

No. 724,699.

PATENTED APR. 7, 1903.

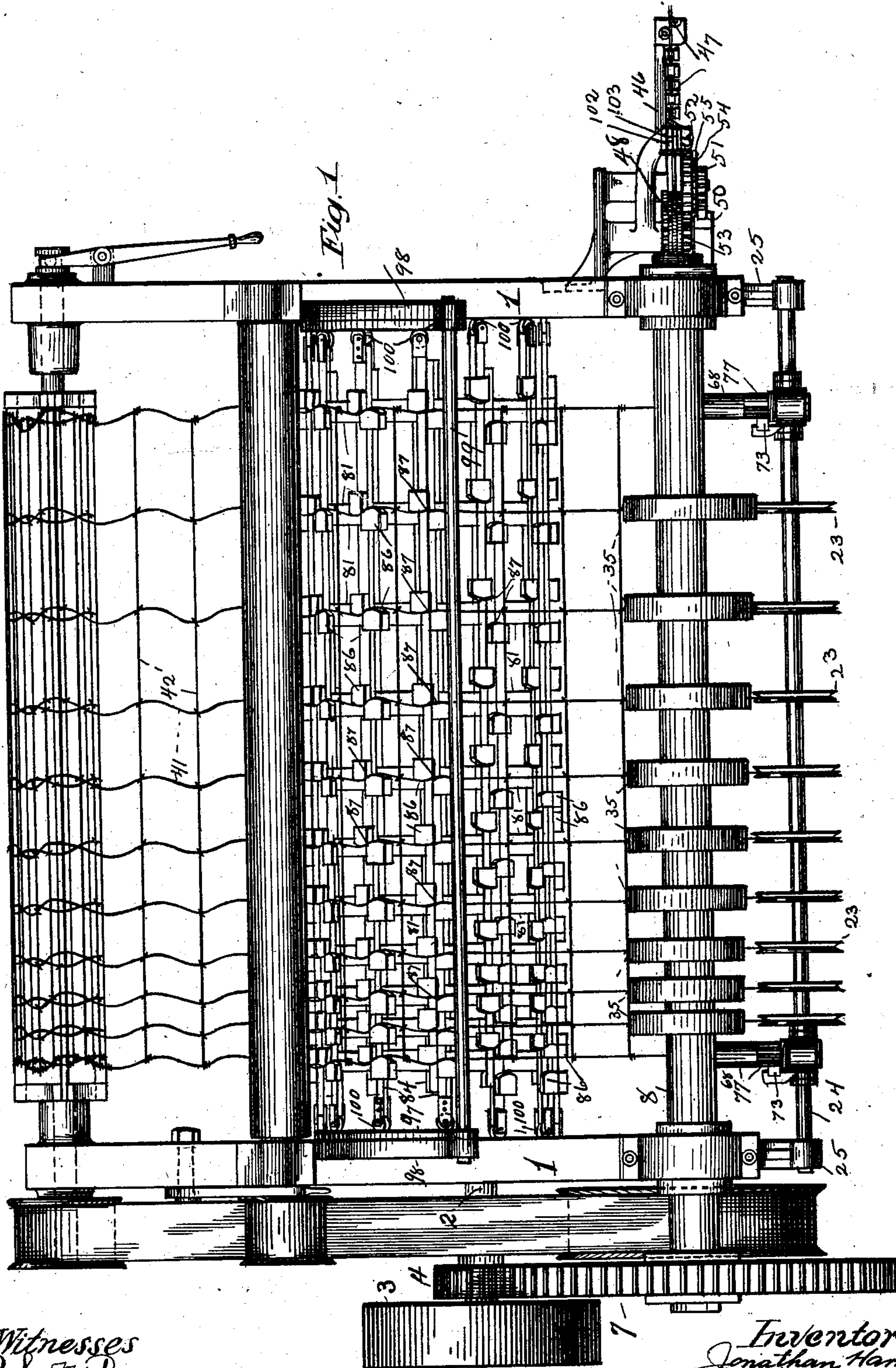
J. HARRIS.

WIRE FENCE MACHINE.

APPLICATION FILED MAR. 3, 1902.

NO MODEL.

7 SHEETS—SHEET 1.



Witnesses
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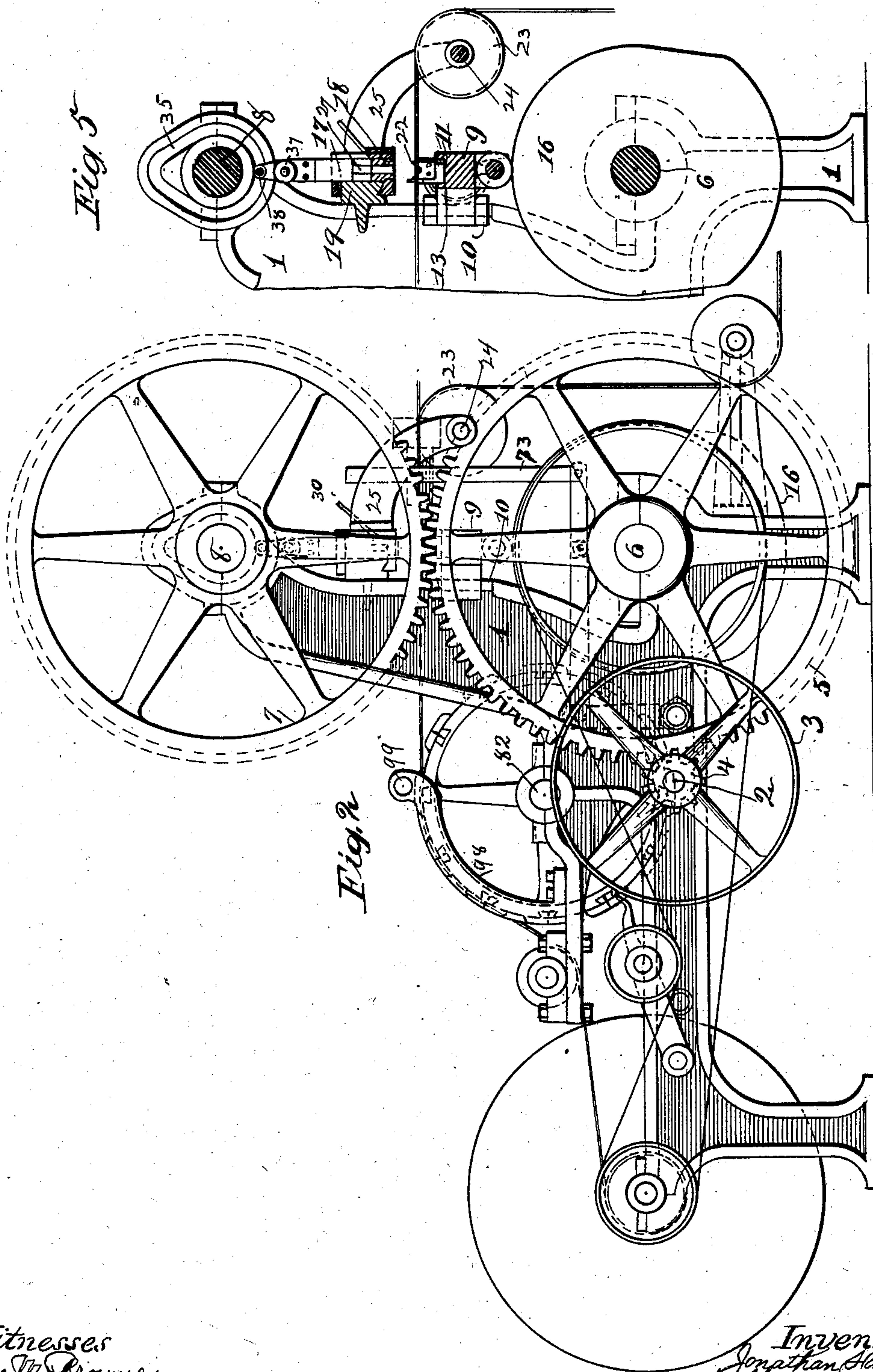
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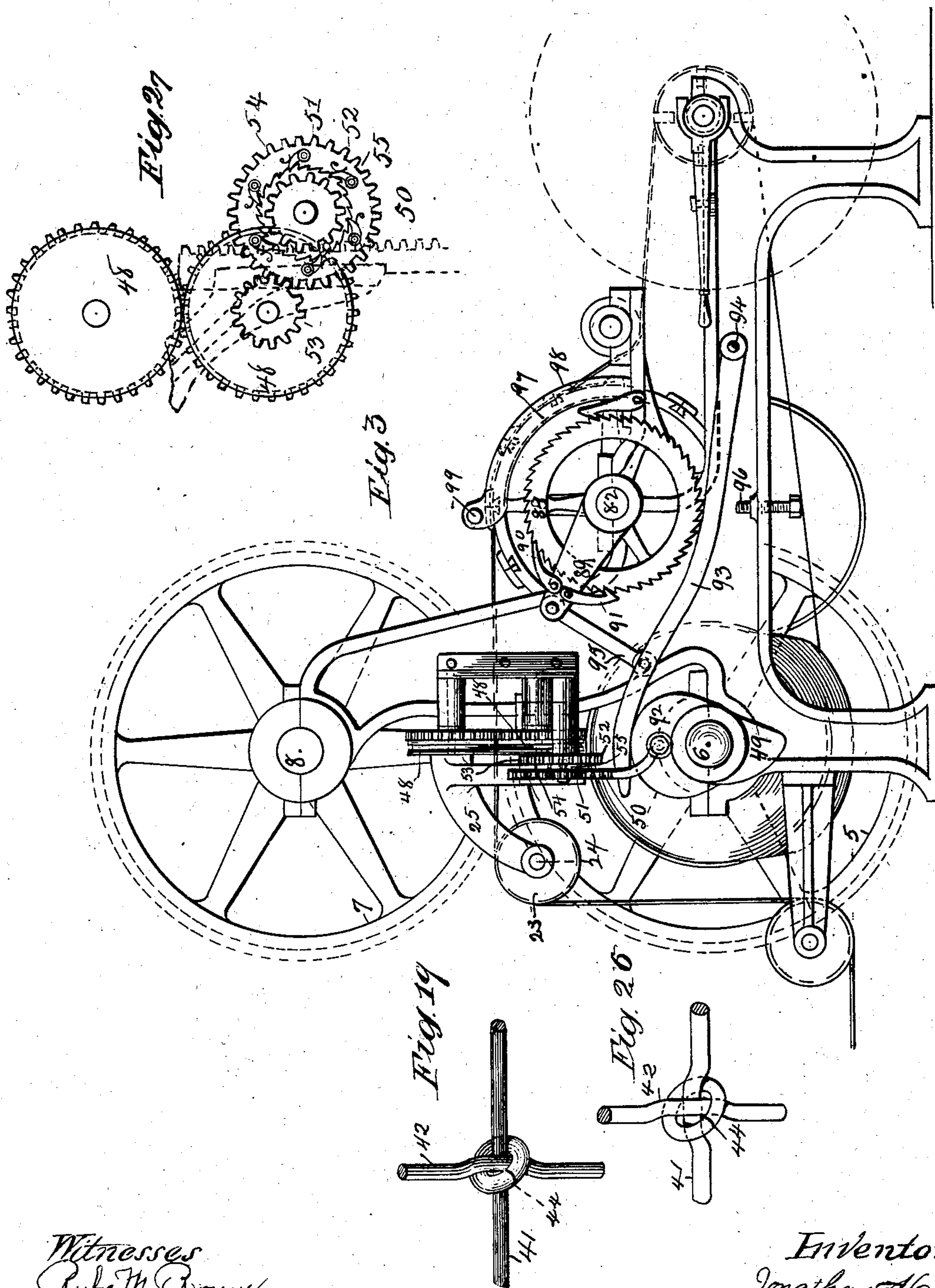
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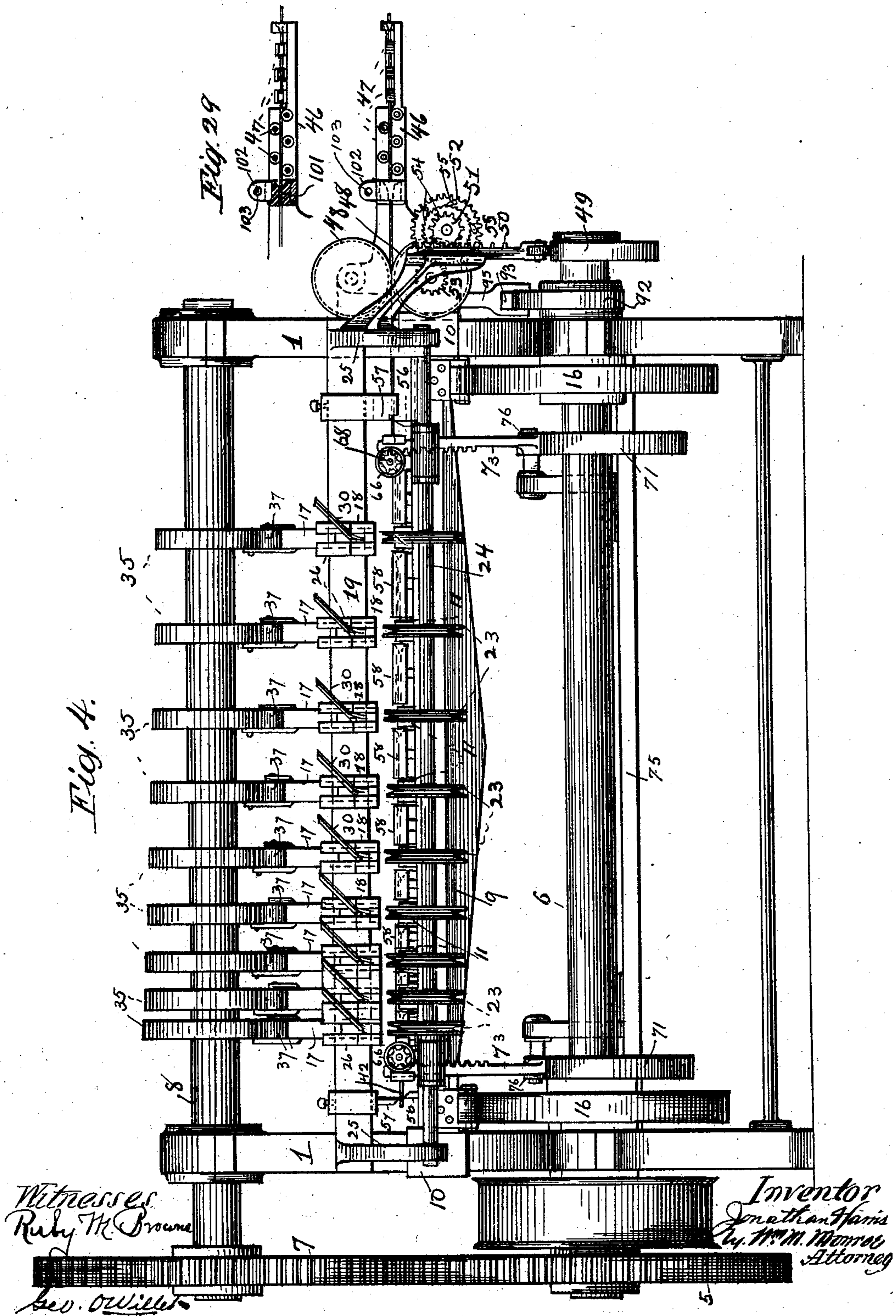
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7 SHEETS—SHEET 4.



