

No. 622,475.

Patented Apr. 4, 1899.

H. HUBBELL.

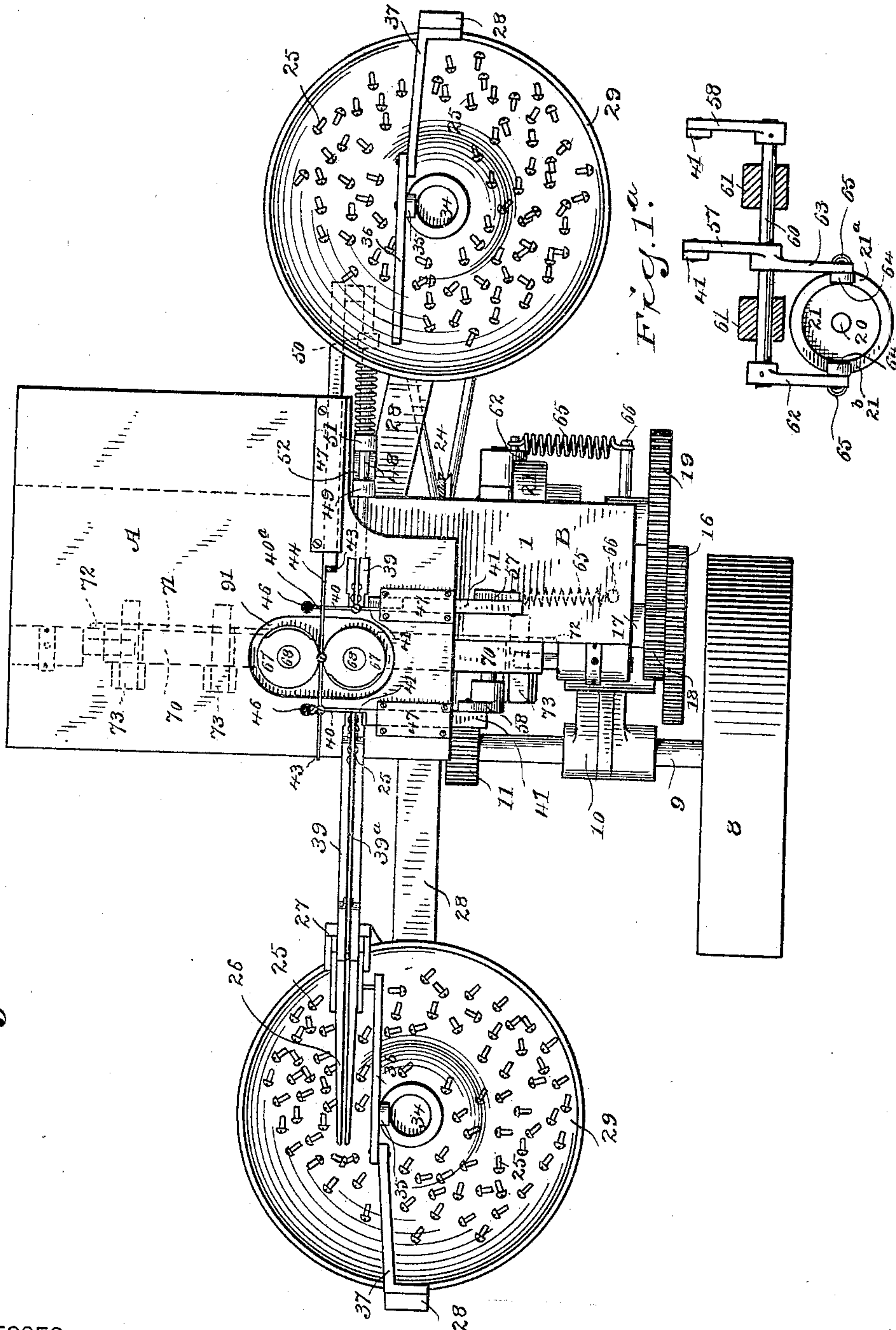
MACHINE FOR THREADING SCREWS.

(Application filed July 27, 1898.)

(No Model.)

5 Sheets—Sheet 1.

Fig. 1.



WITNESSES

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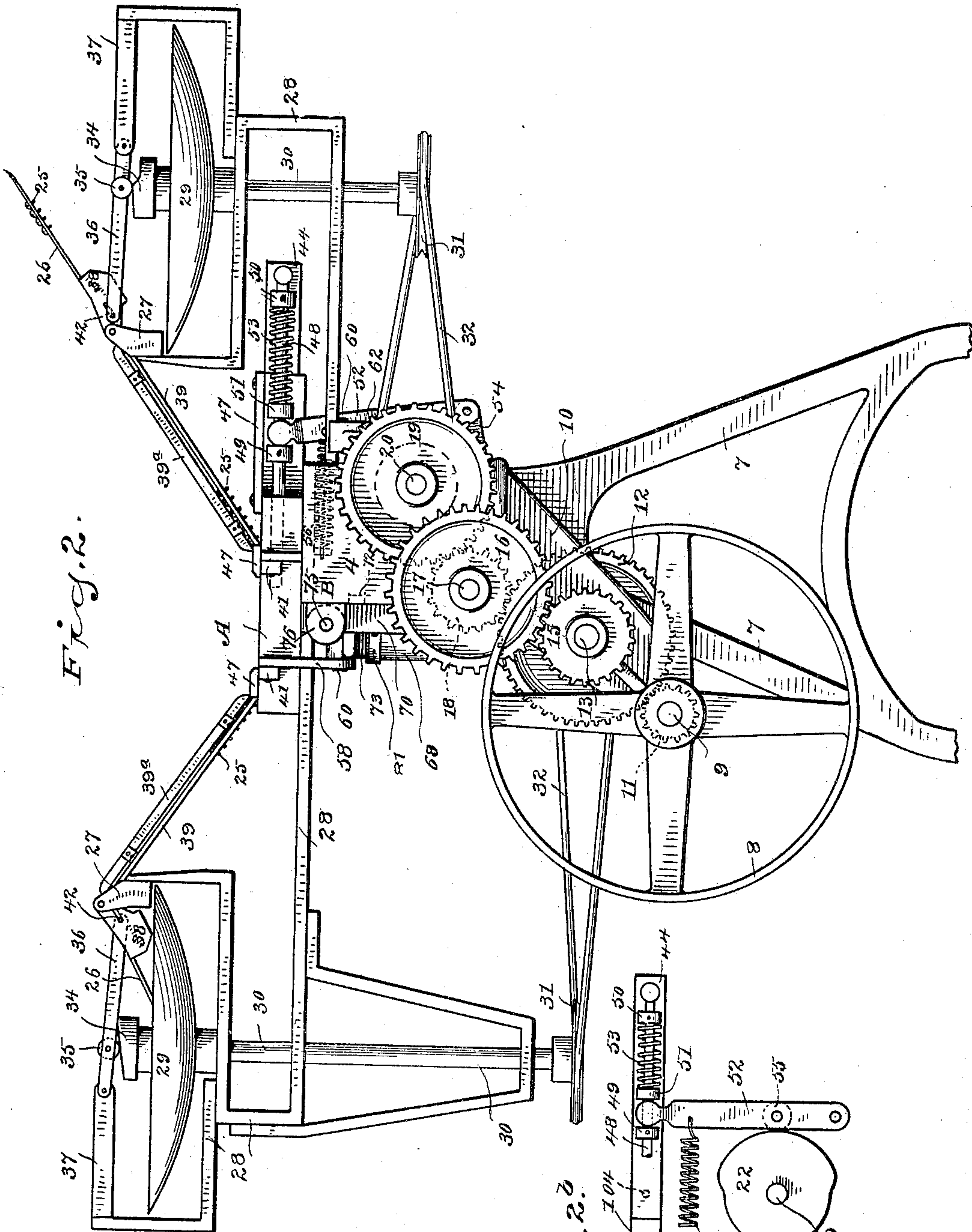


Fig. 2.

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Fig. 3.

