No. 843,839. PATENTED FEB. 12, 1907.

J. NORTHERN.

BOOT AND SHOE MACHINERY.

APPLICATION FILED NOV. 6, 1905.

6 SHEETS—SHEET 1.

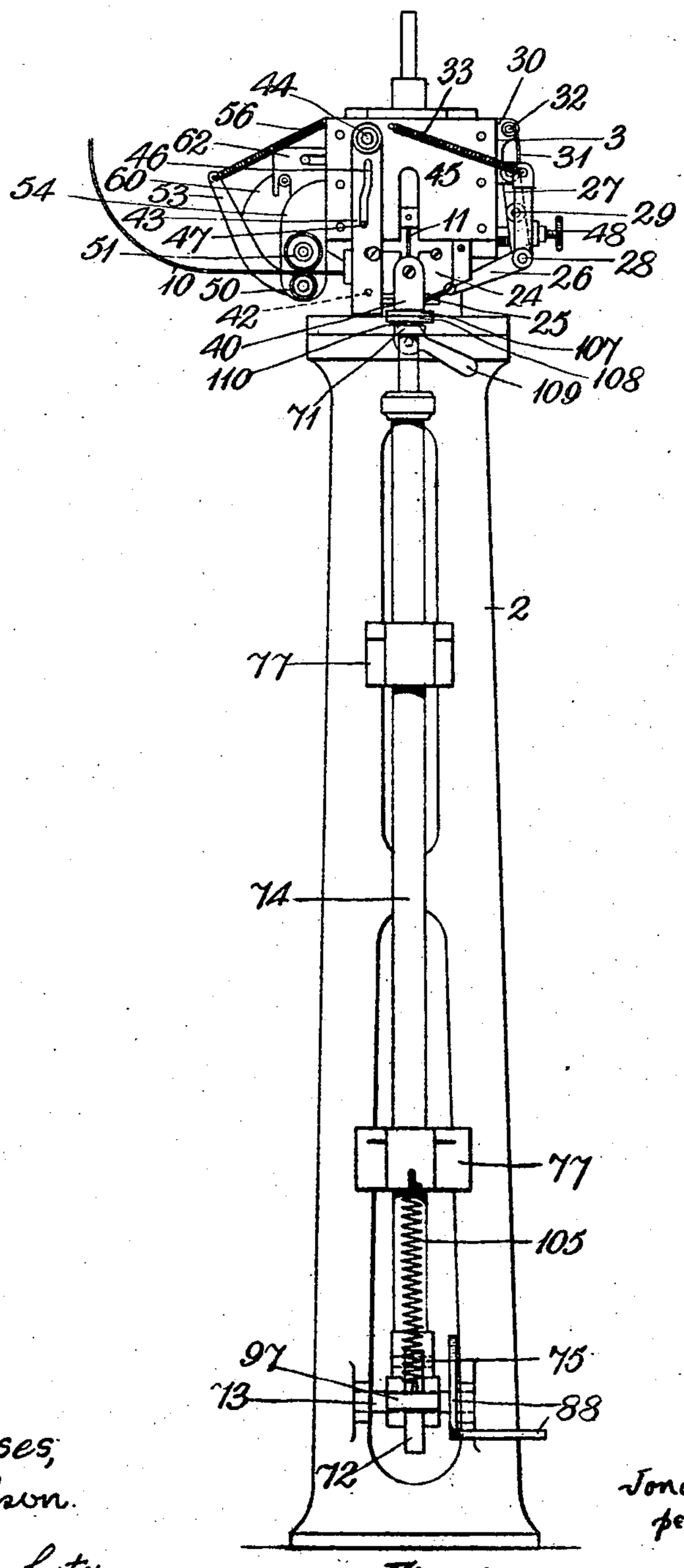

Fig: 1.

Witnesses;
Jos. Wilson.
George Lester

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Jonathan Northern
per.
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Attorney