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7 SHEETS—SHEET 5.

Fig. 6.

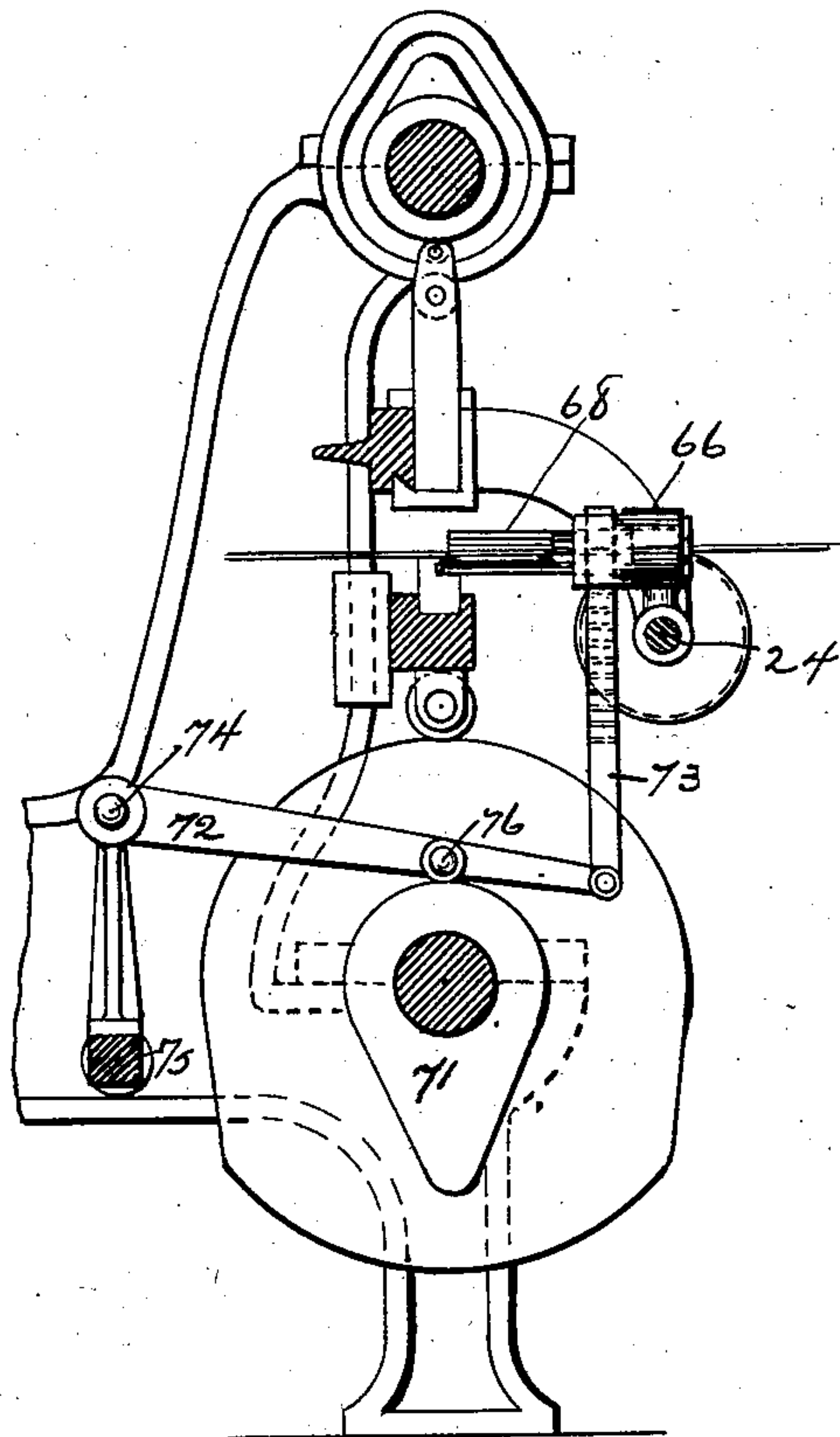


Fig. 7

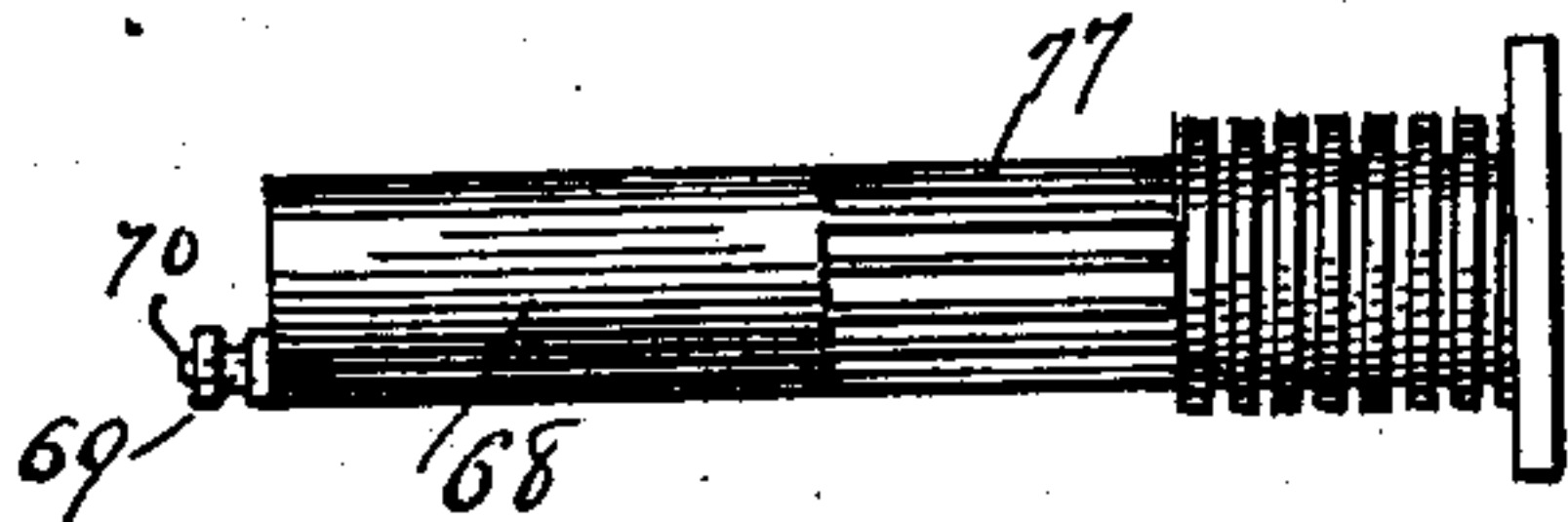


