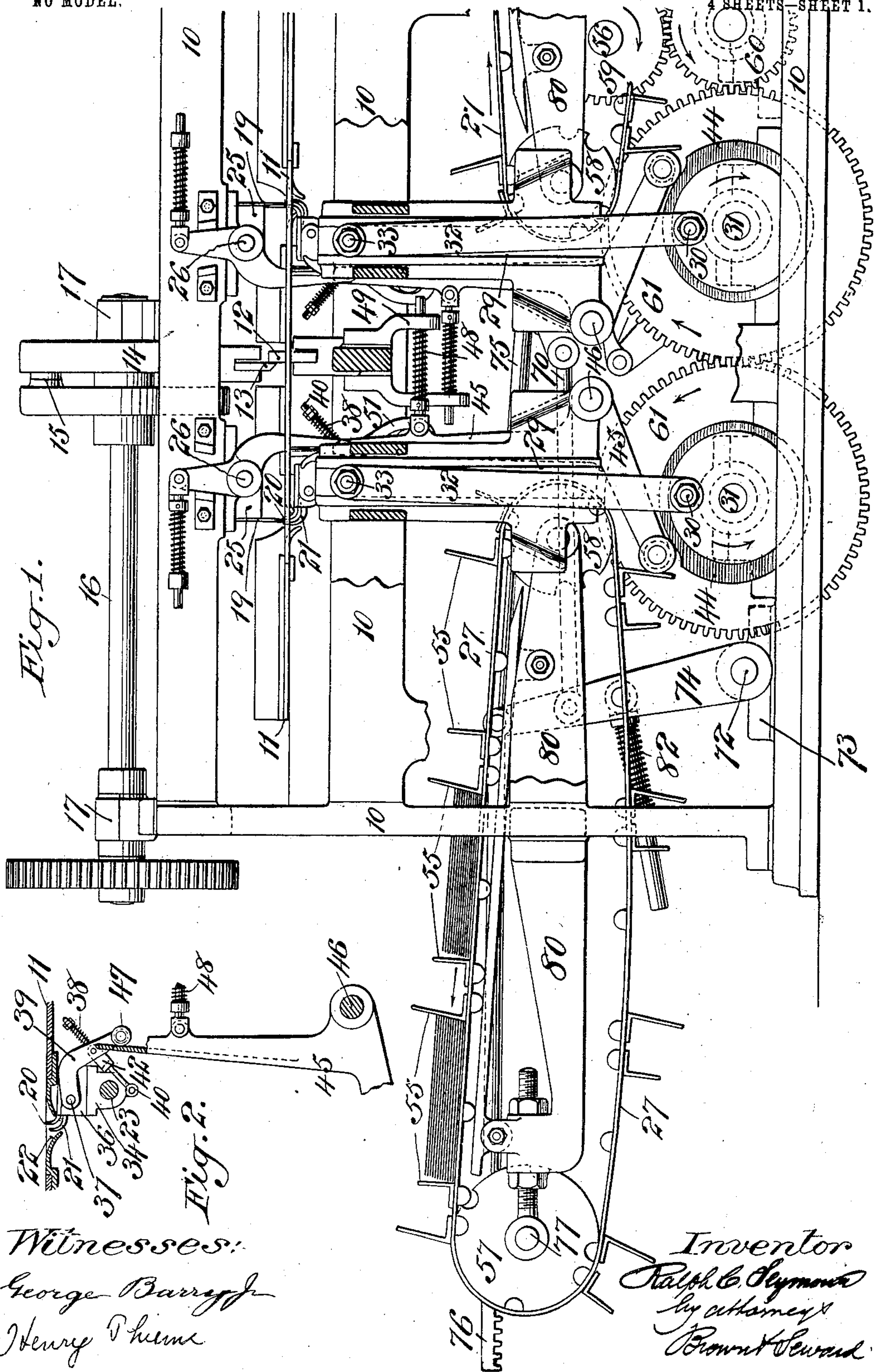


R. C. SEYMOUR.
MACHINERY FOR FOLDING PAPER OR OTHER FABRICS.

APPLICATION FILED MAR. 7, 1903.

NO MODEL.

4 SHEETS SHEET 1.



Witnesses:
George Barry
Henry Phineas

Inventor
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by attorney
Brown & Seward

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NO MODEL.

4 SHEETS—SHEET 2.

Fig. 3.

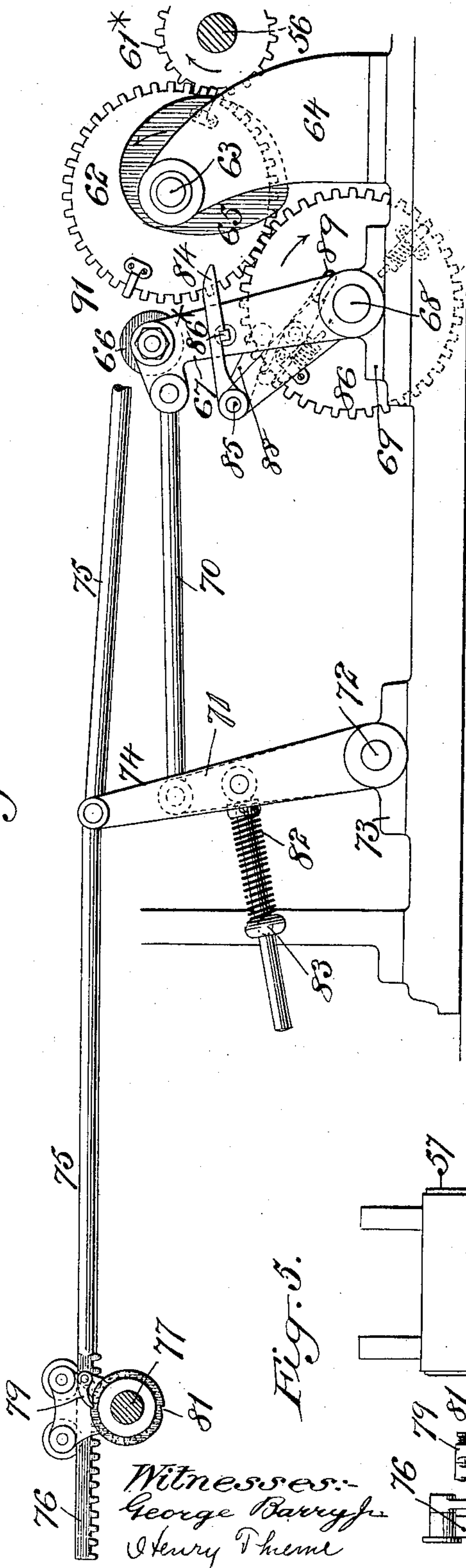


Fig. 4.