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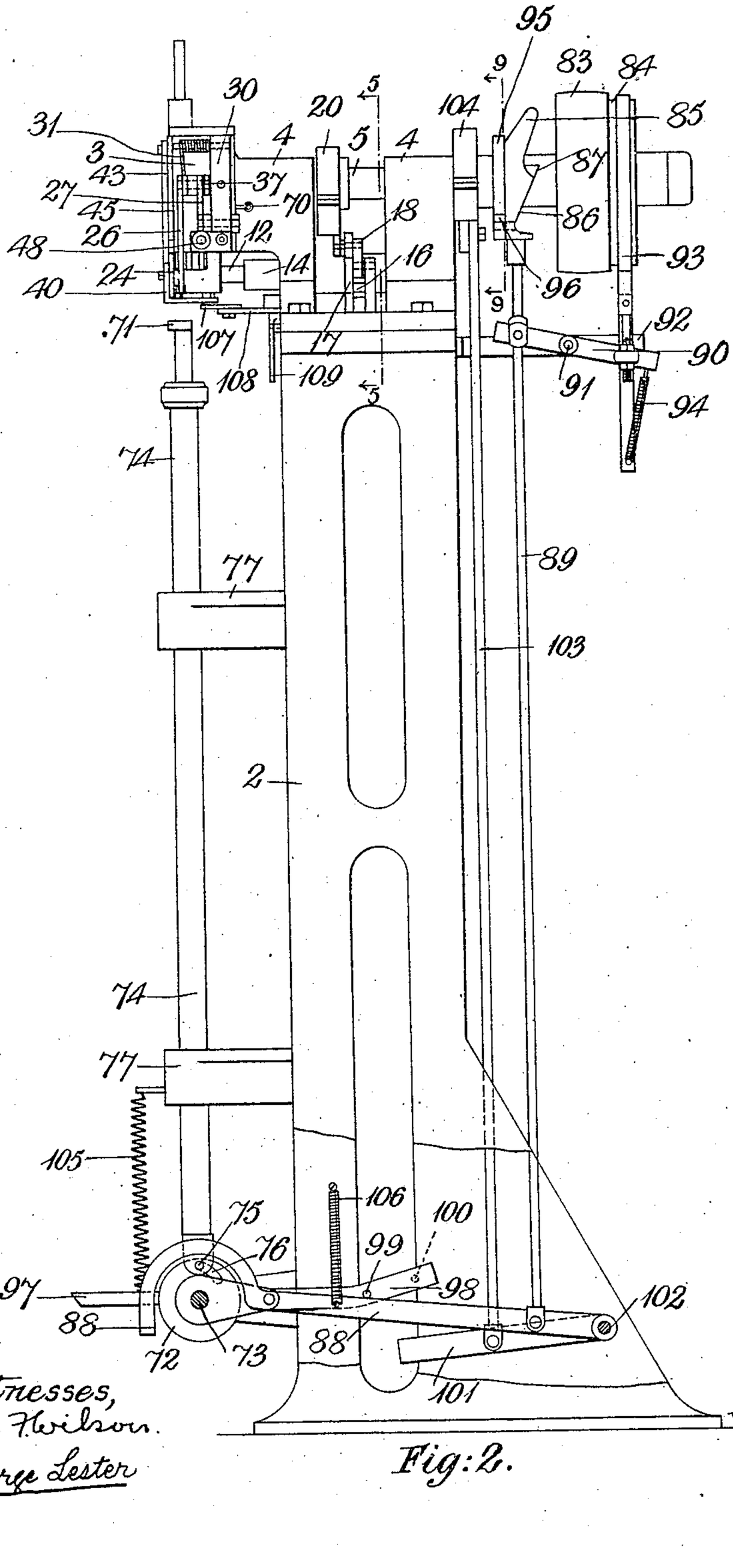
6 SHEETS—SHEET 2.



Witnesses,
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Fig: 2.

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5 SHEETS—SHEET 3.

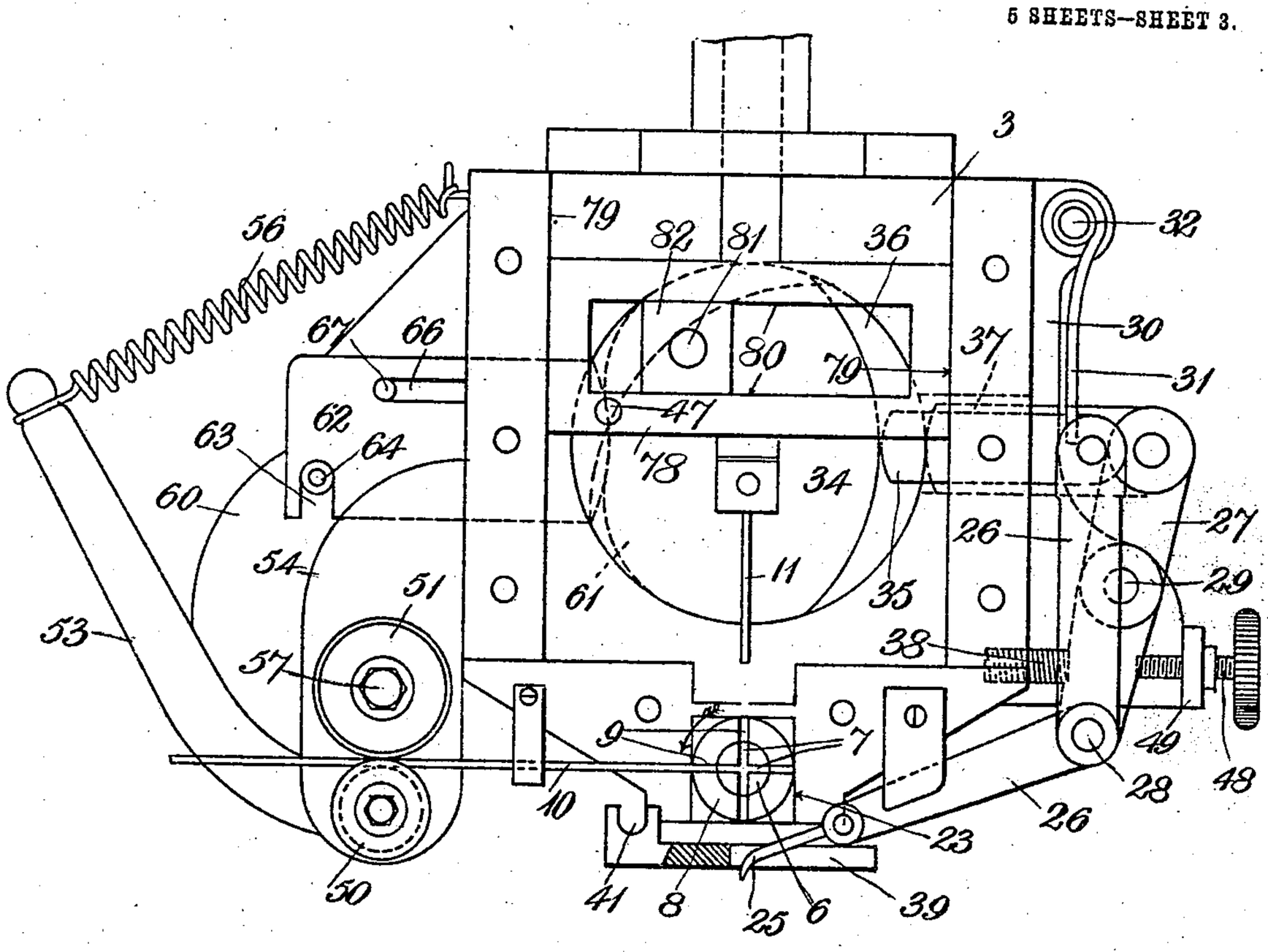

Fig: 3.