Fig. 8

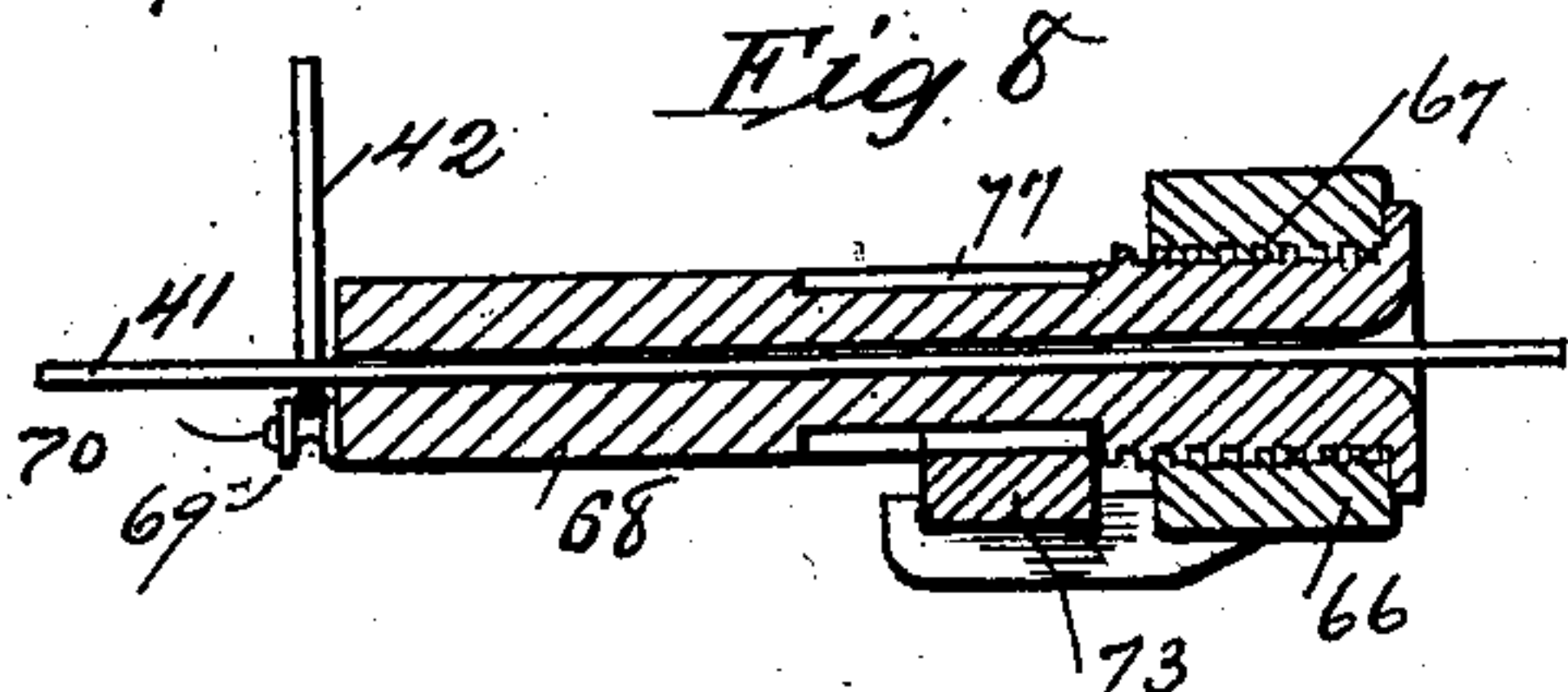


Fig. 9

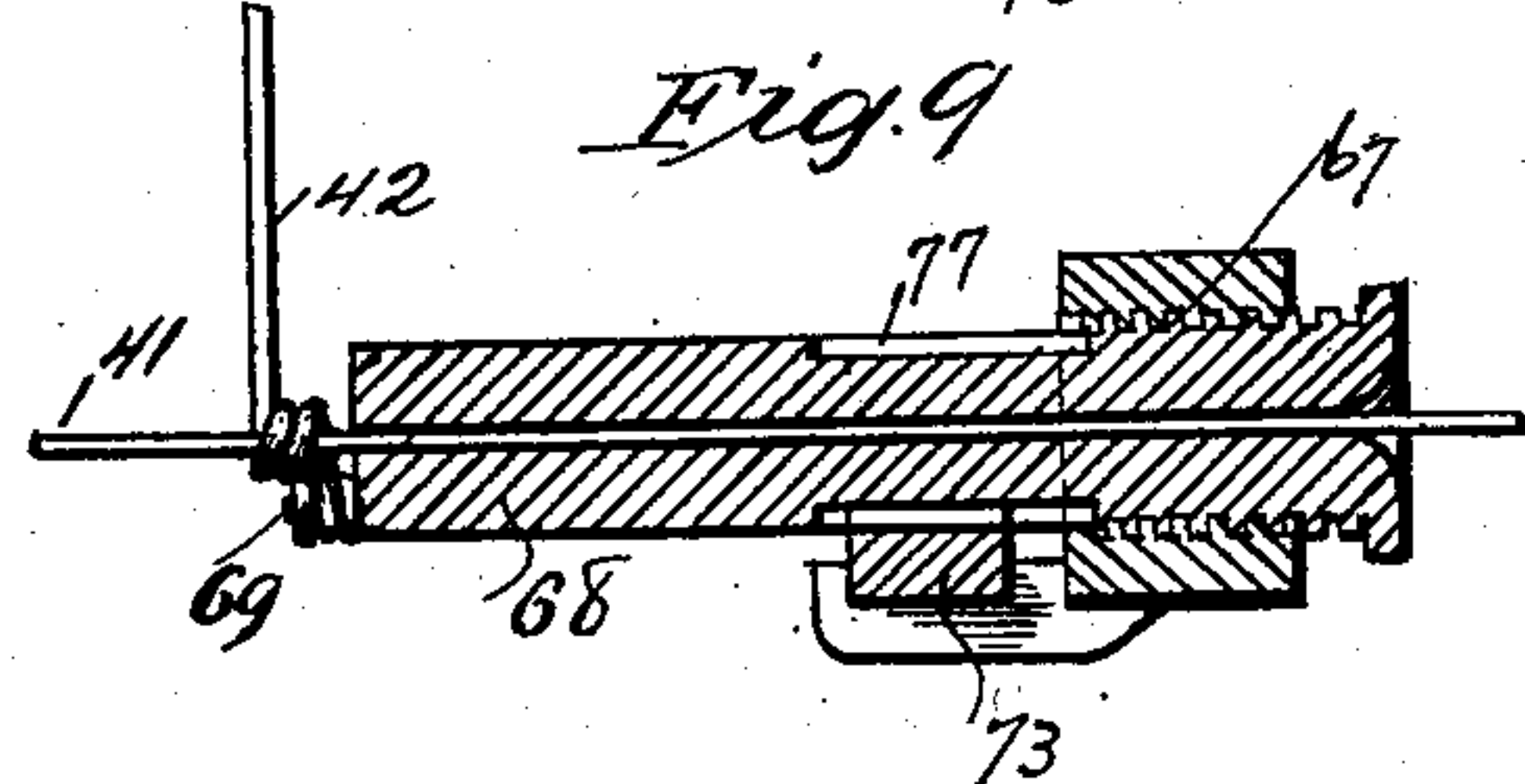
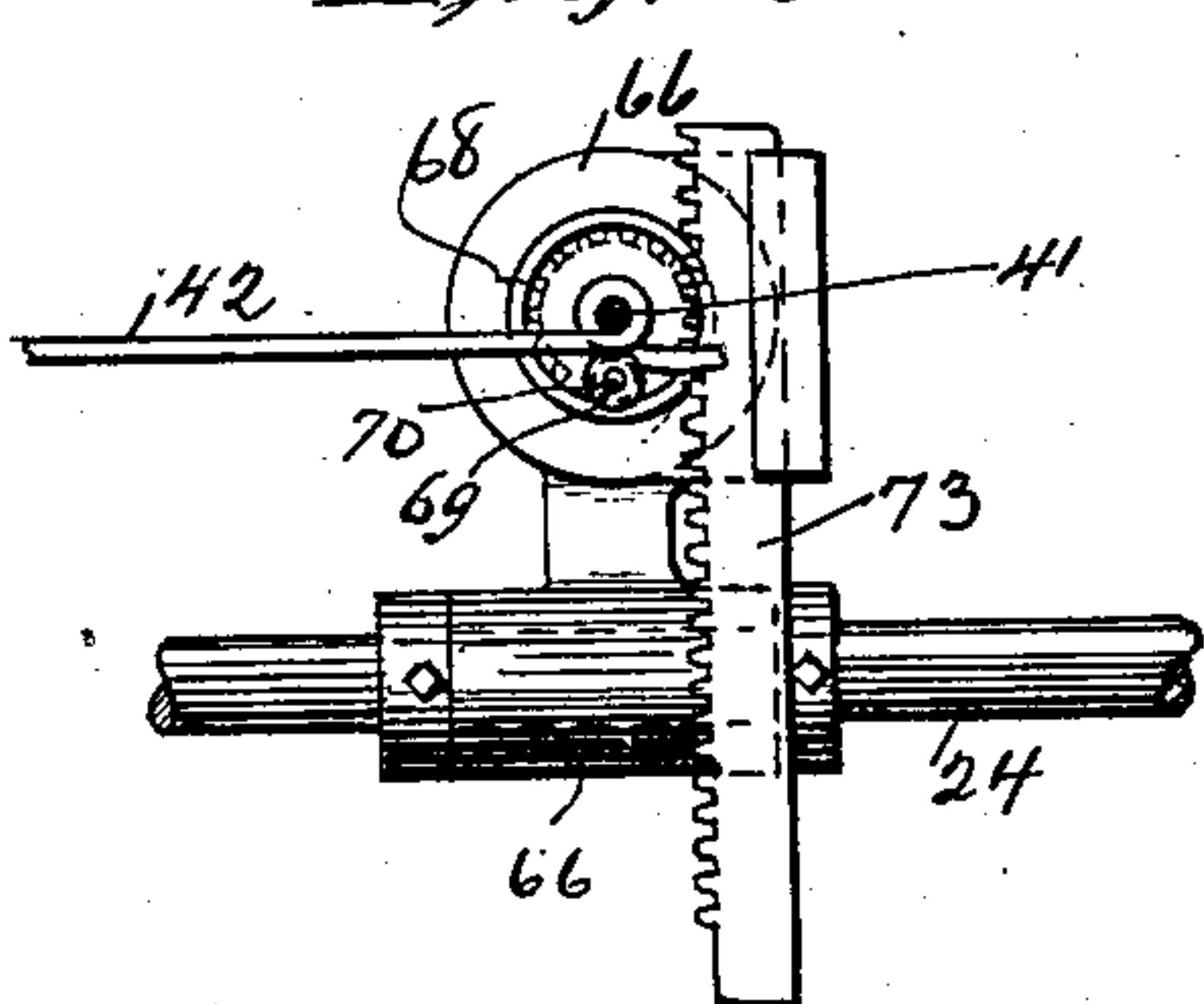


