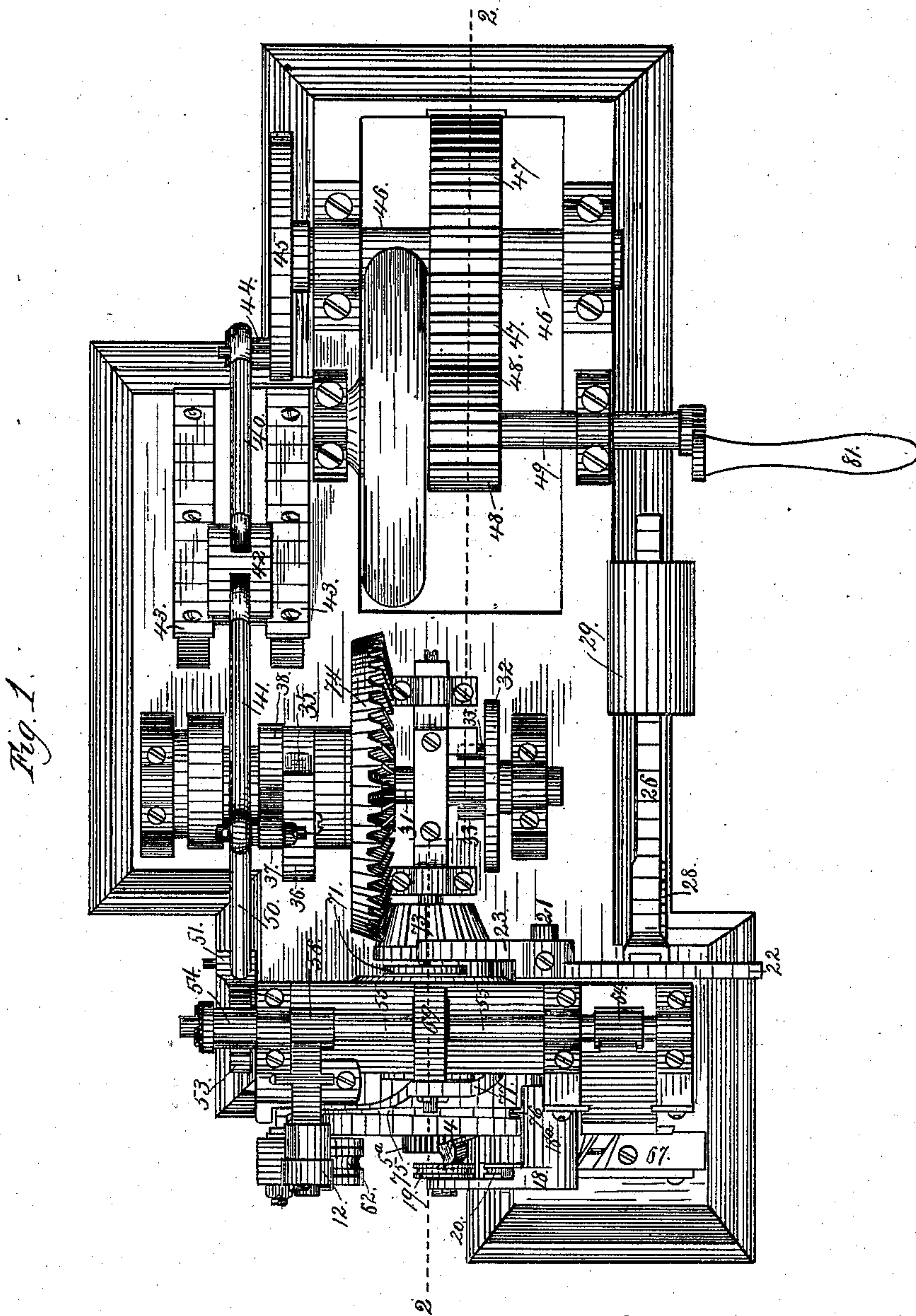


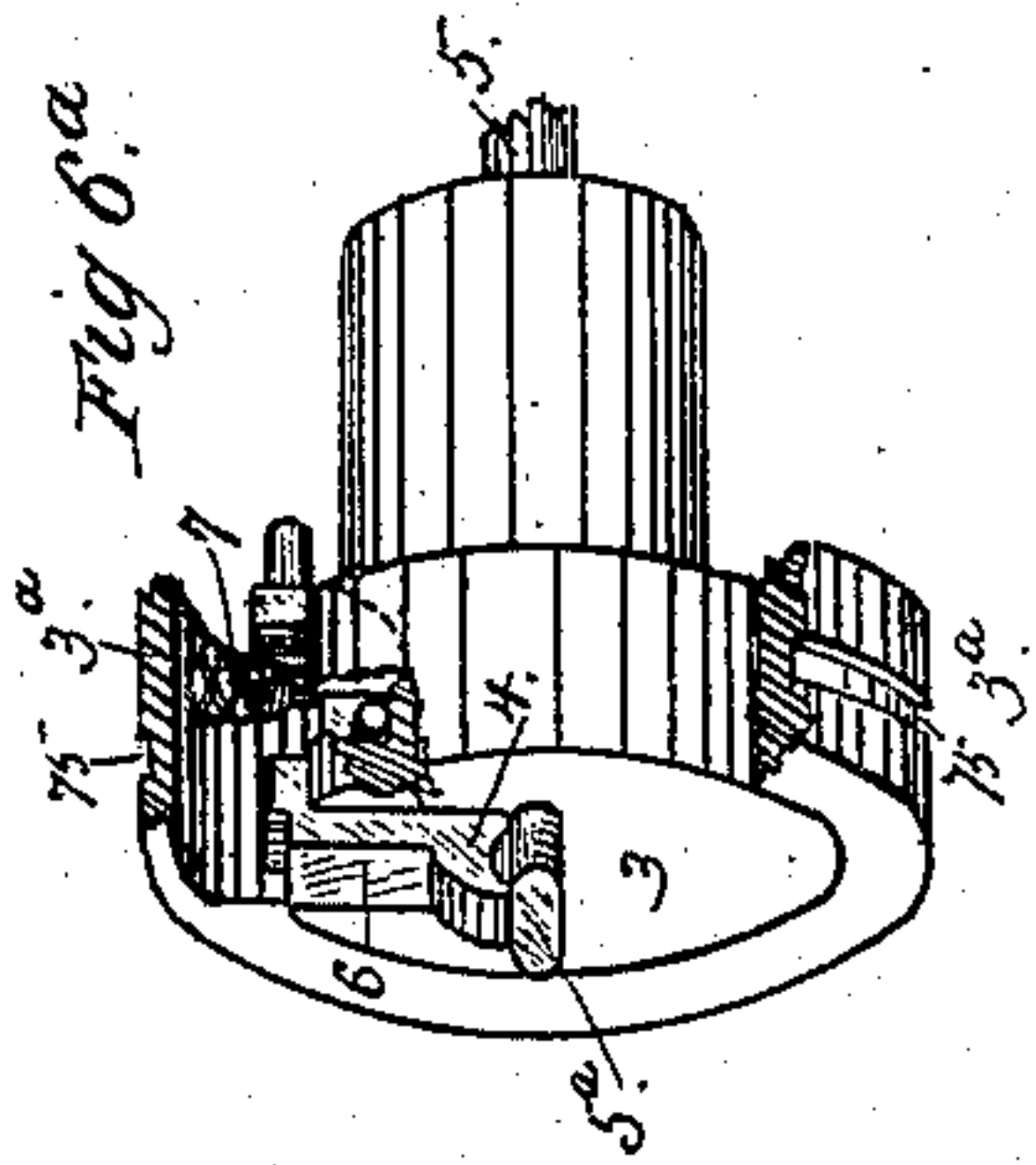