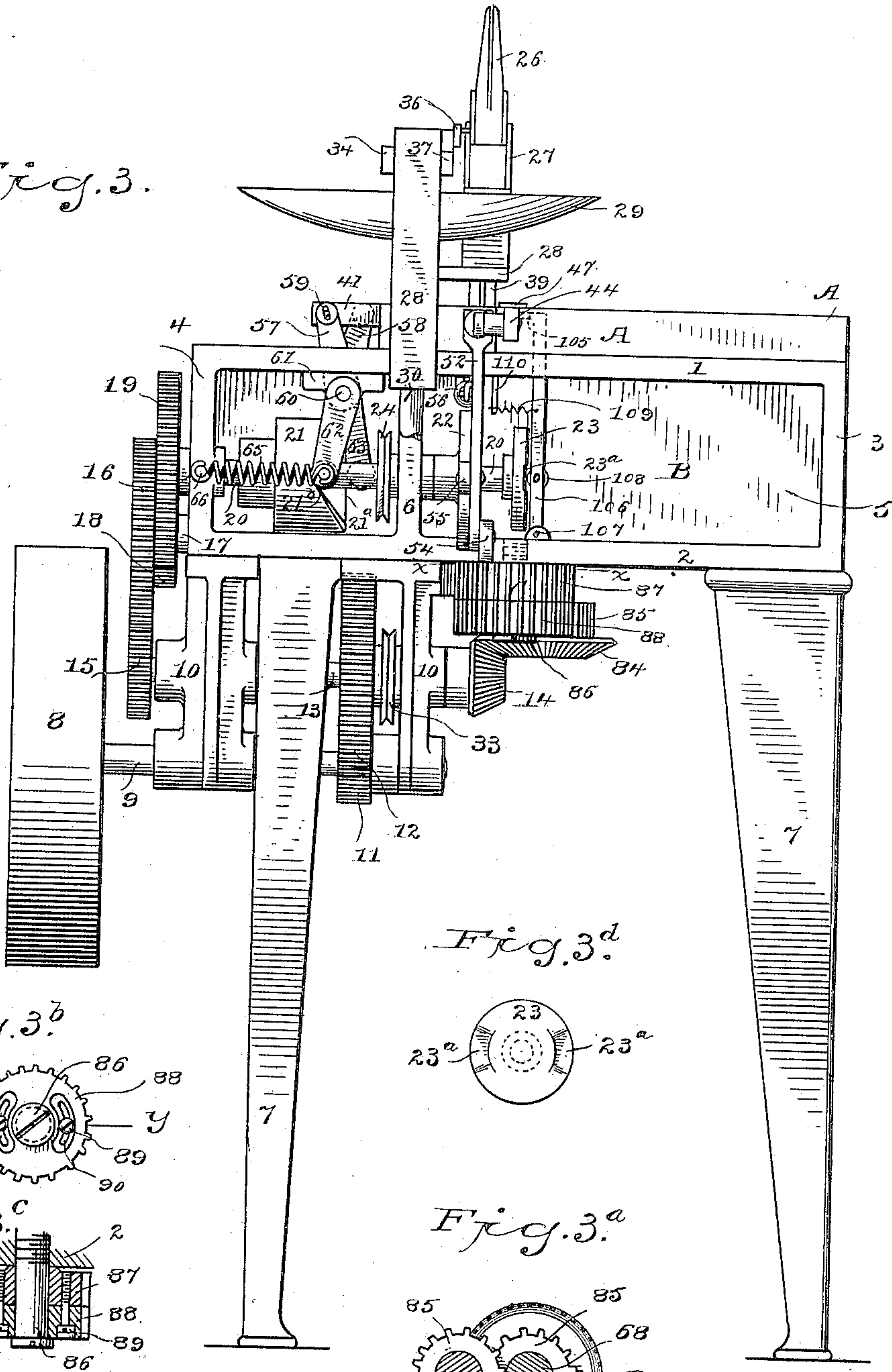


Fig. 3^d.

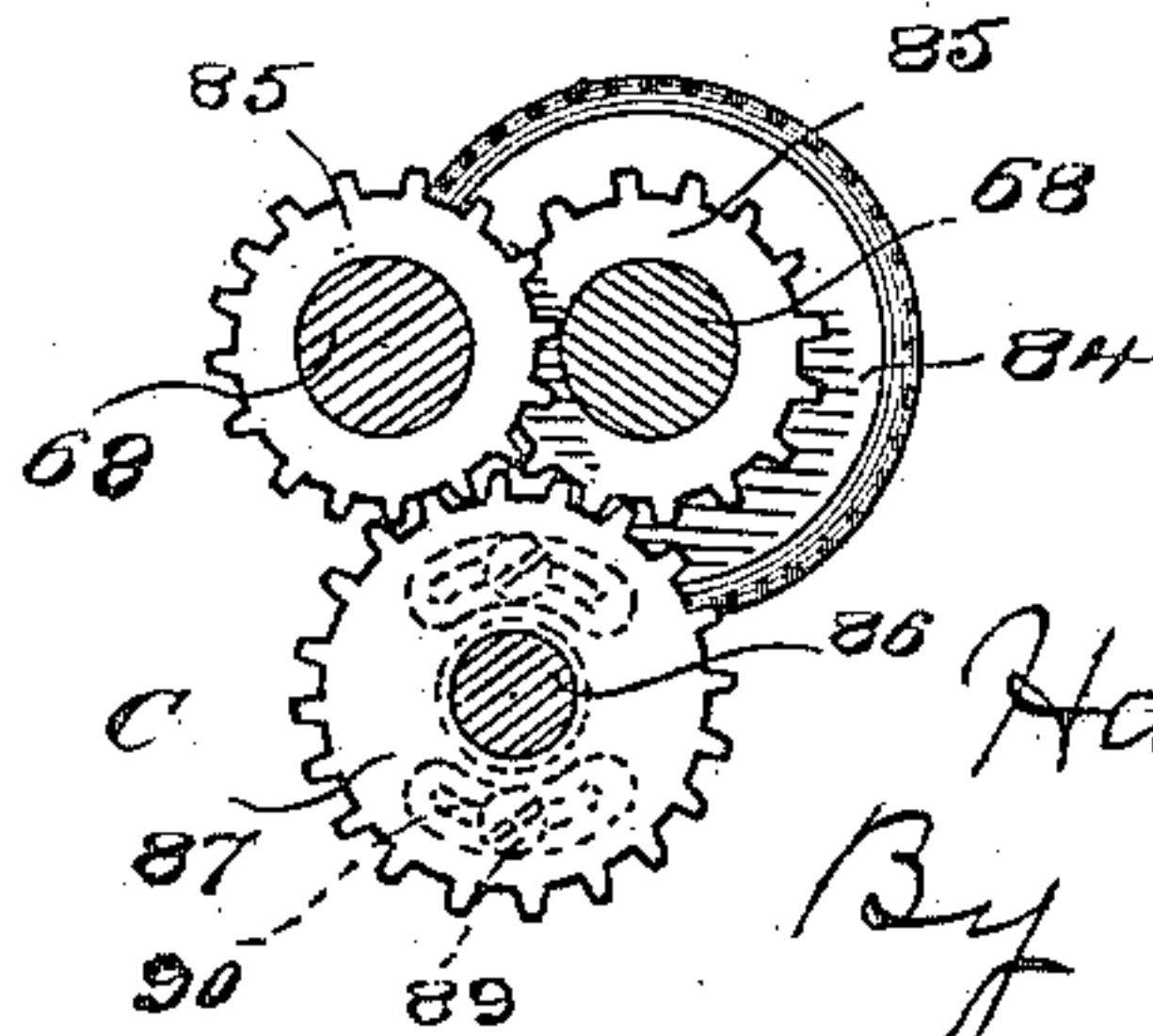
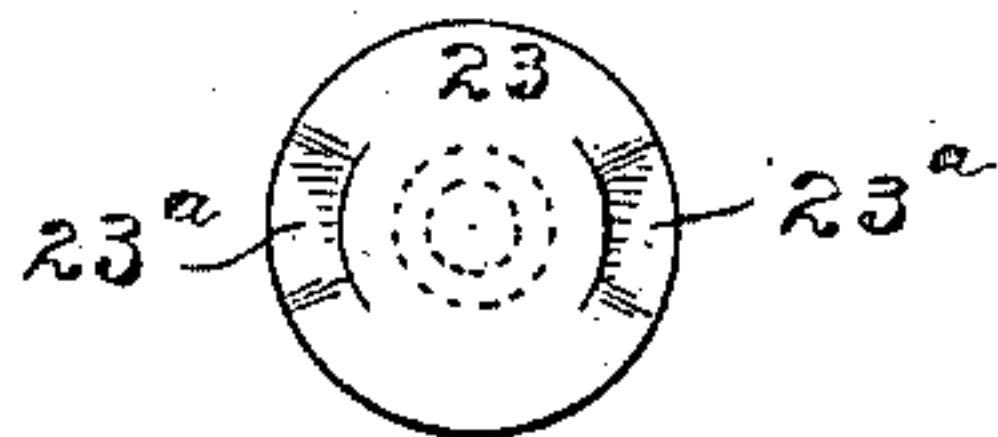


Fig. 3^b.