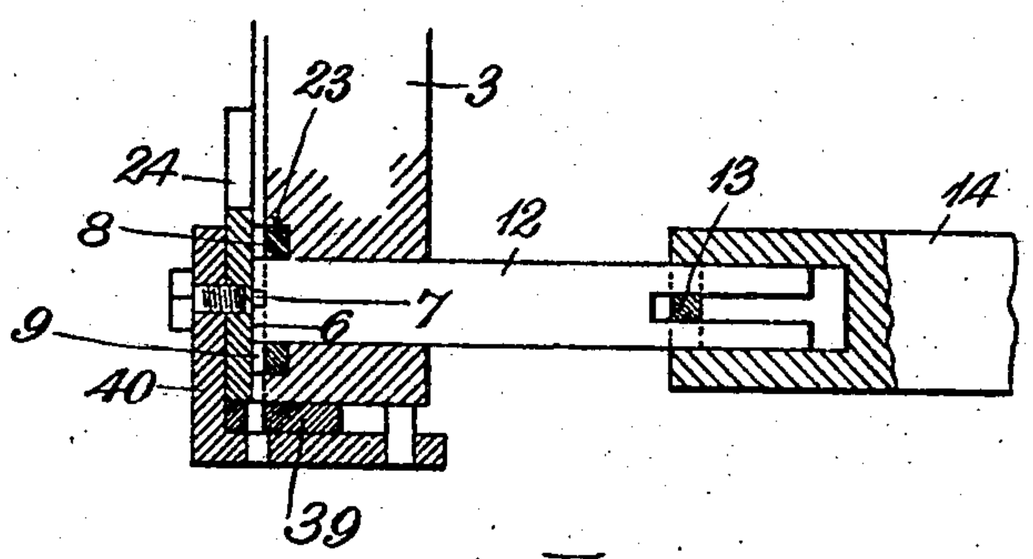

Fig: 4.

Witnesses,
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5 SHEETS—SHEET 4.

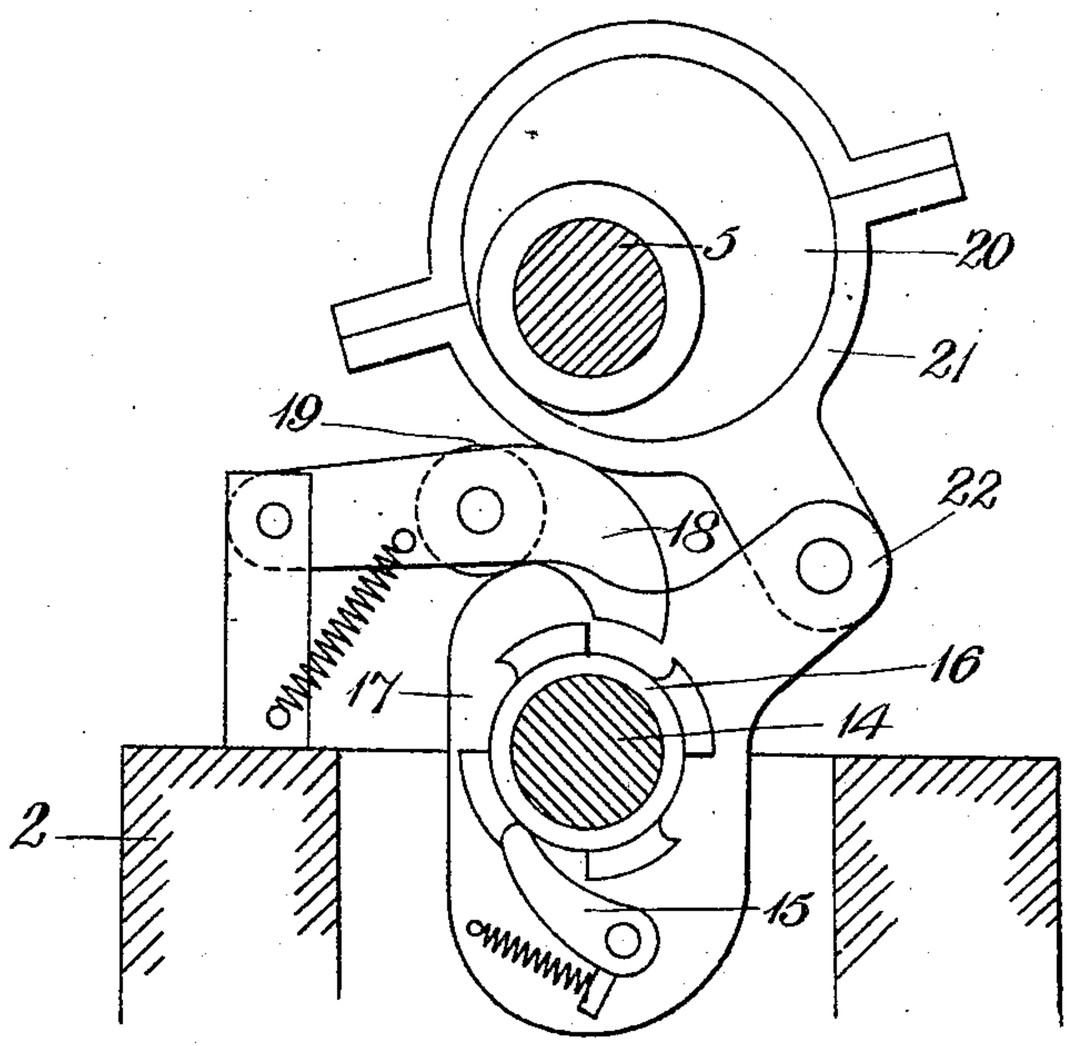

Fig: 5.

