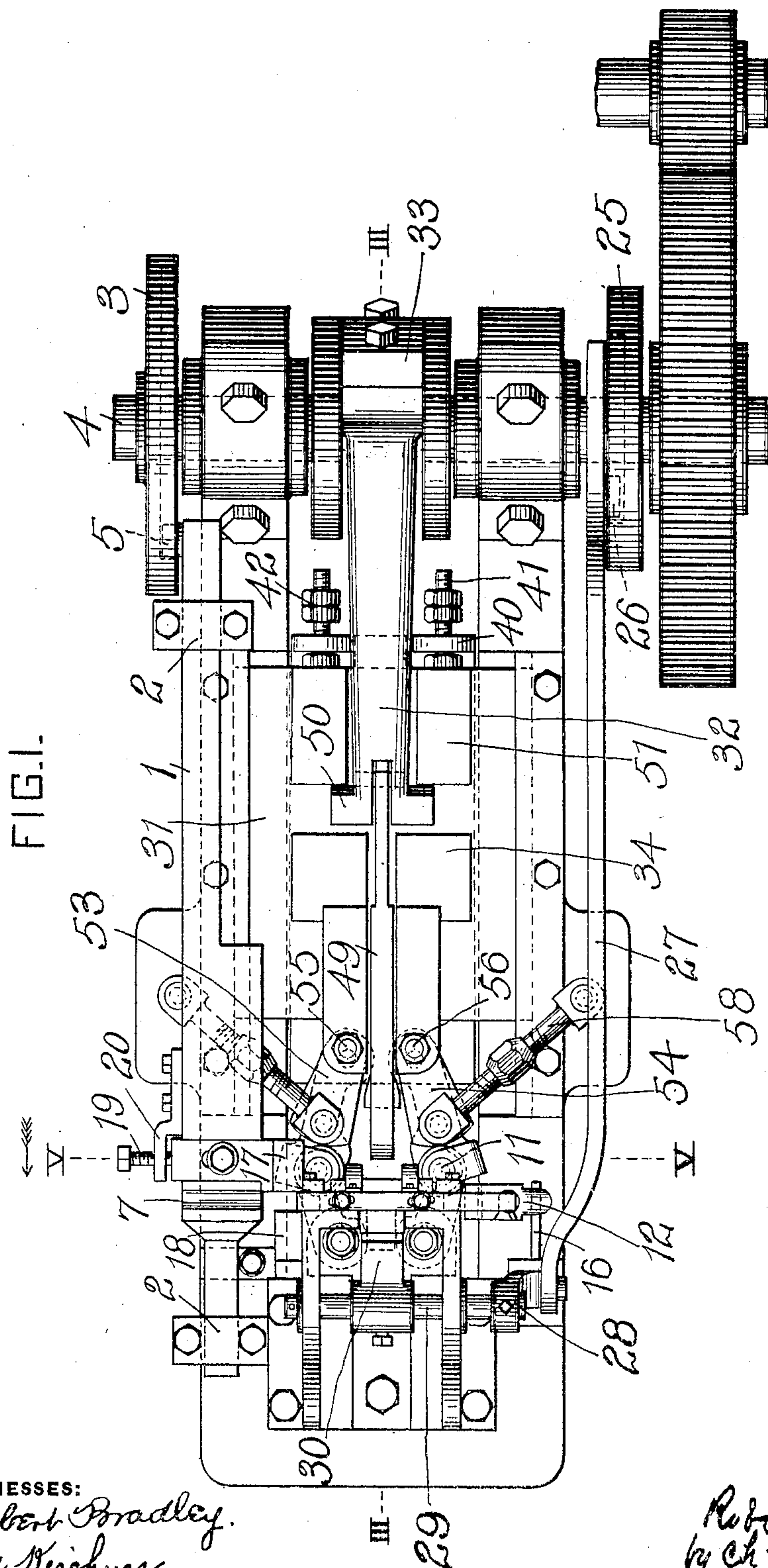


No. 803,988.

PATENTED NOV. 7, 1905.

R. A. CARTER.
BENDING MACHINE.
APPLICATION FILED DEC. 13, 1904.

4 SHEETS—SHEET 1.



WITNESSES:

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Fred Kirchner.