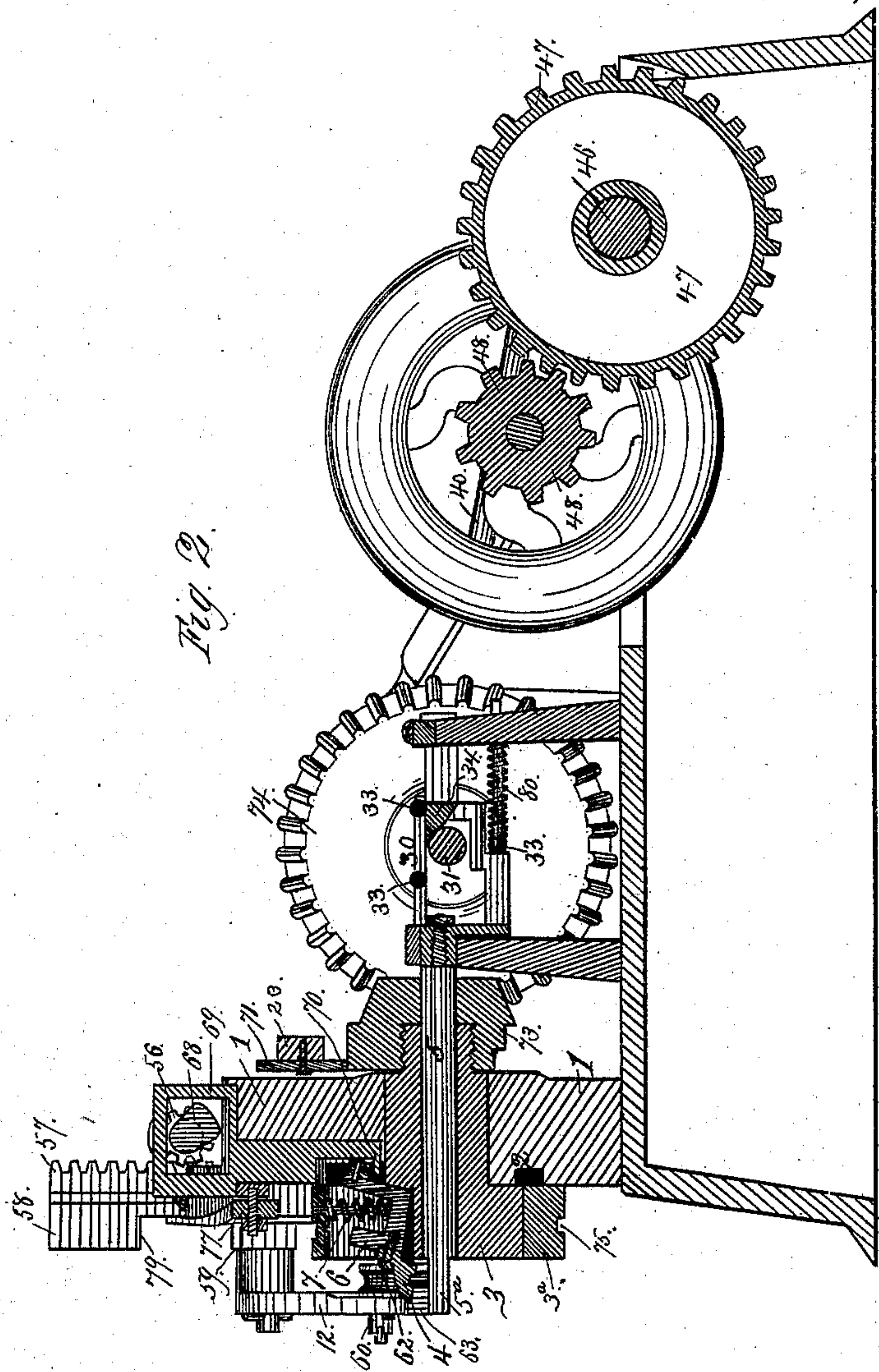
W. JONES.  
Link-Bending Machine.  
No. 205,190. Patented June 25, 1878.



