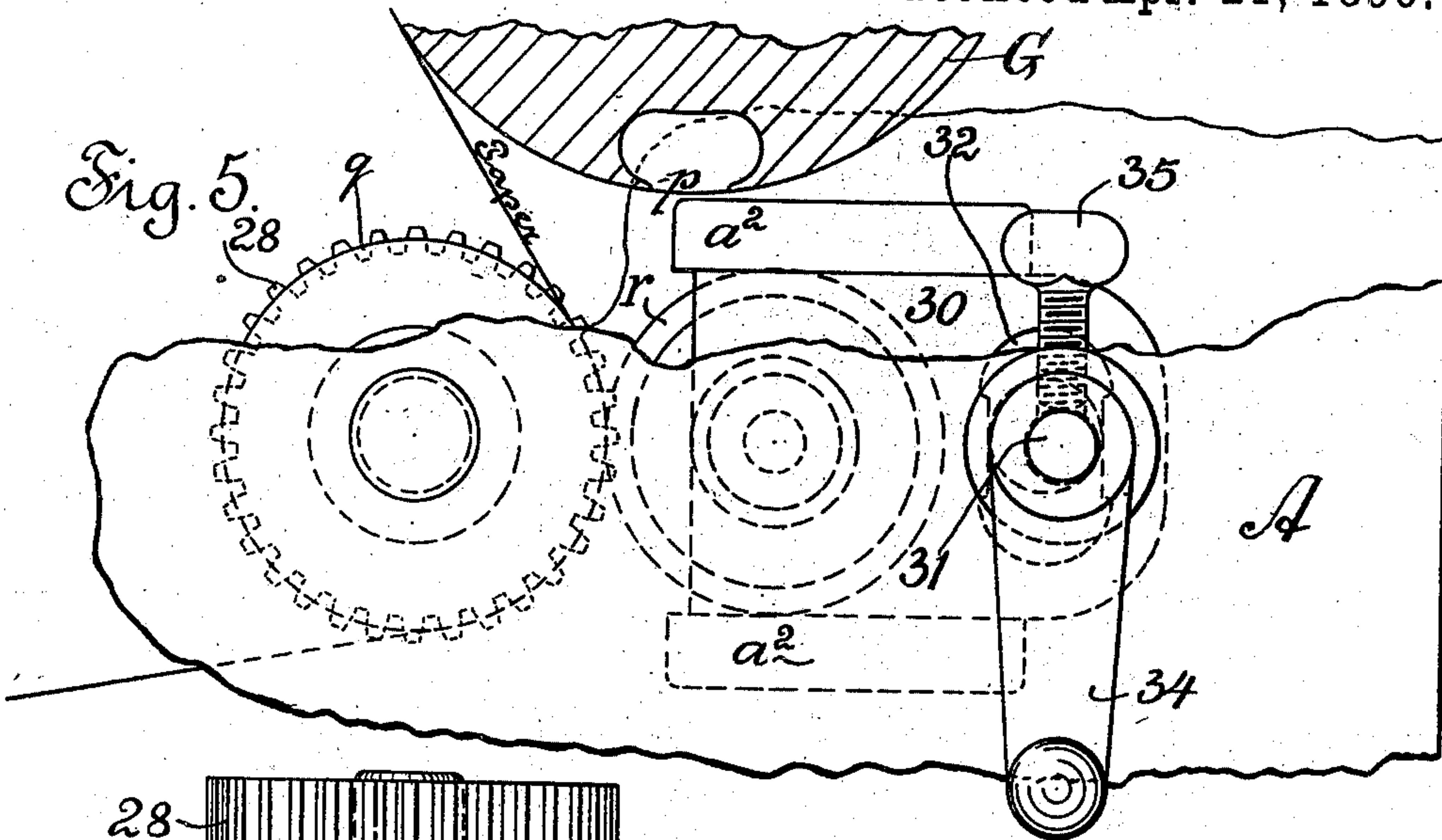
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Witnesses.  
A. D. Spruill  
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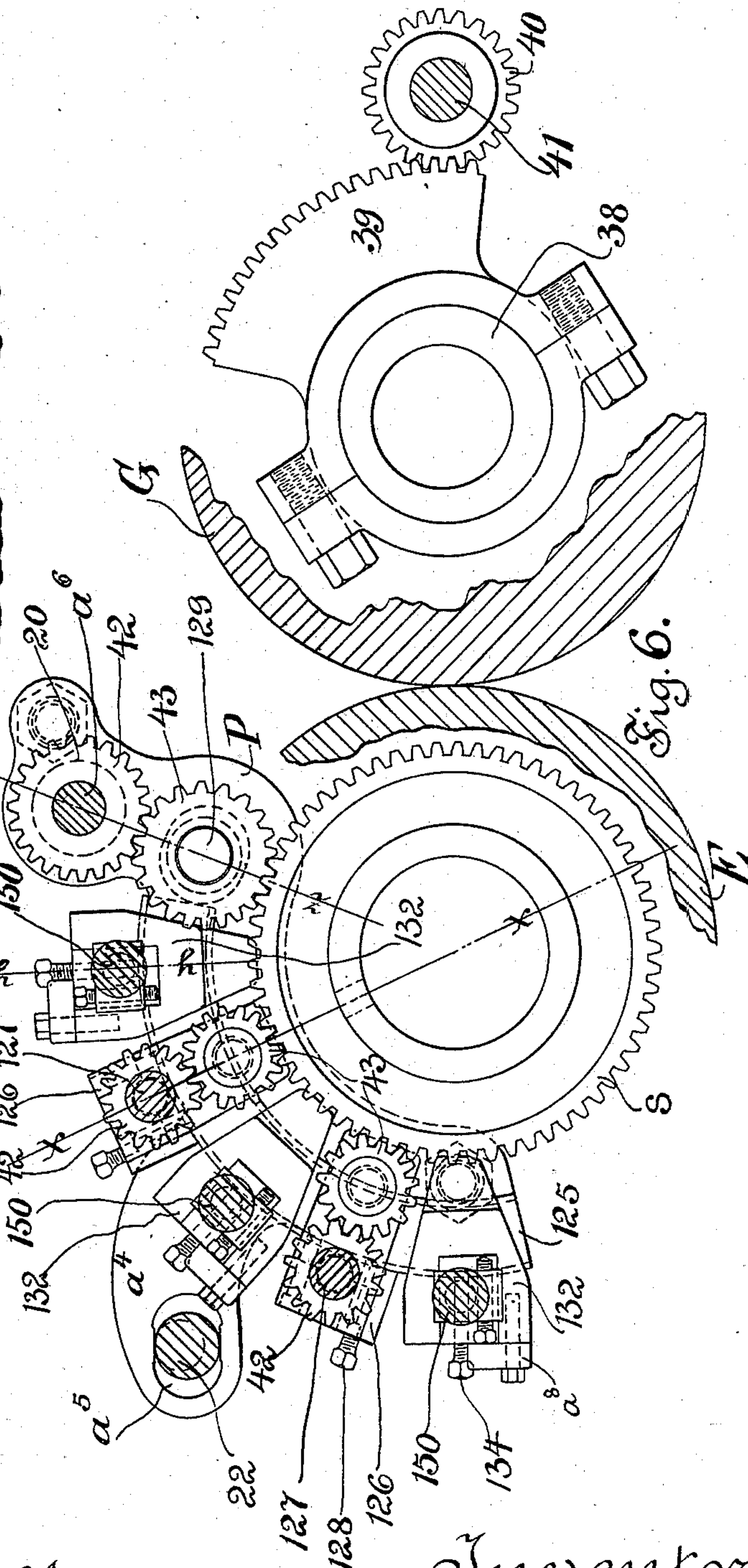
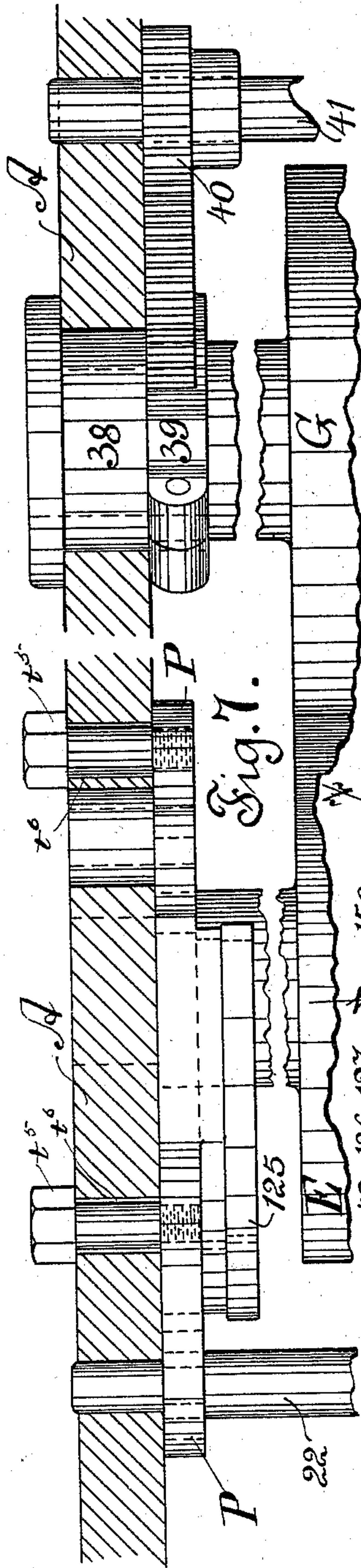
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Patented Apr. 21, 1896.