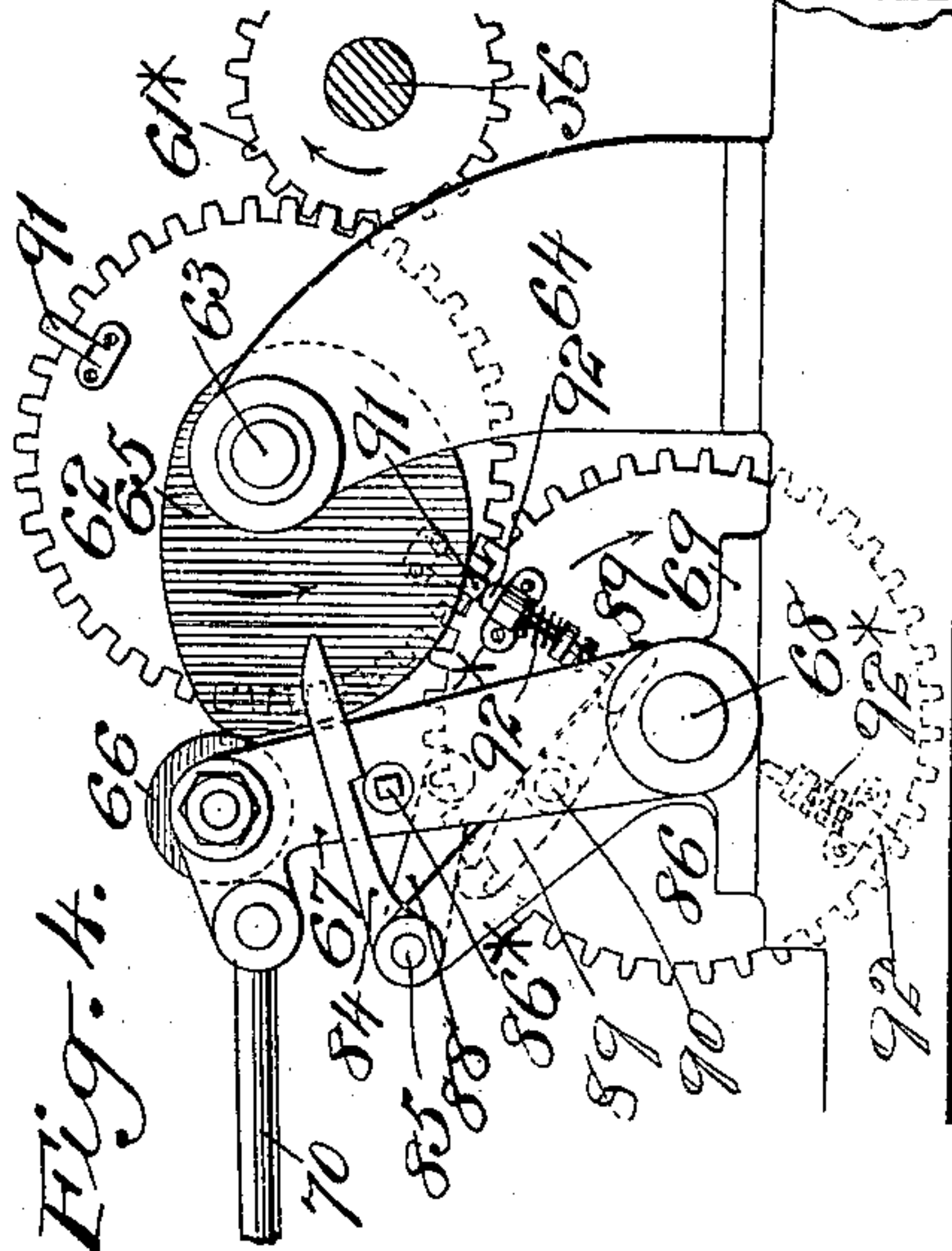


Fig. 4.

