

No. 629,476.

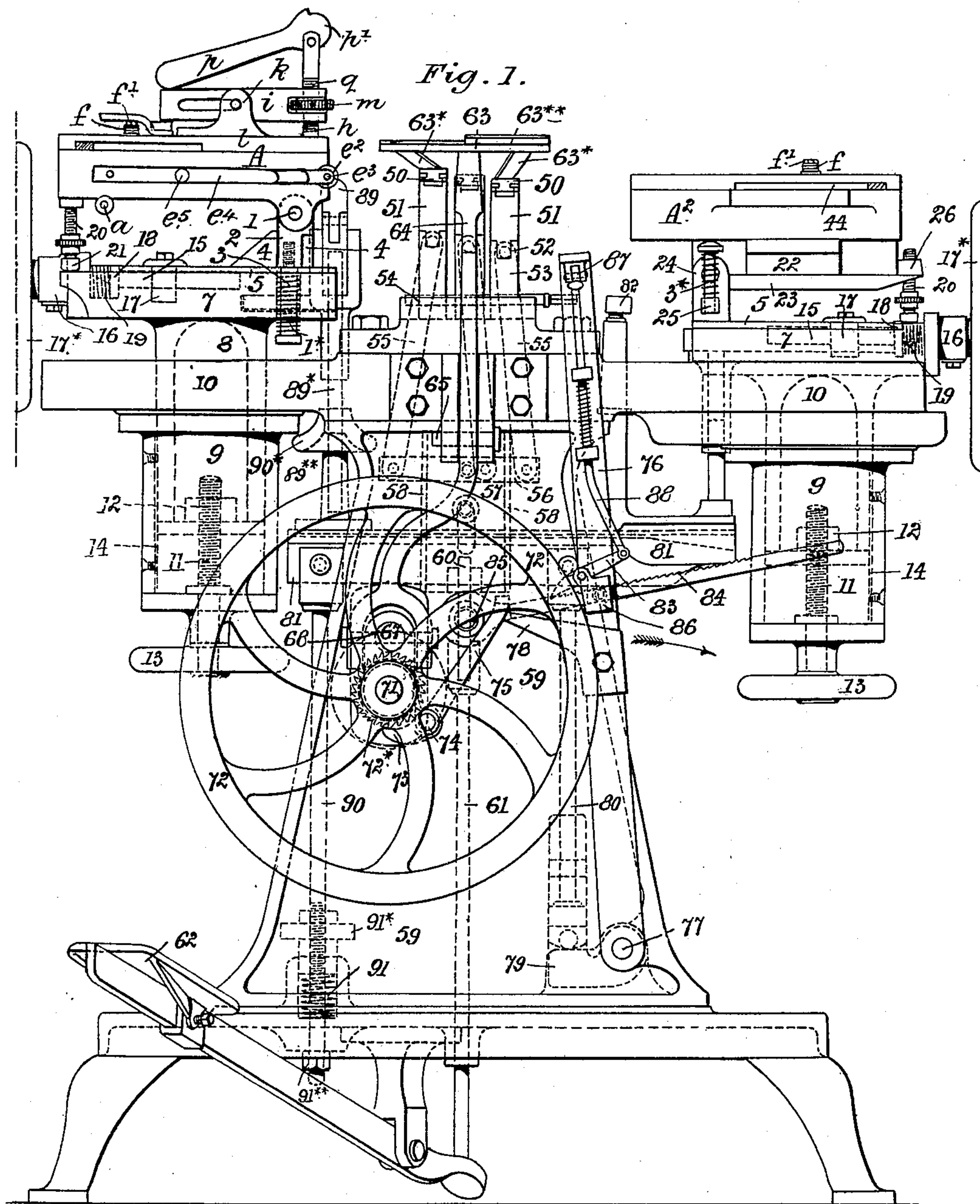
Patented July 25, 1899.

A. E. STIRCKLER.  
MACHINE FOR LASTING BOOTS OR SHOES.

(Application filed Dec. 24, 1897.)

(No Model.)