Witnesses.  
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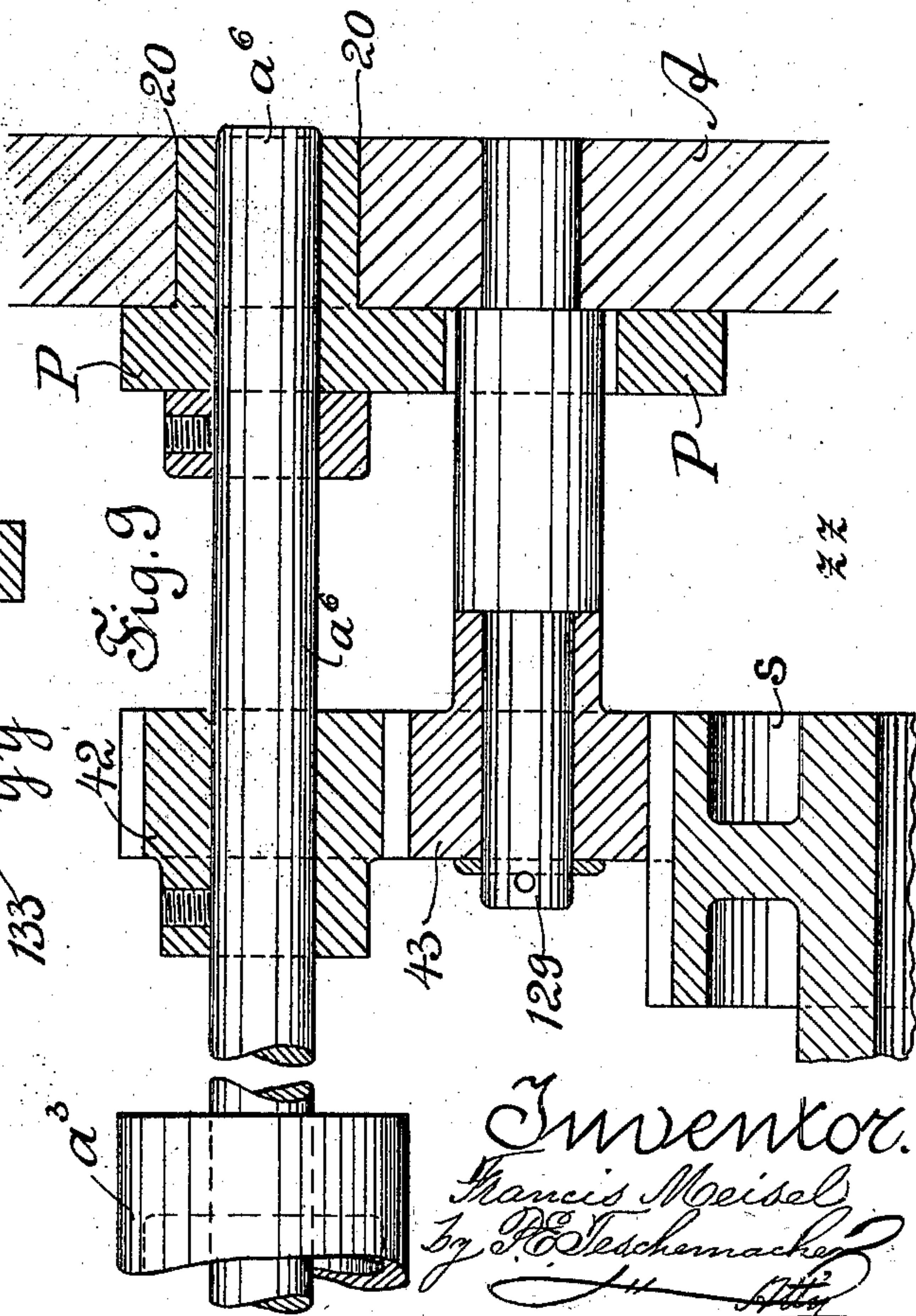
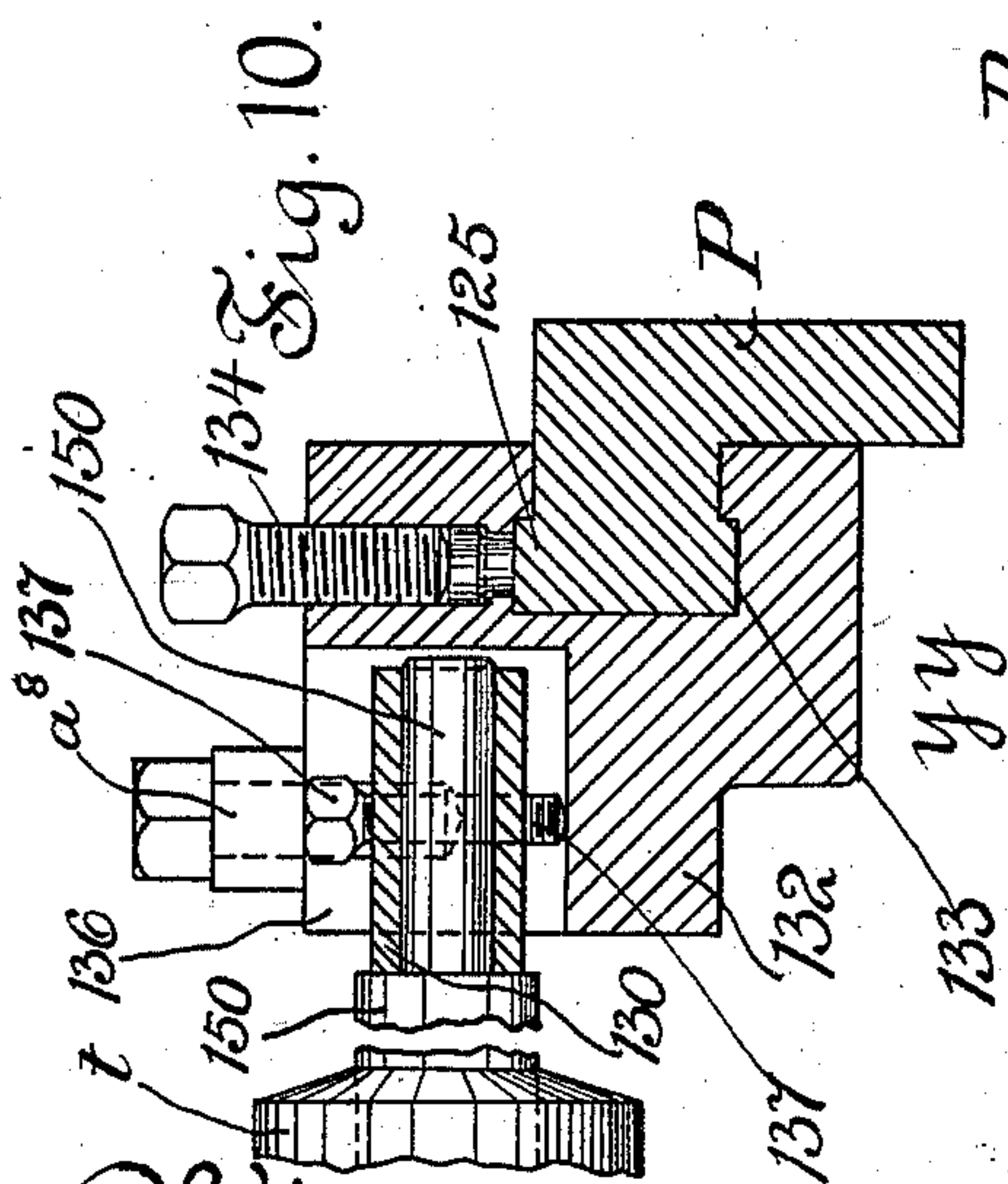
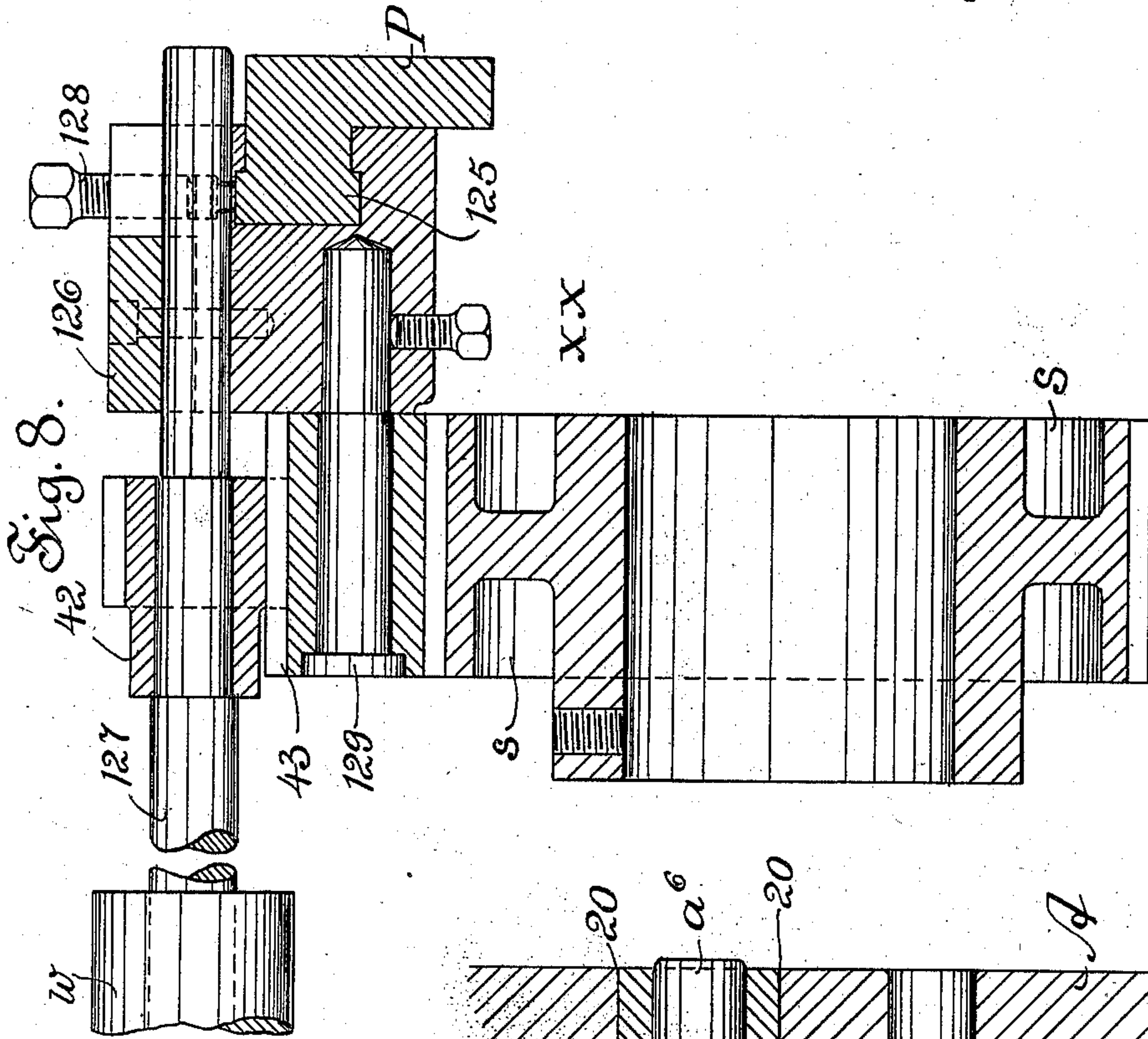
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Witnesses:  
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Fig. 12.