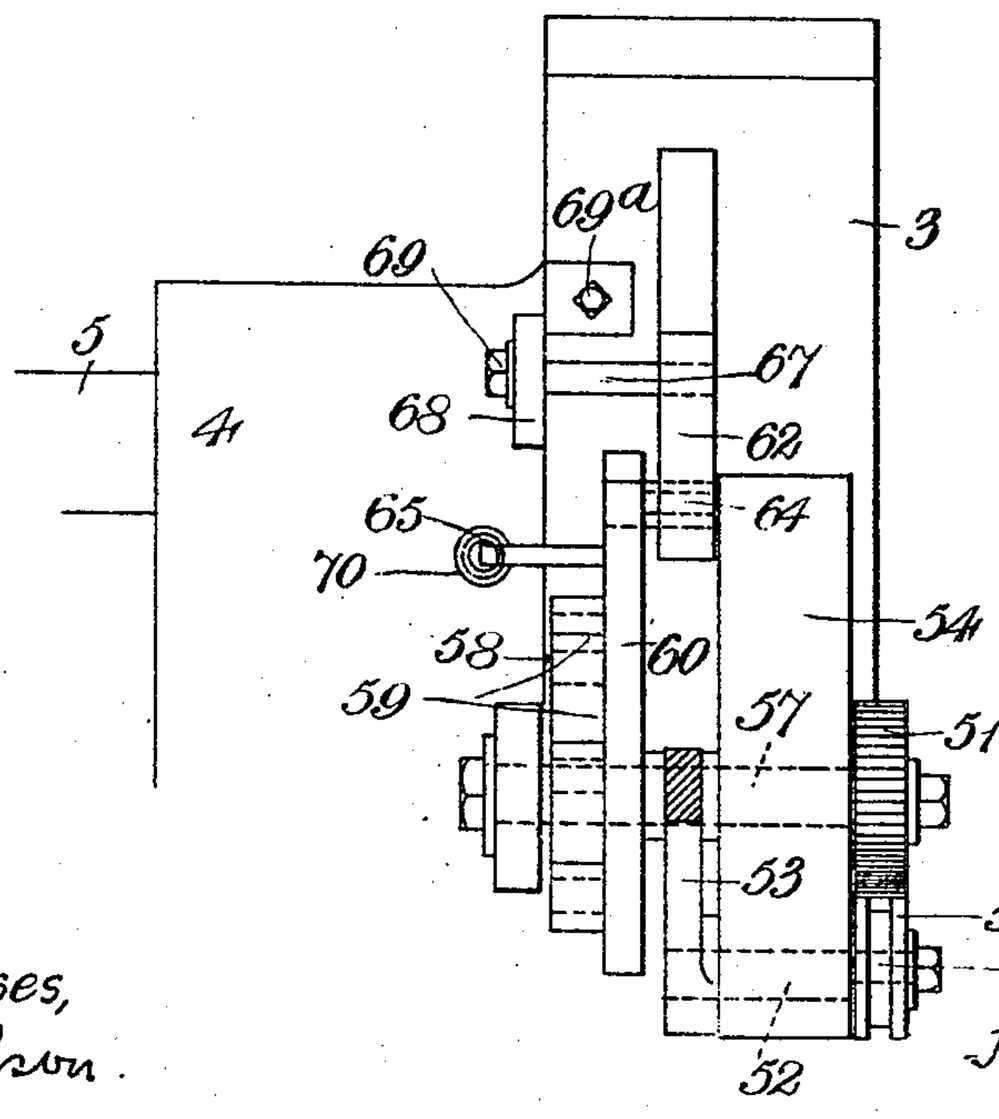

Fig: 6.

Witnesses,
Thos. Wilson.
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5 SHEETS—SHEET 5.