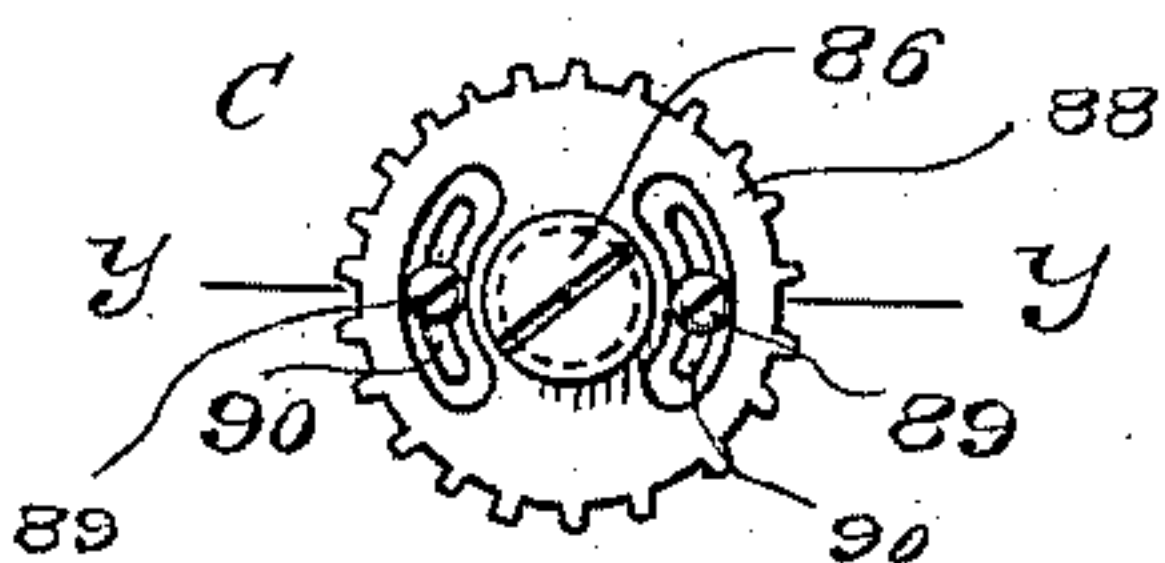
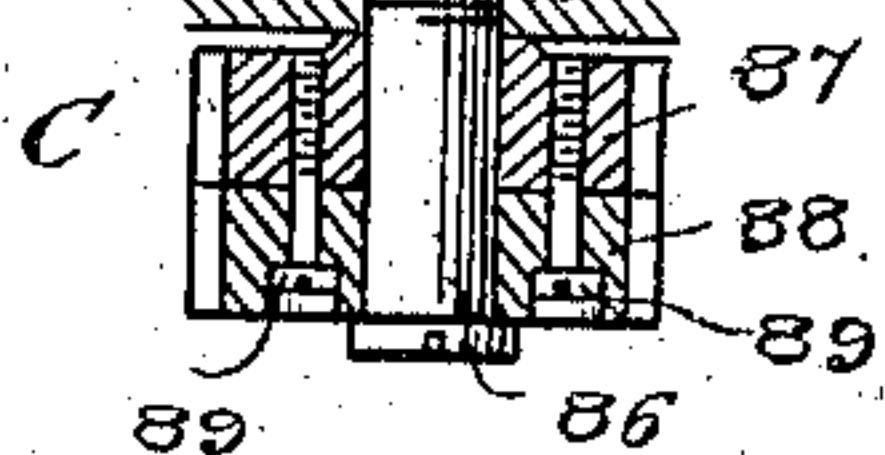


Fig. 3^c.