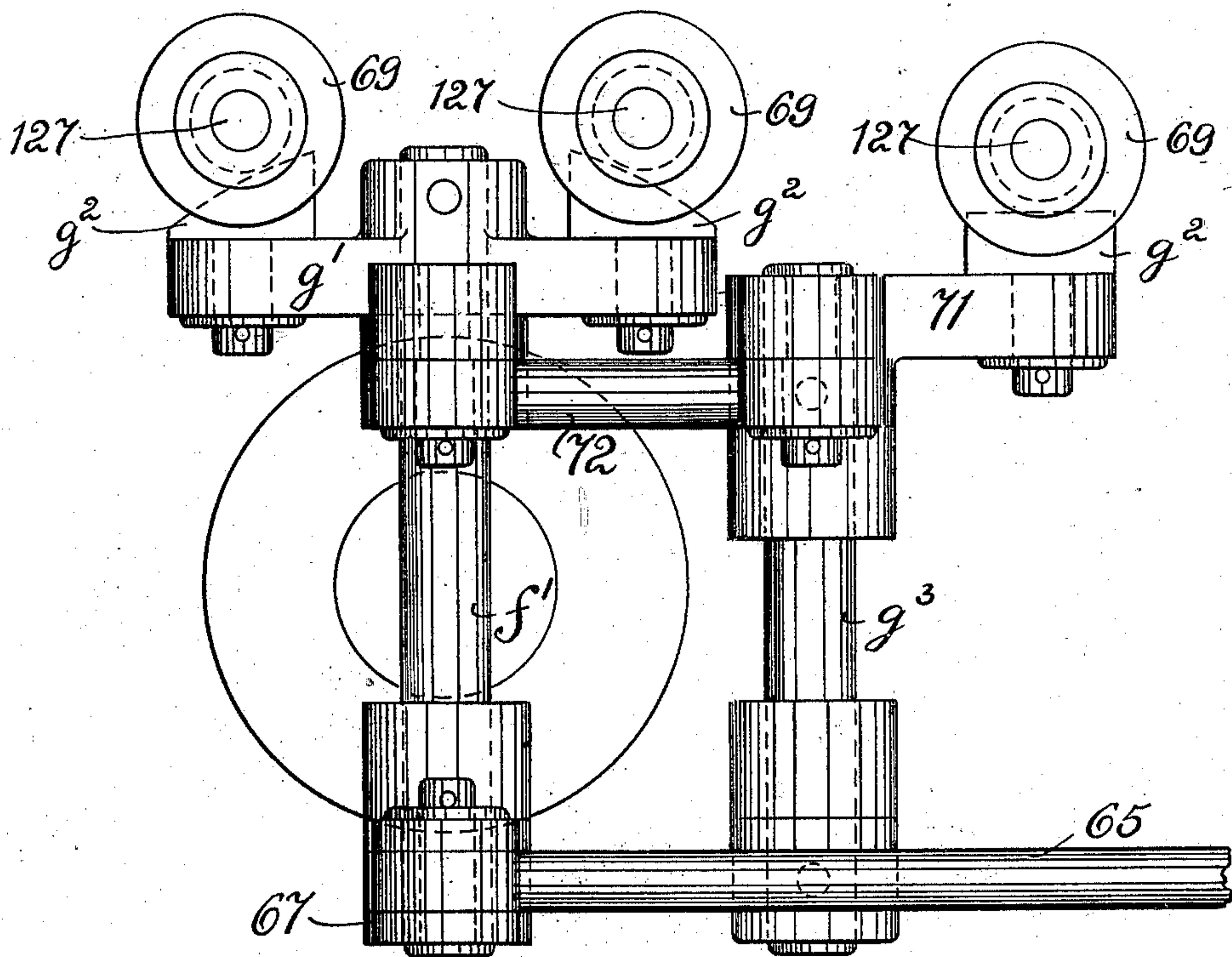
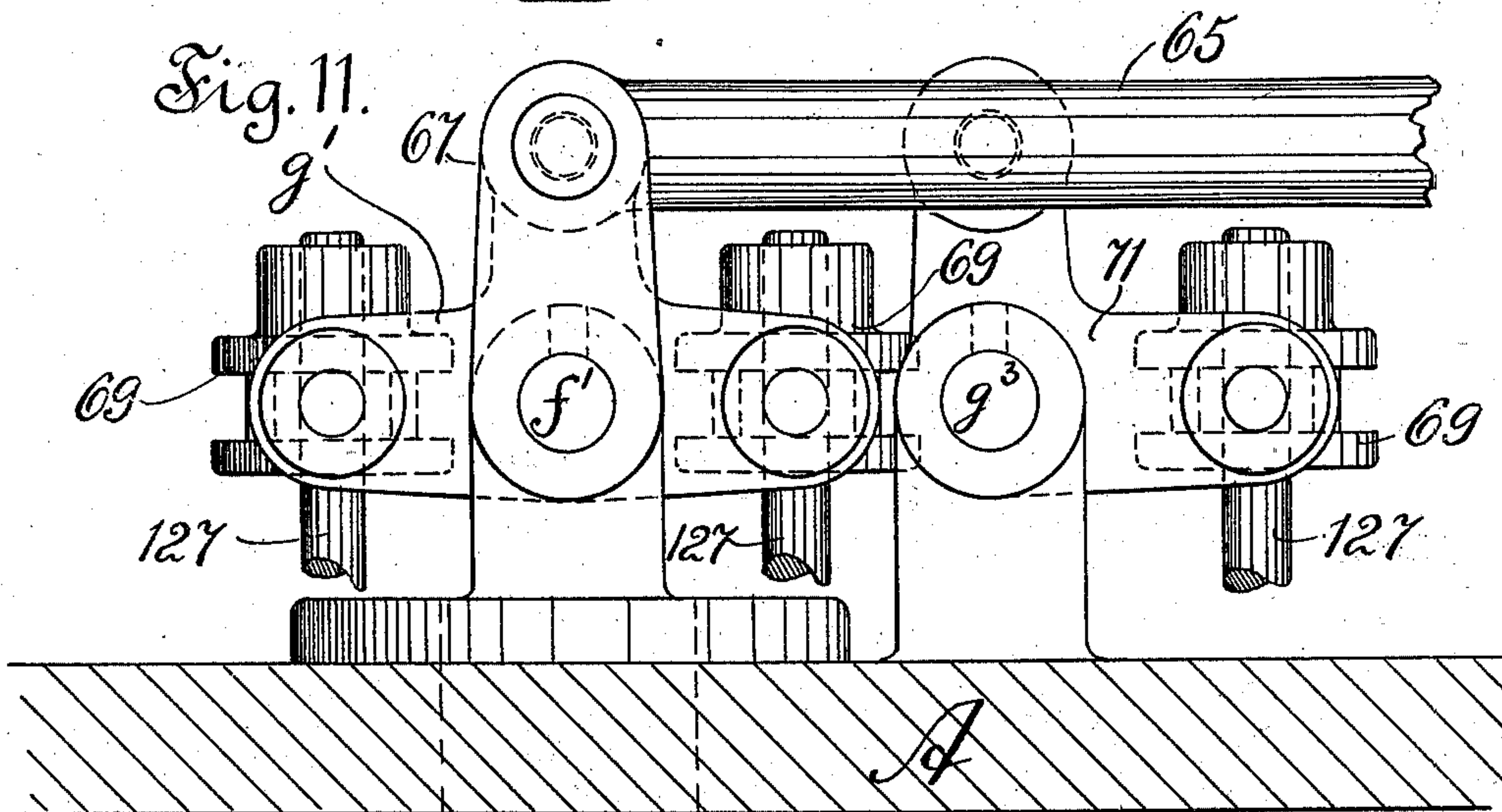


Fig. 11.