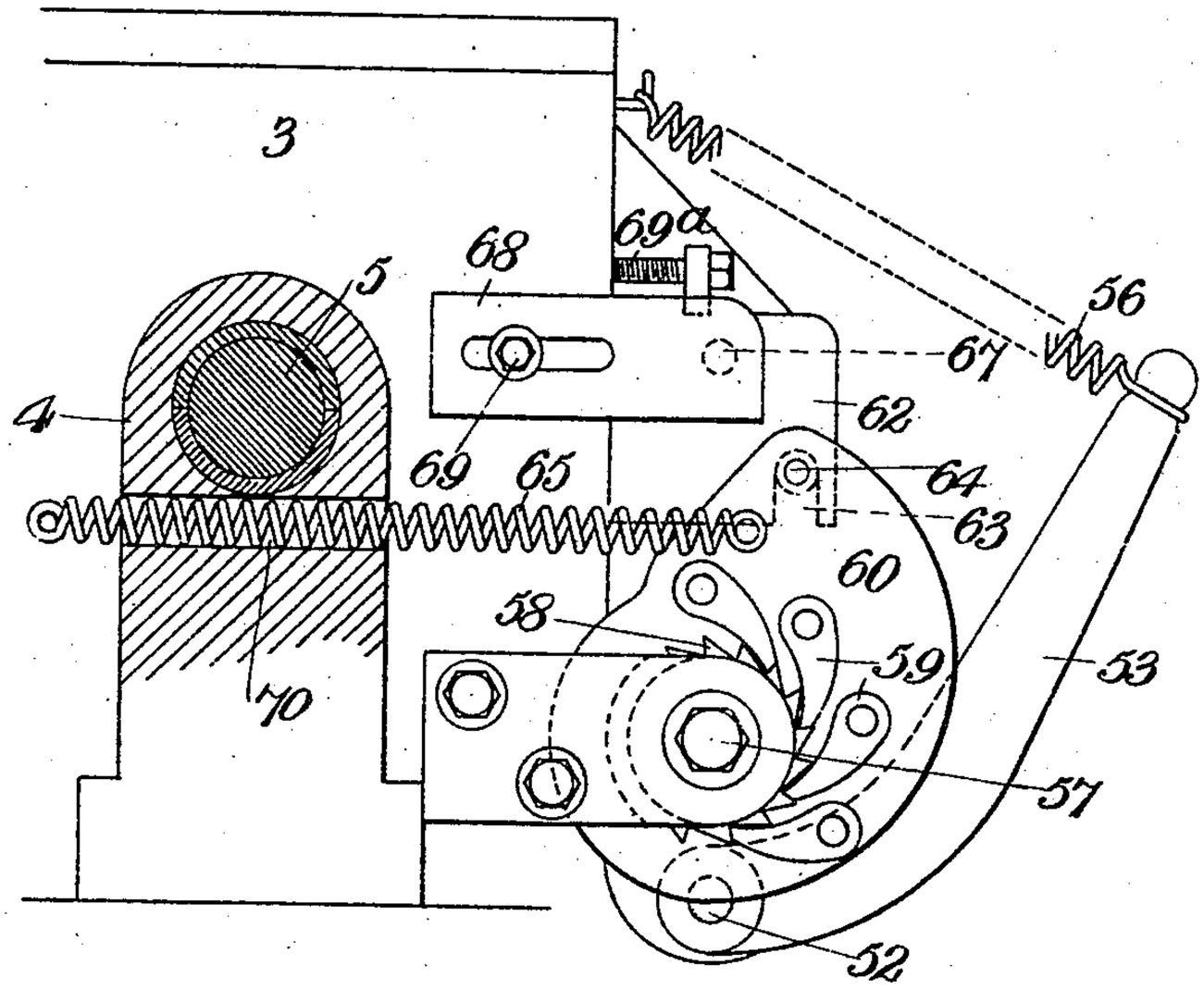

Fig: 7.

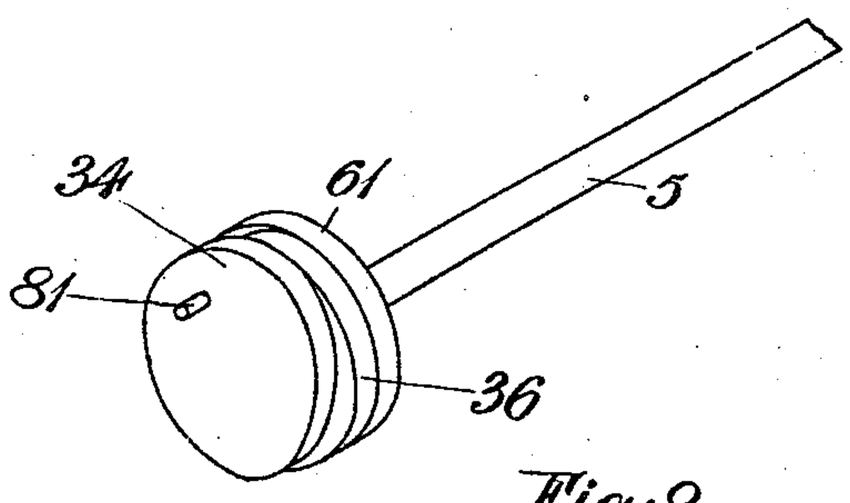

Fig: 8.

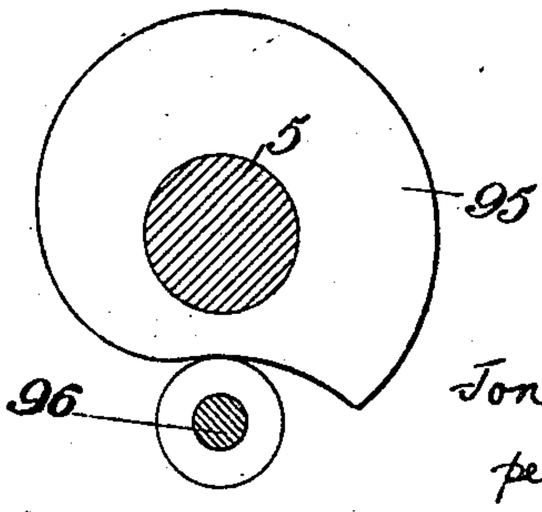

Fig: 9.

Witnesses,
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George Lester

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UNITED STATES PATENT OFFICE.

JONATHAN NORTHERN, OF RUSHDEN, ENGLAND.

BOOT AND SHOE MACHINERY.

No. 843,839. Specification of Letters Patent. Patented Feb. 12, 1907.

Application filed November 6, 1905. Serial No. 286,011.

To all whom it may concern:

Be it known that I, JONATHAN NORTHERN, subject of Great Britain, residing at Rushden, in the county of Northampton, England, have invented new and useful Improvements in or Relating to Boot and Shoe Machinery, of which the following is a specification.

This invention relates to machinery employed in the manufacture of boots and shoes, and has particular reference to the type of nailing or slugging machine in which a short section is cut off the end of a continuous length of wire and driven into a boot sole or heel for the purpose of studding, slugging, or riveting the said sole or heel.