Fig. 10



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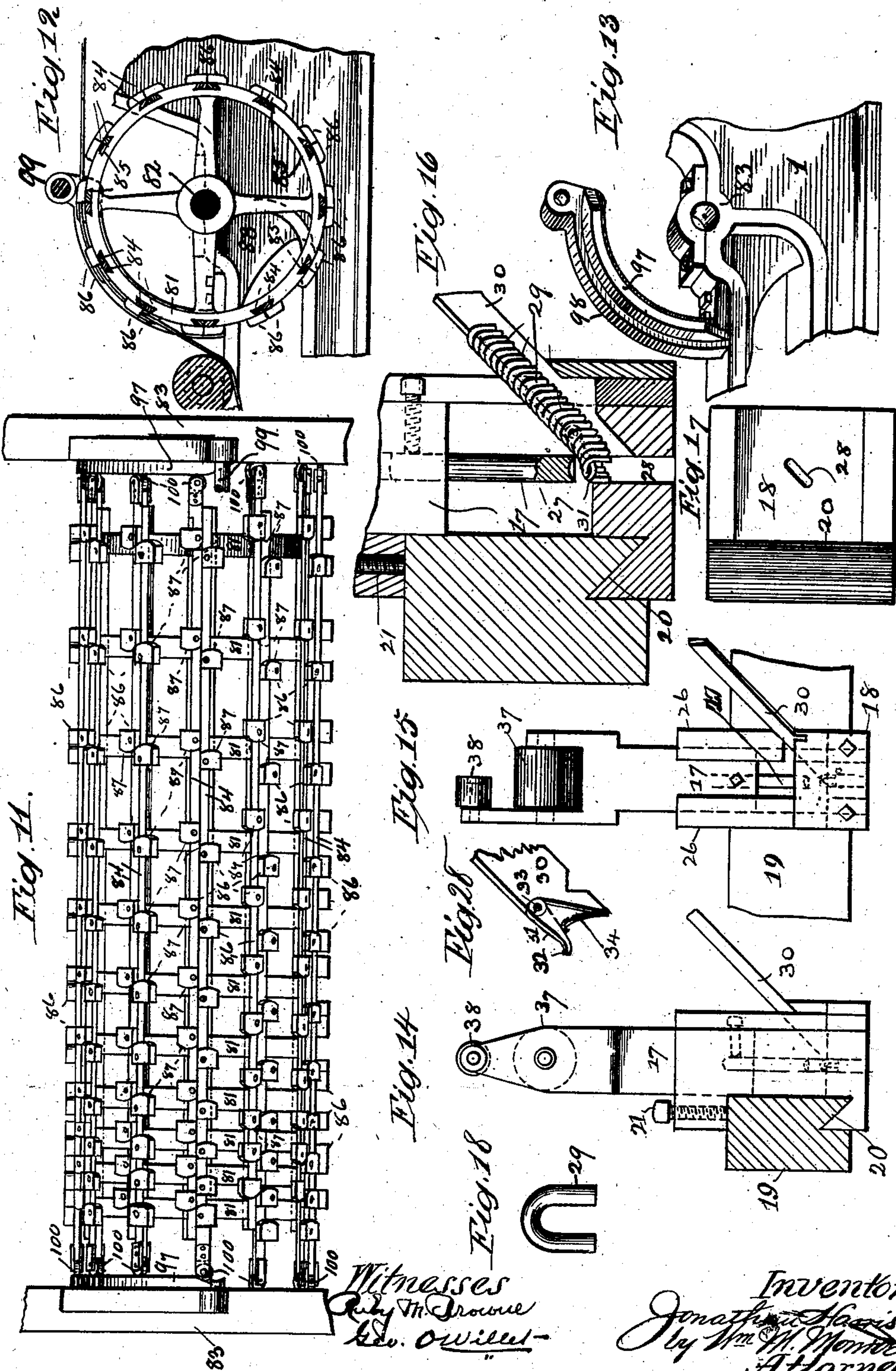
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7 SHEETS—SHEET 6.



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NO MODEL.