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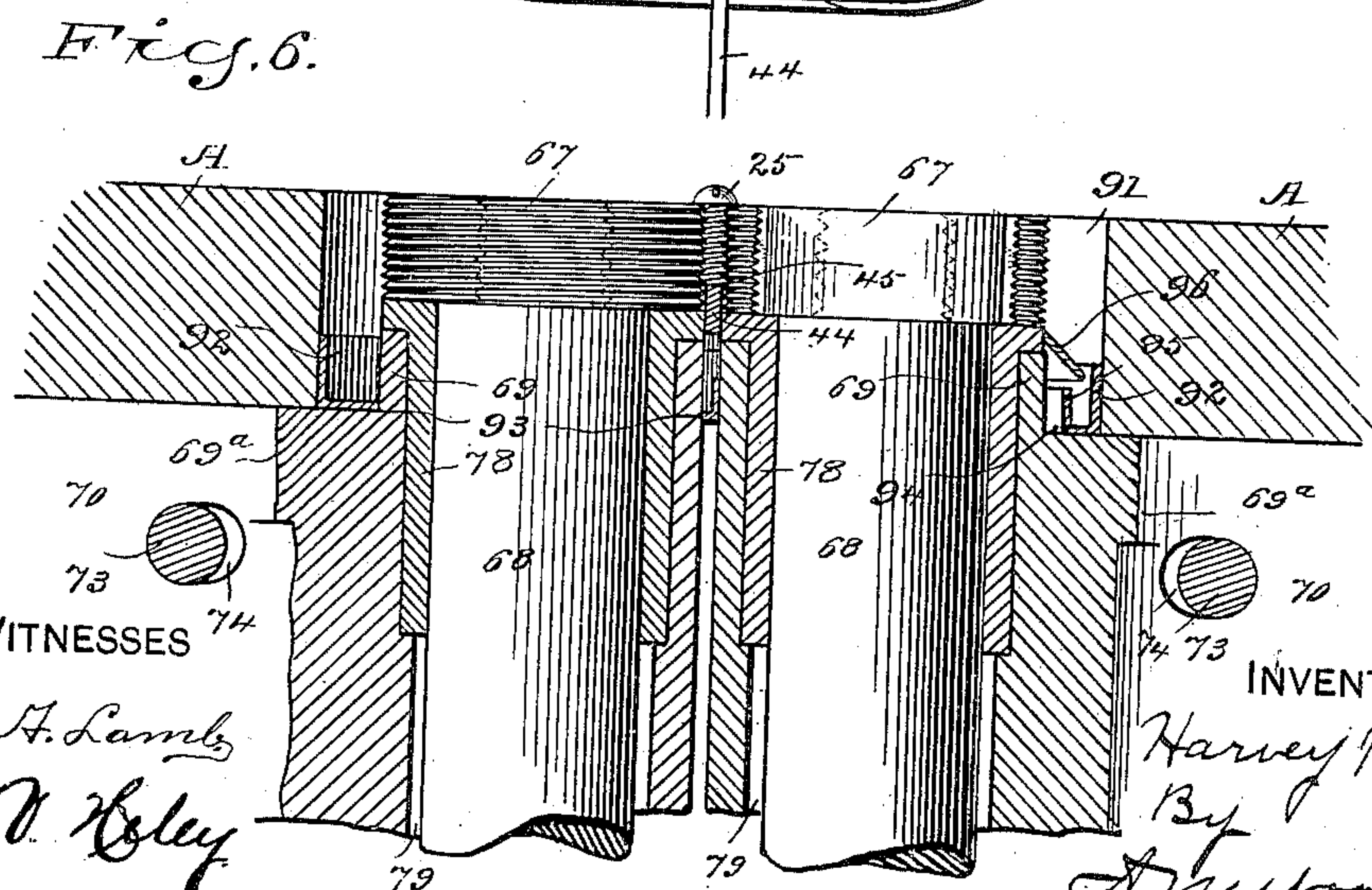
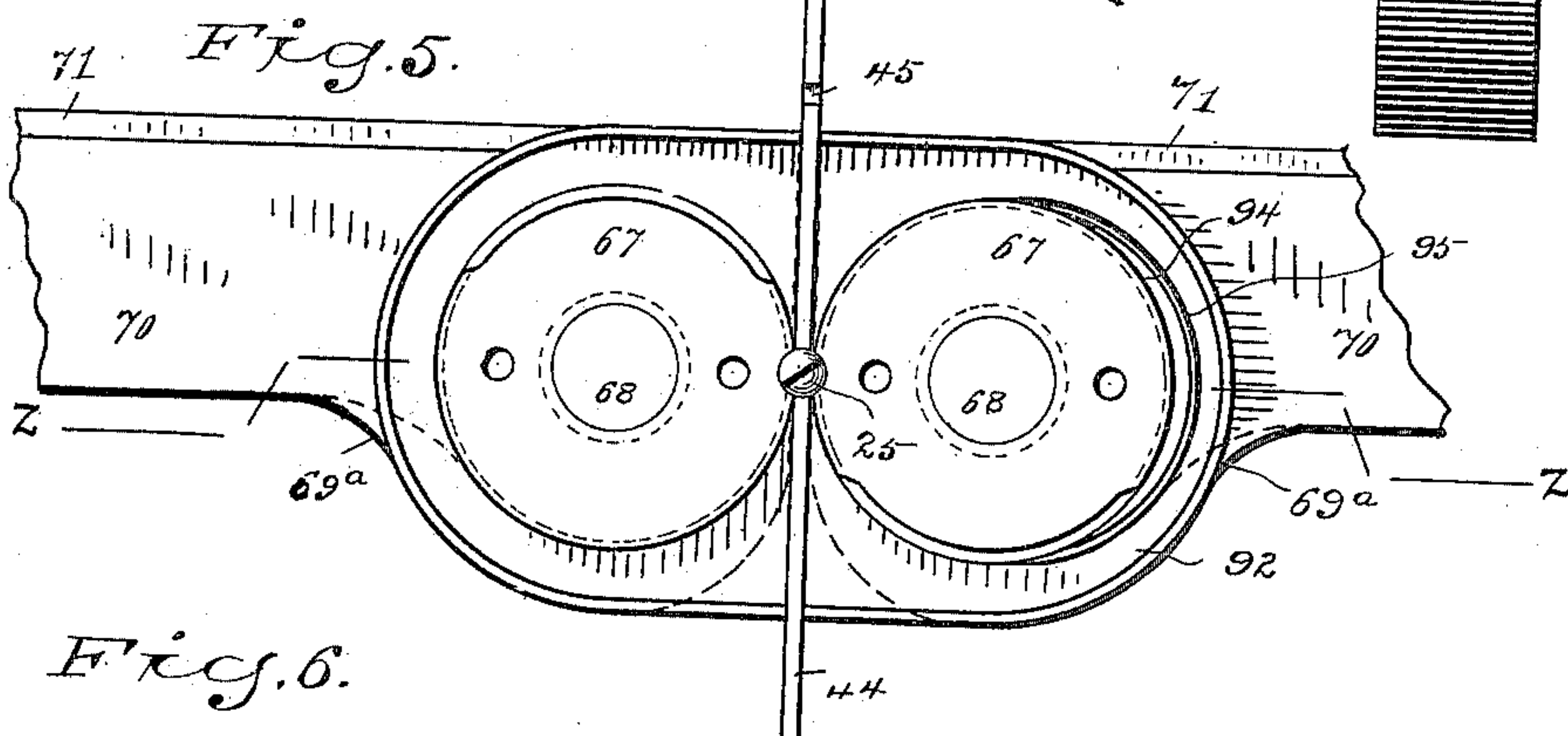
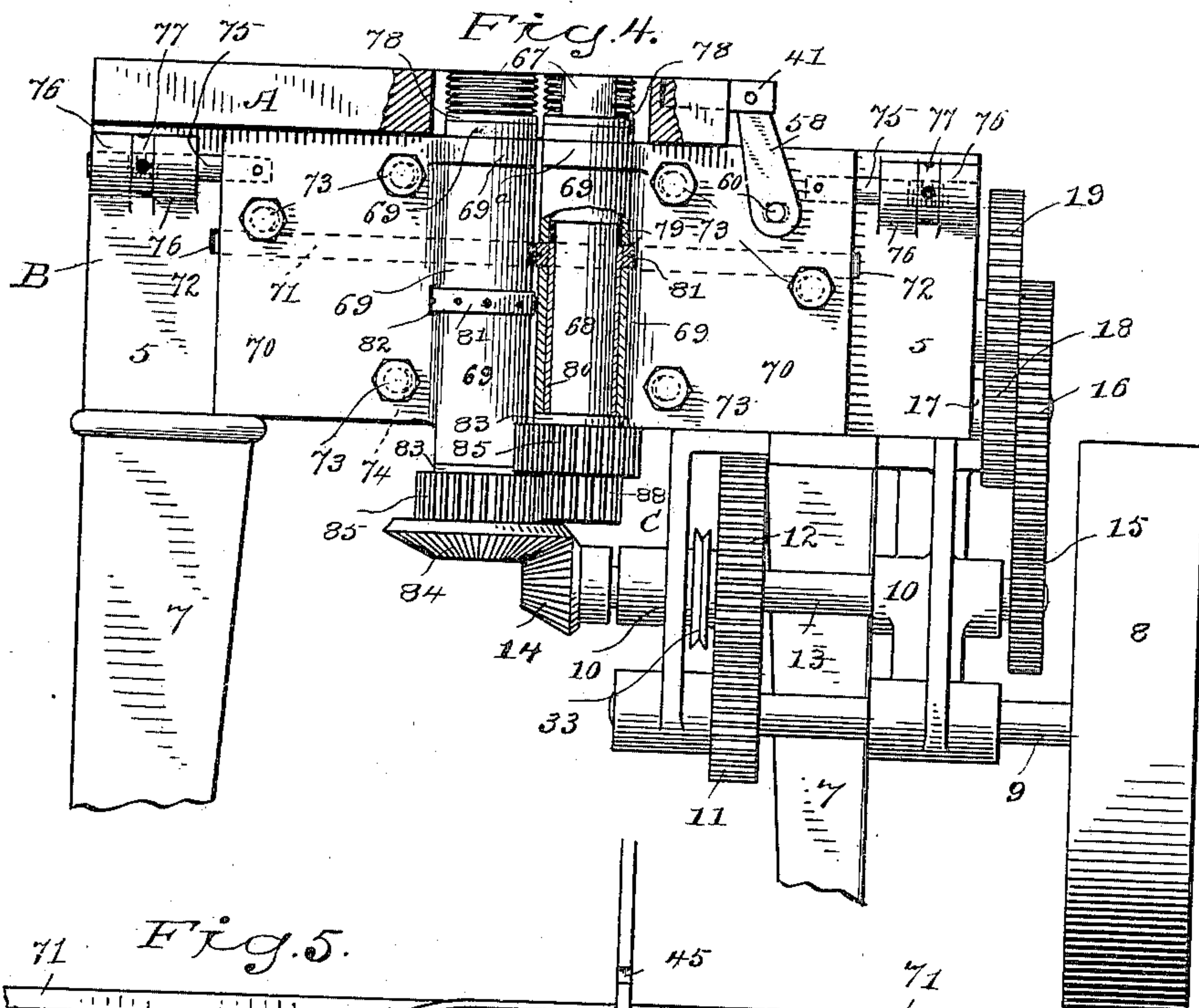
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5 Sheets—Sheet 4.



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Fig. 7.