INVENTOR

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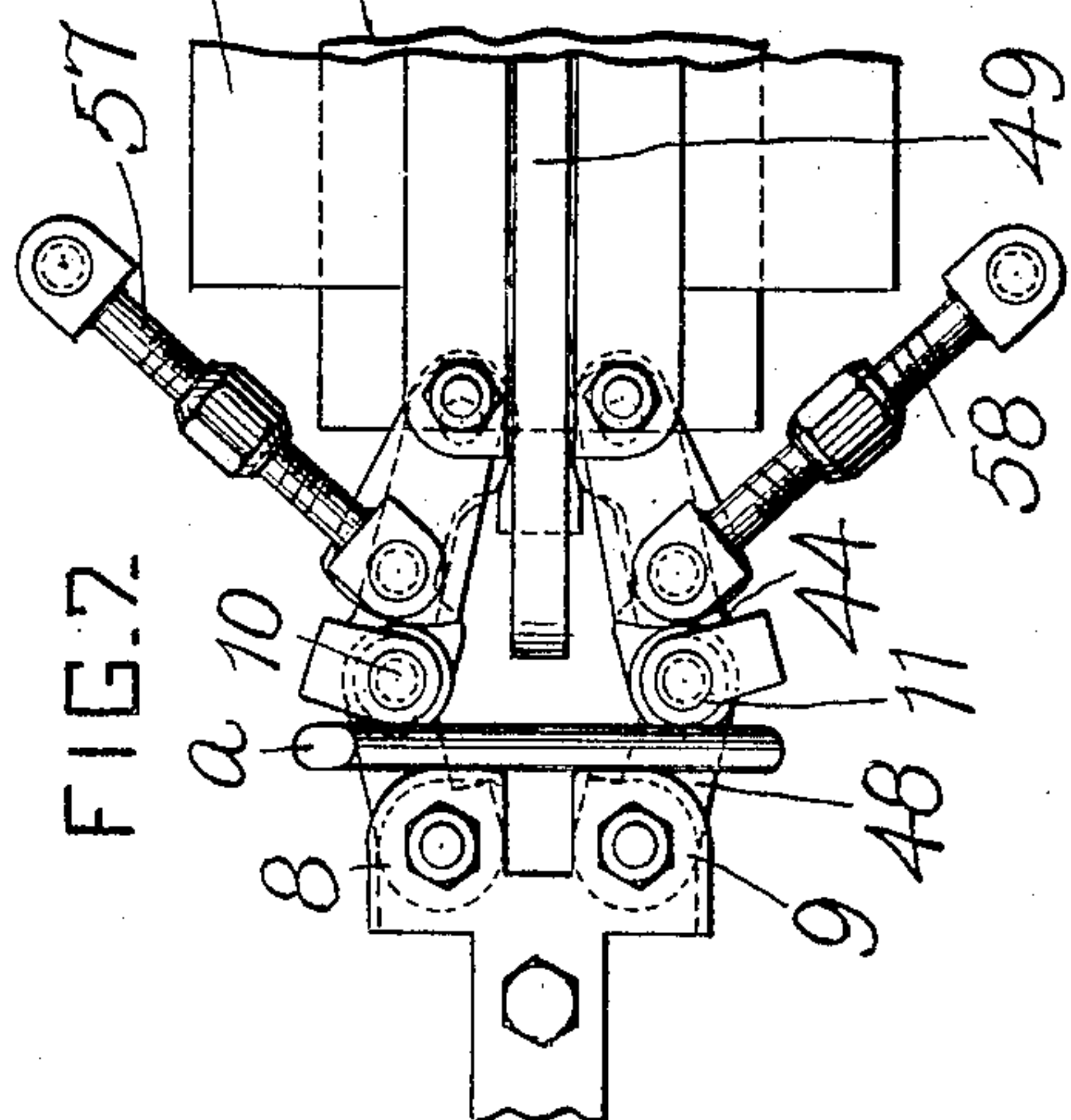
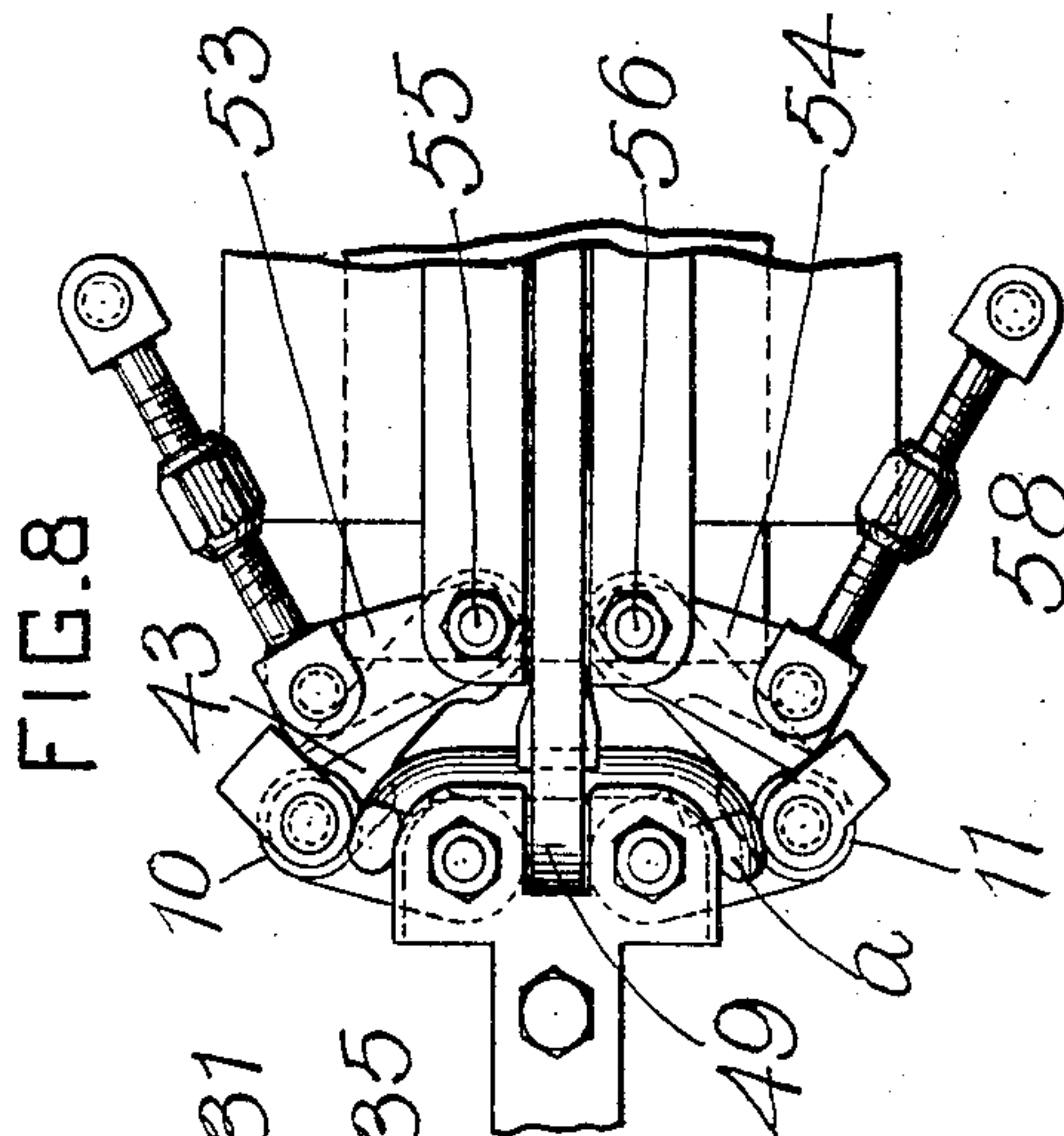
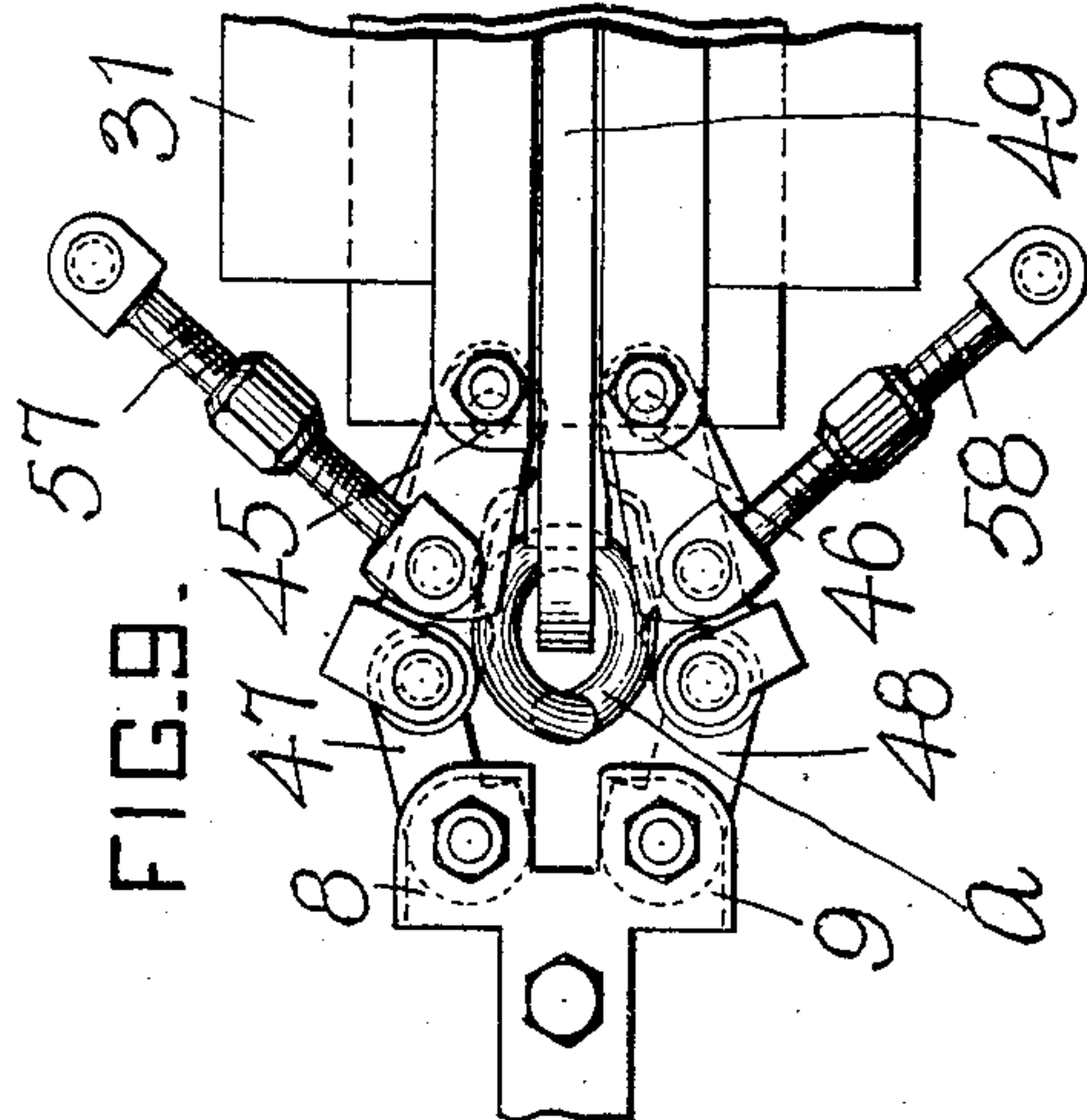