8 Sheets—Sheet 1.



Witnesses  
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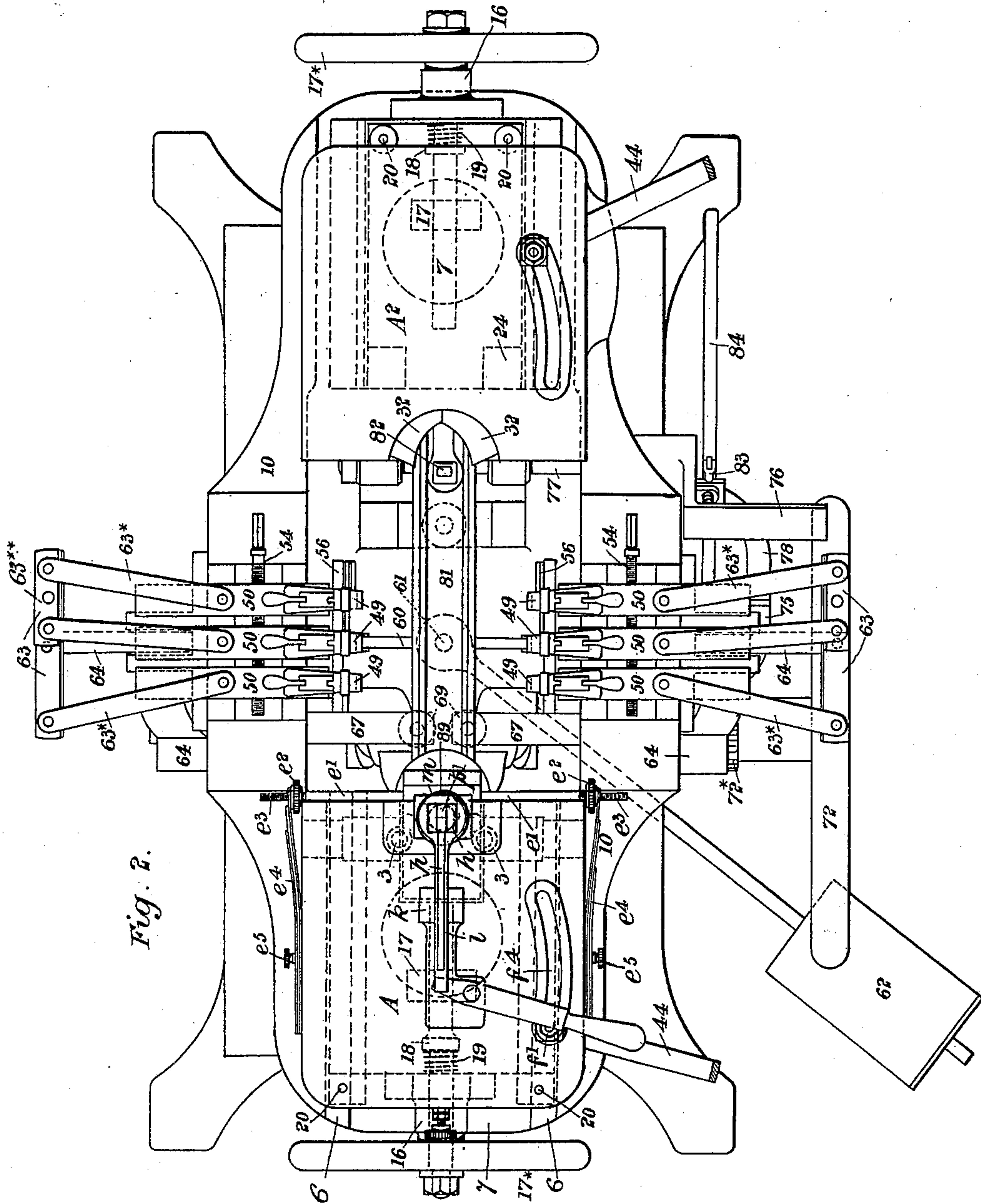


Fig. 2.

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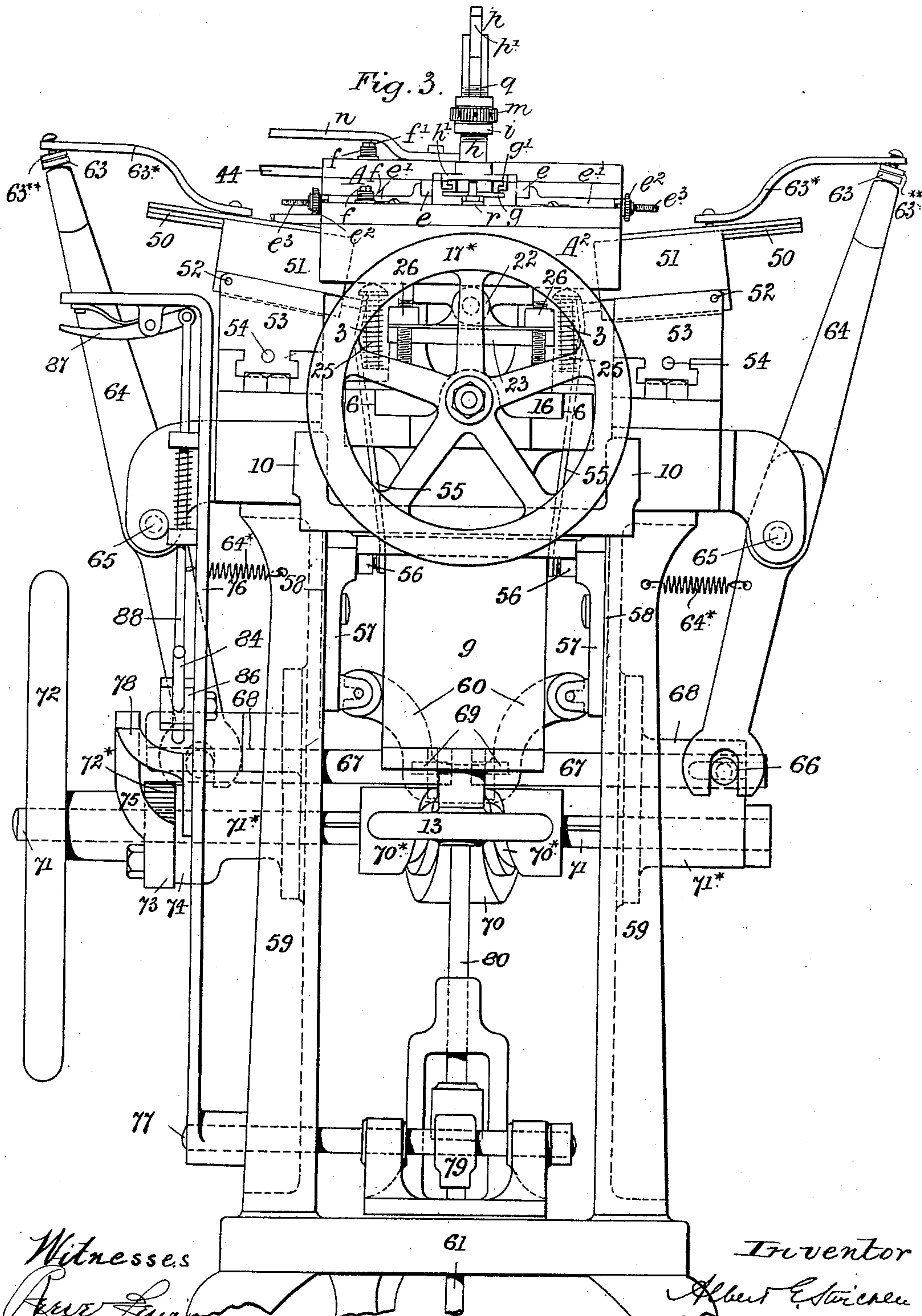
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8 Sheets—Sheet 3.