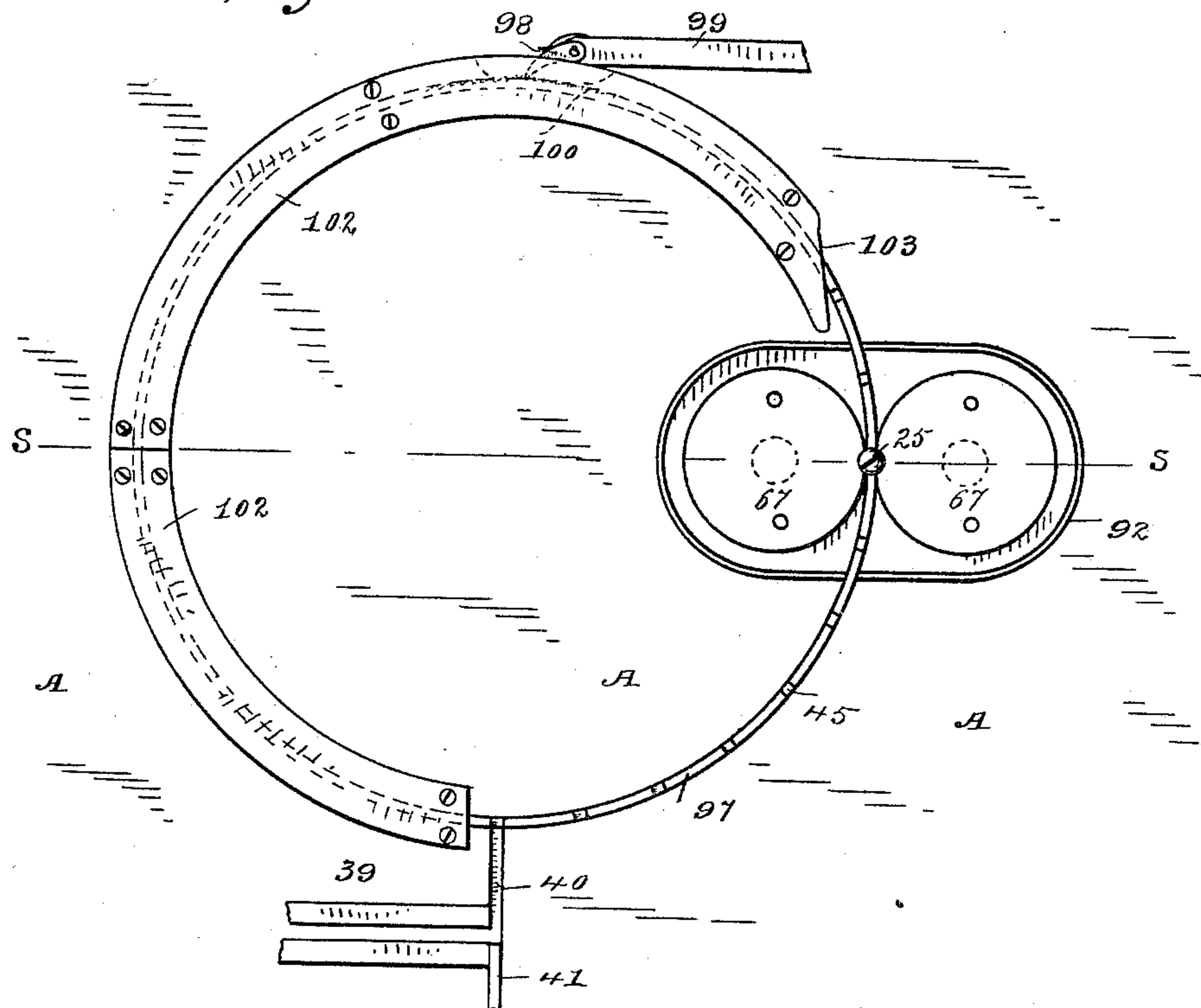
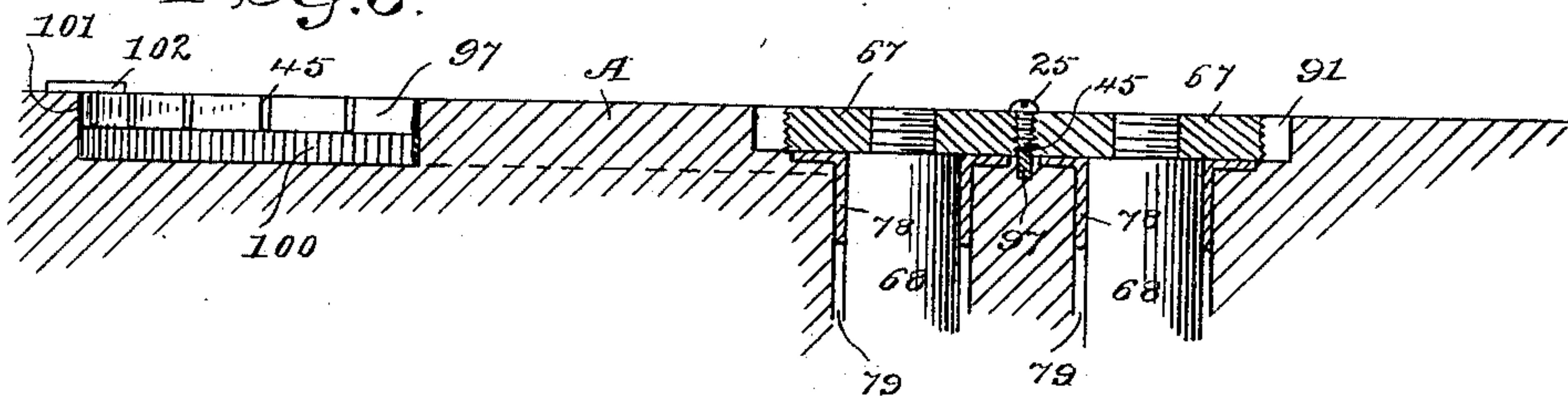


Fig. 8.



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UNITED STATES PATENT OFFICE.

HARVEY HUBBELL, OF BRIDGEPORT, CONNECTICUT.

MACHINE FOR THREADING SCREWS.

SPECIFICATION forming part of Letters Patent No. 622,475, dated April 4, 1899.

Application filed July 27, 1898. Serial No. 686,991. (No model.)

To all whom it may concern:

Be it known that I, HARVEY HUBBELL, a citizen of the United States, residing at Bridgeport, county of Fairfield, State of Connecticut, have invented a new and useful Machine for Threading Screws, of which the following is a specification.

My invention has for its object to produce a machine for threading screws, the principle of operation being that the thread is pressed into the screw-blanks by means of two externally-threaded rotating dies.

In the accompanying drawings, forming part of this specification, Figure 1 is a plan view of the machine complete, with the exception that the slotted finger and slotted way upon one side are removed; Fig. 1^a, a detail view of the cam and levers for operating the slides which carry the blanks from the slotted ways to the holding-slide; Fig. 2, an elevation as seen from the front in Fig. 1, one of the slotted fingers being at the raised and the other at the lowered position; Fig. 2^b, a detail view of the holding-slide and the cam and lever by which it is operated; Fig. 3, an end elevation as seen from the right in Figs. 1 and 2, the bracket and vertical shaft on that side being broken away; Fig. 3^a, a section on the line *xx* in Fig. 3, looking down; Fig. 3^b, an inverted plan view of the two-part idler; Fig. 3^c, a section on the line *yy* in Fig. 3^b; Fig. 3^d, a face view of a cam for operating a bolt to lock the holding-slide; Fig. 4, an end elevation, partly in section, as seen from the left in Figs. 1 and 2, the left hopper and the bracket by which it is carried being removed; Fig. 5, a plan view on an enlarged scale, the bed being removed, showing the drip-pan and illustrating the operation of the threading-dies and the holding-slide; Fig. 6, a section on the line *zz* in Fig. 5 and also including the bed; Fig. 7, a detail plan view illustrating a modification of my invention in which the holding of the blanks while being operated upon is effected by a forwardly-moving ring instead of by a reciprocating slide, and Fig. 8 is a section on the line *ss* in Fig. 7.

A denotes the bed of the machine, and B a casting on which the bed rests and which comprises in the present instance upper and lower plates 1 and 2, end plates 3 and 4, a back plate 5, and a web 6, which lies parallel

with the end plates. This casting rests upon suitable legs 7, the special shape and arrangement of the bed, casting, and legs not being of the essence of my invention. The entire machine is driven by means of a belt (not shown) passing over a pulley 8 on a shaft 9, journaled in brackets 10, depending from the bed.

11 denotes a pinion on shaft 9, which meshes with a gear-wheel 12 on a shaft 13, also journaled in brackets 10. At the inner end of shaft 13 is a bevel-pinion 14, from which the dies are driven, and at the outer end of said shaft is a pinion 15, which meshes with a gear-wheel 16, journaled on a stud 17, extending outward from casting B.

18 denotes a pinion also journaled on stud 17 and fixed to gear-wheel 16, so as to be carried thereby. Pinion 18 meshes with a gear-wheel 19 on a shaft 20, which is journaled in end piece 4 and web 6. Shaft 20 carries a cam 21, which through intermediate mechanism operates the slides which carry the blanks from the slotted ways to the holding-slide, a cam 22, which through intermediate mechanism operates the holding-slide, a cam 23, which through intermediate mechanism acts to lock the holding-slide in operative position, and a belt-pulley 24, from which one of the hoppers is rotated. The headed blanks to be operated upon, which I have indicated by 25, are thrown loosely into a hopper or hoppers, two being shown in the present instance, from which they are picked up by slotted fingers 26, shown as pivoted to ears 27 upon brackets 28. The hoppers, which I have indicated by 29, are carried by vertical shafts 30, journaled in the brackets. At the lower ends of these shafts are belt-pulleys 31, over which belts 32 pass. One of these belts (the right, as seen in Figs. 1 and 2) passes over belt-pulley 24 on shaft 20, the other belt (the left, as seen in Fig. 1) passing over a belt-pulley 33 on shaft 13. (See Fig. 3.) At the center of each hopper and rotating therewith is a cam 34, which is engaged by a roller 35 on an arm 36, one end of which is pivoted to an arm 37, forming part of a bracket 28, the other end of each arm 36 being pivoted to a block 38 upon one of the slotted fingers.