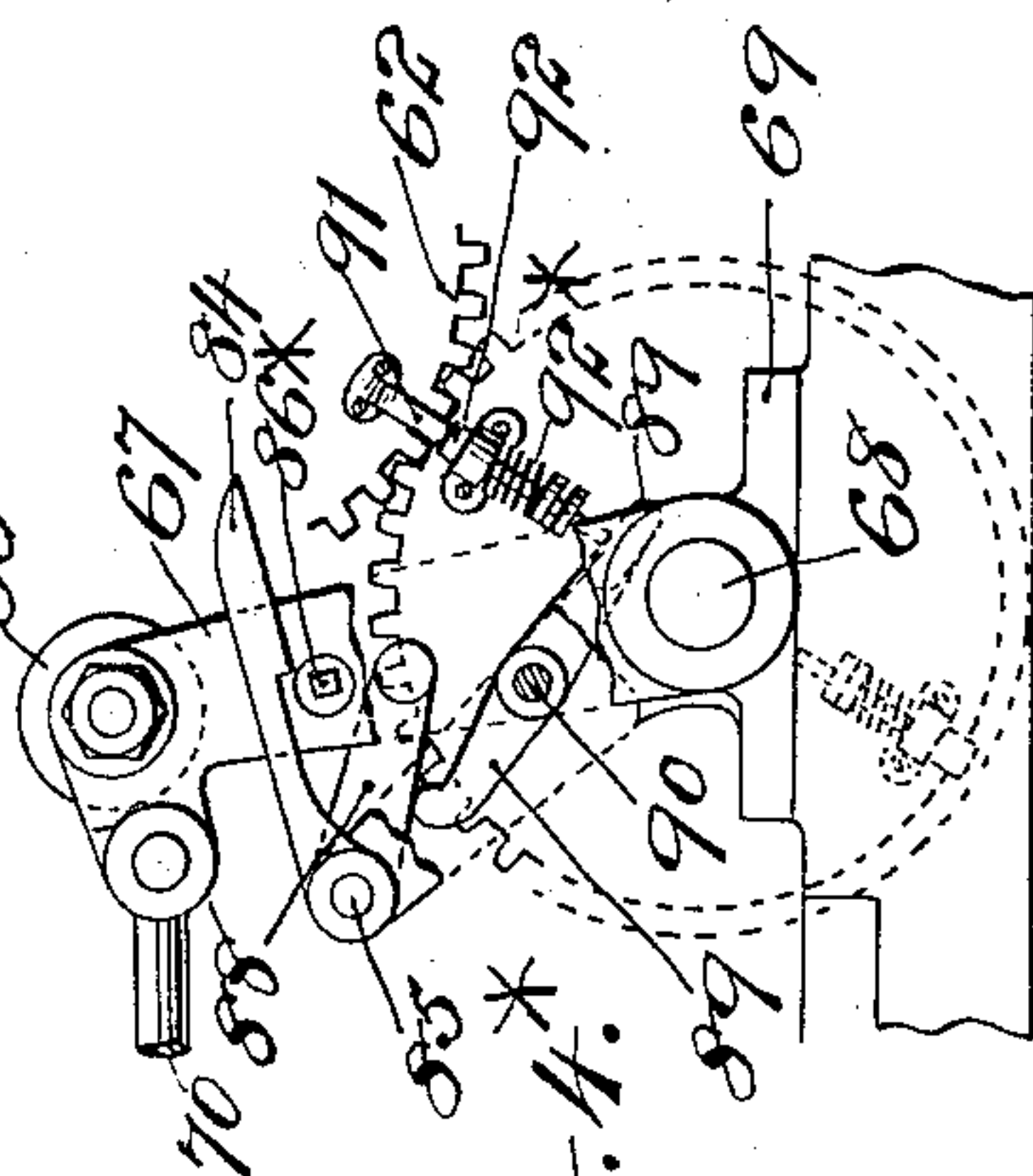
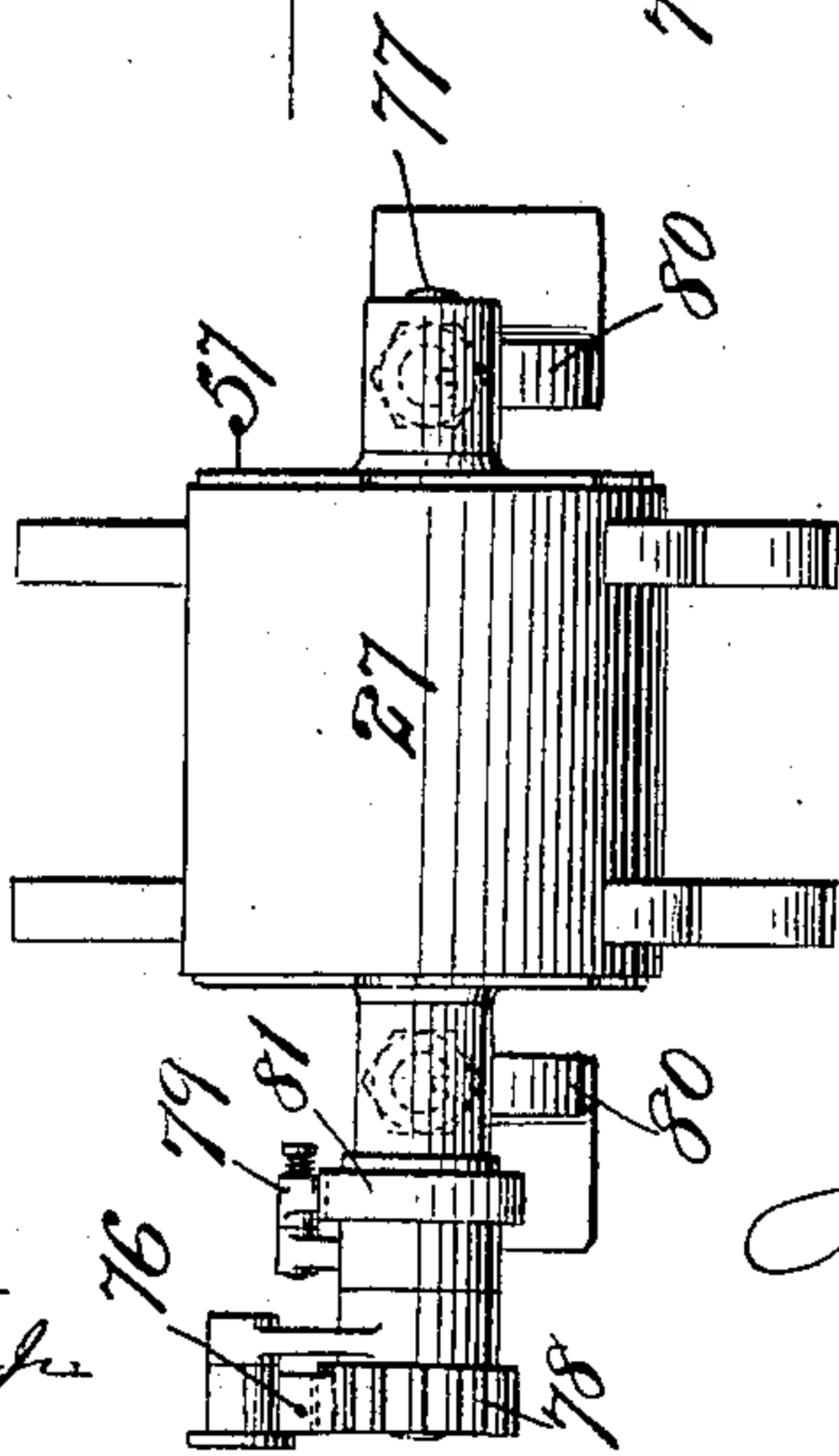


Fig. 5.