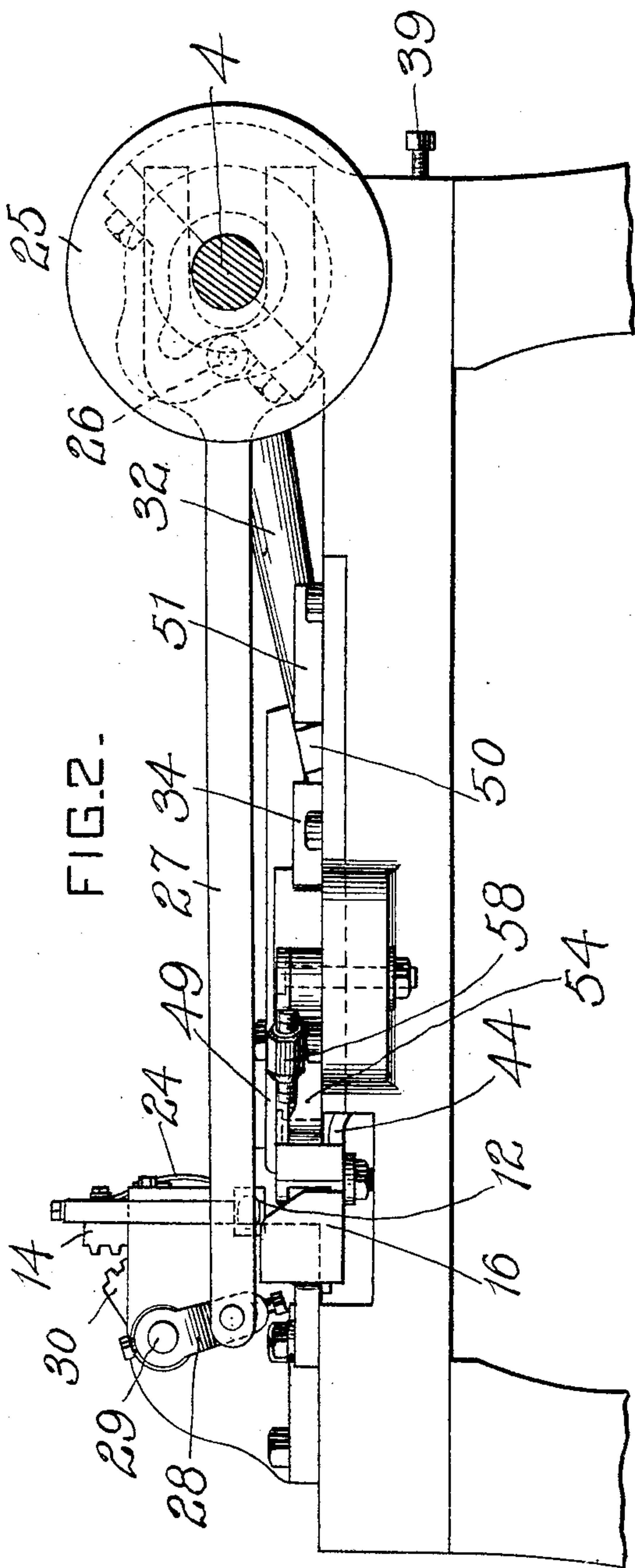
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4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