7 SHEETS—SHEET 7.

Fig. 20

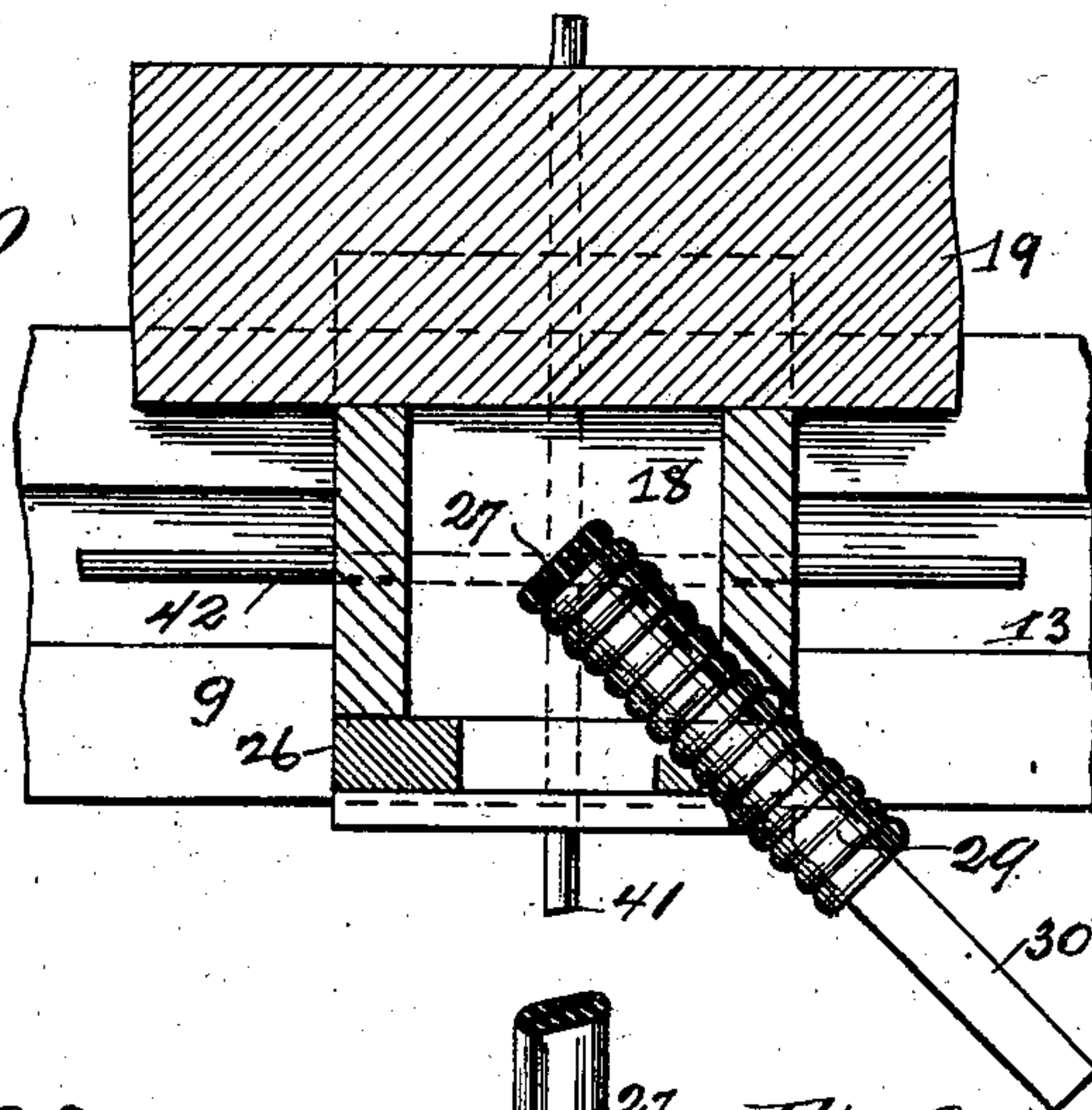


Fig. 23

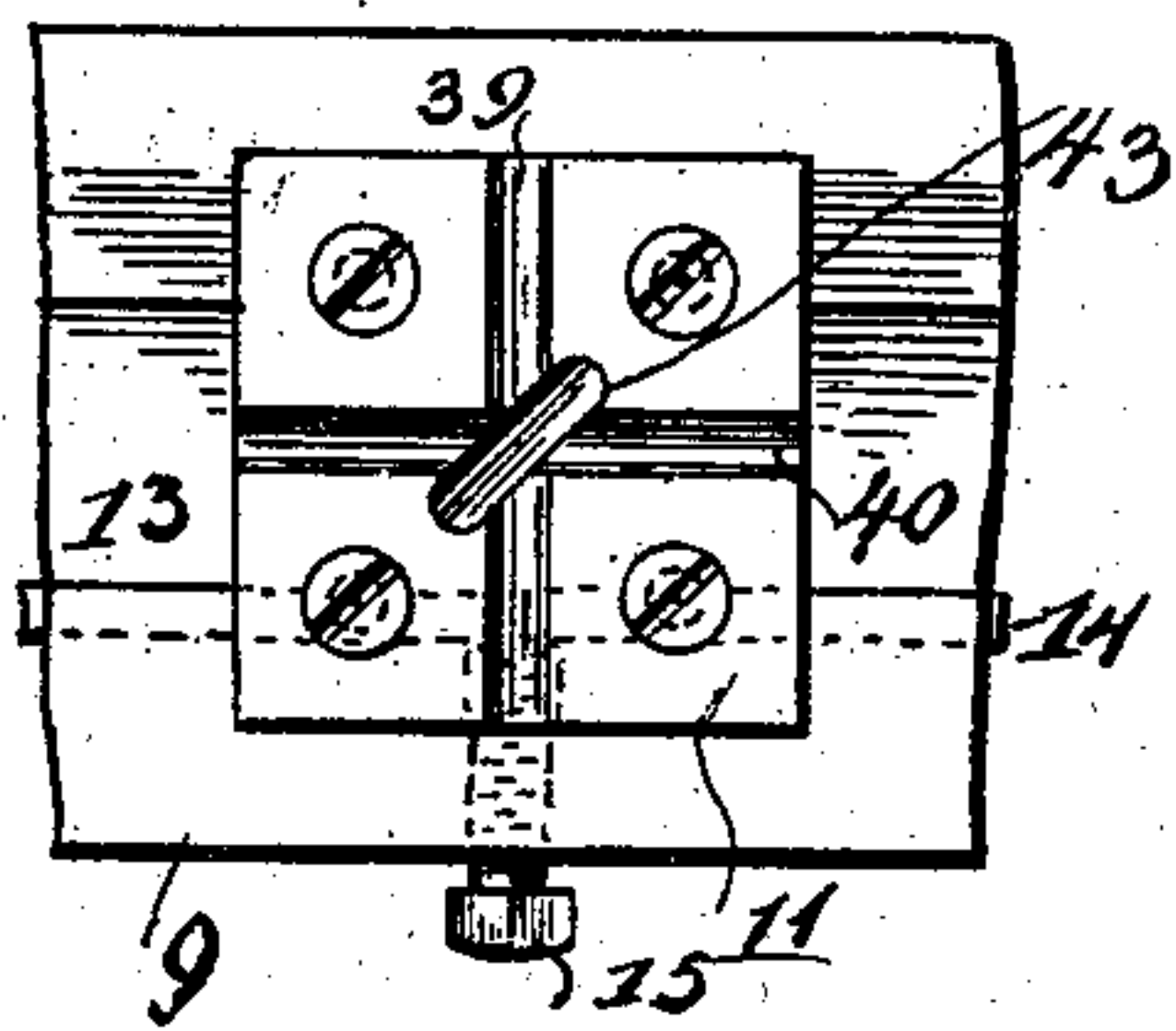


Fig. 21

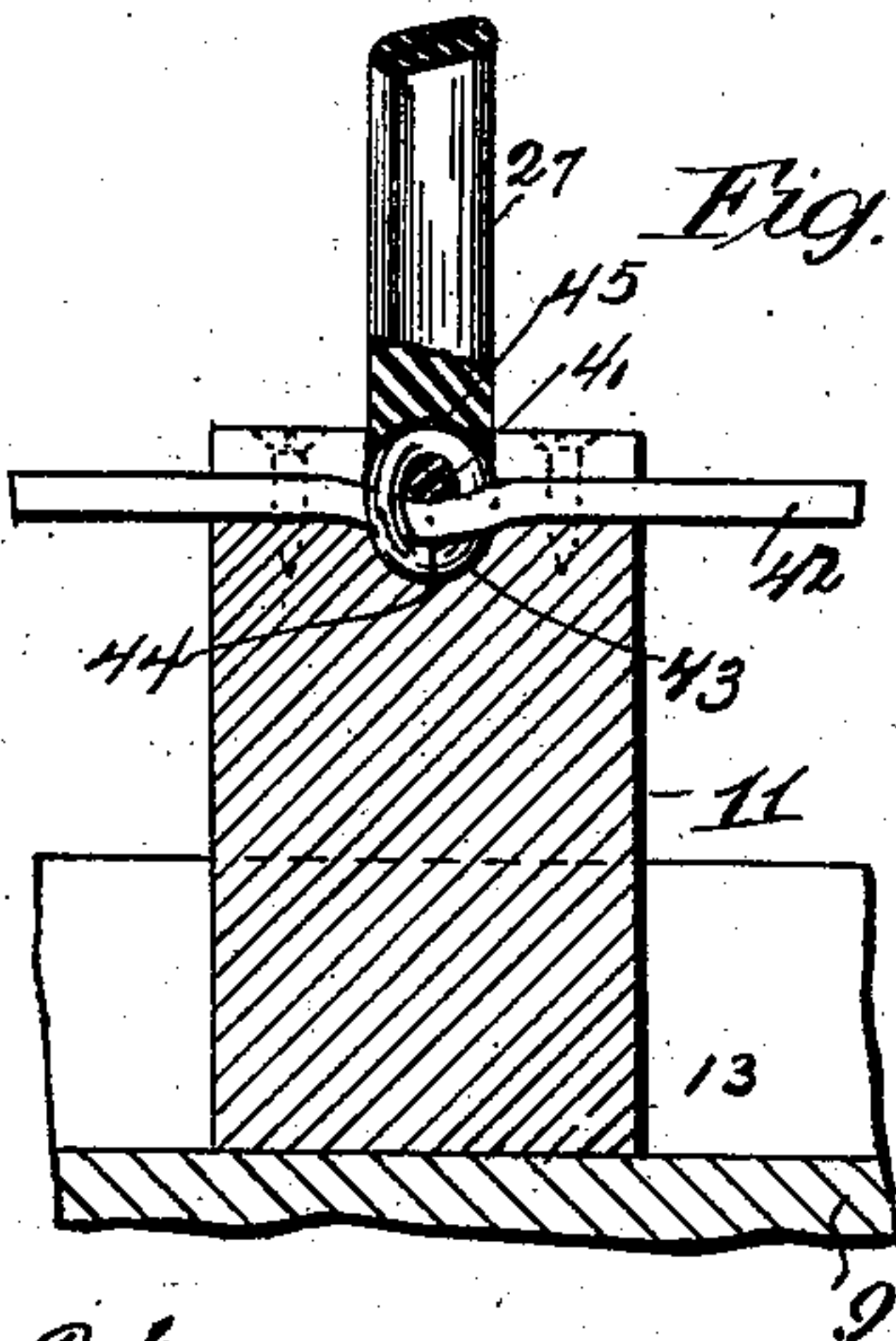


Fig. 22

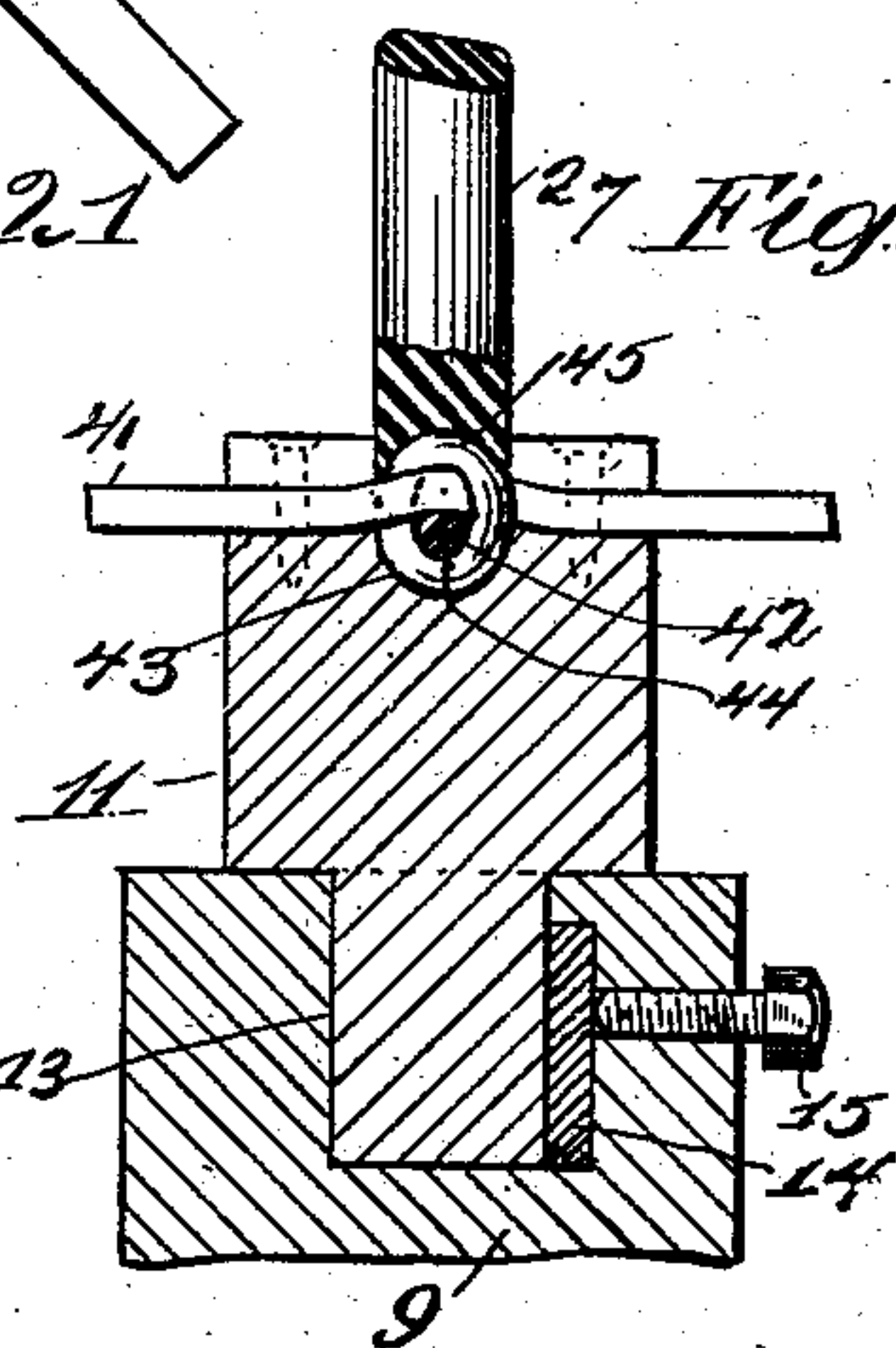


Fig. 24

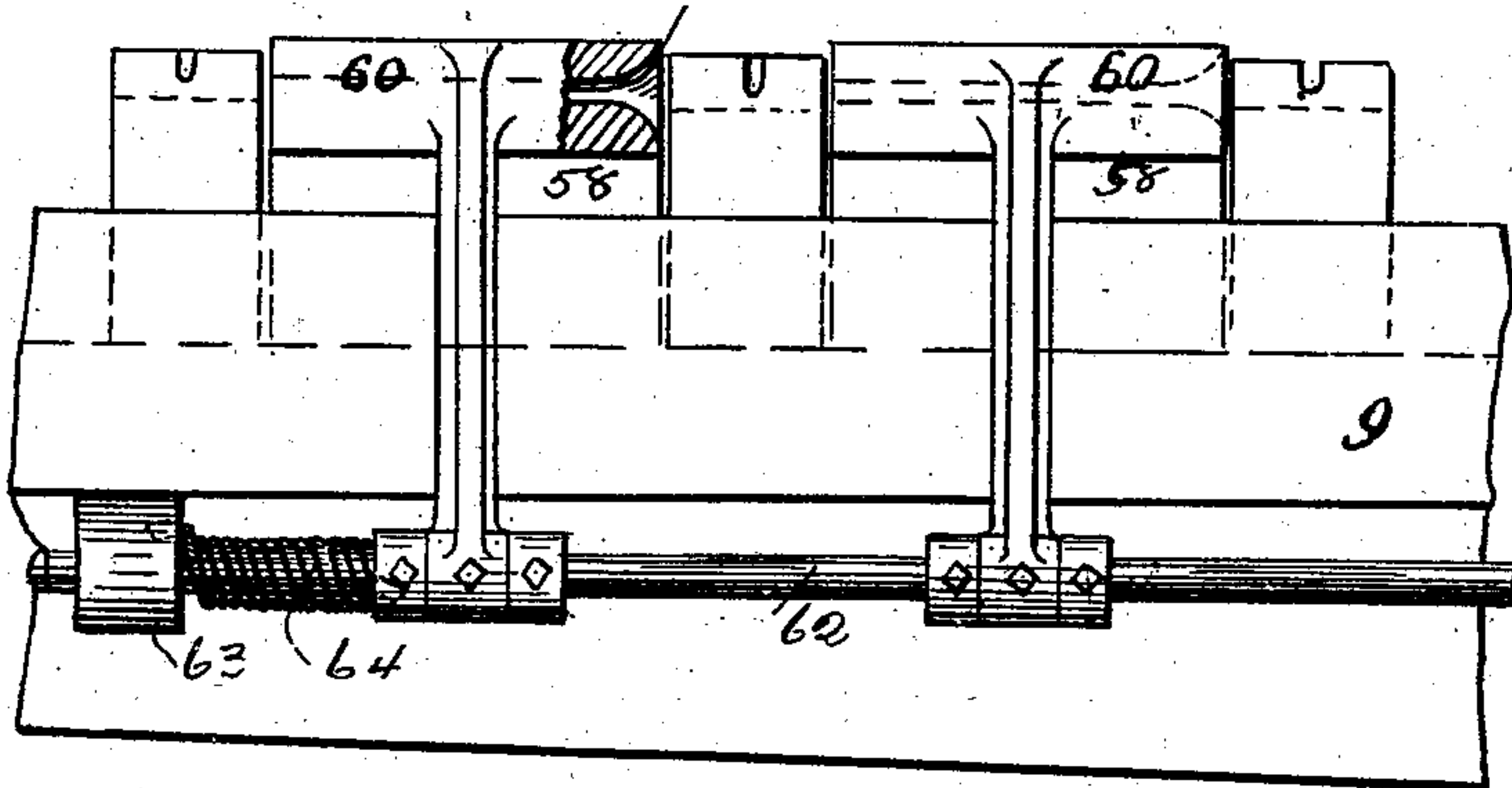
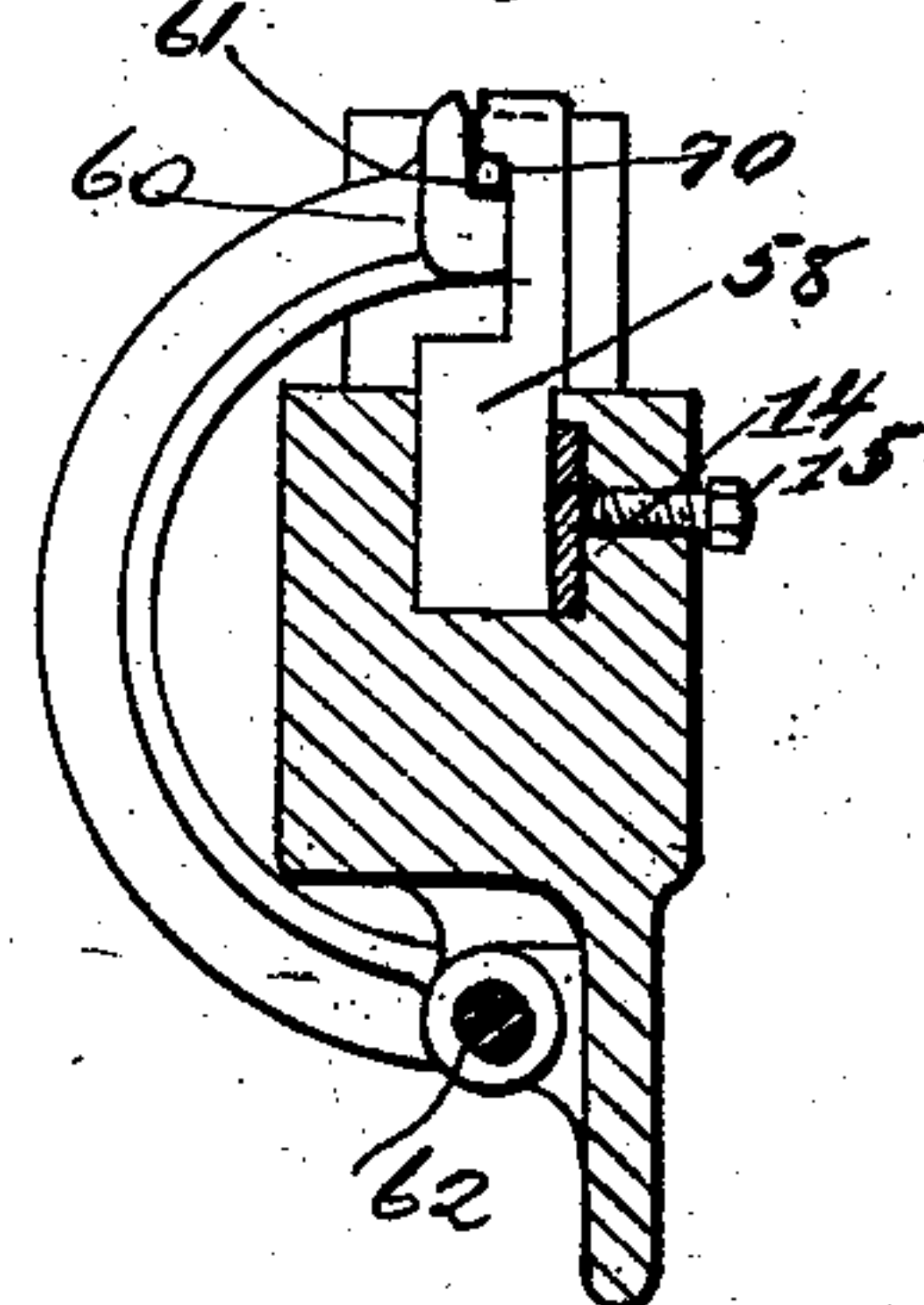


Fig. 25



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UNITED STATES PATENT OFFICE.

JONATHAN HARRIS, OF CLEVELAND, OHIO.

WIRE-FENCE MACHINE.

SPECIFICATION forming part of Letters Patent No. 724,699, dated April 7, 1903.

Application filed March 3, 1902. Serial No. 96,428. (No model.)

To all whom it may concern:

Be it known that I, JONATHAN HARRIS, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, State of Ohio, have invented certain new and useful Improvements in Automatic Wire-Fence Machines, of which I hereby declare the following to be a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in machinery for automatically attaching metal clamps to the wire crossings of a wire fence, and thus forming the fence in the roll from continuously-fed line and stay wires; and the objects of the invention are primarily to provide means for attaching thereto a ring-shaped clamp embodying the minimum weight of metal which cannot be released by any common strain upon the fence and which will not collect moisture and be thereby liable to rust, and, further, to provide a combined feeding and waving device for the line-wires whereby the fence is made to a certain extent elastic and adaptable to the irregular surface outline of a rough country and also is to a large extent unaffected by change in temperature as regards expansion and contraction of the line-wires. Hitherto this result has been attempted by means of spirally-curved line-wires, the disadvantage resulting from which has been found in the injury done the wire by the coiling device, which has scraped or skinned the galvanized surface off from the wire and the twist has weakened the wire.

My invention consists in the quartering-dies arranged upon a movable lower bar, the upper plungers, the staple-feeding device leading thereto, the automatic gripping and waving device for the line-wires, automatic feed and twist-ers for the stay-wires and movable guides therefor, in the various power devices for operating the same in unison, and in the features of combination and arrangement of the various parts and construction or the various details, as hereinafter described, shown in the accompanying drawings, and specifically pointed out in the claims.