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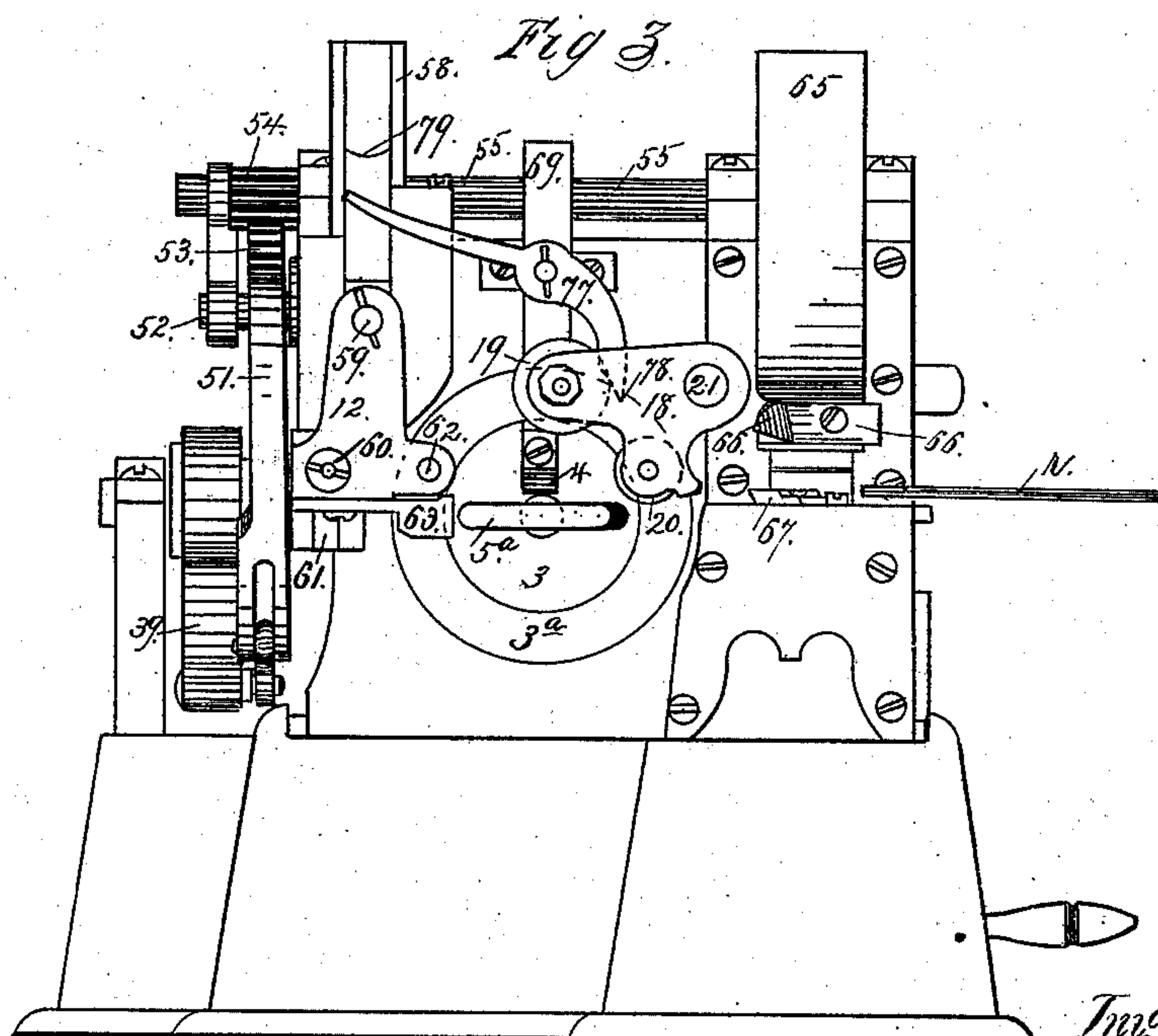
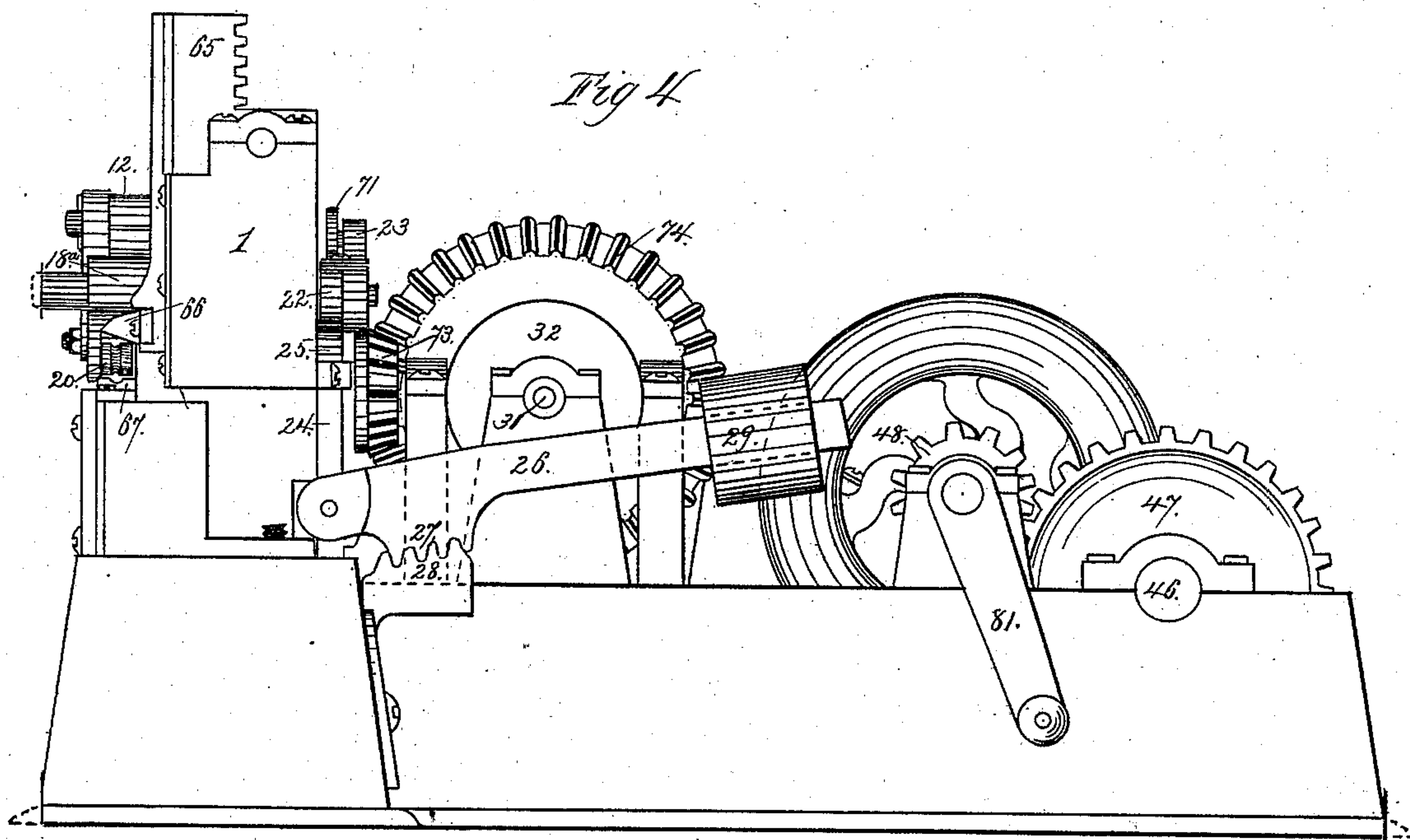