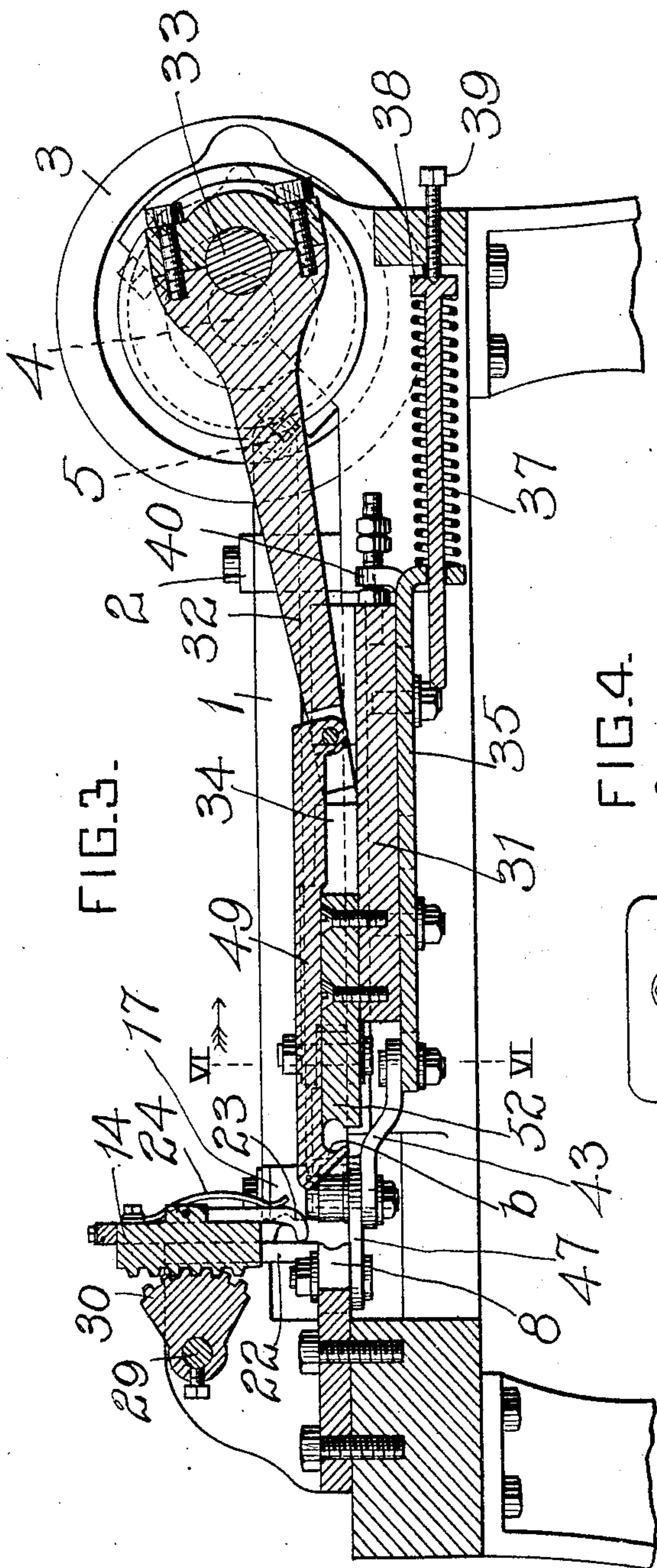


FIG. 3.