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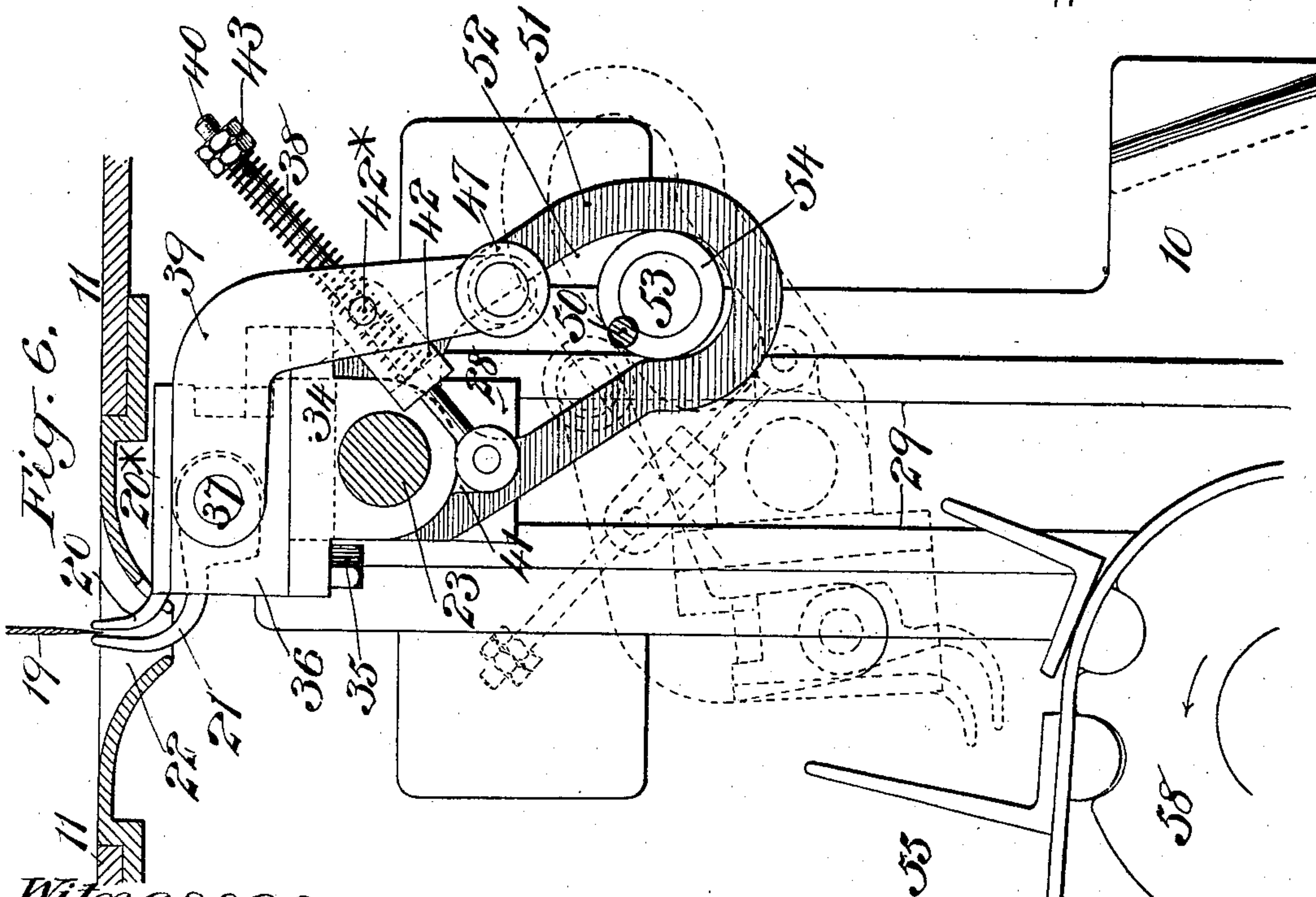
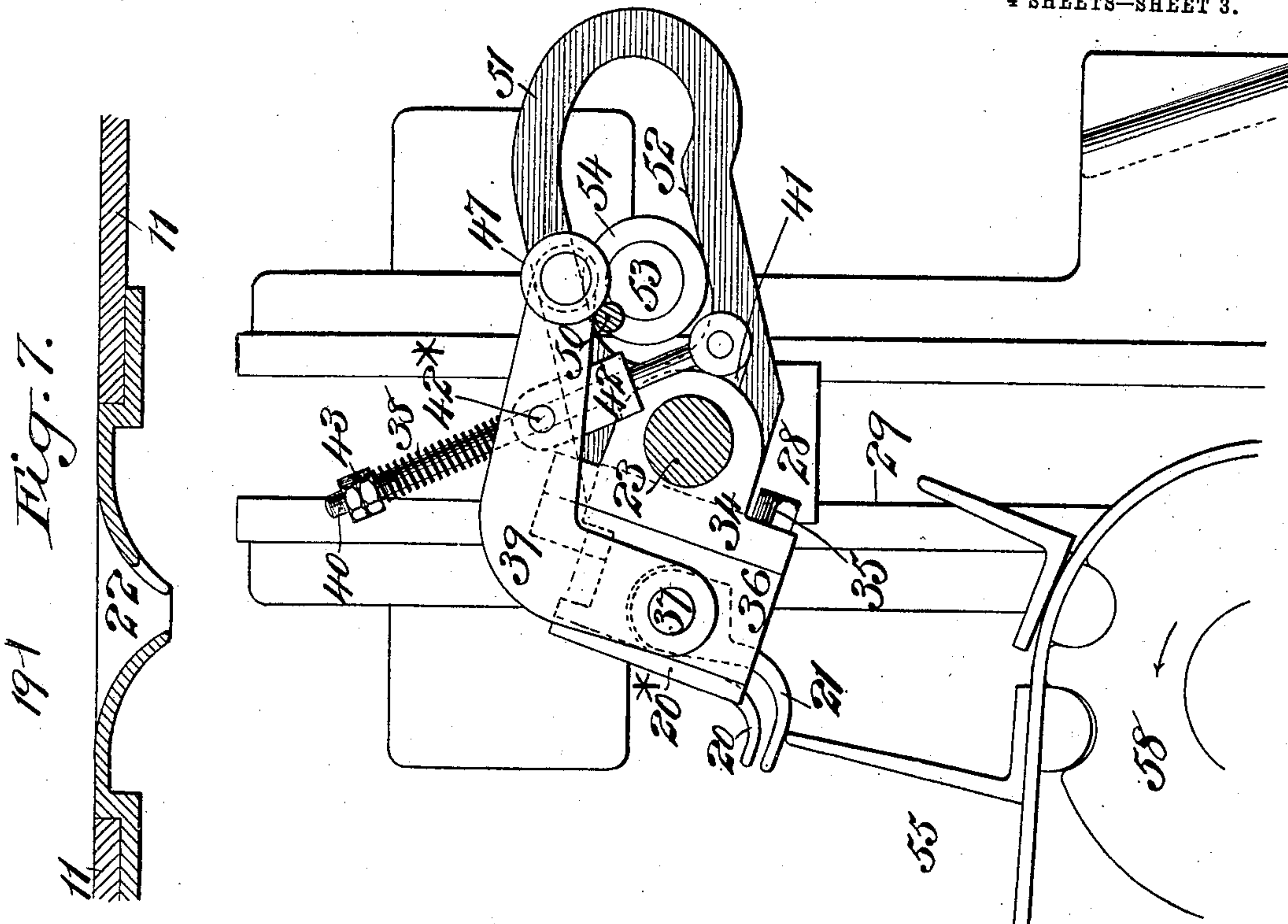
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NO MODEL.