The invention includes improved means for cutting off the slug and carrying it into position to be driven, improved means for actuating the wire-feed wheel, improved means for carrying and operating the awl or pricker which perforates the work for each slug and subsequently feeds the work, and, lastly, improved means for locking the horn or work-support during the driving of the slug and, if necessary, during the perforating of the work.

The invention will be readily understood from the following description, wherein reference is made to the accompanying drawings.

Figure 1 is a front elevation, and Fig. 2 a side elevation, of a slugging-machine constructed according to this invention. Fig. 3 is a front elevation of the head of the machine with the cover-plate removed to reveal the cutter-disks. Fig. 4 is a sectional detail view of the cutter-disks and adjacent parts. Fig. 5 is a transverse section through the driving and cutter shafts on the line 5 5, Fig. 2. Figs. 6 and 7 are a side and back view, respectively, of the feed-wheel gear. Fig. 8 is a perspective view of the driving-shaft *per se*, showing the three cams thereon; and Fig. 9 is a transverse section on the line 9 9 of Fig. 2, showing the cam which governs the stopping of the machine.

Figs. 1 and 2 are drawn to a smaller scale than the other figures; but in all of them identical parts are designated by the same reference characters.

Referring to the drawings Figs. 1 and 2, the frame 2, which may be of any conventional type suitable for the purpose, carries at its upper part a head 3, formed with bearings 4 for the driving-shaft 5, from which all the various motions of the machine are derived—viz., cutting the slugs and carrying them into position to be driven, feeding the wire, driving the slug, and operating the awl or pricker.

According to this invention the slug-cutting mechanism, Figs. 3 and 4, comprises an intermittently-rotating disk 6, on the end or face of which are formed two diametrical grooves at right angles to each other, forming four equidistant passages 7 for receiving the wire 10. This rotating disk revolves within a stationary disk or cutter 8, having a corresponding number of passages 9 for the wire. As the end of the wire is fed forward in the manner hereinafter to be described it passes through the adjacent passage 9 in the stationary disk or cutter 8 into the corresponding passage 7 in the rotary disk cutter 6, and the latter in turning round in the direction of the arrow, Fig. 3, shears or cuts off the end of the wire, constituting a slug and carries it into position under and in alinement with the vertically-reciprocating driver 11 for being driven into the "stock," which term is hereinafter used to designate the sole or heel or other material into which the slug is driven. The disk cutter 6 at each movement is rotated one-quarter of a revolution—*i. e.*, through a distance of ninety degrees—in the manner hereinafter described, thereby bringing one passage 7 into alinement with the wire 10, so that the end of the latter can be fed or projected thereinto, and at the same time another passage in which the slug is contained into alinement with the driver 11, so that the latter can drive it into the stock. The rotary disk cutter 6 is formed of hardened steel and is provided with a slotted stem 12, Fig. 4, arranged to socket into and engage a transverse pin 13 in the hollow front end of the intermittently-rotating cutter-shaft 14. The said cutter-shaft 14, Figs. 2 and 5, derives its motion from the driving-shaft 5 above it by means of an eccentric 20 on the shaft 5, the strap 21 of which eccentric is jointed to a lug 22 on an eccentric flange 17, formed integrally with a sleeve loosely mounted on the cutter-shaft. The said flange carries a pawl 15, which is controlled by a spring and normally engages a ratchet or notched sleeve or pinion 16, keyed on the cutter-shaft 14 in close proximity to said loose sleeve. The number of teeth on the ratchet-pinion 16 correspond with the number of wire-passages in the cutter-disks and in the example shown are four. A spring-controlled detent 18 engages the said ratchet-pinion 16 at the end of each movement of the cutter-shaft and prevents it

moving beyond the point where the passages 7 and 9 in the rotary disk cutter and stationary cutter are in alinement. The said flange 17 at each rotation of the eccentric 20 is actuated thereby to both operate the driving-pawl 15 and simultaneously disengage the detent 18, for which latter purpose the said detent carries a roller 19, which runs on the cam edge of the flange and is raised and lowered thereby to throw the detent out of or into action at the proper times.

The stationary cutter 8 is rendered immovable by being made of square or polygonal shape and located in a recess 23, Fig. 4, of corresponding shape in the front of the head of the machine. A face-plate 24, bolted to the front of the said head, prevents the stationary and rotary disk cutters from falling out of place.

The awl 25, Fig. 3, which perforates the stock and feeds the latter along under the cutter-disks 6 and 8 the predetermined distance between the slugs, is carried adjustably by the lower end of a bell-crank lever 26, hereinafter designated the "awl-carrier." This awl-carrier 26 is fulcrumed at 28 on an auxiliary rocking lever 27, pivoted at 29 to a bracket 30 on the side of the head of the machine. The awl 25 is lowered to perforate the work by means of a strong spring 31, carried by a pin 32, projecting from said bracket, assisted by an auxiliary spring 33 on the front of the machine.