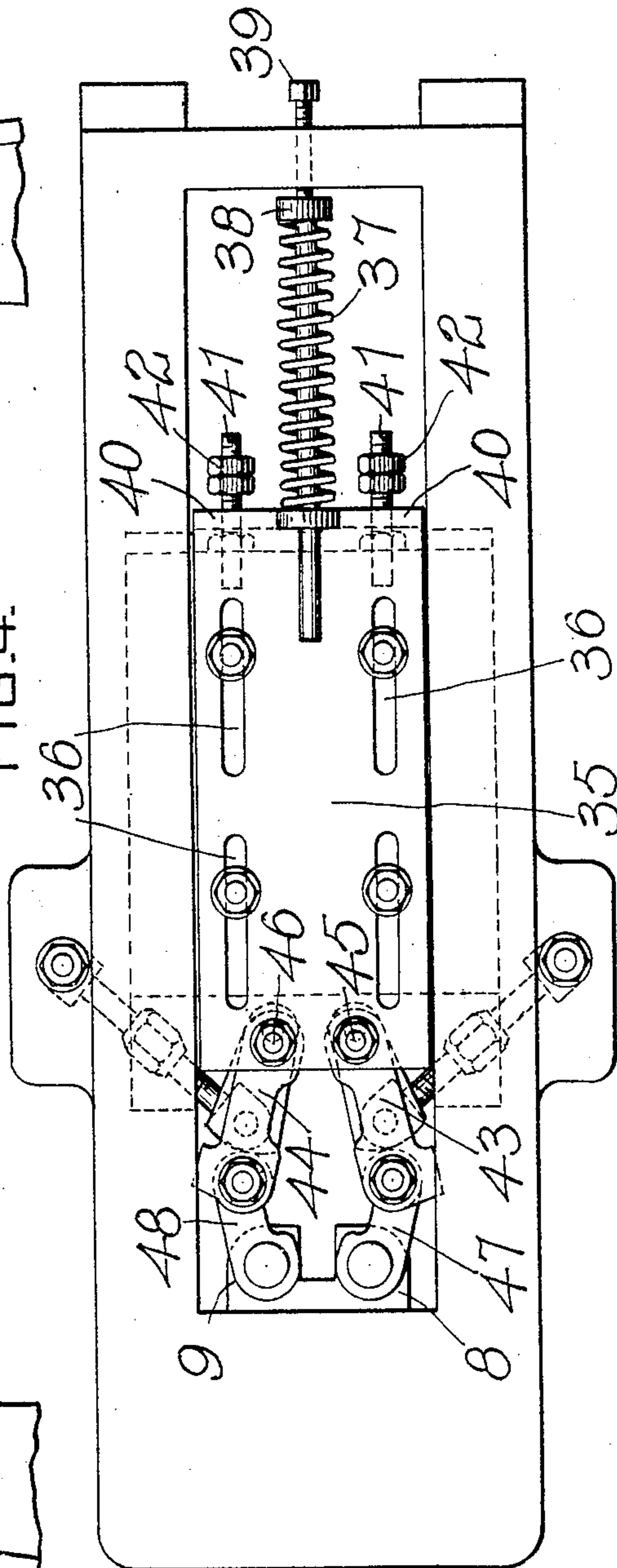


FIG. 4.

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4 SHEETS—SHEET 4.

FIG. 5.