In the accompanying drawings, Figure 1 is a plan view of the machine. Fig. 2 is a side elevation. Fig. 3 is a side elevation of the

side not shown in Fig. 2. Fig. 4 is a front elevation. Fig. 5 is a longitudinal section of front part of the machine, showing dies for forming the clamp and operating-cams therefor. Fig. 6 is a similar section showing twisting device for the extremities of the stay-wires. Fig. 7 is a view of twisting-cylinder. Fig. 8 is a horizontal longitudinal section through twisting-cylinder and screw-threaded bearing therefor at the commencement of the twisting action upon the wire. Fig. 9 is a similar view showing the cylinder moved back as the wire is coiled. Fig. 10 is a front view of the same, showing operating-rack. Fig. 11 is a plan view of combined gripping and waving feed device for the line-wires. Fig. 12 is a transverse section thereof. Fig. 13 is a perspective view of the bearings and one of the actuating-cams therefor. Fig. 14 is a side view of the upper die-block and plunger. Fig. 15 is a front view thereof. Fig. 16 is a vertical section of the same on center line. Fig. 17 is a plan view, in transverse section, of the same. Fig. 18 is a view of one of the staples, which is wrapped around the wire crossings to form the clamp. Fig. 19 is a view of a finished crossing, showing one of the wires crimped at the joint to put the crossing wires in one plane. Fig. 20 is a transverse section of upper die-block, showing feed-bar for staples. Fig. 21 is a vertical section, taken transversely of the machine, of the lower die-block. Fig. 22 is a vertical section, taken longitudinally of the machine, of the lower die-block. Fig. 23 is a plan view of the lower die. Fig. 24 is a rear view of the lower die-bar, showing guides for the stay-wires. Fig. 25 is a transverse section of the lower die-bar, showing the side view of the guides for the stay-wires. Fig. 26 is a view of completed wire crossing or joint, showing both wires bent or crimped at the joint. Fig. 27 is a vertical sectional view of feed-gearing for the stay-wire. Fig. 28 is a detail of feed-finger for the staples.

In the views, 1 is the frame, constructed in two sections, one at each side of the machine; 2, the driving-shaft; 3, the pulley thereon; 4, a pinion which drives the gear 5 upon the main operating transverse shaft 6. This large gear-wheel engages the similar gear-wheel 7 upon a transverse shaft 8, placed at the top of the machine vertically over the

shaft 6, and upon these shafts are mounted cams, by means of which the main operations of the machine are obtained.

9 is a bar mounted to move freely in guides 10 on the front faces of the two sections of the bed-plate, and upon the upper surface of this bar are placed the die-blocks 11 of the lower dies 12, in which the clamps are formed. These blocks are set in a groove 13 in the bar and secured therein by means of a metal strip 14, placed in this groove, and set-screws 15, so that they can be moved freely to separate them or bring them nearer together to correspond with the position desired for the line-wires of the fence, according to the width of mesh desired. This bar is raised, by means of the cams 16 upon the shaft 6, to bring the lower die into engagement with the plungers 17 above and is lowered by gravity. The plungers 17 move in the upper die-blocks 18, which are permanently secured to the transverse bar 19 at the upper part of the machine. These die-blocks are placed vertically above the lower die-blocks, so that the plungers will coincide with the lower dies, and the upper blocks are adjustable upon their supporting-bar by means of the dovetail bearings 20 and set-screws 21, so that they can be moved to correspond with the lower dies.

It is necessary that the line and stay wires should cross exactly over the center of the lower dies. Hence forked or V-shaped guides 22 are placed at the entering sides of the dies, and the line-wires are supported upon idle pulleys 23 to facilitate their passage into the machine and locate their exact positions. These pulleys are movably secured upon the transverse rod 24, supported upon arms 25 upon the bed-plate or frame-sections 1.

The upper die-blocks 18 are formed with guides 26, in which reciprocate the plungers 17, in which in turn are secured the punches or upper dies 27. The lower portion of each block is solid and provided with the vertical channel 28, through which the punch feeds the staple 29, of which the clamp is formed to the die below. To facilitate feeding these staples freely to the dies as fast as they are required, they are seen to ride upon an inclined bar 30, which enters diagonally from in front of the block upon which they descend by gravity, and a finger 31, having its curved point 32 in line with the travel of the punch and pivoted at 33, supports them until as the punch descends it forces down the finger-point and takes off one of the staples at a time, the channel and punch being of exactly the size of the staple. When the punch is elevated, it will release the point, which is raised at once by the action of the spring 34 to receive another staple.

The plungers 17 are positively operated by means of cams 35 and 36, mounted upon the upper shaft 8, and rollers 37 and 38 upon the plungers which engage the cams. The movements of the opposite cams upon the upper

and lower shafts 8 and 6 may be synchronous, and the dies move simultaneously to grip the wire and form the clamps. It is preferable, however, that the cams upon the upper shaft should be set at slightly-varying angles, thus constantly decreasing the lead, so that they will operate their respective dies in quick succession, and thus prevent undue strain and consequent vibration of the upper cam-shaft. The lower bar will then remain at its upper limit until all the clamps are formed. This will occupy about one-quarter of the revolution of the cam-shaft.

The surface of the lower die is clearly seen in Fig. 23, where 39 and 40 are the grooves arranged to receive the line and stay wires 41 and 42, respectively, the stay-wire passing underneath the line-wire. At 43 is seen the semicircular groove, which forms the clamp and compresses together the extremities of the staple, so as to abut them together, as at 44, about the crossing wires when the pressure is exerted on them from above. The punch is also provided with the curved recess 45, corresponding with the curve of the die below, to engage and form the upper surface of the clamp.

It will be seen that the die-hollows and punch and its channel are diagonally or quarteringly placed in the die-blocks, so as to place the clamp at an angle of forty-five degrees to the line of the wires. The staple is rigidly held in the channel in the upper die-block until the lower die comes into contact therewith, when the die-blocks are maintained in contact until the staple has been forced into the lower die and shaped into the finished clamp.

The strand-wire is fed transversely to the dies and, as stated, lies under the line-wires in the die-blocks.

The stay-wires are fed in the following manner: 46 is a wire-straightener of no unusual pattern except that part of the rollers 47 are horizontal and part vertical, and from this straightener the wire passes to the feed-rolls 48, placed in line with the receiving-grooves in the dies when they are down to the lowest point of their movement. The stay-wire is then fed transversely across the machine until all the dies are crossed by means of the cam 49 on the shaft 6 and rack 50, actuated thereby, which engages the pinion 51. This is secured to a larger gear 52, which in turn engages the pinion 53 upon one of the feed-rolls 48. The inner extremity 101 of the straightener is wrist-shaped and is in linear continuation thereof. It is secured in a split bearing 102, in which it can be rotated to any angle suitable to fit the side curves of the wire as it runs off the reel, and it can be clamped at the desired angle by means of a screw 103, thus adapting it to any angle of curvature at which the wire may approach the straightener. The engagement of the rack on its upward movement operates the gearing to rotate the rolls, but does not affect

them on its return movement, since the gear 52 is provided with the ratchet-wheel 54, which is engaged by pawls 55 on the upward stroke of the rack and not by the downward stroke.

5 Thus the stay-wire is fed the prescribed length into the machine and ceases to move forward while the section thereof in the machine is lifted up to receive the staples. As soon as the stay-wire is in place it is instantly cut off
10 as the lower bar begins to rise by means of movable and stationary cutters 56 and 57 on the lower and upper bars, respectively.

Guides must be employed to prevent the stay-wire from bending and lead it centrally
15 over the dies. These guides are seen in Figs. 24 and 25 and are located between each lower die-block. They are made divisible on the center line, so that when the stay-wire is secured to the line-wires it will be released
20 as the finished fence is fed forward. This construction may be described as follows: 58 58 are stationary blocks secured by means of set-screws 59 in the groove in the lower die-bar and provided with grooves 70 in their
25 rear faces. 60 represents pivoted blocks provided with grooves 61, corresponding with the grooves 70 and arranged to be closely adjacent thereto, so as to inclose the stay-wire as it enters the machine and passes from one
30 block to another. The pivoted blocks are mounted upon a transverse rod or shaft 62, secured in bearings 63 upon the lower bar, and a coiled spring 64 maintains the pivoted guide-blocks in close engagement with the
35 stationary ones until the feed device for the fence pulls the stay-wire back, when the pivoted guide-blocks will be pulled backward and the stay-wires will be released. The grooves are placed at the ends which receive
40 the wire at 65, so that it will enter easily between them.

To give finished selvage edges to the roll of fence, and thus form a smooth and even top and bottom without projecting points, the
45 clamps are omitted from the highest and lowest joints of the fence, and the extremities of the stay-wires are twisted around the upper and lower line-wires. This is accomplished by means of the twisting devices shown in
50 detail in Figs. 6 to 10, inclusive. Here 66 represents bearings secured upon the transverse rod which supports the guide-pulleys for the line-wires. These bearings take the places of two of the pulleys, one at each side of the machine, and are internally screw-threaded at 67
55 to receive the cylindrical twisting-bar 68, similarly threaded for insertion therein. Thus the twisting-bars will be seen to take the place of two of the lower dies, and the upper
60 and lower line-wires of the fence are fed centrally through them, the inner extremity of each bar just touching the stay-wire. Upon this extremity is pivoted the grooved friction-roller 69 upon a pin 70. This roller engages
65 the extremity of the stay-wire lying upon it, as seen in Fig. 8, and is rotated to wind the

stay-wire about the line-wire simultaneously with the action of the dies to form the rings about the wire-crossing in the following manner. 71 is a cam upon the lower shaft, which
70 engages the lever 72, to the outer extremity of which is pivoted the rack 73, which thus obtains a vertical reciprocating movement, the downward movement being caused by gravity. The inner extremity of the lever is
75 conveniently pivoted at 74 upon a cross-bar 75 on the bed-plate, and a friction-roller 76 removes all friction from the cam periphery. As the rack 73 moves up and down it engages the pinion-teeth cut in the body of the twister-
80 bar and rotates it, the upward movement thus twisting the stay-wire about the line-wire, as shown in Fig. 9.

In order to accommodate the spiral coil of the stay-wire as it is wrapped about the line-
85 wire, the twisting-bar is screw-threaded, as stated, and inserted in a threaded bearing. For this reason as the bar rotates it also retires from the line-wire as the coil increases in length, thus leaving the stay-wire itself
90 unbent and perfectly straight up to the coil, which has not heretofore been accomplished. As soon, however, as the twister-bar is rotated back again it will advance to its former position ready to engage another stay-
95 wire and act upon it.