Witnesses  
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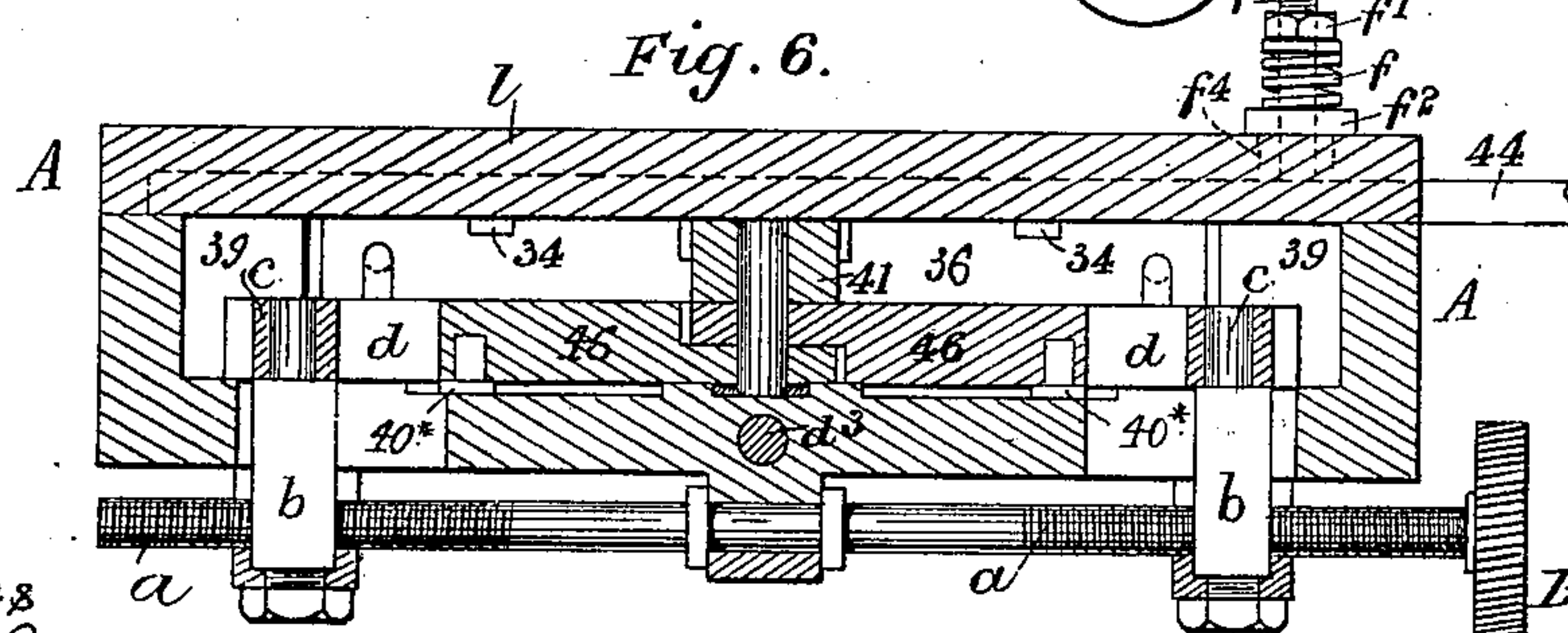
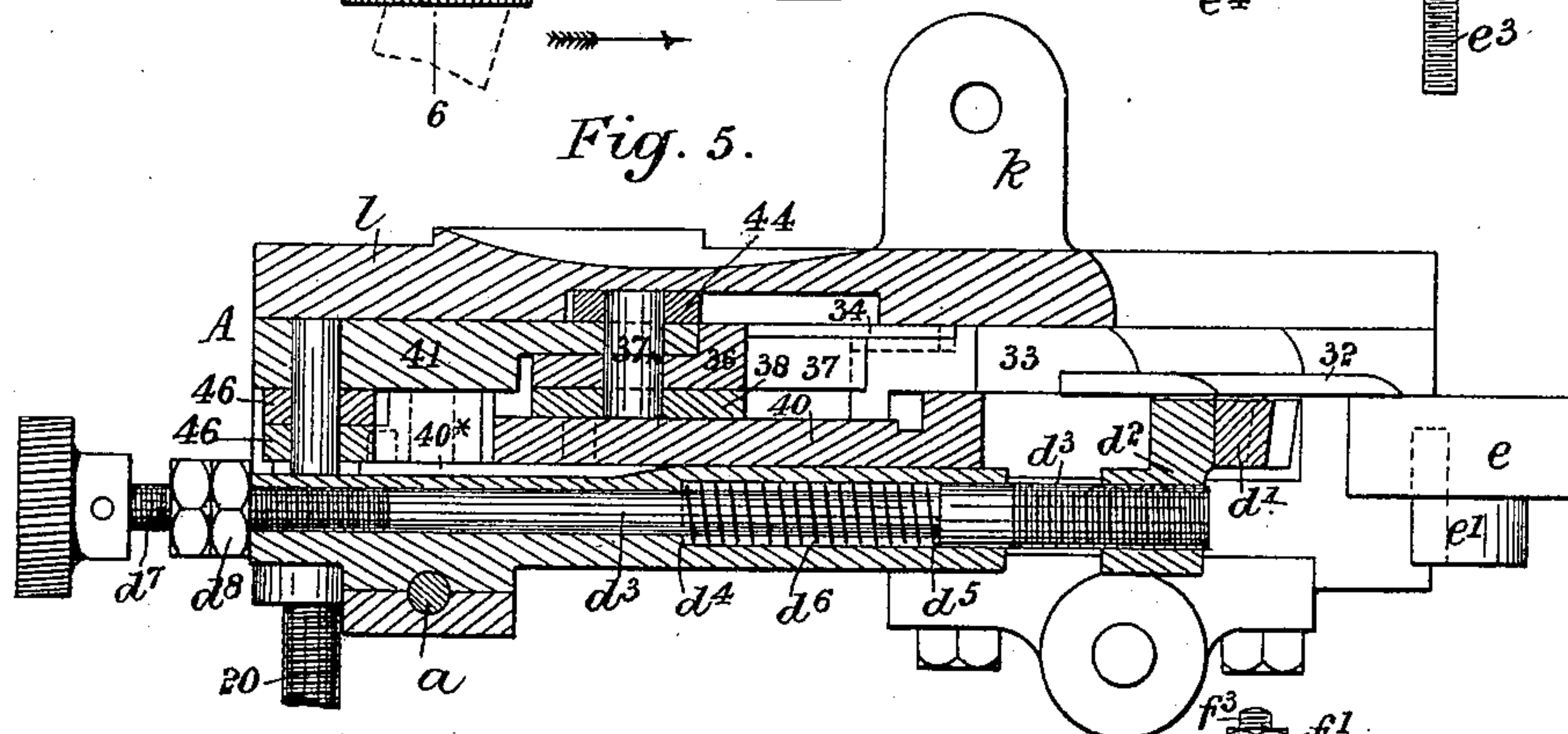