4 SHEETS—SHEET 3.



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R. C. SEYMOUR.

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NO MODEL

4 SHEETS—SHEET 4.

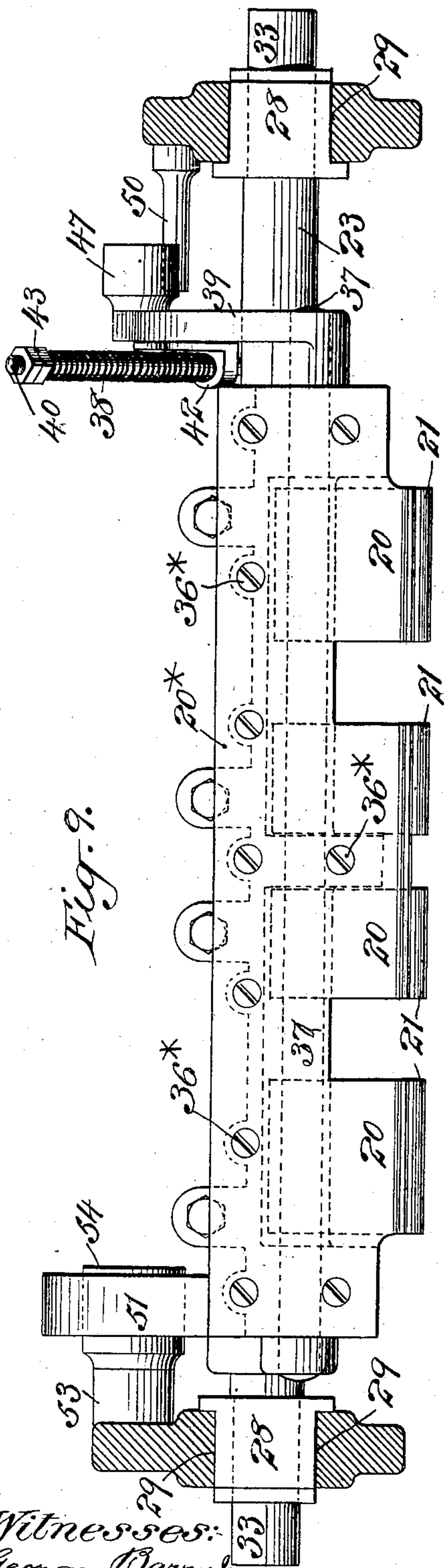


Fig. 9.