Witnesses.

A. D. Sprin  
A. E. Humiston.

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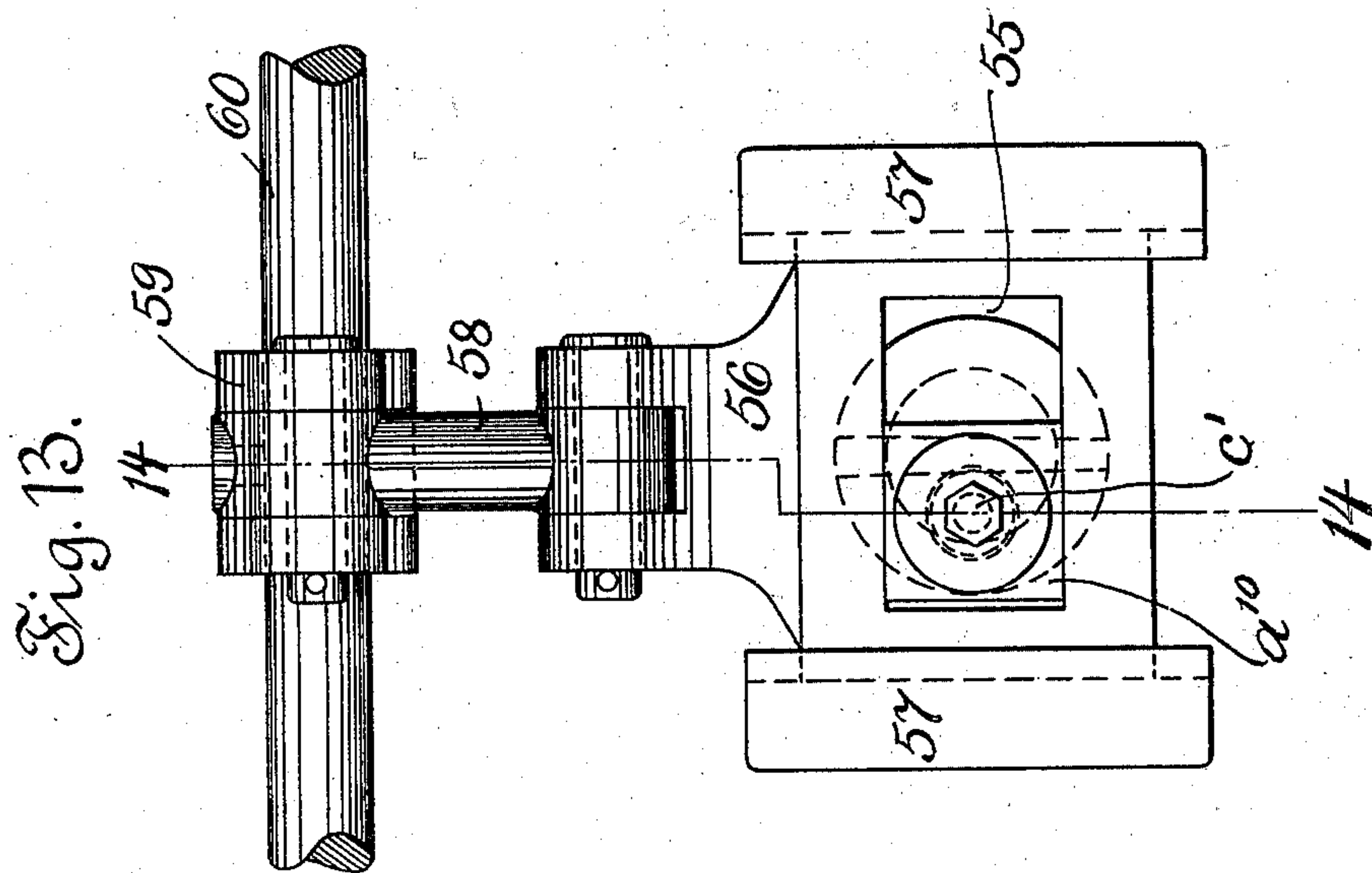
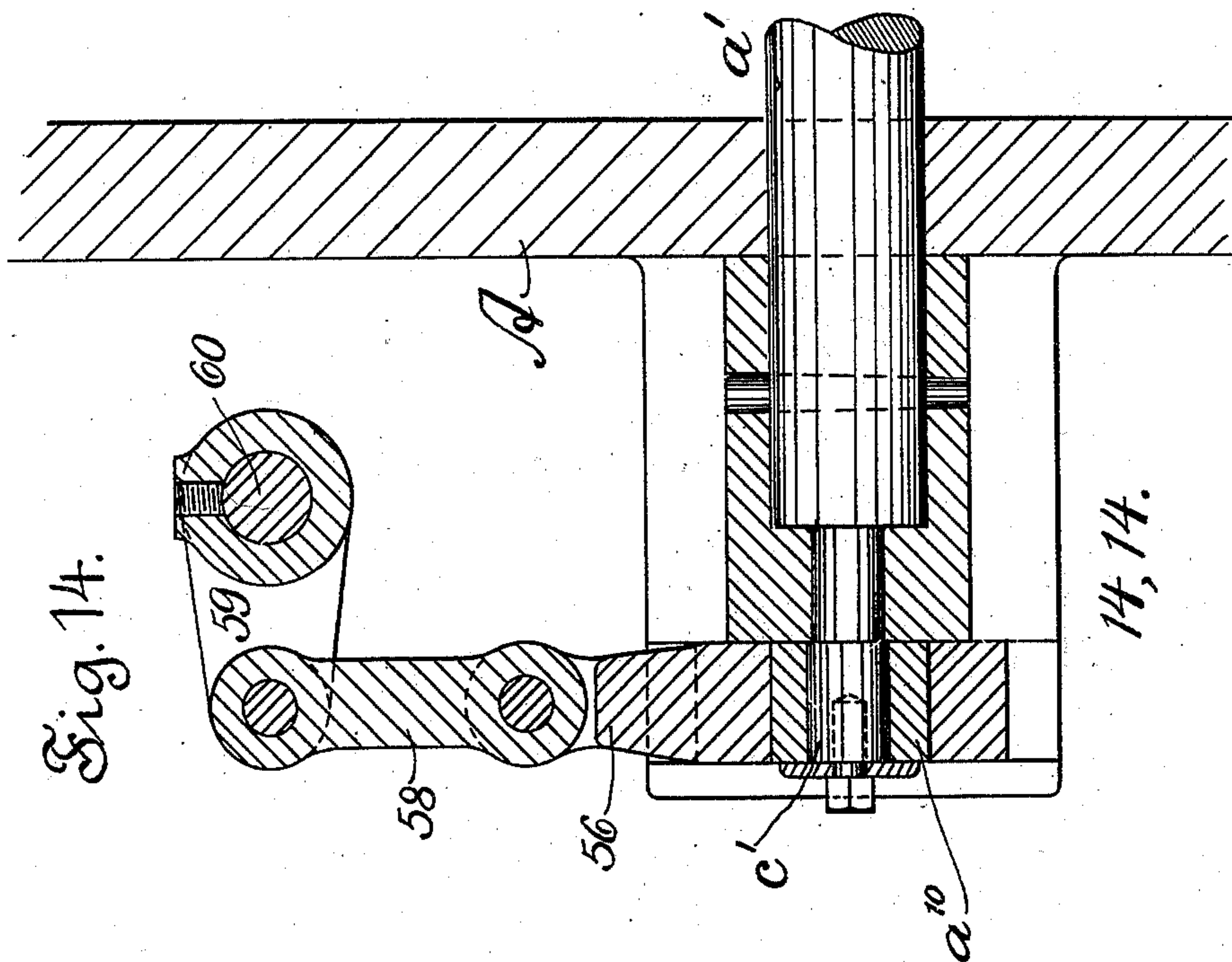
Francis Meisel  
by P. E. Terghemacher  
Att'y



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Witnesses.  
A. E. Hummerton