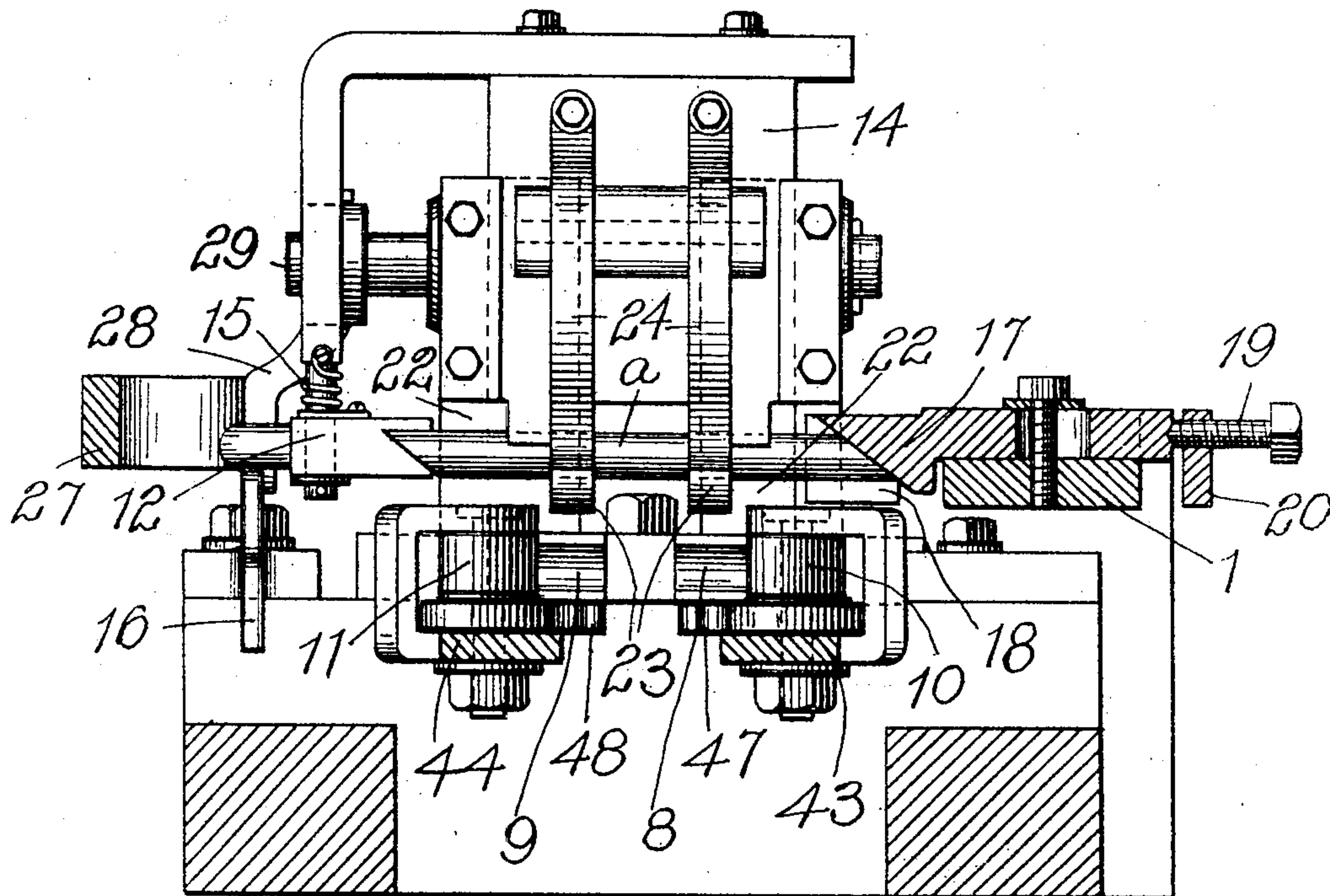
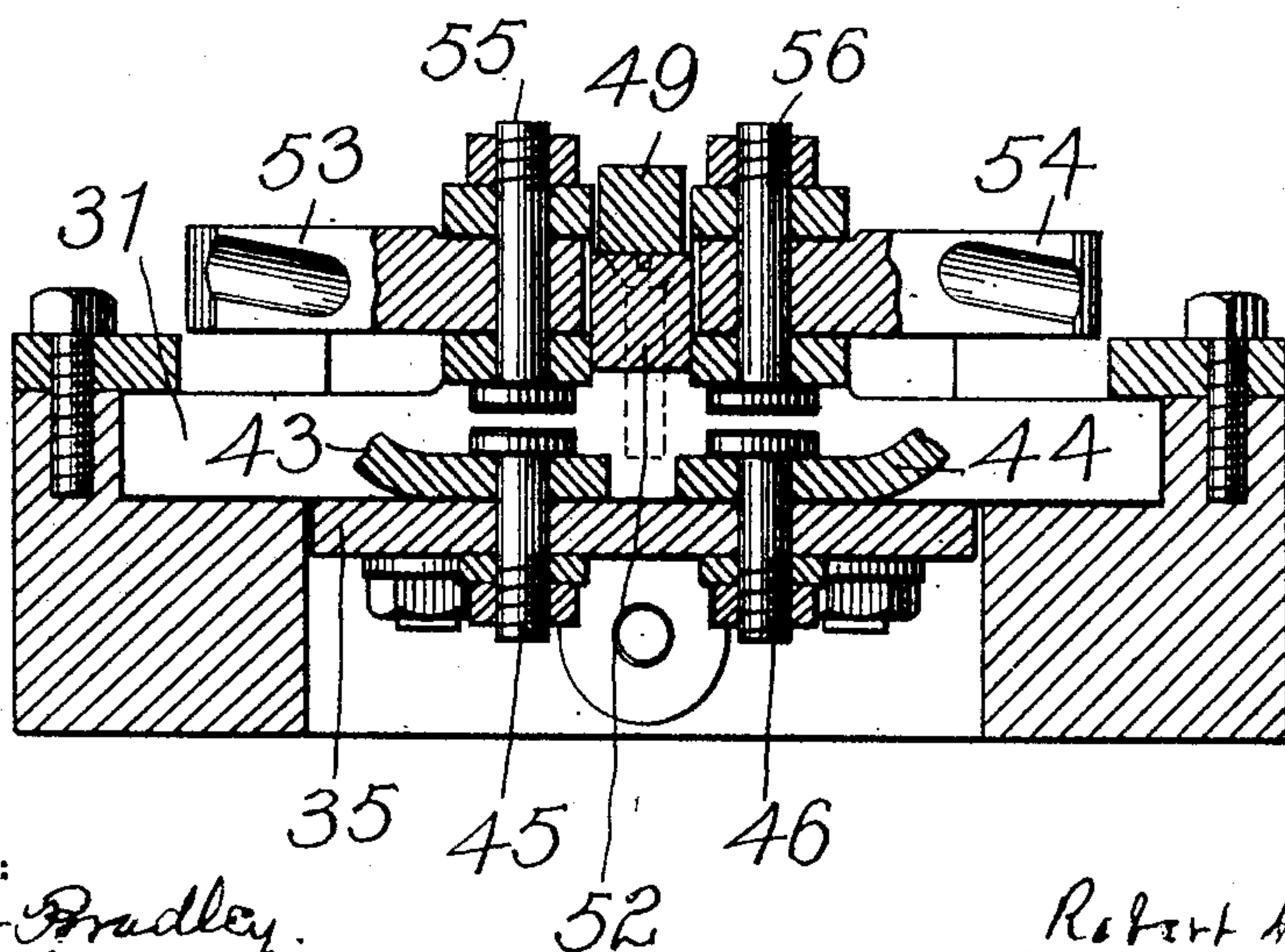


FIG. 6.



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UNITED STATES PATENT OFFICE.

ROBERT A. CARTER, OF PITTSBURG, PENNSYLVANIA.

BENDING-MACHINE.

No. 803,988.

Specification of Letters Patent.

Patented Nov. 7, 1905.

Application filed December 13, 1904. Serial No. 236,694.

To all whom it may concern:

Be it known that I, ROBERT A. CARTER, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Bending-Machines, of which improvements the following is a specification.

The invention described herein relates to certain improvements in mechanism for bending rods, &c., the improvement being especially applicable for the manufacture of links for chains.

The invention has for its object a construction and combination of parts whereby a rod or bar may be divided into sections of suitable length and such sections bent in such manner that their ends when brought together will slightly overlap.

It is a further object of such invention to provide for the separation of the ends of the section when bent in proper overlapping position sufficiently far to permit of the insertion of another link thereinto.

The invention is hereinafter more fully described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a top plan view of my improved bending-machine. Fig. 2 is a side elevation of the same. Fig. 3 is a sectional view on a plane indicated by the line III III, Fig. 1. Fig. 4 is a bottom plan view of the machine. Figs. 5 and 6 are transverse sections of the machine on planes indicated, respectively, by the line V V, Fig. 1, and the line VI VI, Fig. 3. Figs. 7, 8, and 9 are detailed views of the parts directly operative on the section or blank to bend the same, showing such parts in different operative positions.