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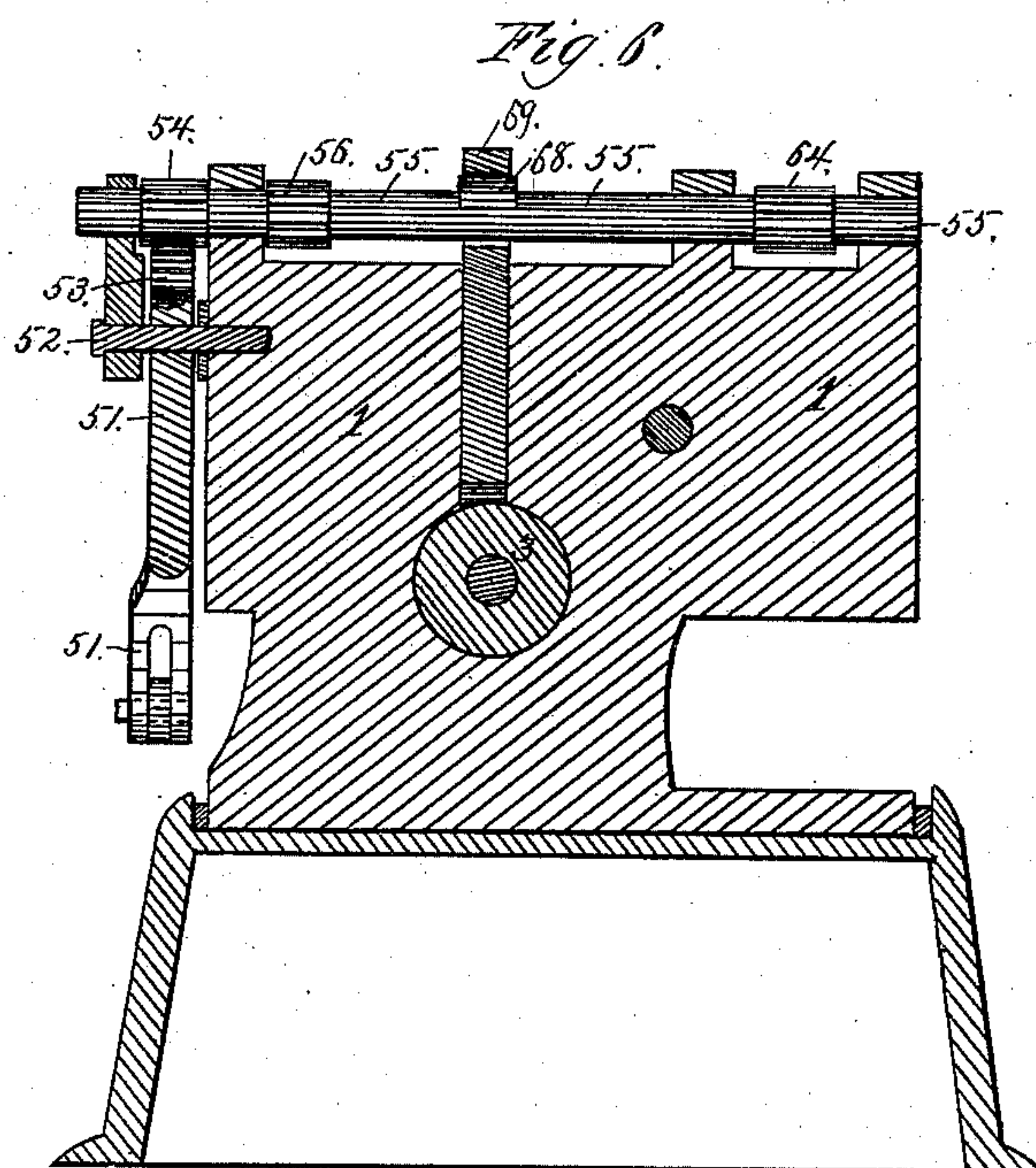
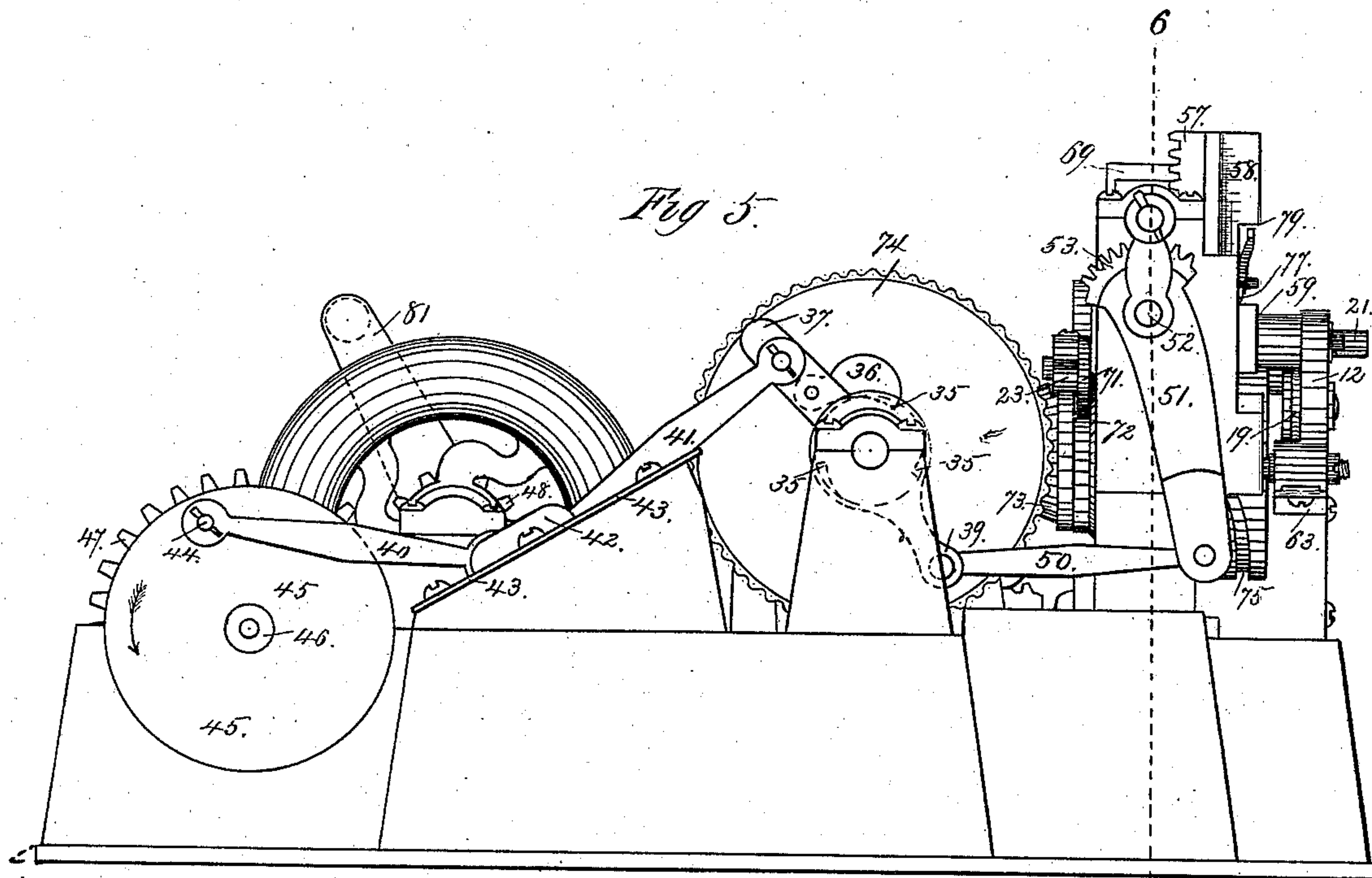
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Fig. 7.