Inventor.  
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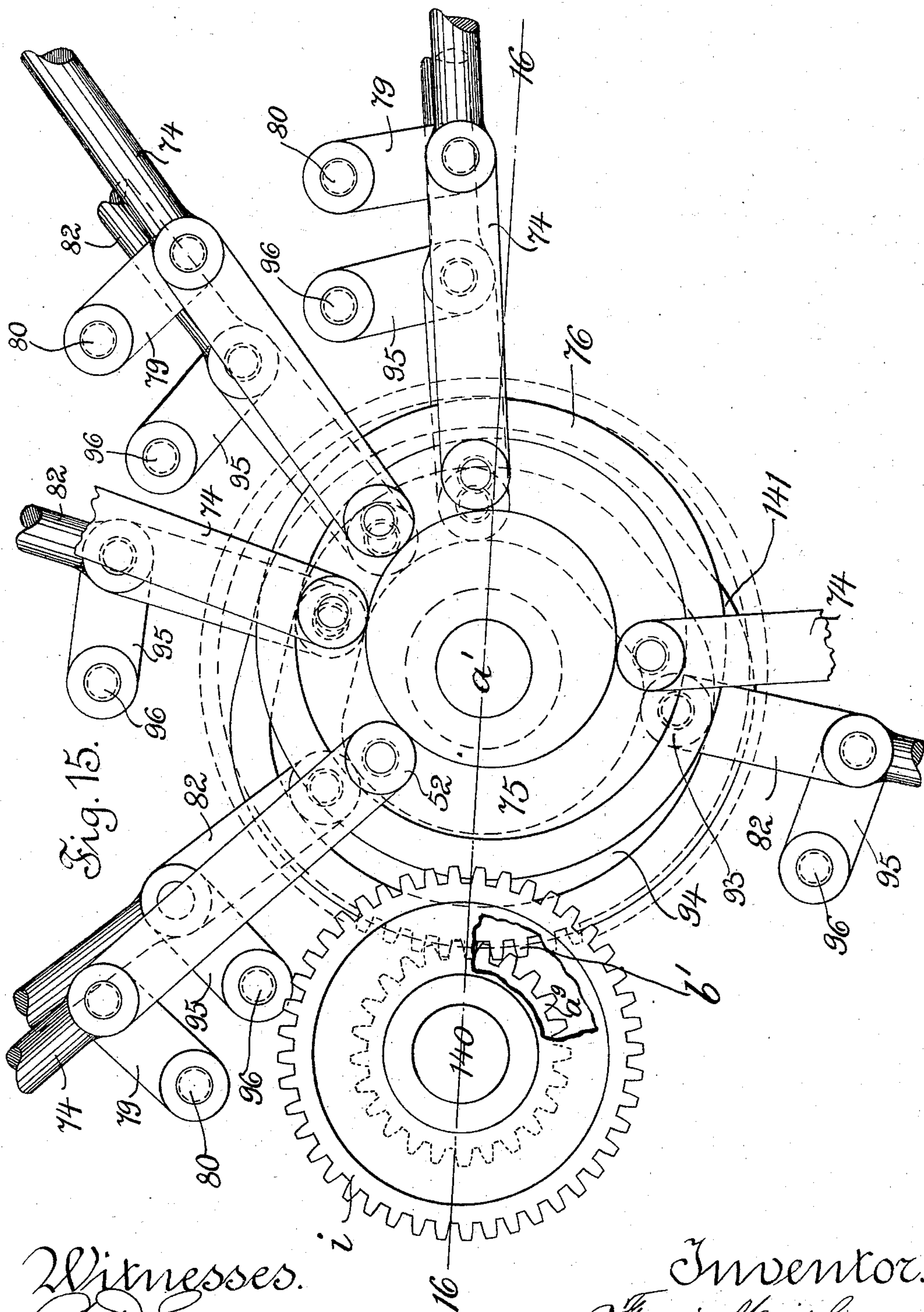
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Patented Apr. 21, 1896.



Witnesses.  
*A. D. Green*  
*A. E. Humiston*

Inventor.  
*Francis Meisel*  
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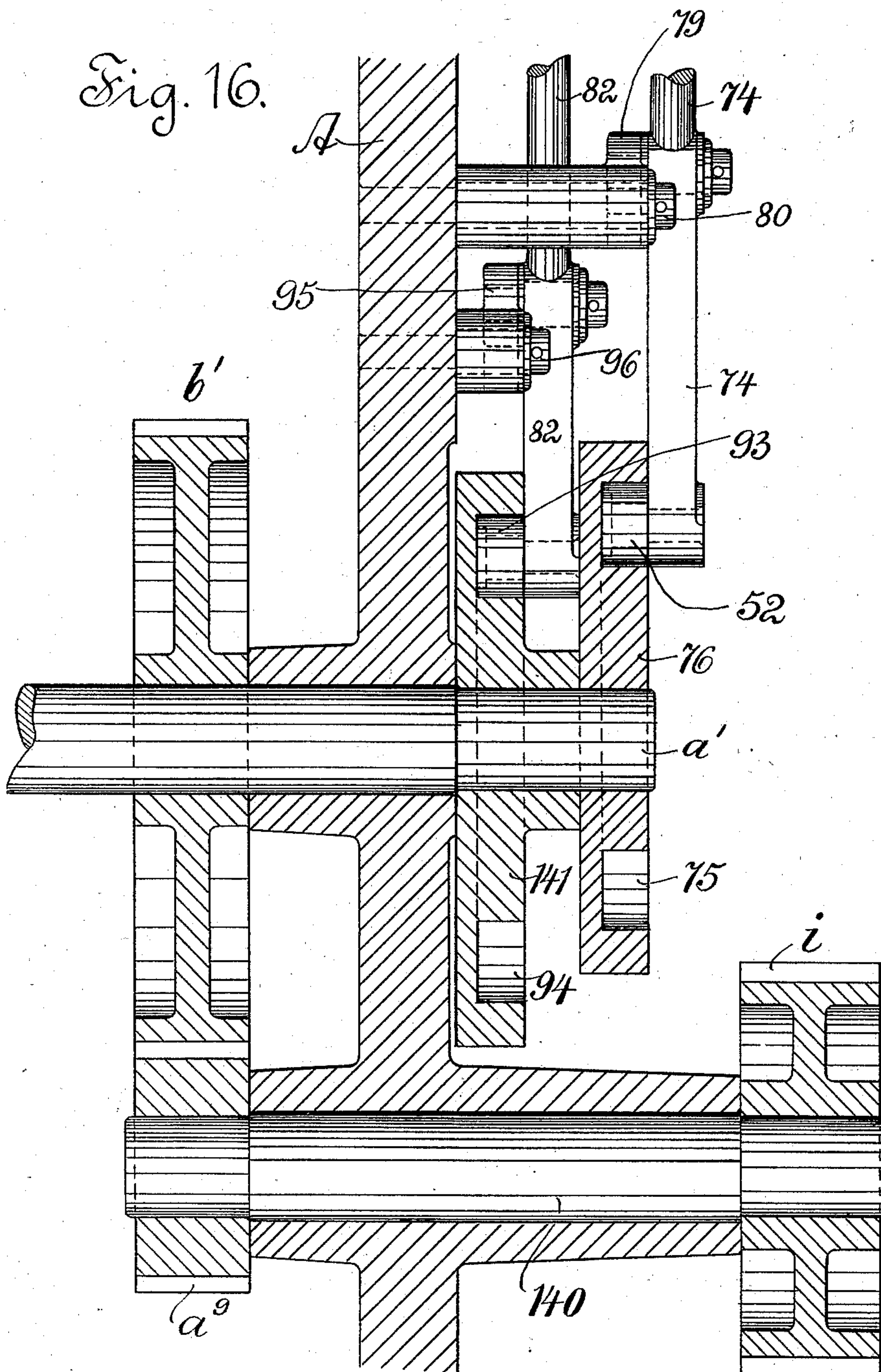
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Witnesses.  
*A. D. Groom*  
*A. E. Humiston*

16, 16.

Inventor.  
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*by H. E. Teschemacher* Atty.

(No Model.)