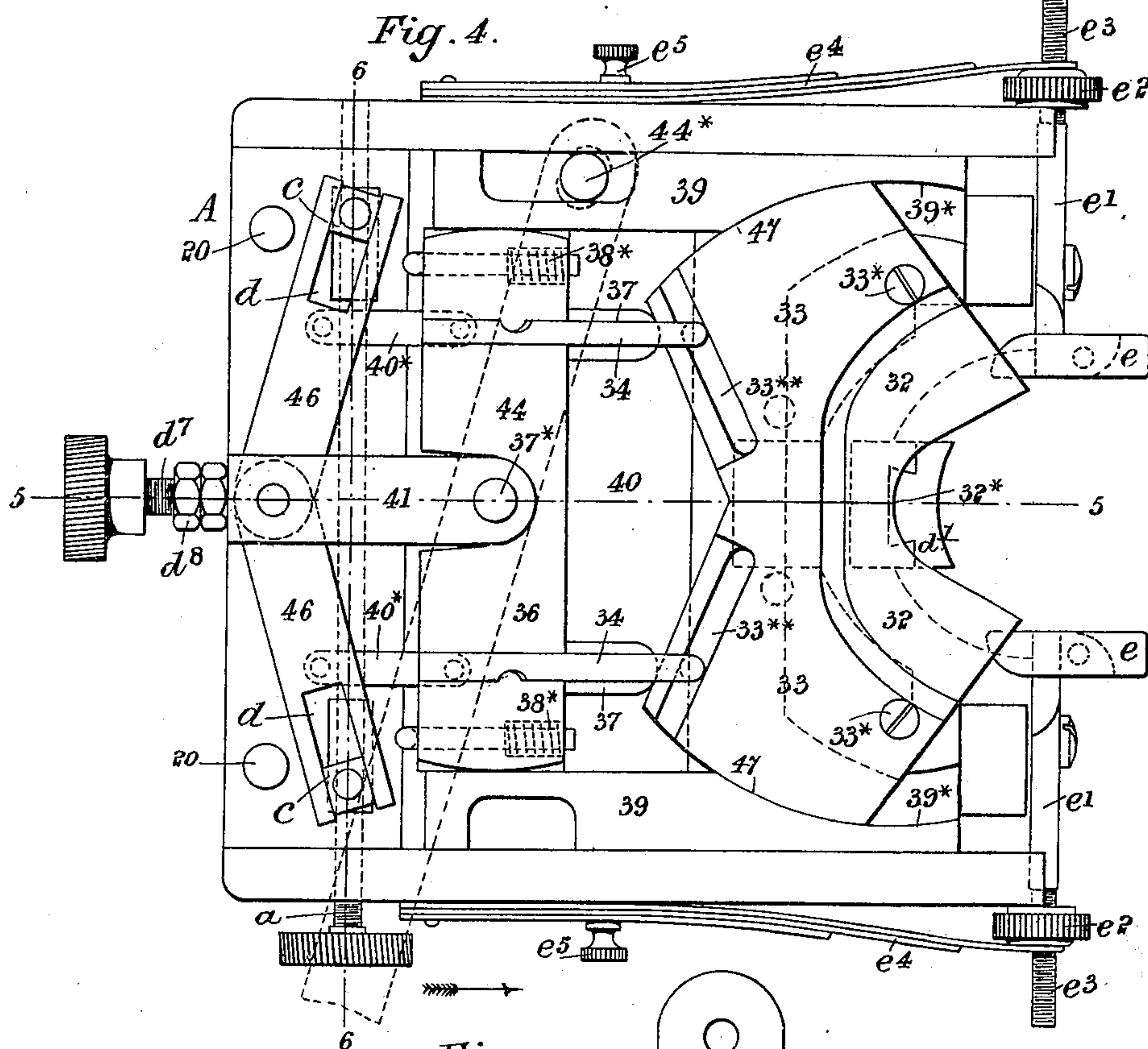
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**Patented July 25, 1899.**