39 denotes inclined slotted ways which extend from ears 27 down to the bed, where they

intersect with slots 40 therein, the slots in the ways being continuous with the slots in the fingers, so that when the latter are raised, as will presently be described, the blanks which have been picked up by the fingers will pass from the fingers into the ways and down the ways by gravity into the slots 40 in the bed. Slots 40, as well as the slots in the fingers and the ways, are of just the required size to receive the shanks of the blanks freely, but not the heads of the blanks, the heads being stopped and resting upon the tops of the fingers and ways and upon the top of the bed while the blanks are in slots 40.

39^a denotes guards over the slots in the inclined ways, which prevent the blanks from being thrown out of the ways, from which they can only pass one at a time into the slots 40 in the bed. When either of the rollers 35 is in engagement with the low part of the corresponding cam 34, the slotted finger will rest upon the bottom of the hopper, as shown at the left in Fig. 1. In this position of the parts the blanks will be picked up by the slotted finger, the shanks of the blanks passing into the slot and the heads thereof resting upon the upper side of the finger. When through the rotation of the hopper and the cam the roller is caused to travel up the incline of said cam, the slotted finger will be raised until when the roller shall have reached the high part of the cam the slotted finger will be at the position shown at the right in Fig. 2, in which position the blanks will slide down the slot in the arm and will continue down the slot in the way which registers therewith until they reach slots 40 in the bed, at which position they are stopped by slides 41, which at their forward position, as shown at the left in Fig. 1, close the slots 40 against the entrance of blanks, but which at their retracted position, as shown at the right in Fig. 1, permit one blank at a time to pass into the slot 40 from the slotted way. As soon as the rotation of a hopper and the corresponding cam causes a roller to pass off from the high part of the cam the slotted finger will drop down again from the position shown at the right in Fig. 2 to the position shown at the left in Fig. 2, and if the blanks previously picked up have passed into the slotted way the finger will pick up additional blanks and when next it is raised will convey them to the slotted way in the same manner as before, it being understood, of course, that any blanks whose shanks do not pass into the slot in the finger will roll off as soon as the finger is raised and blanks whose shanks have passed into the slot, but with the heads downward, will drop out as soon as the finger is raised. It will be noted that arms 36 are connected to blocks 38 by a pin-and-slot connection, as at 42, thereby insuring perfect ease and freedom of movement of the parts. I find in practice that so long as there are blanks enough in the hoppers to cover the bottoms thereof they will be picked up by the slotted fingers

and passed to the slotted ways faster than they can be carried forward by slides 41. Slots 40 intersect with and cross a slot 43 in the bed, which extends at right angles to slots 40 and receives the holding-slide 44. The shape and dimensions of slides 41 and the holding-slide are of course not of the essence of my invention. It will be seen in Fig. 1 that I have made the rear ends of these slides much heavier than the operative ends. This is for the purpose of giving strength and rigidity, so that the slides will move smoothly in use, the slots in the bed being made of just the required size to permit the slides to reciprocate freely, but without lost motion. Slots 40 and 43 are partially covered, and the slides are retained in position therein by means of plates 47, which are secured to the bed by screws. The essential feature of the holding-slide is that it is provided, when two hoppers are used, with two slots 45, each of which is adapted to receive screw-blanks from one of the slotted ways, the slots just receiving the shanks of the blanks, the heads of the blanks resting upon the top of the holding-slide and frequently overhanging the holding-slide, depending, of course, upon the size of the heads upon the blanks. It will be noted (see Fig. 1) that slots 40 not only intersect with but cross slot 43, the portions of slots 40 which lie on the opposite sides of slot 43 from the ways being simply short necks, which I have indicated specifically by 40^a. These necks terminate in openings 46, which are large enough to receive the heads of the blanks freely, the blanks after being operated upon by the dies dropping into these openings and into tubes, by which they are carried away, or into a suitable receptacle placed under the bed, which I have not illustrated, as not being of the essence of my invention.

The special mechanism by which the slides are reciprocated is not an essential feature of my invention.

I have shown the holding-slide as connected to a rod 48, which lies parallel therewith and the other end of which engages an opening in the bed. (See dotted lines, Figs. 1 and 2.) This rod is provided with fixed collars 49 and 50 and with a loose collar 51, which lies between the fixed collars.

52 denotes a lever the upper end of which is shown as bifurcated to straddle rod 48, said lever bearing upon fixed collar 49 and upon loose collar 51, the latter being held closely in engagement with the upper end of said lever by means of a spring 53, which surrounds the rod and the opposite end of which bears against the fixed collar 50. The lower end of lever 52 is pivoted to an ear 54, which extends outward from the bed.

55 denotes a roller carried by lever 52, which bears upon cam 22. (See Fig. 3 in connection with Fig. 2^b.)

56 denotes a spring one end of which is connected to lever 52 and the other to some fixed portion of the machine--in the present in-

stance a pin extending from the casting. (See Fig. 3 and dotted lines, Fig. 2.) This spring acts to retain roller 55 in contact with the periphery of cam 22 and to cause the movement of the holding-slide in one direction, movement of the holding-slide in the opposite direction being produced by the action of the cam on lever 52.

It will be understood from Fig. 2^b that each rotation of cam 22 will act to move the holding-slide to one extreme of its movement, hold it there temporarily, and then permit it to be returned to the other extreme of its movement by spring 56, where it is held temporarily, these movements being indefinitely repeated. The construction of the machine is such that clogging of the screw-blanks is not likely to occur—in fact, is practically impossible. The contingency of clogging, however, is amply provided for, so that should it occur the machine will not be damaged to the slightest extent. For example, should clogging occur when the cam is acting to move the holding-slide toward the right, as seen in Fig. 2^b, spring 53 will yield and loose collar 51 will be moved along the rod, thus permitting the full oscillation of lever 52 to be made without injury or strain to any part of the machine, all movements of the machine continuing as before, except that the feeding of the blanks will be stopped. Should clogging occur when the movement of the holding-slide is in the opposite direction, no harm can result to the machine, as the movement in that direction is not positive, but is produced by the action of spring 56. Slides 41 are shown as operated, respectively, by levers 57 and 58, to which said slides are connected by a pin-and-slot connection, as at 59. (See Fig. 3.) Lever 58 is rigidly secured to a rock-shaft 60, journaled in brackets 61, which are secured to the bed, and lever 57 is mounted to turn on said rock-shaft.

62 denotes a lever rigidly secured to the rock-shaft, and 63 a lever formed integral with or rigidly secured to lever 57 and turning with said lever on the rock-shaft. Levers 62 and 63 are provided with rollers 64, both of which engage the face of cam 21 on shaft 20. The shape of cam 21 will be understood from Fig. 3 in connection with Fig. 1^a. The essential features of said cam are a continuous high part or wall 21^a and a substantially V-shaped notch 21^b in one side of said wall. 65 (see Fig. 3 in connection with Fig. 1^a) denotes springs the ends of which are connected, respectively, to levers 62 and 63 and to fixed points—for example, pins 66. (See Figs. 1 and 3.) The action of these springs, as will be clearly understood from Fig. 3, is to produce the forward movement of slides 41 by drawing the rollers 64 alternately down the inclined sides of notch 21^b in cam 21, the return movement only of said slides being positive, so that should clogging take place from any cause whatever and the forward movement of either of the slides be stopped

no damage whatever could result to the machine, as the movement in that direction is not positive, but is produced by the action of the springs 65.

67 denotes the dies, which are externally threaded and are carried by shafts 68, journaled in hubs 69, formed upon plates 70, which are adapted to be moved toward or from each other on the back plate 5 of casting B. The plates are provided with ribs 71, which engage a groove 72 in the back plate of the casting and are held in operative position by means of bolts 73, which pass through slots 74 in the plates. The plates in use may be moved toward or from each other to adjust the dies by means of rods 75, which are connected to the plates and pass through lugs 76 on plate 5 of the casting. The rods pass freely through the lugs and are provided with threads (see dotted lines, Fig. 4) which are engaged by nuts 77, which lie between the lugs. Rock-shaft 60 also passes through a slot in one of the plates 70, so that adjustment of the plate will in no way effect the adjustment of slides 41, which are actuated from the rock-shaft. The upper ends of shafts 68 are shown as journaled in flanged sleeves 78, which lie in the openings 79 in the hubs, the flanges resting upon the tops of the hubs, which, it will be noted, (see Figs. 4 and 6,) extend above the tops of the plates, the purpose of which will presently be explained. The lower ends of these shafts pass through sleeves 80, (see Fig. 4,) the upper ends of which are threaded and are engaged by nuts 81, which lie in transverse openings 82 in the hubs. It will be apparent from Fig. 4 that should there be lost motion between the dies and the flanges of sleeves 78 the dies may be drawn downward by rotation of nuts 81, the action of which when turned in one direction being to force sleeves 80 downward against collars 83 on the shafts and draw the shafts downward. The dies receive motion through bevel-pinion 14 on shaft 13. This pinion meshes with a bevel gear-wheel 84 on one of the shafts 68, (the left, as seen in Fig. 4,) which also carries a gear-wheel 85, meshing with one part of a two-part idler C, mounted on a stud 86, which depends from casting B, the other part of said two-part idler meshing with a gear-wheel 85 on the other shaft 68.