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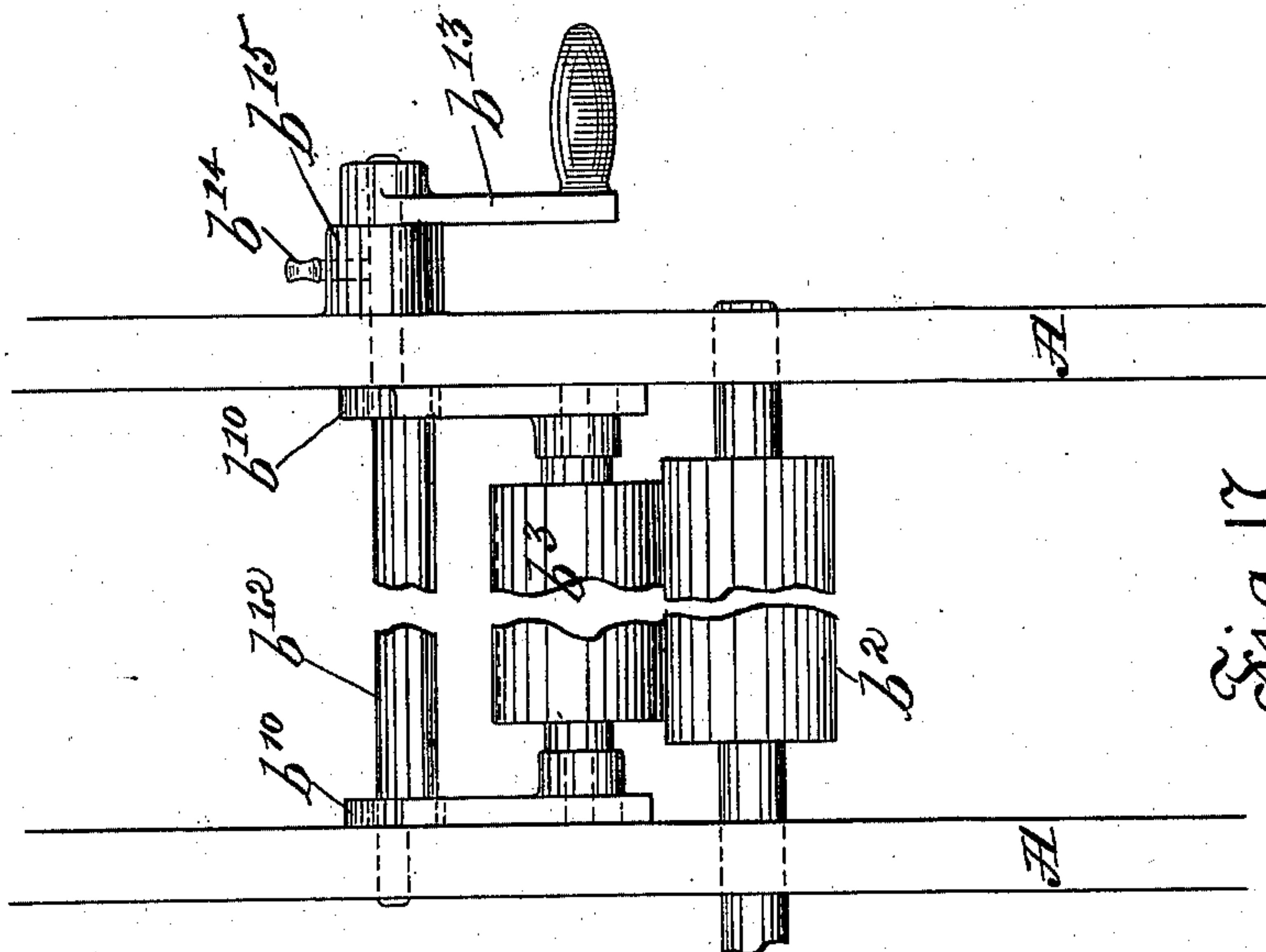


Fig. 17.

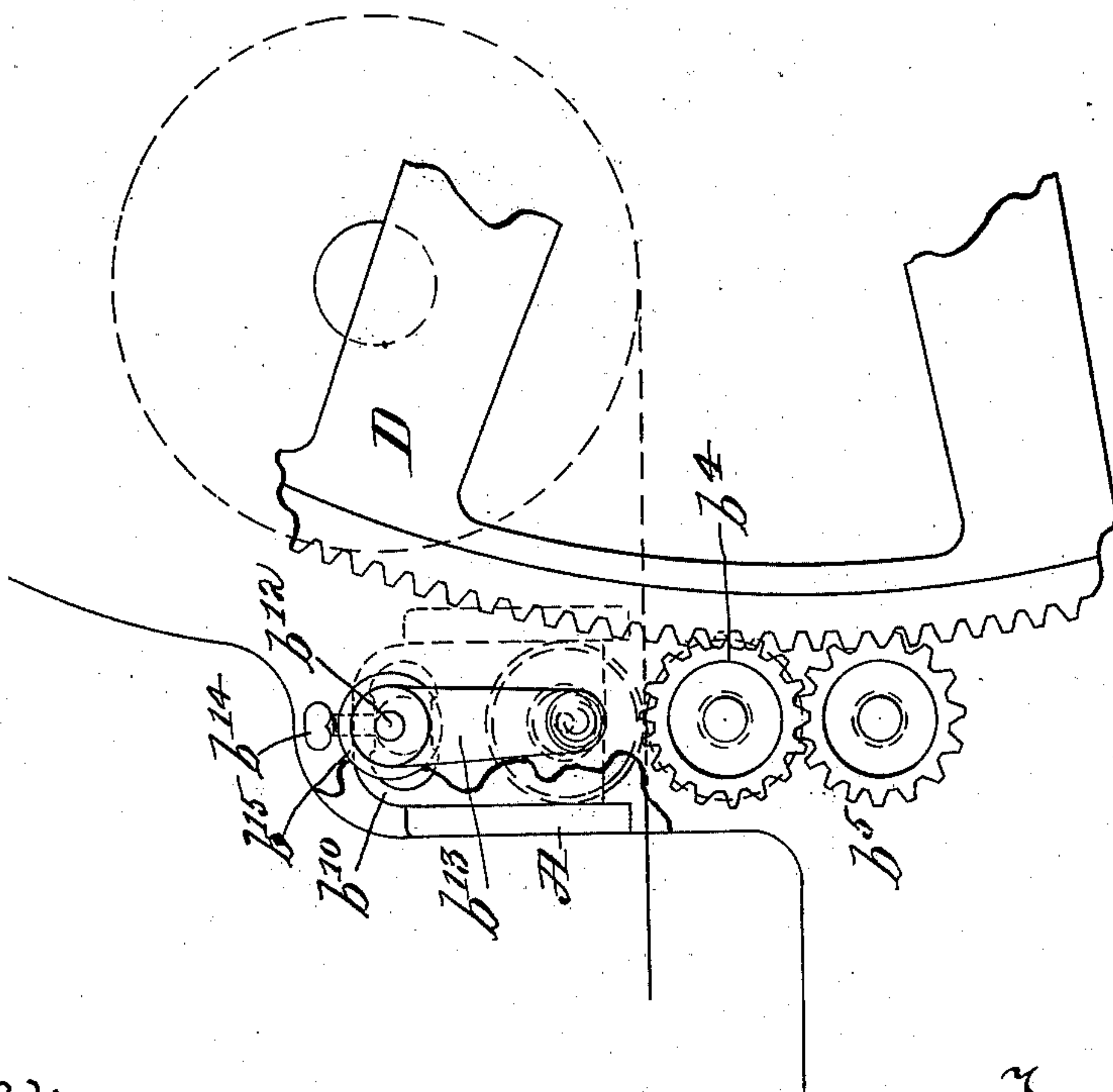


Fig. 18.

Witnesses.  
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by W. E. Teschemacher  
Att'y



# UNITED STATES PATENT OFFICE.

FRANCIS MEISEL, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE KIDDER PRESS MANUFACTURING COMPANY, OF SAME PLACE.

## ROTARY WEB-PRINTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 558,592, dated April 21, 1896.

Application filed January 25, 1895. Serial No. 536,238. (No model.)

*To all whom it may concern:*

Be it known that I, FRANCIS MEISEL, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Rotary Web-Printing Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making  
10 part of this specification, in which—

Figure 1 is an elevation of one side of my improved printing-machine. Fig. 2 is an elevation of the opposite side of the same. Fig. 3 is an elevation of the machine, looking from the left-hand side of Fig. 2. Fig. 3<sup>a</sup> is a longitudinal vertical section on the line 3<sup>a</sup> 3<sup>a</sup> of Fig. 3, looking in the direction of the arrow. Figs. 4 and 5 are details of the paper-unwinding mechanism. Fig. 6 is an enlarged detail  
20 showing in elevation a plate and impression cylinder, the inking mechanism for the same, the impression-cylinder "throw-off," and the form-roller throw-off. Fig. 7 is a plan of the parts shown in Fig. 6. Fig. 8 is an enlarged section on the line *xx* of Fig. 6. Fig. 9 is an enlarged section on the line *zz* of Fig. 6. Fig. 10 is an enlarged section on the line *yy* of Fig. 6. Fig. 11 is an enlarged detail illustrating a portion of the mechanism for  
30 actuating the vibrator-rolls in the direction of their length. Fig. 12 is a side elevation of the same. Fig. 13 is a detail of the eccentric mechanism for actuating the rocker-shaft by which longitudinal motion is transmitted to the vibrator-rolls. Fig. 14 is a section on the line 14 14 of Fig. 13. Fig. 15 is an enlarged detail in side elevation of the cam-wheels and connecting-rods which operate the ratchet-and-pawl mechanism for actuating the fountain-rolls and the lever mechanism which operates the ductor-rolls. Fig. 16 is a section  
40 on the line 16 16 of Fig. 15. Figs. 17 and 18 are details showing the throw-off device applied to the feed or drawing roll *b*<sup>3</sup>.

My invention relates to an improved printing-machine in which each plate or printing cylinder is provided with a companion impression-cylinder, and in which said cylinders are so arranged around the framework as to  
50 afford a space in the center of the machine within which the operator can stand in order

to have convenient access to the impression-cylinders, and also to the plate-cylinder and fountain of the perfecting side, thereby avoiding the necessity of the operator working in a pit beneath the machine, as heretofore, and also enabling him to "make ready" the impression-cylinders by "overlaying" or otherwise to much better advantage than has hitherto been possible in machines of this character. To accomplish this result and secure other advantages is the object of my invention, which consists in certain novel features, combinations of parts, and details of construction, as will be hereinafter fully set forth, and specifically pointed out in the claims.