(Application filed Dec. 24, 1897.)

(No Model.)

8 Sheets—Sheet 4.



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No. 629,476.

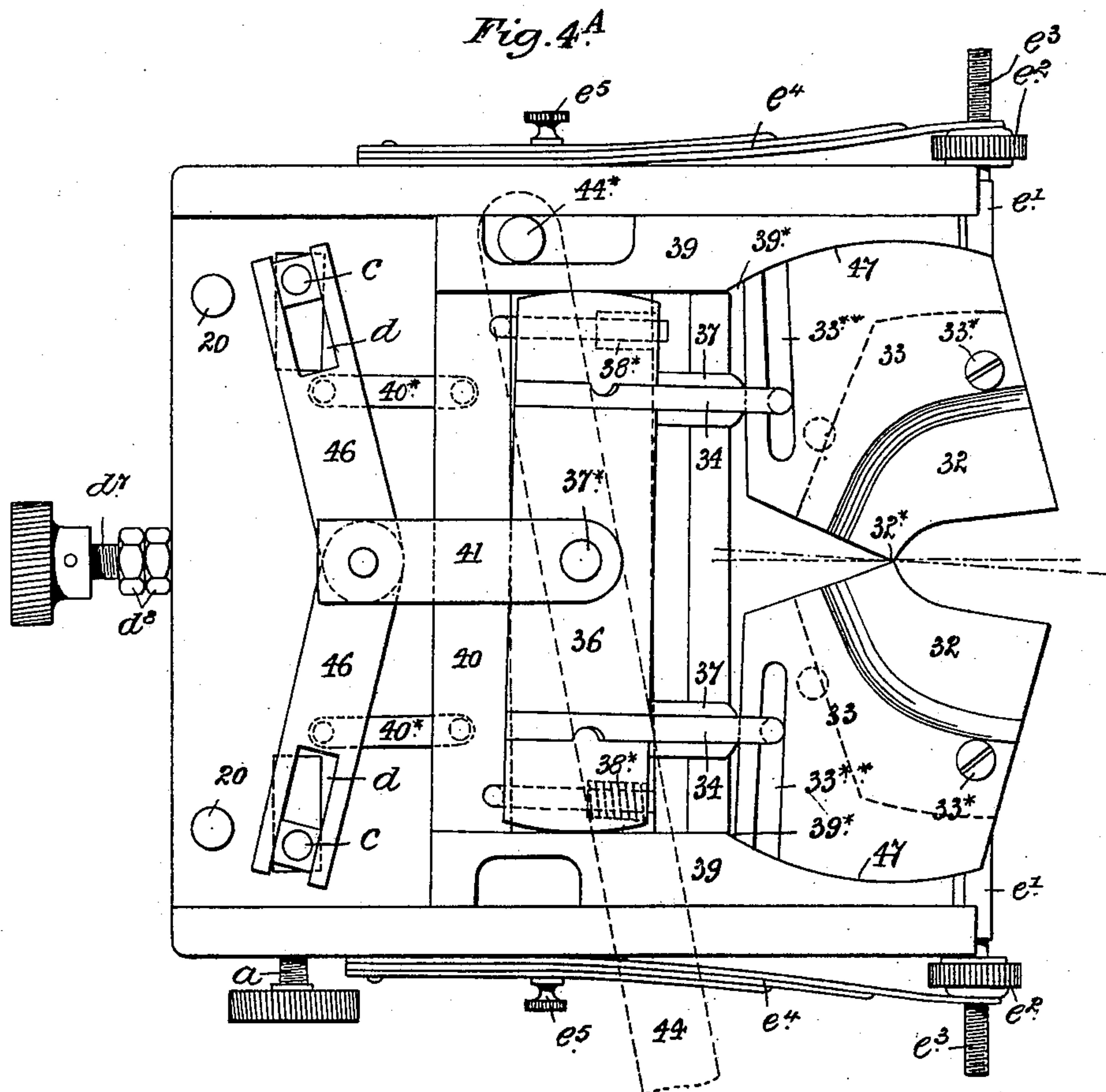
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8 Sheets—Sheet 5.