In the practice of my invention the slide 1 is mounted in suitable ways 2 on the frame of the machine, said slide being operated in any suitable manner—as, for example, by a grooved cam 3 on the main shaft 4 engaging a pin 5 on the slide. This slide is provided with a guide-groove 7, which when the slide is in rearward position will direct the front end of a bar above but in the plane with the space or opening between the forming-surfaces 8 and 9 and the bending-rollers 10 and 11. The inward movement of the bar is limited by an adjustable stop 12, which is pivotally mounted on a bracket, adjustably secured to a vertical slide 14. The block 12 is yieldingly held in normal or operative position by means of a spring 15, surrounding the bracket

and having its ends secured to the block and bracket, respectively, as clearly shown in Fig. 5. The tension of this spring is so adjusted as to hold the tailpiece of said block or stop 12 in position to strike against a cam-plate 16, secured to the frame of the machine in such manner that when the slide 14, and with it the bracket and stop, move downward, the stop will be moved or swung to one side away from the inner end of the bar. As the shaft 4 rotates the slide 1 will be moved forward or to the left, thereby bringing a beveled blade 17 across a similar stationary blade 18, secured to the frame of the machine on one side of the line of movement of the bar or rod as it is fed into the machine. The blade 17 is adjustably secured to the slide in such relation to the guide-groove 7 that on the beginning of the forward movement of the slide it will engage and in connection with the stationary blade 18 sever the bar diagonally, so as to bevel or incline both the end of the section or blank and the end of the bar proper. As shown in Fig. 5, the shank of the blade 17 is slotted for the passage of the screw, and a set-screw 19 passes through a plate 20, secured to the slide 1, and bears against the rear end of the stem of the blade 17.

In order to insure the proper position of the bevels on the blank during the bending operation, the stop 12 is provided with a V-shaped notch for the reception of the beveled end of the rod as it is fed into the machine. By this V-shaped notch or opening the bar will be rotated on its axis when fed in, and hence the bevels on the ends of the blank will be always in proper position relative to each other.

As before stated, the blank is fed into the machine above the position where the bending is effected and must therefore be lowered into the field of movement of the bending devices. When the bar is fed into the machine, it passes across the face of a wall 22, and between the lower edges of the slide 14 and the ends of the supporting-hooks 23, which, as shown in Figs. 3 and 5, are pivotally connected to the slide and held in operative position by springs 24. The groove 7 in the slide 1 and the lower edge of the slide 14 and the hooks 23 form guides for the rod or bar as it is fed into the machine. As soon as the severing of the rod has been effected the slide 14 is moved downward so as to bring the blank between the formers 8 and 9 and the bending-rollers 10 and 11. The movement of the slide is effected by a cam-groove in a disk 25 on

the power-shaft 4, said groove being engaged by a pin 26 on the bar 27, which is connected to an arm 28 on the shaft 29, said shaft having secured thereon a segment of a rack-bar 5 30, engaging teeth on the back of the slide 14. As above stated, this downward movement is effected immediately subsequent to the shearing operation and just prior to the bending of the ends of the blanks. As soon 10 as the blank has been lowered to bending position a slide 31, mounted in suitable ways in the machine, is moved forward, its forward movement being effected by means of a thrust-bar 32, having its rear end connected to a 15 crank-pin 33 on the shaft 4. The forward end of this thrust-bar bears against a shoulder or abutment 34 on the slide 31. A plate 35, provided with slots 36, is secured to the under side of the slide 31 by means of bolts 20 passing through the slots into the slide. This construction will permit a movement of the plate independent of the slide. The plate is yieldingly pressed forward by a spring 37, arranged between a lug on the plate and a 25 shoulder on the guide-rod 38, the position of which can be shifted by the screw 39 to change the tension of the spring. The forward movement of the plate independent of the slide is limited by the abutment of a lug 30 40 against the end of the slide. In order to cause a positive forward movement of the plate, as is necessary to bend the blank, threaded studs 41 project from the slide through the lugs 40, and nuts 42 on said stud bear 35 against the lugs. This construction permits movements of the slide and plate independent of each other and also a positive movement of the plate by the slide. The bending-rollers 10 and 11 are mounted upon pins carried 40 by arms 43 and 44. One end of these arms is pivotally mounted on the plate 35, as by the pins 45 and 46, and the rear ends of the arms are connected by links 47 and 48 to a stationary portion of the machine, as the formers 8 45 and 9, in such relation to the forming-surfaces thereof that when the plate is moved forward and the rollers 10 and 11 pushed forward by the arms 43 and 44 the rollers 10 and 11 will be guided around the forming-surfaces 8 and 9 by the links 47 and 48, thereby 50 imparting the initial bends to the ends of the blank *a*. Immediately after the rollers 10 and 11 have moved forward to engage the blank the shaft 29 is rocked so as to raise the 55 slide 14 and withdraw the fingers or hooks 23 from under the blank, the springs 24 permitting the fingers to move outwardly, leaving the blank firmly gripped by the rollers and stationary formers. As the slide 31 moves 60 forward a hook 49, pivotally connected to the thrust-bar 32, moves forward also, and by reason of the inclination of its forward end will slide over the blank while held by the rollers and formers and allow its pulling shoulder *b* to drop in behind the blank. The re-