In the said drawings, A represents the framework of the machine, in suitable bearings in which runs the driving-shaft B, carrying at one end outside the framework a driving-pulley C, and a pinion *b*, which meshes with and drives a large gear D, running loosely on a heavy stud *c*, projecting from the framework. Around the circumference of this gear D are arranged a series of plate-cylinders E, Fig. 3<sup>a</sup>, to which the type forms or plates are secured in the usual manner, and each of these cylinders E is provided with a companion or coöperating impression-cylinder G, the web of paper *d*, which is drawn from the roll I, passing between the several pairs of cylinders, by which the impressions are produced in the usual manner, and, after being printed, passing between a pair of feed or drawing rolls *b*<sup>2</sup> *b*<sup>3</sup>, having the same surface velocity as the plate and impression cylinders, and being subsequently wound up on a roll 25, Figs. 1, 2, and 3<sup>a</sup>, or cut into sheets, according to the requirements of the case. The shaft of the feed-roll *b*<sup>2</sup> is provided with a gear *b*<sup>4</sup>, Fig. 2, which meshes with an intermediate gear *b*<sup>5</sup>, meshing with and driven by the large gear D, the roll *b*<sup>3</sup> being rotated by frictional contact with the roll *b*<sup>2</sup>.

The shaft of each plate-cylinder E is provided with a gear *e*, Fig. 2, which meshes with and is driven by the large gear D, and each of the gears *e* meshes with and drives a gear *f* on the shaft of its impression-cylinder G, which is thus rotated with the same sur-



face velocity as the plate-cylinder. The faces of the gears *e* are double the width of those of the gears *f* to permit the large gear *D* to be placed in front of the same, as shown in Fig. 3.

*K L* are the web-perfecting pair of plate and impression cylinders, which are arranged to print on the opposite side of the web and are placed nearer the center of the machine or within the line of circumference of the gear *D*. A single pair only of these web-perfecting cylinders may be employed, as shown, or two or more pairs, according to the requirements of the case. The shafts of the cylinders *K L* are connected by gears *g h*, Fig. 2, to rotate at the same speed, and the gear *g* is driven by a train of gears *i k l*, rotating on studs projecting from the framework, the gear *l* meshing with and being driven by the gear *D*.

In order to produce first-class color-work, each plate-cylinder should have its companion impression-cylinder the same as in a single-color press constructed for a fine grade of work, and to produce the desired shades overlaying must be resorted to, which necessitates convenient access to the impression-cylinders. To enable the operator to conveniently reach these cylinders and also the web-perfecting plate-cylinder and its fountain, one of the side pieces of the framework is provided with a large opening *M*, Fig. 1, through which the operator can pass into the machine and stand up between the two sides of the framework in a convenient position to reach and operate upon the several impression-cylinders, as is required in "making ready" for printing, the perfecting plate-cylinder *K* and its ink-fountain being also within easy reach of the operator when standing within the machine, and by thus arranging the several pairs of cylinders and the mechanism connected therewith in such manner as to afford standing-room in the center of the machine, as described, the operator is relieved from the necessity of working in a pit beneath the machine, as has heretofore been customary, and which has added to the expense, and has also proved extremely inconvenient and unsatisfactory.

When standing within the machine, the operator can slowly set it in motion by means of a hand-lever *N*, inside or outside the framework, connected with ratchet-and-pawl mechanism 26, applied to the driving-shaft, as shown in Fig. 1, according to his requirements while making ready. In this manner the operation of overlaying can be performed with great facility and with the minimum expenditure of time and labor. By arranging the several pairs of cylinders in the arc of a circle instead of in a straight or irregular line the web of paper is held away from each plate-cylinder until the point of contact of the same with its companion impression-cylinder is reached, thereby avoiding blurring and insuring a clean sharp impression.

Each impression-cylinder is provided with the usual means for holding and stretching thereover the packing and overlay sheets, and in order to allow the ends of the packing and overlay sheets to be fastened with reel-rods within the periphery of the cylinder in the usual manner a longitudinal slot *p*, Figs. 3<sup>a</sup> and 5, is formed in the periphery of each impression-cylinder communicating with the hollow or cored-out part of the same which contains the reel-rods or fastening mechanism. The roll of paper *I* is mounted on a horizontal shaft the journals of which rest in suitable bearings in the framework, the web being drawn from said roll by a feed or unwinding roll *q*, Figs. 3<sup>a</sup>, 4, and 5, which does not run in contact with the adjacent impression-cylinder, but receives the same surface speed by means of gears 28 29, (shown in Fig. 2,) the latter gear 29 meshing with and being driven by the gear *e* on the shaft of the adjacent plate-cylinder. The paper passes between the roll *q* and a pressure-roll *r*, rotated by frictional contact with the roll *q*, the shaft of said roll *r* being supported in journal-boxes 30, Figs. 3<sup>a</sup>, 4, and 5, which slide in guideways *a*<sup>2</sup> in the two side pieces of the framework *A*, whereby the pressure-roll *r* is made movable toward and from the roll *q*, said movement being effected by an eccentric-shaft 31, passing through slots 32 in the sliding journal-boxes 30 and having its bearings in the sides of the framework, outside which said shaft is provided with a crank-handle 34, the eccentric-shaft 31 being secured in place when adjusted by means of a set-screw 35 in a hub 36 outside the framework through which the said shaft 31 passes. The roll *r* can thus, by a simple movement of the handle 34, be "thrown off" or withdrawn from the roll *q* whenever the paper is to be introduced into the machine. This construction enables the paper to be continuously unwound, so as to register accurately without regard to the open slot *p* in the impression-cylinder, which slot, if said cylinder was in contact with the unwinding roll and dependence was placed upon their frictional contact to unwind the paper, would cause an interruption of the feed when it was brought opposite to the roll *q*.

The feed or drawing rolls *b*<sup>2</sup> *b*<sup>3</sup> serve to maintain a uniform tension on the web of paper at all times and keep it tightly stretched over the impression-cylinders as it passes through the machine, insuring, in connection with the unwinding-rolls *q r*, a positive feed without possibility of the paper becoming slack between any two pairs of cylinders, whereby absolutely perfect register of the colors is attained, which is of the greatest importance in the production of fine or high-class work.

Without the feed or drawing rolls *b*<sup>2</sup> *b*<sup>3</sup> the web would be liable at times to become slack between two adjacent pairs of cylinders by reason of adhering to some one of the plate-



cylinders which carried more ink than the others, and being thereby lifted out of its proper straight course, which would spoil the register and produce imperfect work.

5 The roll  $b^3$  is provided with a throw-off device similar to that used for the feed-roll  $r$ , previously described, whereby said roll  $b^3$  may be withdrawn from the roll  $b^2$  to facilitate the entering of the paper. This throw-off device is constructed as follows: The shaft of the roll  $b^3$  is supported in journal-boxes  $b^{10}$ , Figs. 17 and 18, which slide in suitable guide-ways in the framework A, whereby the roll  $b^3$  is made movable toward and from the roll  $b^2$ , 15 said movement being effected by an eccentric-shaft  $b^{12}$ , passing through slots in the sliding journal-boxes  $b^{10}$  and having its bearings in the sides of the framework, outside which said shaft is provided with a crank-handle  $b^{13}$ , the eccentric-shaft  $b^{12}$  being secured in place when adjusted by means of a set-screw  $b^{14}$  in a hub  $b^{15}$  outside the framework through which the said shaft  $b^{12}$  passes. The roll  $b^3$  can thus by a simple movement of the handle 20  $b^{13}$  be thrown off or withdrawn from the roll  $b^2$  whenever the paper is to be introduced into the machine.

Each of the impression-cylinders G is provided with a throw-off device by which it can 30 be moved away from its companion plate-cylinder to avoid taking an impression, thereby rendering it unnecessary to run the paper through the machine while the ink is being distributed and preventing injury to the make ready by depositing ink thereon, as would otherwise be the case, while waste of time and paper as well as much annoyance to the pressman is also avoided. This throw-off is effected by mounting the journals of the 40 impression-cylinder in eccentric journal-boxes 38, Figs. 6 and 7, turning in bearings in the framework, each of said boxes being provided with a toothed sector 39, which is engaged and turned by a pinion 40 on a shaft 41, the latter being provided with a crank-handle 37, located in a convenient and accessible position outside the framework, as shown in Fig. 1.

The shafts 150 of the form-rollers  $t$ , the 50 shafts 127 of the vibrator-rolls  $w$ , and the shaft  $a^6$  of the ink-distributing cylinder  $a^3$ , Figs. 3<sup>a</sup>, 8, and 10, belonging to each plate-cylinder are mounted on a swinging frame P, Figs. 3<sup>a</sup>, 6, and 7, pivoted in the framework 55 at 20, an arm or projection  $a^4$ , at the opposite end of each of the side pieces of the frame P, being provided with a slot  $a^5$ , through which passes an eccentric-shaft 22, having a crank-handle 23, Fig. 1, by turning which a half-revolution the entire set of form-rollers and vibrator-rolls can be lifted away from the plate-cylinder either while the machine is in motion or while it is at rest without danger of breaking or injuring any portion of the mechanism. 65 This feature is a very important one, as the ink can be distributed without depositing it on the plates, thereby saving ink and the

time required to wash the plates. It is also very useful, and, in fact, almost indispensable, during the time the pressman is engaged 70 in overlaying and making ready, as he can lift the form-rollers clear of the plates on cylinder at which he is at work, enabling him to work up the colors one by one to the shade desired.