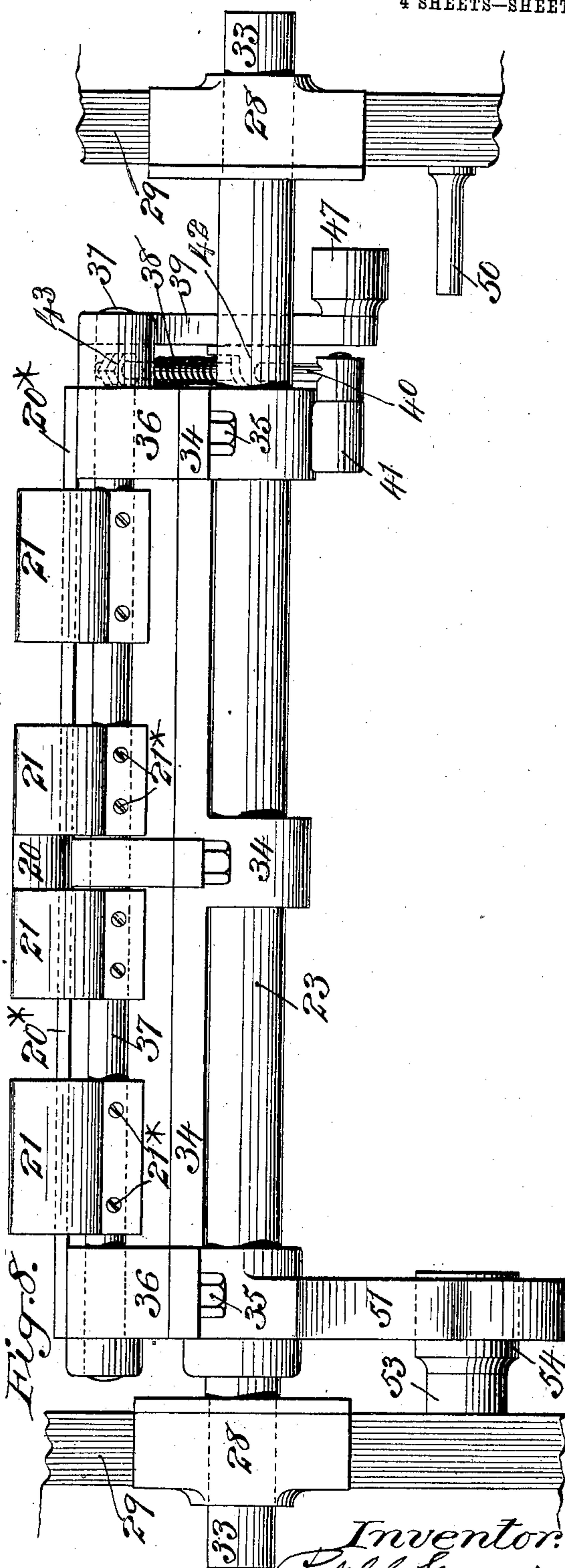


Fig. 8.

Witnesses:
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UNITED STATES PATENT OFFICE.

RALPH C. SEYMOUR, OF SOUTH ORANGE, NEW JERSEY, ASSIGNOR TO C. B. COTTRELL & SONS COMPANY, OF NEW YORK, N. Y., AND STONINGTON, CONNECTICUT, A CORPORATION OF NEW JERSEY.

MACHINERY FOR FOLDING PAPER OR OTHER FABRICS.

SPECIFICATION forming part of Letters Patent No. 736,031, dated August 11, 1903.

Application filed March 7, 1903. Serial No. 146,644. (No model.)

To all whom it may concern:

Be it known that I, RALPH C. SEYMOUR, a citizen of the United States, and a resident of South Orange, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Machinery for Folding Paper or other Fabrics, of which the following is a specification.

This invention relates to that class of folding-machines which are the subject of United States Patents Nos. 668,393 and 668,394 and in which the folding devices comprise a slotted table or support upon which the sheet to be folded is placed, a blade situated at the face of said table or support and presented edgewise opposite to the slot therein, and reciprocating gripping-jaws operating through said slot to first crease the sheet over the edge of said blade in the intended line of fold and to afterward complete the folding of the so-creased sheet by drawing it from said blade and through said slot. In the examples of such machines illustrated in said patents the grippers had only, besides their necessary opening and closing movements, the reciprocating movement by which they were made to crease the sheet over the blade and to complete its fold by drawing it through the table or support and to place the folded sheets edgewise upward into a packer. In thus placing folded printed sheets together there was considerable liability of their faces so rubbing together as to produce smut.

The object of the present improvement is to obviate or reduce this liability by laying the folded sheets flat one upon another in piles in or on any suitable receptacle. For this purpose I so pivotally mount the grippers in their carriage that after having produced the folding of the sheet they may before opening to release it be turned to a horizontal or nearly horizontal position for the purpose of delivering it; and my said improvement consists in certain combinations hereinafter described and claimed in which the so-mounted grippers and the devices for operating them constitute elements.

In the accompanying drawings, Figure 1 represents a longitudinal elevation, partly in

section, of as much of a folding-machine as is necessary for the illustration of the invention; Fig. 2, a view corresponding with Fig. 1 of one set of folding-grippers and their operating mechanism; Fig. 3, a longitudinal elevation of mechanism for operating one of the endless pocketed carriers which is employed for receiving and taking away the piles of folded sheets; Fig. 4, a view corresponding with Fig. 3, but showing the parts in a different position; Fig. 4*, a side view of some of the details shown in Figs. 3 and 4; Fig. 5, a view of one of said carriers, taken at right angles to Fig. 1. Figs. 6 and 7 are views corresponding with Fig. 1, but on a larger scale, of the folding-grippers and parts of their operating mechanism, showing said grippers in different positions; Fig. 8, a side view of the grippers and their mounting corresponding with Fig. 6; Fig. 9, a plan corresponding with Fig. 8.

The folding-machine represented is a double one—that is to say, it contains two sets of folding devices for folding at the same time two sheets obtained by cutting at the middle of their width single sheets presented to the machine. There are two pocketed carriers, one for each set of folding devices, for receiving and taking away in opposite directions, respectively, the piles of folded sheets produced by the two sets.

Fig. 1 of the drawings represents the two sets of folding devices and the cutter, on opposite sides of which the said devices are arranged. It represents also one of the pocketed carriers complete; but it has been thought only necessary to represent a part of the other one, both being alike.

10 10 designate the stationary framing, on which are supported all the working parts of the machine.

11 is the stationary table, on which sheets to be cut and folded are deposited by any suitable means.

12 13 are the blades of the cutter, of which 12 is stationary in a slot in the table, and 13 is carried in a stock 14, which derives a reciprocating motion from a crank 15, carried by a rotary shaft 16, running in bearings 17