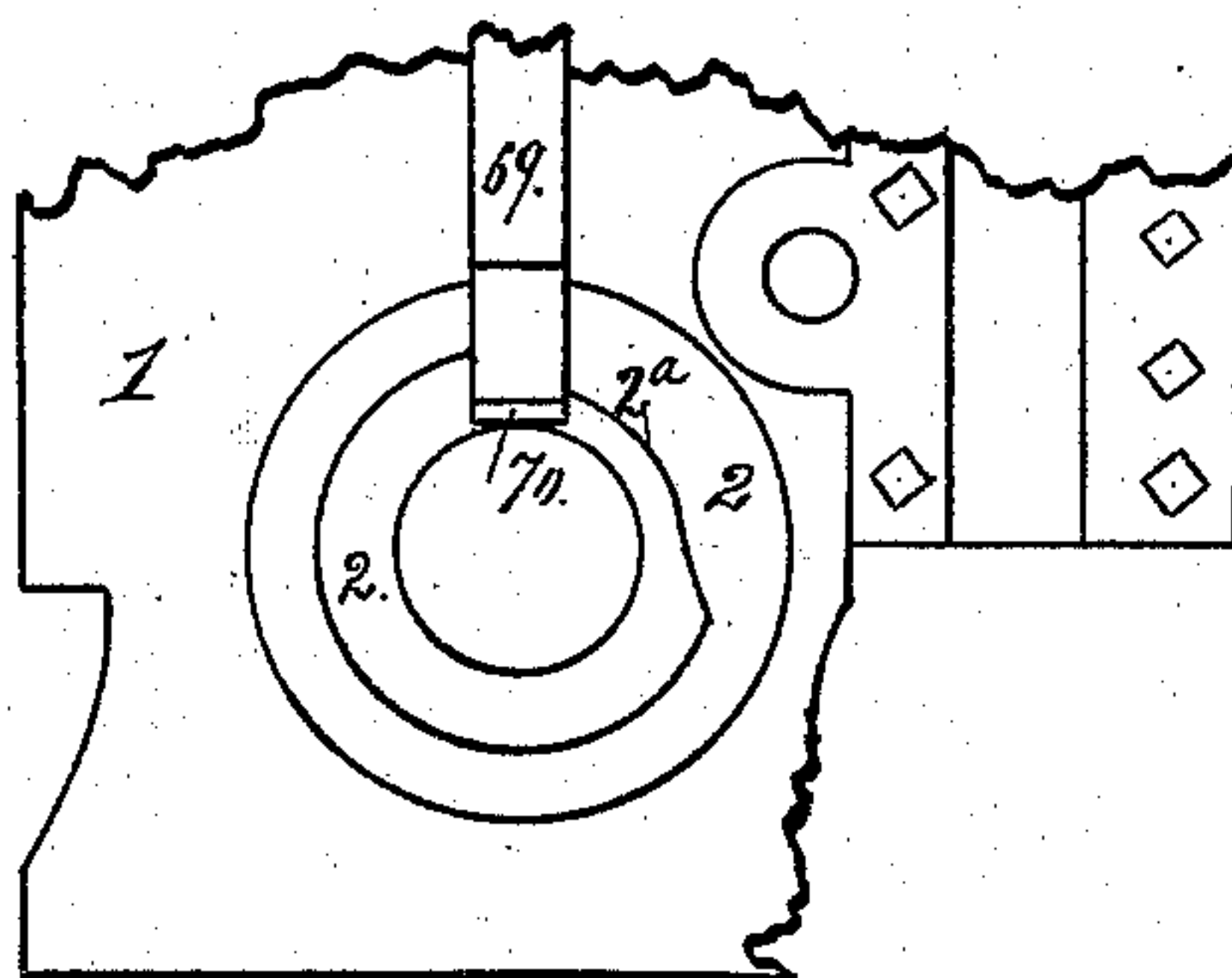


Fig. 8.

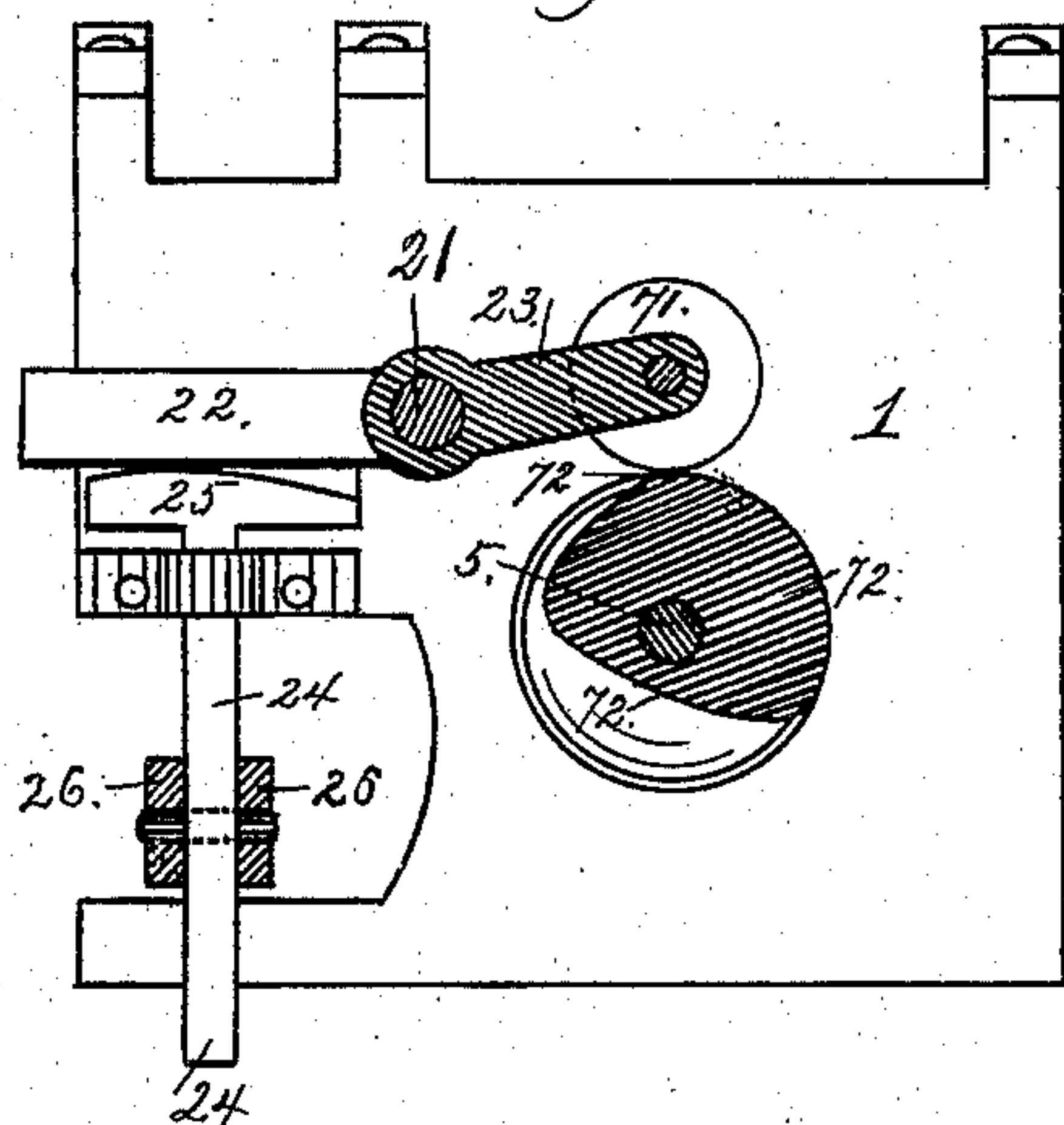
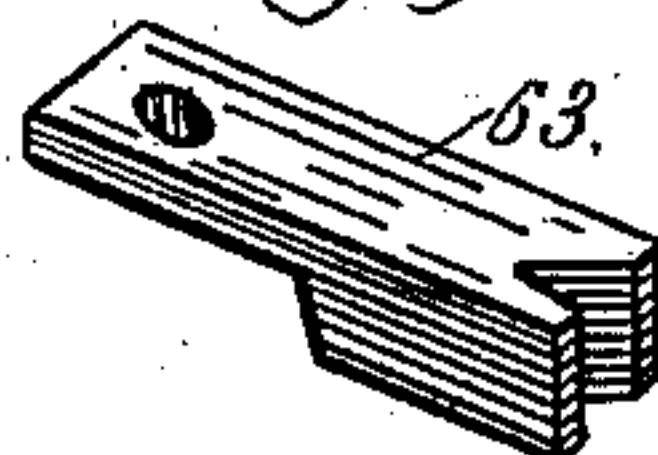


Fig. 9.