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No. 629,476.

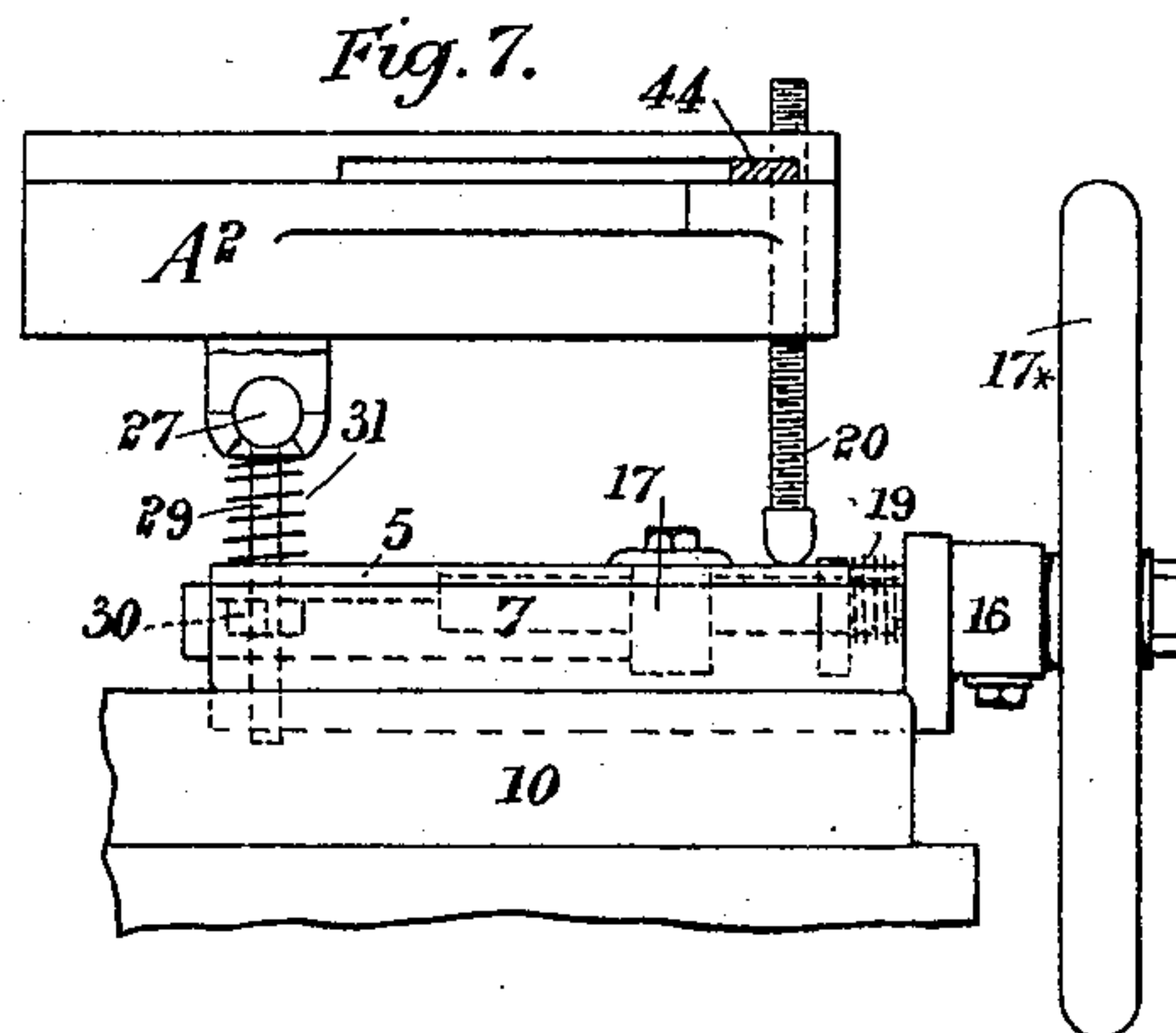