on the framing. At equal distances from the cutter, on opposite sides thereof, are the two folding-blades 19 and two sets of folding-grippers 20 21, said blades being arranged 5 opposite to slots 22 (see Figs. 2, 6, and 7) in the table and said grippers being carried by vertically-reciprocating carriages 23. The blades 19 may be either stationary just above the slot 22 in the table 11, as in Patent No. 10 668,394, or they may be and are represented in Fig. 1 as carried by stocks 25, which are pivoted by pivots 26 to the framing 10 and which provide for a slight oscillating movement of the blades, as in Patent No. 15 668,393; but as the fixity or oscillation of the blades is immaterial to the present invention it is not thought necessary to further particularly describe them. The two sets of grippers being both alike, it will be only nec- 20 essary to describe one of them in detail, and as the pocketed carrier 27 on the left side of the machine, Fig. 1, is represented complete the set of grippers on that side of the machine will be the one described. The two 25 rows of jaws 20 21, constituting the set, are carried bodily by a bar 23, which is journaled or pivoted near its ends in two sliding boxes 28, working in stationary upright guides 29, and which is capable of turning in said boxes 30 to present the points of the grippers upward, as shown in Figs. 1 and 6, for the creasing and folding of the sheets and to present them sidewise, as shown in Fig. 7, for the delivery 35 of the folded sheets in a horizontal or approximately horizontal position and pile them one upon another. The necessary reciprocating movement of this bar 23 and grippers for folding the sheets is produced, as in Patent No. 668,393, by two cranks 30 on a shaft 31, Fig. 40 1, running in bearings in the lower part of the framing 10, the said cranks being connected by rods 32 with the parts 33 of the bar, which project, as shown in Figs. 8 and 9, through the guide-boxes 28. The said bar 45 has firmly secured upon it a light frame 34, on which are bolted by bolts 35 the boxes 36, in which are the bearings for the rock-shaft 37, on which the jaws 21 are firmly secured by screws 21*. The jaws 20 are represented 50 as all formed on a plate 20*, which is screwed onto the said boxes 36 by screws 36*. The said jaws 20 are thus fixedly connected with the bar 23, and the jaws 21 have a pivotal connection with those, 20, for the opening and closing. The boxes 28, bar 23, frame 34, 55 and boxes 36 constitute what may be termed the "gripper-carriage." The grippers are kept normally closed by means of a spring 38, applied between the frame 35 and an arm 39, provided on one end of the rock-shaft 37 of the grippers 21, said spring being represented as a coil applied on a rod 40, which is pivoted to a lug 41 on the frame 35 and which runs through an angle-piece 42, pivoted by 65 a pin 42*, Figs. 6 and 7, to said arm 39, said spring abutting between said angle-piece and an adjusting-nut 43, screwed onto the end of

the rod. For opening the grippers at the upper end of the stroke of the carriage to perform the creasing of the sheet on the blade 70 19 there are provided, as shown in Figs. 1 and 2 and as in Patent No. 668,393, a cam 44 on the crank-shaft 31 and a lever 45, working on a fixed fulcrum 46, said lever acting at the proper time against a roller 47 on the arm 39 75 of the shaft 37. Except at the proper time for this opening said lever 45 is held back out of the way of the roller 47 by a spring 48, applied between the said lever 45 and an abutment-piece 49 on the machine-framing 10. 80 For opening the grippers for the delivery of the folded sheets there is provided on the machine-framing a fixed stud 50, over which the roller 47 passes during the lower part of the descent of the carriage and grippers. The 85 turning of the bar in the boxes 28 of the carriage for presenting the grippers toward the blade, as shown in full outline in Fig. 6, during the upper part of their movement for creasing and folding the sheet and for presenting 90 them sidewise during the lower part of their movement in the position shown in Fig. 7 and in dotted outline in Fig. 6 for delivering the folded sheet in an approximately horizontal position or in a pile is performed by means 95 of a curved slotted arm 51, which is rigidly attached to the bar 23 in any similar manner—for example, as represented, by being formed upon or in the same piece with the frame 34. The slot 52 of this arm receives 100 within it a stationary stud 53, which is secured in a suitable part of the machine-framing and which has upon it a friction-roller 54, which fits the said slot.

For the reception of the sheets folded by the 105 grippers and delivered therefrom as described any known or suitable receptacle or receptacles might be employed. In the machine represented such receptacles consist of the pocketed carriers hereinbefore referred 110 to by the numeral 27. There is one of these carriers for each set of folding devices, each consisting of an approximately horizontal endless apron 27, furnished with pockets 55 and running on rollers or drums 57 58, the 115 shafts of which have their bearings in brackets 80, attached to the framing 10 10. The said carriers have step-by-step movements, between which each remains stationary with one of its pockets in suitable relation to its 120 respective folding devices long enough to receive therefrom as many folded sheets as it may be desirable to collect in a pile in each pocket.

The mechanism represented for producing 125 the step-by-step movements of the two pocketed carriers of the double machine herein illustrated will be explained with reference to Figs. 1, 3, and 4, in which there is shown in section the driving-shaft 56 of the machine 130 from a gear 59, Fig. 1, on which the shafts 31 for operating the folding devices derive their motion through an intermediate gear 60, which gears with one of the two intermesh-

ing gears 61 on the said shafts. The said shaft 56 carries also a gear 61*, Figs. 3 and 4, which gears with a gear 62 on a shaft 63, which runs in bearings in standards 64, erected on the bed-plate of the machine. This shaft 63 carries a cam 65, which operates against a friction-roller 66 on the upper end of a lever 67, working on a fixed fulcrum-stud 68 in a fixed stand 69 on the bed-plate. The said lever is connected by a rod 70 with one arm 71 of a lever, the fulcrum 72 of which is in fixed bearings 73 on the bed-plate, and another arm 74 of which has connected with it bars 75, on which are toothed racks 76, gearing with pinions 78 on the shafts 77 of the carrier-drums 57. One only of these drums 57, with its rack 76 and pinion 78—viz., that belonging to the left-hand set of folding devices—is represented; but the following description of one will apply to both. The pinion 78, Fig. 5, is loose on the shaft 77, but it has attached to its hub a pawl 79, engaging with a two-toothed ratchet-wheel 81, which is fast on said shaft, and hence when the levers 67, 71, and 74 move away from said shaft and toward the cam-shaft 64 the rack-bar moving in the same direction turns the pinion 78 without turning the shaft 77, carrier-drum 57, and without moving the carrier; but when the said levers and the rack-bar are moved away from the cam-shaft the ratchet-wheel and the shaft 77 and the carrier-drum 57 are turned to the extent of half a revolution, which is sufficient to give the carrier a movement equal to the distance between one carrier-pocket and the next. The lever 67 is constantly pressed toward its cam 65 by a spring 82, which is applied to the lever-arm 74 and abuts against a fixed bearing 83; but until the proper time arrives for moving the carrier the lever 67 is locked out of the operative range of the cam, as shown in Fig. 3, by a hooked catch 84, which is pivoted at 85 to the stand 69 and which engages, as shown in Fig. 3, with a catch-piece 86* on one side of said lever 67. When the proper time arrives for moving the carrier, the said catch 84 is lifted from the catch-piece and the lever is left to the action of the spring 82, which causes it to follow the cam, so that it may be caused to move the chains as the rising portion of the cam comes into action on it. The lifting of the catch 84 is effected, as shown in Figs. 4 and 4*, by radially-sliding tripping-tappets 92 on a spur-gear 86, which turns on a pin 87, inserted into the stand 69 opposite to and in line with the fulcrum-stud 68, the said gear 86 gearing with and being driven by the spur-gear 62 on the cam-shaft. The said tappets 92 act on a tripping-arm 88, attached to the catch 84, through a short tripping-lever 89, which works on a fulcrum-pin 90 on the stand 69. The said gear 86 is driven by the gear 62, hereinbefore mentioned, on the cam-shaft 63, said gear 62 having a smaller number of teeth than the gear 86. The said gear 62 has fixedly attached to it tappets 91,