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# UNITED STATES PATENT OFFICE.

WILLIAM JONES, OF PITTSBURG, PENNSYLVANIA.

## IMPROVEMENT IN LINK-BENDING MACHINES.

Specification forming part of Letters Patent No. **205,190**, dated June 25, 1878; application filed March 27, 1878.

*To all whom it may concern:*

Be it known that I, WILLIAM JONES, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a certain new and useful Improvement in Car and Chain Link Bending Machines, of which the following is a specification:

My machine is constructed with a perforated head or standard, within which revolves a hollow shaft carrying a forming-mandrel, which has a longitudinal movement to discharge the bent link. The bending is effected by two levers furnished with rollers, one serving to bend the forward end of the blank, and the other bending the central portion around the edge of the mandrel as it revolves, and subsequently bending the other extremity of the link, the last-mentioned lever having also a longitudinal movement for the purpose of lapping the ends of the link. The blank is gripped to the face of the mandrel by a lever working on a self-adjusting fulcrum supported by a spring, the tail of the lever being elevated by a slide to cause the lever to gripe the blank, and being held in this position by a circular camway on the stationary head, said camway being reduced for one-third of its circuit to permit the gripping-lever to release the link. The second or main bending-lever is actuated by a weighted lever working on a changeable fulcrum, so as to graduate the pressure required in bending the link. The hollow shaft, carrying the mandrel, is stopped by a suitable dog at the proper point in its revolution for the discharge of the link and the reception of a new blank. The operating parts are actuated by suitable gearing rotating a crank-wheel, which is connected by rods to a crank mounted on a shaft which imparts a reciprocating movement to such parts as require such movement, and an intermittent rotary movement, through the medium of a ratchet, to the hollow shaft forming mandrel, the guideways on which the slide of the connecting-rods works being inclined, so as to throw the said rods in line while under pressure.

In the accompanying drawing, Figure 1 is a plan view of the machine. Fig. 2 is a longitudinal section on the line 2 2, Fig. 1. Fig. 3 is a view of the front end. Figs. 4 and 5 are elevations of the respective sides. Fig. 6 is a vertical transverse section on the line 6 6, Fig. 1.

5. Fig. 6<sup>a</sup> is a detached perspective view of the gripping-lever and mandrel, and the hollow shaft which carries them. Fig. 7 is a front view of a portion of the stationary perforated head or standard, with the hollow shaft and other parts removed to show the form of the encircling rim or camway. Fig. 8 is a rear view of the said head or standard, showing the hollow shaft and the mandrel in section. Fig. 9 is a perspective view of the gage detached, showing the oblique shape which adapts it to receive the scarf end of the rod.

1. represents a head or standard, rigidly mounted on the bed-frame of the machine, and having a circular opening surrounded by a camway or groove, 2, which is concentric with the opening for two-thirds (more or less) of the circuit, the remaining one-third consisting of a depressed portion, 2<sup>a</sup>, of less radius. Within the opening in the hollow standard works a hollow shaft, 3, surrounded by a shroud, 3<sup>a</sup>, and carrying a gripping-lever, 4, the tail of which rides on the flange or camway 2, so that in passing around the larger portion of said camway the tail of the lever will be kept in a raised position, and its nose, which projects through the enlarged head 3<sup>a</sup> of the hollow shaft, will be depressed. 5 is a forming-mandrel, having a flat or elliptic end, 5<sup>a</sup>, adapted to impart the required form to the chain links or rings, and swiveled at its rear end in a yoke, 30, embracing a horizontal shaft, 31, which carries a disk, 32, having three tappets or crank-pins, 33 33 33, which engage with a wedge-shaped lug, 34, projecting laterally from the yoke 30. The shaft 31 receives an intermittent rotary motion by means of ratchet-teeth 35, three in number, on an enlargement of said shaft, actuated by a pawl, 36, which is carried by an arm, 37, attached to a sleeve, 38, which turns freely on the shaft 31, and carries a second arm, 39, adapted to impart intermittent motion to other parts of the machinery, as hereinafter described.

The arm 37 is actuated by pitmen or connecting-rods 40 41, pivoted at their meeting ends to a slide, 42, working on inclined ways 43, the lower rod, 40, being connected to a wrist, 44, on a crank wheel or disk, 45, on a shaft, 46, which derives motion through gearing 47 48 from the main driving-shaft 49.

The arm 39 is connected by a rod, 50, with



an arm, 51, pivoted at 52 to the standard 1, and having at its upper end a cogged segment, 53, gearing with a pinion, 54, on the horizontal shaft 55, which has another pinion, 56, gearing with a rack, 57, on a vertically-sliding head, 58, which carries a triangular lever, 12, pivoted at 59 to the said sliding head, and carrying at one angle a pin, 60, which works in an eccentric or oblique slot, 61, in the standard 1, and at its other angle or extremity a roller, 62, which is employed for bending the first scarf end of the blank, as hereinafter described. The said triangular lever also carries the gage 63, to regulate the insertion of the rod from which the blank is cut. The shaft 55 carries at its other end a pinion, 64, gearing with a vertically-sliding rack or head, 65, carrying an oblique knife, 66, which cuts shearwise, with an adjustable knife, 67, fixed to the stationary head 1, the fixed knife 67 being provided with a groove, as shown in Fig. 4, for the reception of the rod *r*. In the center of the shaft 55 is a cam, 68, working in a yoke, 69, formed at its lower end with a lug, 70, which engages beneath the tail of the gripping-lever 4 to cause it to gripe the blank. The gripping-lever 4 is mounted on a self-adjusting fulcrum-block, 6, which is held to its work by a spring, 7, adapted to yield sufficiently to accommodate rods or blanks of different thicknesses.