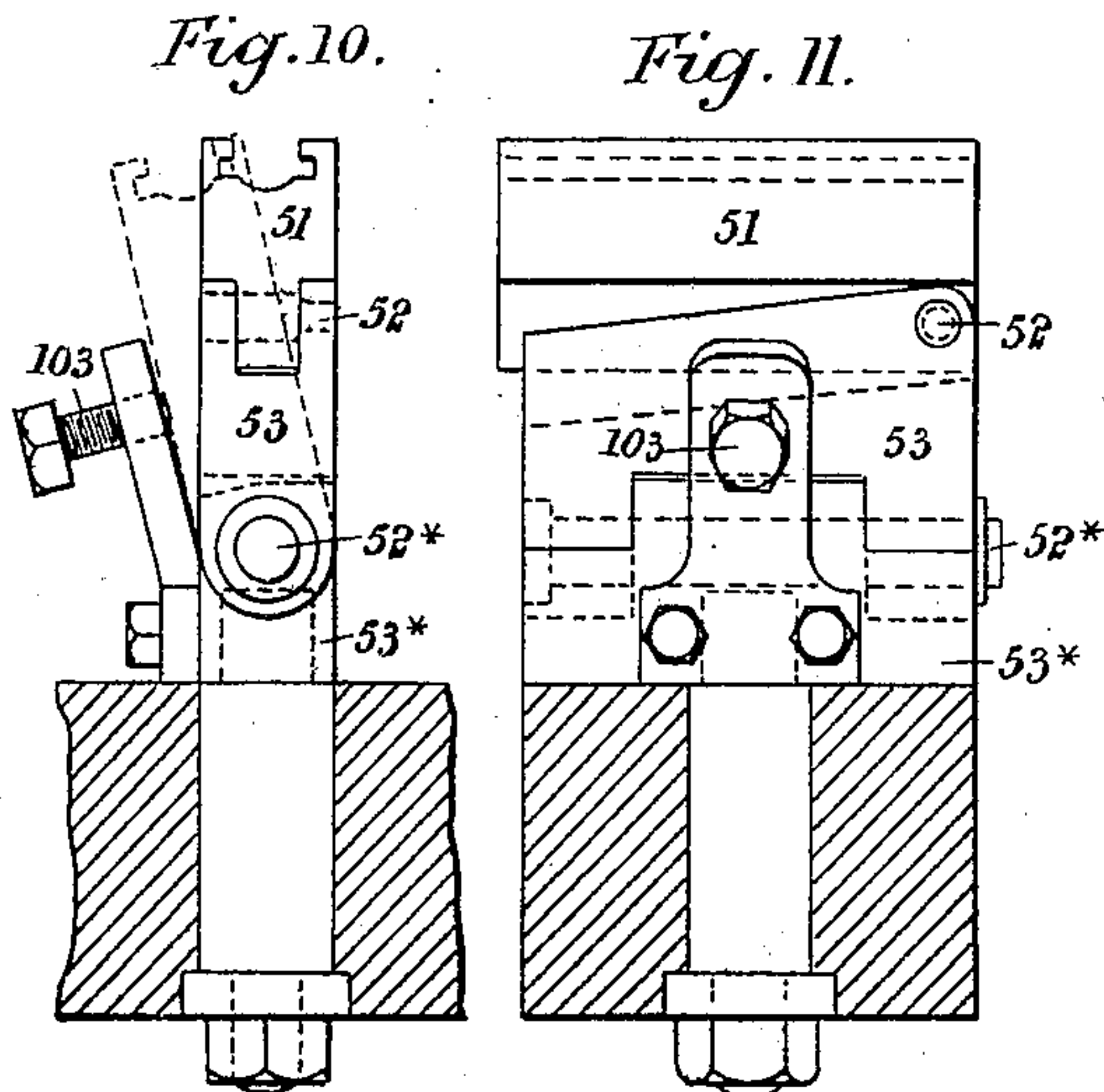
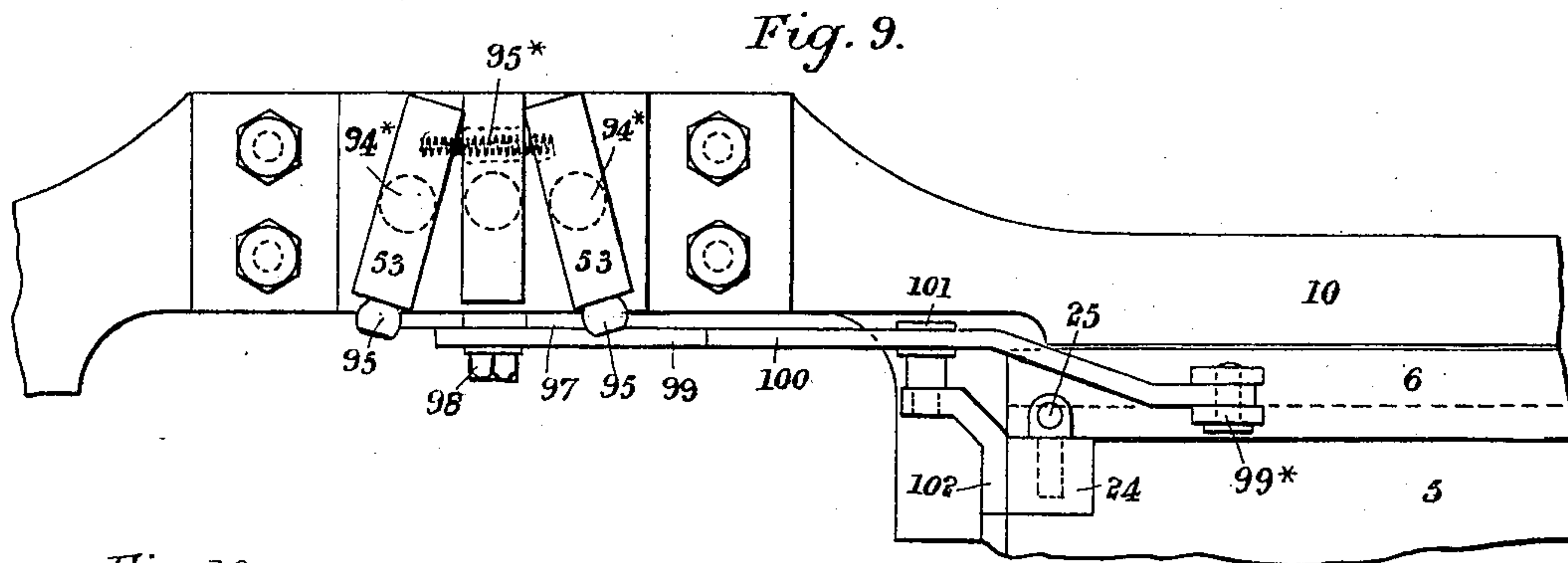