87 and 88 denote specifically the parts of idler C, said parts being secured together by screws 89, which pass through slots 90 in one of the parts (in the present instance part 88) and engage the other part. The object in constructing the idler in this manner is to permit one part of the idler to be shifted relatively to the other part to give a simple and convenient rotary adjustment of one of the dies, so as to insure that the thread of this die may be conveniently set in proper relation to the thread of the other die. In practice the holding slide may or may not be locked against movement in either direction while

the blank is being operated upon by the dies. I have shown the holding-slide (see Fig. 2^b) as provided with holes 104, which are adapted to be engaged by a locking-bolt 105, (see dotted lines, Fig. 3,) carried by a lever 106, fulcrumed between ears 107 on lower plate 2 of casting B. This lever carries a roller 108, which bears upon the face of cam 23. (See Figs. 3 and 3^d.) The cam is provided in its face with two depressions 23^a, which are adapted to be engaged by the roller. A spring 109, one end of which is connected to the lever, the other to any fixed portion of the machine—for example, a pin 110, extending from the casting—acts to draw the lever toward the cam and to force the locking-bolt into either of the holes 104 in the holding-slide when roller 108 passes into either of the depressions in the cam. As the locking movement is caused by the action of the spring and the unlocking movement by the positive action of the cam, it will be understood that no injury can result to the machine should clogging occur.

91 denotes an elongated opening in the bed, which receives a correspondingly - shaped drip-pan 92, the outer edge of which rests on enlargements 69^a of hubs 69. The bottom of this pan is provided with a round opening 93, which just receives the upper end of one of the hubs 69, (the left hub, as seen in Fig. 6,) and with an elongated opening 94, having a flange 95, which receives the other hub (the right, as shown in Fig. 6) and permits the slight movement of said hub, which may be required in adjusting the dies toward or from each other.

In the drawings I have shown both of the plates 70, which carry the dies, as made adjustable toward or from each other. In practice, however, it is only necessary to adjust one die. I have therefore shown one of the hubs 69 as fitting closely in the bottom of the drip-pan, so that there will be no leakage of oil, and have guarded against leakage of oil at the other opening by placing a flange around it and also by attaching a lip 96, which may be made of metal or leather, to the flange of the sleeve 78 on that side, so that oil dripping from the die will run down the lip and will pass outside of the flange 95, surrounding the opening through which the hub passes, and will deliver the oil into the drip-pan instead of permitting it to work down under the drip-pan and under the bed.

The operation of the entire machine is as follows: Headed blanks in the hoppers are picked up by the slotted fingers, which are raised and lowered by the cams 34, the blanks passing from the slotted fingers into the slotted ways and downward by gravity into the slots 40 in the bed, the slots in the bed being just wide enough to receive the shanks of the blanks loosely and permit them to be moved forward freely by slides 41, the heads of the blanks resting upon the top of the bed on opposite sides of the slots. It will be under-

stood from the drawings that slides 41 move forward alternately. It will be noted, furthermore, that the holding-slide 44, which travels in the slot 43 in the bed-plate, as hereinafore described, is provided with two slots 45, which receive the blanks from slots 40 as they are moved forward by slides 41, the blanks being retained in an upright position in slots 45 in the holding-slide 44 to insure their proper feeding to the holding-dies by reason of said slide 44 lying in the slot 43 in the bed-plate. (See Figs. 1, 2, and 3 in connection with Figs. 5 and 6.) It will be readily understood from the position of the parts in Fig. 1 that a blank received from the right slide 41 has been carried forward by the holding-slide and is being operated upon by the dies and that the blank last operated upon and which was received from the left slot 40 has been returned to a position in alinement with the left slot 40 and has been forced forward by the new blank, which has been moved forward by the left slide 41 out of the holding-slide and across to the opposite side of slot 43, where it is lying in the neck between slot 43 and opening 46, which I have indicated by 40^a. When the machine is in use, there is always a blank lying in each of these necks or short portions of the slots 40, the blanks lying in these necks serving as stops to limit the forward movement of each new blank as it is fed into the slot in the holding-slide by the slide 41 and insuring that the blank will not pass beyond the slot in the holding-slide, thereby preventing the possibility of clogging, and also insuring that all of the blanks will be operated upon by the dies. Each blank as it is received from one of the slots 40 is carried forward by the holding-slide and acted upon by the dies and then carried back to a position in alinement with the same slot 40 from which it was received, while the other slot in the holding-slide is receiving another blank from the other slot 40, each blank after it has been operated upon by the dies and carried back to the slot 40 being forced forward by the new blank and acting as a stop for the new blank and remaining in the neck until the new blank has been carried forward by the holding-slide, been operated upon by the dies, and returned to the slot 40, from which it was received, at which instant a third blank will be received from the slot 40 on that side, will force the blank that has just been operated upon into the neck of the slot 40, and the blank that has been operated upon will force the blank last previously operated upon into the opening 46, the operations upon blanks received from the right and left hoppers and the corresponding slotted fingers and slotted ways being alternate.

Any clogging of the blanks is rendered practically impossible owing to the fact that the slides 41 act as stops to prevent the passage of blanks from the slotted ways into slots 40, except when the slides 41 are in the

retracted position; but one blank at a time therefore can pass into the slots 40 under any circumstances, as the new blank must push the blank already in the holding-slide out into the neck 40^a, where it will rest, and the forward movement of slide 41 is only just sufficient to place the new blank in the slot 45 in the holding-slide.

In the modified form in Figs. 7 and 8 instead of a reciprocating holding-slide operating in connection with two hoppers and two slotted fingers and slotted ways I use a forwardly-moving holding-ring 97, this ring being provided with a series of slots 45 and receiving intermittent forward movement from a pawl 98, carried by a reciprocating slide 99 and engaging a circular rack 100 on the holding-ring. The holding-ring in practice works in a circular slot 101 in the bed and is shown as partly covered by plates 102. The operation of this form is the same as the other, with the exception of the blank-holding mechanism. Each blank as it is received from the slotted ways passes into slot 40 and is moved forward by slide 41 into a notch 45 in the holding-ring and then carried forward by intermittent movement until it has been acted upon by the dies, each blank remaining in the slot in the holding-ring until it is expelled by the engagement of the head thereof with an incline 103 at the end of one of the plates 102, by which it is expelled from the holding-ring and drops into a suitable receptacle. (Not shown.)

Having thus described my invention, I claim—

1. In a screw-threading machine, the combination with a pair of externally-threaded rotating dies, of mechanism for feeding the blanks, and a device which receives the blanks from said feeding mechanism, and means for operating said device whereby it is caused to carry the blanks between said dies, hold them in a stationary position between the dies during the threading operation and then remove them.

2. In a screw-threading machine, the combination with a pair of externally-threaded rotating dies, of mechanism for feeding the blanks, a device which receives the blanks from said feeding mechanism, means for operating said device whereby it is caused to carry the blanks between said dies, hold them in a stationary position between the dies during the threading operation and then remove them, and means for locking said device in a stationary position during the threading operation.

3. In a screw-threading machine, the combination with a pair of externally-threaded rotating dies, of inclined slotted ways down which the blanks pass, a slide to feed each blank forward from said slotted ways, and a device which receives said blank from the feed-slide, carries it to the threading-dies, holds it in position to be operated upon, and then removes it from between the said dies.

4. The combination with a pair of externally-threaded rotating dies, a device for holding the screw-blanks in position to be operated upon, a rotating hopper having a cam 34, a pivoted slotted finger by which the blanks are picked up, an inclined slotted way which receives the blanks from the finger, an arm 36 one end of which is pivoted to a fixed support, the other to the slotted finger, said arm carrying a roll which engages the cam so that each rotation of the hopper and cam will raise and lower the slotted finger and a slide 41 by which the blanks received from the slotted way are fed forward and delivered to the device for holding the blanks while they are being operated upon by the dies.

5. In a screw-threading machine, the combination with a pair of externally-threaded rotating dies, of a device which receives the blanks, carries them to a position between the dies, holds them during the threading operation, and then removes them from between said dies.