one of which after a certain number of revolutions of the cam-shaft comes into contact with the outer end of one of the sliding tripping-tappets 92 and pushes the latter inward far enough for its inner end to act on the lever 89, which then acting on the tripping-arm 88 lifts the latter and the catch-hook 84 and produces the disengagement of the lever 67, which is then pushed back by the spring 82 into operative contact with the lower portion of the cam. The sliding tappets 92 have applied to them springs 92*, which press them outward to the position to be met by the tappets 91, but which allow them to move inward to act on the lever 89. The proportions between the several gears 59, 61, 61, and 86 are such that the gear 86 makes one revolution for every revolution of the folder-operating shafts 31; but the number of revolutions of the said shafts and the number of sheets folded between the successive movements of the pocketed carrier produced by the cam 65 depends on the relative numbers of teeth in the gears 62 86 and the number of tappets thereon. Suppose, for example, as in the machine represented, the gear 86 on the cam-shaft has forty teeth and the gear 62 has thirty-nine teeth and there are two tappets arranged opposite each other on each of said gears. There will be twenty operations of the folder during every operation of the cam 65 on the liberated lever 67, which actuates the pocketed carrier, said lever being locked out of range of the cam during nineteen successive operations of the said cam and only liberated for action during every twentieth revolution. The folded sheets will therefore be deposited in the pockets of the carrier in piles of twenty to be removed therefrom by hand or any other convenient means.

It may be here mentioned that in a double machine such as represented with two sets of folding devices and two pocketed carriers for taking away the piles of folded sheets the gearing between the two rack-bars 75 and the shafts 77 of the two carriers will have to be reversed in order that the two carriers may move in opposite directions.

What I claim as my invention is—

1. In a sheet-folding machine comprising a blade and reciprocating grippers, the combination with said grippers of means for turning them to direct their jaws toward and away from the blade.

2. In a sheet-folding machine comprising a blade and grippers, the combination with said grippers of means for producing their movement toward and from the blade and means for turning them to present their jaws toward the blade as they approach and leave it and to present them sidewise after they have receded a certain distance from it.

3. In a sheet-folding machine comprising a folding-blade and folding-grippers cooperating therewith, the combination with said grippers of means for producing their movement toward and from the blade, means for

opening them as they approach the blade, means for opening them at or near the termination of their movement from the blade, means for closing them as they recede from the blade, and means for turning them toward and away from the blade.

4. In a folding-machine, the combination of a folding-blade and folding-grippers cooperating therewith, a carriage for said grippers in which they are capable of turning toward and away from said blade, and means for moving the carriage and grippers toward and from the blade.

5. In a folding-machine, the combination of a folding-blade and folding-grippers, a bar carrying said grippers, boxes in which said bar is pivoted, means for giving said boxes a movement to carry said bar and grippers toward and from the blade and means for turning said bar in said boxes.

6. In a sheet-folding machine comprising a folding-blade and grippers cooperating therewith, and a receptacle for folded sheets, the combination with said grippers of a carriage therefor and means for giving said carriage a reciprocating movement between said blade and receptacle, means for turning the grippers in said carriage toward and from said blade and receptacle alternately and means for opening the grippers while turned toward the receptacle.

7. In a sheet-folding machine comprising a folding-blade and folding-grippers cooperating therewith and a receptacle for folded sheets, the combination with said grippers of a carriage therefor and means for giving said carriage a reciprocating movement between said blade and receptacle, means for opening said grippers as the carriage approaches respectively the blade and the receptacle, and means for turning them in the carriage to present their jaws toward the blade and the receptacle alternately.

8. In a sheet-folding machine comprising a folding-blade and folding-grippers cooperating therewith, of a carrier for the reception

of folded sheets, means for moving the grippers to and fro between the blade and said carrier for folding the sheets and depositing them in the carrier, means for holding said carrier stationary during a number of movements of the grippers and means for moving the carrier after such number of movements of the grippers.

9. In a sheet-folding machine comprising a slotted folding-table, a folding-blade above said table, a carrier below said table, a gripper-carriage and folding-grippers therein having a vertical reciprocating movement between said table and blade and said carrier and means for turning the grippers in said carriage to present their jaws upward toward the table and in a substantially horizontal position toward said carrier.

10. In a sheet-folding machine comprising a folding-blade and folding-grippers, a carriage having a reciprocating movement toward and from said blade and consisting in part of a pivoted bar to which the grippers are attached, an arm attached to said bar, and a stationary stud with which said arm engages to produce the turning of the grippers in said carriage toward and away from the blade by the to-and-fro movement of the carriage.

11. In a sheet-folding machine comprising a folding-blade and reciprocating folding-grippers cooperating therewith, a gripper-carriage consisting of boxes 28, a bar 23 pivoted in said boxes, a frame 34 affixed to said bar, gripper-jaws 20 affixed to said frame, boxes 36 on said frame, a rock-shaft 37 journaled in said boxes 36 and gripper-jaws 21 carried by said rock-shaft, all substantially as herein described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 3d day of March, 1903.

RALPH C. SEYMOUR.

Witnesses:

GEORGE BARRY, Jr.,

FREDK. HAYNES.