75  $t^5$   $t^5$ , Fig. 7, are two bolts which serve to hold the frame P up against the side of the framework A, said bolts being tapped into the frame P and passing through holes or slots  $t^6$  in the framework A of sufficient size 80 to permit of the movement of the swinging frame P.

The vibrator-rolls  $w$  and the ink-distributing cylinder  $a^3$  are operated by means of gears 42, which are driven by intermediate gears 85 43, the latter meshing with and being driven by a gear  $s$  on the shaft of the plate-cylinder E, as shown in Fig. 6.

The upper edges of the swinging frame P are curved in the arc of a circle concentric 90 with the periphery of the plate-cylinder E and are each provided on the inner side with a T-shaped guide-flange 125, Figs. 6, 8, and 10, on which are mounted the journal-boxes 126 of the shafts 127 of the vibrator-rolls, said 95 journal-boxes having grooves corresponding in shape to the flanges 125, upon which they are fitted to slide in the arc of a circle, set-screws 128 being provided for clamping the journal-boxes in place when adjusted. Each 100 journal-box 126 has projecting from its outer side a stud 129, upon which runs the intermediate gear 43, by which motion is transmitted from the gear  $s$  to the gear 42 of the shaft 127 of the vibrator-roll. 105

The journal-boxes 130, Fig. 10, of the form-roller shafts 150 are mounted in housings 132, which are provided with dovetailed grooves 133 to adapt them to slide upon the T-shaped flanges 125 of the frame P, said housings when 110 adjusted being clamped in position by set-screws 134.

The journal-boxes 130 are each supported within a recess 136 in the housing 132 by means of an adjusting-screw 137, tapped through the 115 box 130 and bearing on the bottom of the recess, said screw being held down in place by a cap  $a^8$ , Fig. 10, adapted to be swung over its head, and in this manner the form-rollers can be adjusted to the exact height or position required with relation to the plate-cylinder. By thus mounting the housings of the form-roller journal-boxes, and the journal-boxes of the vibrator-rolls upon the curved edges of the swinging frame P, and making 125 them movable upon the same, they can be adjusted to any position required with great facility, whereby the form-rollers if reduced in diameter by shrinkage can, together with the vibrator-rolls, be set up toward the ink-distributing cylinder  $a^3$ , Figs. 2 and 9, from 130 which the ink is supplied to all of the form-rollers.

I will now describe the mechanism for oper-



ating the vibrator-rolls  $w$  in the direction of their length, reference being had particularly to Figs. 1, 11, 12, 13, and 14.

$a'$ , Figs. 2, 3<sup>a</sup>, 14, and 15 is a transverse shaft mounted in the framework and carrying a gear  $b'$ , Fig. 3<sup>a</sup>, which meshes with and is driven by a small intermediate gear  $a^9$ , which is fastened to a short shaft 140, Figs. 3<sup>a</sup> and 16, having its bearings in the framework and carrying outside the same the larger intermediate gear  $i$ , Fig. 2, which receives motion from the large gear  $D$  through the gears  $k$   $l$ , as previously explained. The shaft  $a'$  carries at one end outside the framework a crank-pin  $c'$ , working in a box  $a^{10}$ , fitted within a slot 55 in a slide 56, supported in guide-ways 57, as shown in Figs. 13 and 14. The slide 56 is connected by a link 58 to an arm 59 on an inclined rock-shaft 60, supported in suitable bearings on the outside of the framework, as shown in Fig. 1. The motion of this shaft 60 is transmitted by bevel-gears 61 and 62 to a short rock-shaft 63 and by means of rocker-arms 64 and rods 65 to lever mechanism, by which suitable motion is transmitted to the vibrator-rolls to actuate the same in the direction of their length.

As the mechanism for operating each set of the vibrator-rolls is substantially alike, I will describe that for one set only, which will apply equally to the others, referring particularly to Figs. 1, 11, and 12.

$f'$  is a rock-shaft, which is connected with one of the rods 65, either by a rocker-arm 67, as shown in Figs. 11 and 12, or by means of intermediate mechanism consisting of rocker-arms, rods, and shafts, as shown in Fig. 1. This shaft  $f'$  carries a double rocker-arm  $g'$ , having at its opposite ends projections  $g^2$ , which engage grooved disks 69, secured to the ends of the shafts 127 of two of the three vibrator-rolls of a set. The grooved disk 69 on the shaft of the third vibrator-roll of the set is engaged by a projection  $g^2$  on a bell-crank rocker-arm 71, which is secured to a short shaft  $g^3$ , parallel with the shaft  $f'$ , and is connected by a short rod 72 with the rocker-arm  $g'$  on the shaft  $f'$ , and in this manner all of the vibrator-rolls are actuated in the direction of their length from the single central rock-shaft 60 in a simple and convenient manner, and at a slower speed than if connected directly with the shafts of the impression-cylinders.

Each of the fountain-rolls  $h'$  is operated by a ratchet-and-pawl mechanism  $i'$ , provided with a slotted lever 24, adjustably connected at 73 with a reciprocating rod 74, the lower end of which carries a cam-roll 52, which runs in a cam-groove 75 in a cam-wheel 76, Figs. 2, 15, and 16, secured to the shaft  $a'$ , which carries the gear  $b'$ , which meshes with and is driven by the gear  $a^9$ , the rod 74 being held in its proper position while being operated by means of an arm or link 79, pivoted thereto and to a stud 80, projecting from the framework. By making the ratchet-and-pawl

mechanism adjustable by means of the slotted levers 24 each fountain-roll can be given more or less rotation independently of the fountain-rolls of the other cylinders. The ink-cylinders  $a^3$  are supplied with ink by the ductor-rolls  $k'$  in the usual manner, said ductor-rolls receiving the ink from the fountain-rolls  $h'$ , and being supported in U-shaped bearings  $k^2$ , Fig. 2, at the upper ends of arms 81, which are vibrated to bring the ductor-rolls alternately into contact with the fountain-rolls  $h'$  and ink-distributing cylinders  $a^3$  by means of connecting-rods 82 and levers 83, each rod 82 being pivoted to one of the levers 83, and carrying at its lower end a cam-roll 93, Fig. 16, which runs in a cam-groove 94 in a cam-wheel 141 on the shaft  $a'$ , said rods 82 being each maintained in its proper position while being operated by means of an arm or link 95, pivoted thereto and to a stud 96, projecting from the framework. By this construction the entire series of fountain-rolls and ductor-rolls are operated in a very simple and convenient manner, two cam-wheels only being required, one for the fountain-roll rods and the other for the ductor-roll rods.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A web-printing machine, comprising a frame having an opening in one side for the entrance of the operator, a large gear-wheel journaled on a short stud at the opposite side of the frame, a series of impression-cylinders arranged on an arc above and at opposite sides of the door-opening, a throw-off for each impression-cylinder provided with an operating-handle at the open side of the frame around its opening and within reach of the operator, a series of plate-cylinders exterior to the impression-cylinders and geared thereto; the plate-cylinders being also geared to the said large gear, two pairs of feed-rolls one pair located in advance of the first pair of cylinders and the other pair beyond the last pair of cylinders the pressure-roll of each pair having a throw-off provided with an operating-handle at the open side of the frame and the feed-rolls being geared to said large gear and an inking mechanism for each plate-cylinder.

2. In a web-printing machine, the combination with a plate-cylinder, of a pivoted swinging frame having its upper edges curved in the arc of a circle concentric with the periphery of said plate-cylinder, the form-rollers and vibrator-rolls having their bearings or supports made adjustable toward and from each other on the upper edges of said swinging frame, and means for clamping the same when adjusted, substantially as described.

3. In a web-printing machine, the combination with the swinging pivoted frame, of the form-rollers having the journal-boxes of their shafts supported in housings made adjustable on the upper edges of said swinging frame, said journal-boxes being made adjustable in height, substantially as described.



4. In a web-printing machine, the combination with the swinging pivoted frame P, of the form-rollers having the journal-boxes of their shafts supported in recesses in housings made adjustable on the upper edges of said frame P, said journal-boxes being made adjustable in height by means of screws 137, tapped through the same, and bearing on the bottoms of said recesses, and swinging caps 10  $\alpha^8$ , for holding said screws in place within said recesses, substantially as described.

5. In a web-printing machine, the combination with the plate-cylinder and the swinging frame P, of the form-rollers, vibrator-rolls, 15 and ink-distributing cylinder mounted on

said frame, said form-rollers and vibrator-rolls being made adjustable on said frame P, whereby they can be set up toward the ink-distributing cylinder, and said vibrator-rolls, and the ink-cylinder having their shafts provided with gears meshing with intermediate gears, the latter meshing with and being driven by the gear s, of the plate-cylinder, all operating substantially as described.

Witness my hand this 23d day of January, 25 A. D. 1895.

FRANCIS MEISEL.

In presence of—

P. E. TESCHEMACHER,  
S. V. MERTSCHINSKY.