6. The combination with a pair of externally-threaded rotating dies, of a holding-slide having two slots which receive blanks, two complete feeding mechanisms and mechanism for moving the holding-slide forward to place a blank in position to be operated upon by the dies and then moving it back to the point from which the blank was received, one feeding mechanism acting to deliver a blank to the holding-slide at the instant that the blank received from the other feeding mechanism is being operated upon by the dies.

7. In a machine of the character described the combination with a reciprocating holding-slide having slots, of dies by which the blanks are threaded while held by the slide and feeding mechanism by which the blank is delivered to one of the slots while the blank in the other slot is being operated upon by the dies.

8. In a screw-threading machine, the combination with threading-dies, of inclined slotted ways down which the blanks are fed, a slide to carry the blanks to the threading-dies, hold them during the threading operation, and then remove them from the action of said dies, and slides which receive the blanks from said slotted ways and deliver them to the said first-mentioned slide.

9. In a screw-threading machine, the combination with a pair of rotating threading-dies, of a slide to present the blanks to the said dies and hold them in position to be operated upon, slides on either side of said dies which deliver blanks to said holding-slide alternately, and inclined slotted ways down which the blanks pass to said last-mentioned slides.

10. In a screw-threading machine, the combination with a pair of rotating threading-dies, of a slide adapted to reciprocate between said dies and hold the blanks in position to be operated upon and then remove them from between the dies, slides on either side of said dies at right angles to the first-named slide

which deliver blanks to said holding-slide alternately, and inclined slotted ways down which the blanks pass to the said holding-slide.

5 11. The combination with the dies, and the ways, of a bed having a slot 43 and slots 40, which extend from the ways across slot 43 and terminate in openings 46 leaving necks 40^a between slot 43 and the opening, a recip-
10 rocating holding-slide in slot 43 which is provided with slots to receive the blanks and slides 41 in slots 40 which carry the blanks from the ways to the holding-slide.

12. The combination with the dies and the
15 ways, of the bed having a slot 43, a reciprocating holding-slide in said slot having slots to receive blanks, slots 40 in the bed which extend from the ways across slot 43 and terminate in openings 46 leaving necks between
20 said openings and slot 43 and alternately-reciprocating slides 41 in slots 40 which carry each blank to the holding-slide by which it is carried forward, operated upon by the dies and returned to alinement with the slide 41
25 from which it was received, the second blank which is moved into the slot in the holding-slide by a slide 41 acting to force the blank that has been operated upon out of the slot and into the neck and the blank that is forced
30 into the neck acting to force the blank last previously acted upon into opening 46.

13. In a screw-threading machine, the combination with a pair of rotating threading-dies, of a slide to present blanks to said dies,
35 hold them in position to be operated upon, and then remove them from the dies, of slides to carry blanks to said holding-slide, cams for imparting return movement to said slides, and springs to force them forward on their
40 blank-feeding movements, so as that should clogging of the blanks occur said springs will yield and prevent injury to the machine.

14. The combination with the dies, the holding-slide having two slots which receive
45 blanks and mechanism whereby a blank is supplied to each slot while the blank in the other slot is being operated upon by the dies, of cam 22, lever 52 which engages the cam and is connected with the holding-slide and
50 a spring 56 acting to draw said lever toward the cam and produce the forward movement of the slide, the return movement being produced by the cam.

15. The combination with the dies, the reciprocating holding-slide having two slots,
55 and slides 41 which carry blanks to the slots in the holding-slide alternately, of cam 21 having in one side a notch 21^b, rock-shaft 60, levers 57 and 58 pivoted to slides 41, one of said levers being rigidly secured to the rock-shaft the other mounted to turn thereon, levers 62 and 63 which engage said cam, one of said levers being rigidly secured thereto, the other being connected to lever 57 and
60 mounted to turn on the rock-shaft and springs 65 acting to hold levers 62 and 63 in contact

with the cam and produce the forward movements of slides 41.

16. The combination with the dies, and a reciprocating holding-slide having two slots
70 to receive blanks, of mechanism for feeding blanks to said slots alternately and mechanism for locking the holding-slide at either extreme of its movement.

17. The combination with the dies, the reciprocating holding-slide having holes 104
75 and two slots which receive blanks and mechanism whereby a blank is supplied to each slot while the blank in the other slot is being operated upon by the dies, of cam 23 having
80 depressions 23^a, lever 106 having a locking-bolt 105 adapted to engage either of the holes in the slide and a spring 109 acting to hold the lever in contact with the cam and to produce the forward movement of the locking-
85 bolt.

18. In a screw-threading machine, the combination with a pair of rotating threading-dies, of a slide which presents the blanks to
90 said dies and holds them in position to be operated upon, a cam to move said slide in one direction, a spring, as 56, which moves the slide in the opposite direction, and a spring, as 53, opposed to said cam and adapted to yield if abnormal resistance to the action of
95 the cam due to clogging of the blanks occurs, and thus prevent breakage of the machine.

19. The combination with the dies and the holding-slide, of cam 22, lever 52 which engages the cam and is connected with the slide,
100 a spring 56 acting to draw said lever toward the cam and a spring 53 interposed between the lever and the slide substantially as described for the purpose specified.

20. The combination with the dies and the holding-slide, of rod 48 attached to said slide,
105 fixed collars 49 and 50 and loose collar 51 on said rod, cam 22, lever 52 bifurcated to straddle rod 48 between fixed collar 49 and loose collar 51, a spring 56 acting to draw the lever
110 toward the cam and a spring 53 which encircles the rod and bears against fixed collar 50 and the loose collar.

21. In a screw-threading machine, the combination with the main supporting-frame, of
115 plates mounted on said frame, means for adjusting said plates toward and from each other, hubs carried by said plates, rotary die-shafts mounted in said hubs, threaded dies carried by said shafts, flanges on the ends of
120 said shafts opposite said dies, vertically-movable sleeves surrounding the lower ends of said shafts and bearing against said flanges at the lower ends of said shafts, and nuts carried by said hubs and engaging said sleeves
125 by means of which said sleeves may be given a vertical movement to adjust said shafts and dies and take up lost motion.

22. In a screw-threading machine, the combination with the main supporting-frame, of
130 vertically-arranged plates mounted on said frame, means for adjusting said plates hori-

zontally on the frame, hubs formed integral with said plates, vertical shafts mounted in said hubs, externally-threaded dies carried by said shafts, threaded sleeves through which said shafts pass, nuts to move said threaded sleeves vertically and adjust said shafts and their dies to take up lost motion, and means for presenting a screw-blank to said dies to be operated upon.

23. The combination with the dies, shafts 68 by which they are carried and which are provided with collars 83, plates 70 having hubs 69 provided with vertical openings 79 and transverse openings 82, sleeves 80 threaded at their upper ends and bearing upon the collars and nuts 81 lying in openings 82 and engaging the threads on sleeves 80 whereby the shafts and dies may be adjusted to take up lost motion.

24. The combination with the dies and shafts 68 by which they are carried and which are provided with pinions 85, of driving mechanism whereby motion is communicated to one of said shafts and a two-part idler intermediate the pinions 85 whereby motion is communicated from one shaft to the other, the parts of said idler being adjustable relatively to each other so that one of the dies may be given rotary adjustment in order to place the threads of the dies in proper relation to each other.

25. The combination with the dies and shafts 68 having pinions 85, of idler C intermediate said pinions, said idler comprising independent parts each part engaging one of the pinions and screws passing through slots in one of said parts and engaging the other

part, so that one part of said pinion may be shifted relatively to the other part to give rotary adjustment to one of the dies.

26. The combination with plate 70 having hubs 69, the dies, and shafts 68 by which they are carried and which are journaled in the hubs, of the bed having an opening 91, a drip-pan in said opening having in its bottom a round opening which receives one of the hubs closely and an elongated opening having a flange 95 which receives the other hub.

27. The combination with plate 70 having hubs 69, the dies, shafts 68, flanged sleeves 79 resting upon the tops of the hubs in which the shafts are journaled and upon which the dies rest, the bed having an opening 91, a drip-pan in said opening having in its bottom a round opening which receives one of the hubs closely and an elongated opening having a flange 95 which receives the other hub and a lip 96 depending from the flanged sleeve so that oil from the dies will be caught by the drip-pan.

28. The combination with the dies and shafts 68 by which they are carried, of plates 70 having slots 74, hubs 69 in which the shafts are mounted and ribs 71, plate 5 having a groove to receive said ribs, bolts passing through the slots in plates 70 and engaging plate 5 and means for moving plates 70 toward or from each other on plate 5.

In testimony whereof I affix my signature in presence of two witnesses.

HARVEY HUBBELL.

Witnesses:

A. M. WOOSTER,

A. M. WITHERELL.