18 is the second and principal bending-lever, which carries two grooved rollers, 19 and 20, the last mentioned serving to bend the center of the link, and to impart the final bend to the meeting ends thereof, while the roller 19 presses the sides of the link flat against the faces of the mandrel. The roller 20 also serves as a guide for the rod in entering.

The lever 18 is constructed with a sleeve, 18<sup>a</sup>, sliding on a spline on a fulcrum-shaft, 21, to the rear end of which are rigidly secured a pair of horizontal arms, 22 23, the first of which rests on the T-head 25 of a vertical rod, 24, which is pivoted at its lower end to a weighted lever, 26, formed with a cog-segment, 27, resting in a stationary rack, 28. The lever 26 is held down with any necessary force by an adjustable weight, 29. The arm 23 carries a wheel, 71, resting on a cam, 72, which raises the lever 18 and rollers thereon, to admit the end of the rod.

The hollow shaft derives rotation through a beveled pinion, 73, from a beveled gear, 74, mounted on the intermittingly-moving shaft 31.

The enlarged head or shroud 3<sup>a</sup> of the hollow shaft is constructed with a cam-groove, 75, in its periphery, to receive a stud or lug, 76, on the sleeve 18<sup>a</sup> of the bending-lever 18, so as to impart a horizontal motion to said sleeve and bending-lever, in order that the blank may be bent into proper shape, as hereinafter described.

A dog, 77, pivoted on the stationary head 1, drops into a notch, 78, in the enlarged head 3<sup>a</sup> of the hollow shaft, so as to stop the rota-

tion of said shaft at the proper point for the insertion of the rod or blank. The dog 77 is retracted from the notch, so as to release the shaft 3, by the contact of a lug or shoulder, 79, on the vertically-sliding head 58.

80 is a spring employed to throw the mandrel forward when released by the successive tappets 33. 81 represents an operating-crank, which is, of course, replaced by pulley or crank when the machine is driven by power.

The gage 63 is formed with an oblique face, to receive the first scarf end of the blank and hold it in proper position while being bent by the lever 12.

The mandrel 5<sup>a</sup> should be made with a parting on its flat face, so as to allow a ready way of changing it for the various sizes of car-links, the parting-line to be within the head of the hollow shaft. The parts can be secured together with bolts.

Operation: The parts being in the position shown in Fig. 1, with the flat head 5<sup>a</sup> of the forming-mandrel in horizontal position, a rod of metal is introduced, as shown at *r*, passing beneath the guide-roller 20 and gripping-lever 4, and above the flat head 5<sup>a</sup> of the forming-mandrel, until it is stopped by the gage 63. The motion of the machine then causes the tail of the gripping-lever 4 to be raised by the contact of the lug 70, so as to firmly hold the rod on the mandrel. At the same moment a proper length for a blank is cut off by the knife 66, and the descent of the vertically-sliding head 58 bends the first scarf end of the blank around the edge of the forming-mandrel by means of the roller 62, and also raises the stop-dog 77. Then the engagement of the pawl 36 with one of the ratchet-teeth 35 rotates the mandrel, carrying the blank against the bending-rollers 20 and 19, which are, at the same time, moved longitudinally over the mandrel by the cam-groove 75 in the shaft-head acting on the stud 76 on the fulcrum-sleeve of the lever 18. The pressure of the bending-roller 19 on the blank as it rests on the mandrel is regulated by the weighted lever 26, acting through the vertical rod 24 and T-head 25 on the arm 22, which is fixed to the fulcrum-shaft of the lever 18. As the end of the lever 18, carrying the roller 19, is elevated by the passage of said roller around the edge of the mandrel, the fulcrum-bearing of the lever 26 is shifted nearer to the short end of said lever and farther from the weight 29, causing said weight to act with more power. In like manner the descent of the roller 19 allows the weight 29 to descend, and, by the shifting of the fulcrum-point, to act with less power, so that the necessary heavy pressure will be imparted to the blank for bending it around the edges of the mandrel, the shifting of the fulcrum of the lever causing the pressure to be regulated as required while retaining the lever in the required position. The cam 72 on the hollow shaft subsequently raises the lever 18 by acting on the wheel 71 and arm 23, so as to throw the guide-roller 20



up, that the bar *r* may be fed in for the next link. The lever 18 is retained in this elevated position while the bent link is discharged and a new blank introduced. The discharge of the link is effected by the retraction of the mandrel within the head by contact of one of the tappets 33 with the lug 34 on the yoke 30, the said yoke, carrying the mandrel, being, when released, thrown suddenly forward by the spring 80, the griping-lever 4 having previously been released by the passage of its tail over the contracted portion 2<sup>a</sup> of the camway, and retracted by the spring 7.

Having thus described my invention, the following is what I claim as new and desire to secure by Letters Patent:

1. The griping-lever 4, mounted on a self-adjusting fulcrum-block, 6, supported by a spring, 7, and operating in combination with the revolving mandrel 5<sup>a</sup>, as described.

2. The combination, with the griping-lever 4, former 5, and camway 2, of the slide 8, operating to elevate the tail of the lever, as described.

3. The combination of the intermittingly-revolving mandrel 5, the bending-lever 12, and

the gage 63, carried by said bending-lever, as described.

4. The weighted lever 26, mounted on a variable fulcrum, 27 28, to graduate the pressure of the bending-lever 18 on the blank, as required.

5. The combination, with the mandrel 5, of the bending-lever 18 and sleeve 18<sup>a</sup>, mounted on a rock-shaft, 21, and carrying bending-rollers 19 and 20, said sleeve receiving an endwise motion at the proper period to impart a spiral bend to one-half of the blank.

6. In combination with the bending mechanism, the inclined ways 43, slide 42, pitmen 40 41, and cranks 44 37, combined and arranged as described, causing the said pitmen to be brought approximately to a straight line while operating the bending mechanism.

7. The combination of the oblique shears 66 67, guide-roller 20, forming-mandrel 5, bending-roller 12, and oblique-faced gage 63, all substantially as and for the purpose set forth.

WILLIAM JONES.

Witnesses:

JOHN R. WILLIAMS,  
A. THOMSON.