One of the important features of the machine is the feed device for the line-wires and finished fence, which accomplishes the two-
fold object of tightly gripping the line-wire, 100 while by a rotary movement it pulls it the required distance to properly space the stay-wires and also waves the wire by means of the compression required to grip it, and the waving outline of the wire is formed by the
105 shape of the gripping-blocks. This device is clearly shown in Figs. 1, 3, and 11, where 80 is a reel comprising as many disks 81 as there are line-wires in the fence, mounted upon the shaft 82, which rests in suitable bearings
110 83 on the sections of the bed-plate. Transversely across the disks are the bars 84, which slide in dovetail slots 85 in the edges of the disks. The bars are arranged in pairs, the meeting edges of each pair being closely ad-
115 jacent. Upon each bar are secured gripping-blocks 86, having curved edges 87 to engage the wire. The curved edges, it will be seen, face oppositely on the adjacent bars and are designed to slide past one another and grip
120 the wire between two curved surfaces, thus giving the wire a double curve and forming the desired wavy outline as it is seized in turn by the blocks on each pair of bars. The reel is rotated and the bars are reciprocated
125 to grip or release the wire in the following manner: 88, Fig. 3, is a ratchet-wheel upon the reel-shaft. 89 is an arm loose upon the shaft, upon which are pivoted the ratchet-pawls 90 and 91, one of which is adapted to
130 push and the other to pull. This arm is reciprocated by means of the cam 92 upon the

lower shaft, the lever 93 pivoted to the frame at 94, and a connecting-rod 95 between the arm and lever.

The distance through which the arm moves, and therefore the feed of the gripping-blocks is determined, is regulated by means of a set-screw 96 upon the frame underneath the lever, so that the throw of the cam need not be changed to increase or decrease the distance between the stay-wires.

The gripping action of the blocks on the reel is obtained by means of segmental cams 97, mounted upon standards 98, which are secured on the frame at either end of the reel and rigidly connected by means of an overhead rod 98. Upon these cams roll the friction-rollers 99 and 100, which are secured to the respective outer ends of the bars composing each pair in the reel. Each bar in every pair thus engages its cam as the reel turns on its axis, one bar engaging one cam and one the other, thus forcing one bar to slide past the other and the gripping-faces of the blocks past one another, so as to hold the wire firmly and shape the wave. As soon, however, as the bars pass the cams the blocks separate and release the wires of their own accord from the tension of the wire or by means of a spring 101 engaging each bar.

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

1. In means for securing clamps upon the crossings of a wire fence, the combination with a sectional frame, of upper and lower cam-shafts thereon, a bar transversely placed in vertical guides on said sections, cams upon the lower shaft engaging said bar and shaped to raise the same at stated intervals and permit it to fall by gravity, lower die-blocks and dies adjustably secured upon the said movable bar, a stationary bar above the said movable bar, upper die-blocks adjustably secured upon said stationary bar, plungers reciprocating in said upper die-blocks and cams upon the upper shaft, engaging said plungers, substantially as described.

2. In means for securing clamps upon the crossings of a wire fence, the combination with a machine-frame, of a lower bar transversely movable in guides on the vertical face thereof, an upper transverse bar rigidly secured to said frame, upper and lower transverse shafts on said frame, cams on said lower shaft shaped to raise the lower bar at predetermined intervals and permit it to fall by gravity, die-blocks and dies adjustably secured upon the said lower bar, die-blocks adjustably secured upon the upper bar in line with the die-blocks on the lower bar, plungers moving in guides in said upper die-blocks, cams on the upper shaft arranged to depress the plungers as the lower bar and dies are raised, means for feeding the clamps to said plungers and for aligning the line and stay wires in the lower die-blocks to receive the clamps, substantially as described.

3. In means for securing clamping-rings about the crossing wires of a wire fence, upper and lower die-blocks and supports therefor, means for raising the lower die-blocks into engagement with the upper die-blocks, reciprocating plungers in the upper die-blocks, punches in the plungers provided each with one-half of the die-recess incised in its lower end, the corresponding recess being in the lower die-block and a channel in each upper die-block through which the unformed clamp is passed by the punch to the corresponding lower die, substantially as described.

4. The combination with lower vertically-movable die-blocks and upper relatively stationary die-blocks, of plungers in the upper blocks, a channel at the lower extremity of each die-block, a punch secured to each plunger and adapted to pass through said channel, a die-recess in each punch extremity and corresponding recesses in the lower die-blocks and means for reciprocating said lower die-blocks and plungers for aligning the crossing fence-wires in position in the dies and for feeding the incomplete clamps to the punch and channel in the upper die-blocks, substantially as described.

5. The combination with a vertically-movable lower die provided with guide-grooves upon its surface for stay and line wires placed at right angles therein, and with a die-recess incised diagonally or quarteringly across the intersecting point of said grooves, of a vertically-reciprocating punch provided with the corresponding die-recess cut in its lower extremity and an upper die-block provided with a channel in which said punch is adapted to move, substantially as described.

6. The combination with upper and lower die-blocks, one set movable to and from the other set, of a channel in each die-block for one set, a punch adapted to reciprocate in each channel, a feed device for unfinished clamps leading to said channel, die-recesses incised in the opposite set of die-blocks and automatic mechanism for operating the movable die-blocks and punches, and for feeding the line and stay wires of a fence to said dies, substantially as described.

7. In dies for clamping a metal ring about the intersecting points of wires crossing each other at an angle, a die-block provided with intersecting grooves upon the die-surface and a diagonal recess crossing the intersecting point of said grooves, in combination with an opposing die-block provided with a vertical channel, a punch adapted to reciprocate therein provided with a recess incised in its lower extremity corresponding with the diagonal recess in the opposite die, and means for reciprocating one of the die-blocks and the punch, substantially as described.

8. A machine for automatically making wire fence in the roll in which the intersecting wires are secured together by a metal ring, comprising a feeding device for the line-wires, a device adapted to feed the stay-wires

one at a time transversely thereto, a cutting device for the stay-wires, opposing dies provided with diagonally-incised recesses on their meeting faces placed at the intersection of said wires, means for feeding the incomplete clamps to the dies and for operating the several parts of the machine in unison, substantially as described.

9. In an automatic machine for putting clamps on the intersections of the wires in a wire fence a combined feeding and waving device for the line-wires, feeding and cutting devices for the stay-wires, a twisting device for each end of the stay-wire arranged to wrap the ends of the stay-wire about the upper and lower line-wires, upper and lower dies between which said wire intersections are located, means for feeding the incomplete clamps to the upper dies and means for operating the working parts in unison, substantially as described.

10. A combined feeding and waving reel for fence-wires, comprising disks upon a reel-shaft, closely-adjacent bars longitudinally movable in the disks, blocks upon the adjacent bars, provided with curved surfaces adapted to grip and shape the wire between them, and mechanism adapted to move the adjacent bars in opposite directions to bring the curved blocks into engagement with the wire, substantially as described.

11. Means for feeding and simultaneously waving wires, consisting of closely-adjacent bars slidably mounted in longitudinal bearings, blocks upon said bars provided with curved surfaces arranged to grip and form the wire between them, and means for laterally moving said bars and for longitudinally moving the adjacent bars in opposite directions.

12. A reel adapted to feed and simultaneously wave the line-wires of a fence, consisting of disks mounted upon a shaft, bars longitudinally movable in said disks in pairs, closely-adjacent blocks mounted upon said bars, provided with curved surfaces, the curved surfaces on adjacent blocks facing in opposite directions, and a cam at either extremity of the reel, the cam at one end being engaged by one bar in each pair, and the cam in the other end by the other bar, whereby the adjacent bars are moved in opposite directions as the reel rotates.

13. A twisting device arranged to coil the extremity of one wire about another wire consisting of a cylinder provided with a central opening for one wire, a pin eccentrically placed at one extremity, an external screw-thread and an elongated gear at the other, in combination with a rack engaging the gear, a screw-threaded bearing for the cylinder and means for operating the rack, substantially as described.

14. An automatic feeding device for a stay-wire comprising feed-rolls geared together, and means for automatically rotating the rolls to feed the wire at predetermined intervals

consisting of a rack and gear-wheel, a ratchet-wheel upon the gear, a closely-adjacent gear-wheel having the same axis as the ratchet-wheel, pawls upon said last-named gear arranged to engage the ratchet-wheel when it rotates in one direction but to slip in the other direction, a pinion upon one of the rolls engaging the last-named gear and automatic means for moving the rack, substantially as described.

15. The combination with a vertically-moving bar and die-blocks and dies spaced thereon, of means for guiding line and stay wires thereto so that their points of intersection will come over the dies comprising intersecting grooves on the die-blocks, and guides between the blocks for the stay-wire, substantially as described.

16. The combination with a series of die-blocks arranged in line, of guides between the blocks arranged to convey wire directly to the dies, consisting of pivoted rear portions provided with grooves on their front faces, and stationary front portions provided with corresponding grooves, substantially as described.

17. The combination with a series of die-blocks and fixed guide portions alternating therewith, of a support therefor and means for adjustably securing them therein consisting of a groove in which they are inserted, a narrow bar engaging them placed in one side of the groove, and set-screws in the support engaging the bar, substantially as described.

18. In means for securing clamps upon the crossings of a wire fence, the combination with a lower vertically-movable bar, and dies therein, of an upper stationary bar and dies therein, supports for said bars, a lower cam-shaft and cams upon said shaft engaging the lower bar, an upper cam-shaft and cams upon said shaft engaging the upper dies, the cams upon the upper shaft being set with gradually-increasing leads whereby the upper dies will engage the lower dies by a successive movement, substantially as described.

19. A straightening device for a wire-fence machine, consisting of a body portion provided with rollers, a part of which are on one plane and a part on a plane at right angles thereto, in combination with a split bearing in which the inner extremity is secured, and a tightening-screw for the bearing, substantially as described.

20. In a wire-straightener, in combination, a body portion provided with rollers, an inner extremity or wrist extending therefrom in linear continuation thereof, and an adjustable bearing for said wrist portion, substantially as described.

21. A reel for feeding and bending the line-wires of a fence, comprising, bars longitudinally movable in pairs, the adjacent bars adapted to move in opposite directions, a separable gripping device for each pair, one portion of which is mounted on one bar and the other portion on the other bar, a rotatable

support for the bars, means for longitudinally moving the adjacent bars in opposite directions, and for revolving the support through a predetermined degree of revolution substantially as described.

22. In a gripping and waving device for wire, a suitable support, bars longitudinally movable in said support mounted therein in pairs, means for moving the adjacent bars of each pair longitudinally in opposite directions, and a separable gripping device for each

pair, one portion of the gripping device being mounted on one bar, and the other portion on the other bar, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JONATHAN ^{his} × HARRIS.
mark

Witnesses:

C. H. OLDS,

WM. M. MONROE.