A cam 36 on the driving-shaft 5, Fig. 3, acts on the auxiliary lever 27 through the medium of a short arm 37 on the latter, causing it to actuate the awl-carrier and the awl, so that the latter feeds the stock along. A second cam 34 on the driving-shaft next acts on the awl-carrier through the medium of a short arm 35 on its upper end, moving it on its fulcrum 28, so that the awl is raised or withdrawn from the stock, whereupon the first cam 36 in passing out of action allows a compression-spring 38 to return the auxiliary lever and the awl-carrier back to their original positions. The awl is guided in its movements by a slotted plate 39, through which the driver passes. The said plate is movable in a bracket 40, attached to the front of the machine, and is formed with a grooved lug 41, which is engaged by a pin 42 on the inner side of the lower end of a lever 43, Fig. 1, pivoted at 44 to the cover-plate 45. The said lever is formed with a cam-slot 46, in which a pin 47 on the face of the slotted bar 78, carrying the driver 11 and hereinafter referred to, engages. The arrangement is such that as the awl moves forward and backward the said pin 47, acting in the cam-slot 46, rocks the lever 43 on its pivot, thus causing its lower end to correspondingly move the said plate to allow for the motions of the awl. The extent of the inward or forward motion of the awl-carrier may be altered to vary the pitch of the slugs by means of a screw-pin 48, carried by a lug 49 on the bracket 30 and abutting against the lower arm of the auxiliary lever on the opposite side to that on turning this screw-pin the extent of the which the compression-spring 38 bears. By movement of the auxiliary lever, and hence of the forward or inward movement of the awl-carrier, each time said lever is operated by its cam may be determined so that the slugs may be inserted into the stock either nearer to or farther away from each other, as desired.

The feed-wheels, Figs. 3, 6, and 7, by which the wire is fed to the cutting-disks, comprise a small grooved roller 50 and an intermittently-rotated feed-wheel 51. The grooved roller is located beneath the feed-wheel and is mounted loosely on an arbor 52, forming the pivot-pin of a lever or arm 53. The said arbor is located in a socket formed in a lug 54 on the head of the machine and is provided with an eccentric-stud 55, carrying the roller, so that by turning the arbor round by means of the lever 53 the roller may be moved closer to or farther away from the feed-wheel. A tension-spring 56, attached at one end to the free end of the lever and at the other end to the head of the machine, is employed to hold the roller in its operative position. When feeding is not required, the said spring may be unshipped from the lever, whereupon the roller is thrown out of action. The intermittently-rotatable feed-wheel 51 is mounted on a spindle 57, carried by the aforesaid lug 54, and is rotated by means of a ratchet-wheel 58, keyed to said spindle 57, said ratchet-wheel being itself driven by four pawls 59, arranged on a disk 60, mounted loosely on said spindle and operated at the required times to rotate the ratchet-wheel to feed the wire by a third cam 61 on the driving-shaft 5, through the medium of a sliding bar or plate 62, formed with a vertical slot 63, engaging a pin 64 on said disk 60. The object of employing a plurality of pawls 59 is to insure a uniform feed each time the cam pushes the plate 62 outward. The said plate is controlled by a spring 65, which passes transversely through a hole 70, Figs. 1 and 7, in the support for the front bearing 4. The plate 62 is also slotted horizontally at 66 to pass over a stud 67, carried by a slotted bracket 68, secured by a nut and bolt 69 to the machine and adjustable thereon by means of a set-screw 69[a], bearing against the head of the machine, so that by loosening the nut 69 and turning said screw the bracket may be adjusted and the said plate arranged nearer to or farther from its cam 61, whereby to vary its stroke to effect a corresponding difference in the movement of the feed-wheel, and hence in the length of wire fed into the wire-passage in the disk cutter, thereby making a longer or a shorter slug.

The horn or work-support 71, upon which the stock is placed during the slugging operation, may be locked in position to render it firm when required, as during the driving of the slug, by means of a lock-rod (not shown) which may be moved up to and in contact with or so as to embrace the pillar of the horn by means of a cam acting upon an intermediate rod or connection. The said lock-rod may be arranged so as to press against or straddle the said pillar with sufficient pressure to enable it to resist the downward pressure thereon, due to the impact of the driver in sending the slug through the stock. In practice, however, the locking arrangement shown in Fig. 2 is preferably employed and consists of a disk 72, rotatable on a spindle 73, located vertically beneath the upright pillar 74, carrying the horn at its upper end. The lower end of said pillar carries a truck or roller 75, which engages a cam-slot 76, cut in said disk. The pillar 74 is arranged centrally above said disk in guides 77 and may be raised and lowered at the proper times during the running of the machine, as hereinafter explained, by turning said disk, which, being always centrally beneath the pillar, forms a firm and solid lock or stop therefor in a vertical direction.

The driver 11 is carried by the before-mentioned vertically-moving bar 78, arranged between guides 79 on the head of the machine and having therein a slot 80, in which is located an eccentric-pin 81 on the front cam 34, hereinbefore referred to, said pin being provided with a bearing-block 82, which is a sliding fit in the slot 80, Fig. 3.

The cams 34, 36, and 61 for operating the awl-carrier, auxiliary lever, and feed-wheel mechanism, respectively, are carried on the end of the driving-shaft (see Fig. 8) which is supported in the head of the machine and makes the latter exceedingly compact and simple and easy of adjustment and repair. The said driving-shaft is driven by means of a pulley 83, mounted on a clutch 84 on the rear end of said shaft. The clutch is preferably operated by means of a yoke 85, having an inclined or wedge face 86, which coöperates with a correspondingly-inclined shoulder 87 on the nave or boss of the pulley, as shown in Fig. 2. The yoke is depressed to throw the clutch into action by means of a pivoted foot-lever 88 through the medium of a rod 89. The said rod is also jointed to one end of a rocking bar 90, pivoted at 91 to a bracket 92 on the machine, the other end of which bar is jointed to the free end of a brake-band 93, surrounding the fixed part of the clutch. A spring 94 normally keeps the brake in its operative position and the clutch in its inoperative position. The horn 71 having been adjusted in the upper socketed end of the pillar 74 relatively to the driver 11 and the stock placed in position thereon, the machine is started by depressing the foot-lever 88, whereupon the clutch is thrown into action and simultaneously the brake is taken off, as above described. The clutch is maintained in action during the greater part of the revolution of the driving-shaft by means of a cam 95 on said shaft engaging a roller 96 on the yoke 85, as shown in Figs. 2 and 9. The said cam is timed and arranged to allow the clutch to be thrown out of action only at the end of the cycle of operations constituting as a whole the slugging operation. During one revolution of the driving-shaft the third cam 61 thereon first operates the wire-feed wheel 51 by means of the bar or plate 62 and the pawl-and-ratchet gear 59 58. At or about the same time as the wire is being fed into the wire-passage 7 of the cutter-disk the first cam 34 allows the awl-carrier 26 to be suddenly lowered by means of the springs 31 33 to cause the awl 25 to perforate the stock, after which the second cam 36 next comes into action and by means of the auxiliary lever 27 moves the awl-carrier inward or forward a predetermined distance corresponding to the desired pitch of the slugs. The awl is returned to its original position by the cam 34 and spring 38 as the driving-shaft continues its revolution, by which time the cutter-shaft has completed its quarter-turn and the cutter-disk 6 has cut off and brought the slug into alinement with the driver 11, which is now forcibly lowered by means of the eccentric-pin 81 to drive the slug into the stock.