turn movement of the slide 31 is effected by means of the thrust-bar 32, which is provided with a head 50, its front end adapted to drop into a recess in the slide. The widths of the recess and head on the bar 32 are so propor- 70 tioned that the space between the abutment or shoulder 34 and the shoulders 51, forming the rear wall of the recess, as to allow a certain play or free movement of the thrust-rod in the slide, so that when the thrust-rod moves 75 backward it will draw back the hook 49 and pull the blank against a holding shoulder or head 52 on the slide, thereby firmly clamping the middle portion of the link between the abutment *b* on the hook and the head 52. As 80 the thrust-rod continues its rearward movement the slide will be forced back by the hook operating on the slide through the blank and the head 52. By this rearward movement of the slide the blank is withdrawn from between 85 the formers and rollers 10 and 11, which during the initial rearward movement of the slide will be yieldingly held against the blank by the spring 37, acting through the plate 35. During this rearward movement of the slide 90 with the partially-formed link bending-wings 53 and 54 are moved forward against the portions of the blank on opposite sides of the hook, thereby imparting the final bend to the blank. As clearly shown in Figs. 1, 7, 8, and 95 9, these wings are pivotally mounted upon the slide 31 by pins 55 and 56 and are connected by links 57 and 58 to stationary portions of the machine, so that when the slide is moved forward the wings will be drawn 100 out to the position shown in Figs. 7 and 8; but when the slide moves backward or to the right in Figs. 1 and 9 these wings will be forced inward against the blank, completing the bending of the same, as shown in Fig. 7. 105

It is characteristic of my improvement that the bar is fed in sheared during the bending of the ends of the previously-cut blank, and that the final bend is given by the wings 53 and 54 to one blank while the next blank is 110 being forced down between the stationary formers and the bending-rollers. It is also characteristic of my improvement that the blank is firmly gripped between the hook 49 and the head 52, thereby preventing any move- 115 ment of the blank during the action of the wings 53 and 54 thereon. As the movement of the slide is due to the pull of the hook on the blank and the movement of the wings is caused by the backward movement of the 120 slide, it follows that the greater resistance the blank presents to the action of one or both wings to bend the blank the more firmly will the blank be gripped.

When the inner surfaces of the links are to 125 be grooved or have any particular configuration, the faces of the formers 8 and the face of the abutment *b* of the hook 49 are so shaped as to preserve or impart such internal shape or configuration. 130

By reason of the construction permitting the slide 31 to move back a short distance independent of the plate the blank will be yieldingly held against the forming-surfaces 8 and 9 by the rollers 10 and 11 both prior to the bending of the ends of the blank and also during the initial rearward movement of the blank by the hook 49.

I claim herein as my invention—

1. In a bending-machine the combination of stationary formers, bending-rollers movable around the formers, guides for the blank arranged above the plane of movement of the rollers, and means for shifting one of said guides to bring the blank into position between the rollers and formers, substantially as set forth.

2. In a bending-machine, the combination of stationary formers, bending-rollers movable around the formers, guides having a yielding member and arranged above the plane of movement of the rollers, and means for reciprocating said guide, substantially as set forth.

3. In a bending-machine, the combination of a slide, a thrust-rod for shifting the slide, and movable independent thereof a hook connected to the thrust-rod, a bearing-head carried by the slide, bending-wings and means operative on the movement of the slide for shifting the wings, substantially as set forth.

4. In a bending-machine the combination of a slide, a thrust-rod adapted to shift the slide and movable independent thereof, a hook movably connected to the thrust-rod, a blank-bearing head carried by the slide, wings pivotally connected to the slide and links connecting the wings to stationary portions of the machine, substantially as set forth.

5. In a bending-machine, the combination of a slide, a thrust-rod for shifting the slide movable independent thereof, a hook pivotally connected to the thrust-rod, a bearing-head on the slide, bending-wings and means for forcing said wings toward each other during the movement of the slide, substantially as set forth.

6. In a bending-machine, the combination of a slide, wings pivotally mounted on the slide, links connecting the wings to stationary portions of the machine, a reciprocating hook for engaging the blank, and operative through the blank to force the slide backward to close the wings, substantially as set forth.

7. In a bending-machine, the combination of stationary formers, bending-rollers movable around the formers, guides for the blank normally above the plane of movement of the rollers, means for shifting the guides to bring

the blank into operative position between the rollers and formers and a stop movable with the guides, substantially as set forth.

8. In a bending-machine, the combination of stationary formers, bending-rollers movable around the formers, guides for the blank, normally above the plane of movement of the rollers, means for shifting the guides to bring the blank into operative position between the rollers and formers, a stop having a blank-guiding surface movable with the guides, and means for removing the stop out of engagement with the blank, substantially as set forth.

9. In a bending-machine, the combination of stationary formers, bending-rollers, movable around the formers, guides for the blank normally above the plane of movement of the rollers, means for shifting the guides to bring the blank into operative position between the rollers and formers, a pivotally-mounted stop movable with the guides and means for swinging the stop during its movement with the guides, substantially as set forth.

10. In a bending-machine the combination of stationary forming-surfaces, a reciprocating slide, a plate movably mounted on and operative by the slide, bending-rollers operative by the plate and a spring for shifting the plate independent of the slide, substantially as set forth.

11. In a bending-machine, the combination of stationary forming-surfaces, a slide, a thrust-rod for shifting the slide and movable independent thereof, a plate movable on and operative by the slide, bending-rollers operative by the plate, a spring for shifting the plate independent of the slide, bending-wings, means operative by the slide for shifting said wings, a hook connected to the thrust-rod and a head carried by the slide, substantially as set forth.

12. In a bending-machine, the combination of stationary formers, a slide, a thrust-rod for shifting the slide and movable independent thereof, a plate movable on and operative by the slide, bending-rollers operative by the plate, a spring for shifting the plate independent of the slide, bending-wings, means operative by the slide for shifting said wings, and a hook connected to the thrust-rod, substantially as set forth.

In testimony whereof I have hereunto set my hand.

ROBERT A. CARTER.

Witnesses:

CHARLES BARNETT,
HERBERT BRADLEY.