The disk 72, which locks the horn, is provided at the front with a foot-plate 97, whereby it may be turned by the foot when it is desired to lower the horn. The said disk is also provided with a rearwardly-extending articulated arm 98, provided at its free end with two laterally-directed pins 99 100, one (99) of which bears on the top edge of the foot-lever 88, while the other pin, 100, is adapted to be engaged by the upper edge of a lever 101, pivoted at one end at 102 and jointed at an intermediate point in its length to a rod 103, connected to the strap 104 of an eccentric on the driving-shaft. The arrangement is such that when the foot-lever 88 is depressed, as aforesaid, to start the machine it allows the spring 105 to turn the disk 72 to raise the pillar 74, and hence the horn, into position beneath the driver. Now in order that stock may be free to be moved the proper distance by the awl between each cycle of operations and ready for the next it is necessary to lower the horn slightly for this purpose, and this is effected by the eccentric 104, which by means of the pivoted lever 101 and pin 100 raises the arm 98 and turns the disk 72 through a small angle in an opposite direction, thus lowering the horn at the proper time once in each revolution of the driving-shaft. A spring 106 is employed to raise the foot-lever

88 when the latter is released from the foot, thus stopping the machine.

An adjustable guard is provided on the machine, up against which the operator may hold the stock while in the machine, so that the slugs may be inserted thereinto at a uniform distance from the edge of the stock. Said guard preferably comprises a plate 107, Fig. 2, carried on the end of a horizontal bar 108, arrranged adjustably in a slot or socket in the front of the frame of the machine immediately beneath the head of the latter. The said bar is locked in its adjusted position by means of a hand-lever 109, the pivoted end of which is formed with a cam edge 110, between which and the overhanging framework the bar is gripped when the lever is turned on its pivot.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a machine of the kind herein described the combination with means for feeding the wire and means for driving the slugs formed therefrom, of a stationary cutter-disk formed with grooves or wire-passages, and an inner cutter-disk rotatable within said stationary disk and formed with passages to correspond, a cutter-shaft carrying said inner disk, a driving-shaft, an eccentric thereon, a sleeve on said cutter-shaft, an eccentric flange on said sleeve, a collar fixed on said cutter-shaft in close proximity to said flange and provided on its periphery with as many notches or teeth as there are wire-passages in the cutter-disks, a pawl on said flange engaging said collar so that as the driving-shaft rotates the eccentric thereon actuates the sleeve and flange, and hence the pawl, to move the cutter-shaft through a predetermined angle, and means for preventing the cutter-shaft at each such movement being moved beyond the point where the passages in the inner cutter-disk are in alinement with the passages in the stationary cutter-disk substantially as and for the purposes described.

2. In a machine of the kind herein described the combination with means for feeding the wire and with means for driving the slugs formed therefrom, of a stationary cutter-disk formed with grooves or wire-passages, and an inner cutter-disk rotatable within said stationary disk and formed with passages to correspond, a cutter-shaft carrying said inner disk, a driving-shaft, an eccentric thereon, a loose sleeve on said cutter-shaft, an eccentric flange on said sleeve, a collar fixed on said cutter-shaft in close proximity to said flange and provided with a notched periphery, a pawl on said flange engaging said notched collar, a roller riding on said eccentric flange, a pivoted detent supported by said roller, so that toward the end of each movement of said cutter-shaft the flange allows the detent to drop into engagement with the notched collar and prevent the inner cutter-disk being moved beyond the point where the passages therein are in alinement with the passages in the stationary cutter-disk substantially as and for the purposes described.

3. In a slugging-machine of the kind herein described, means for feeding and perforating the stock comprising an awl, a pivoted carrier therefor, a rocking lever carrying said carrier, means for moving said carrier on its pivot to lower and raise the awl toward and from the stock in perforating the latter, and mechanism for actuating said rocking lever to move the awl and awl-carrier bodily backward and forward in feeding the stock substantially as described.

4. In a slugging-machine of the kind herein described means for feeding and perforating the stock comprising a pricker, a pivoted carrier therefor, a rocking lever carrying said carrier, a cam and springs for moving said carrier on its pivot to lower and raise the awl toward and from the stock in perforating the latter, a cam and spring for actuating said rocking lever to move the awl-carrier and awl bodily forward and backward in feeding the stock and means for determining the extent of said movement to regulate the pitch of the slugs substantially as described.

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

JONATHAN NORTHERN.

Witnesses:

E. N. LEWIS,

THOS. F. WILSON.