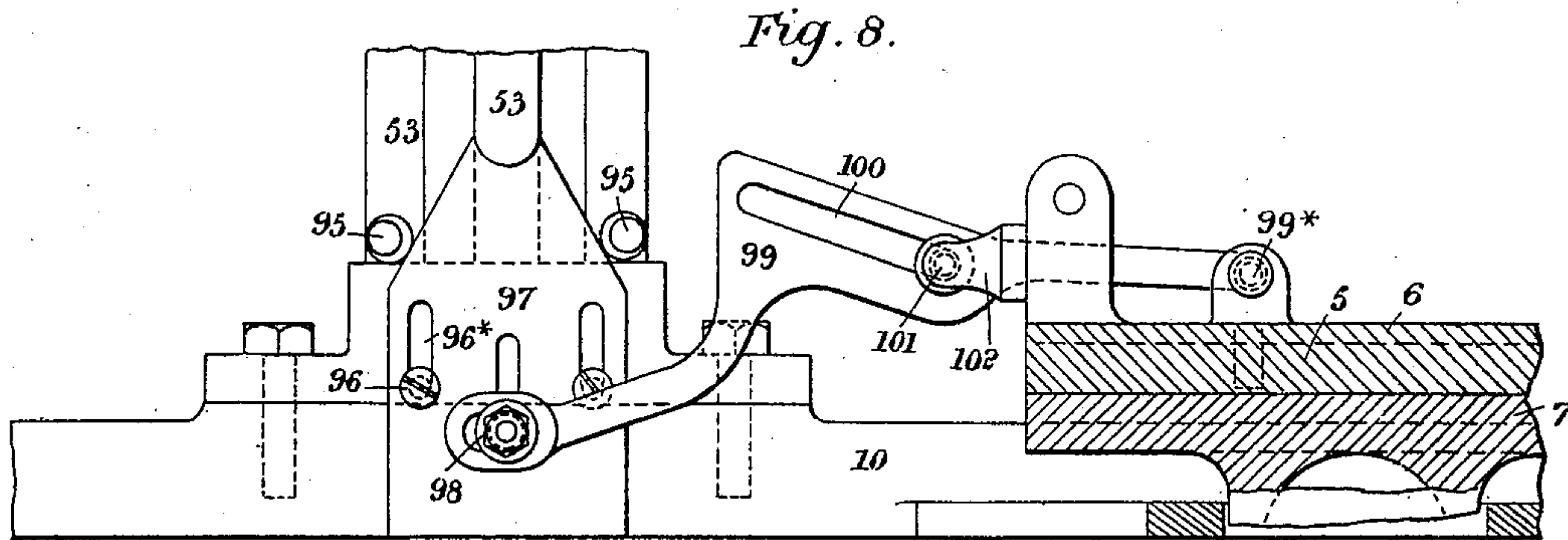
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(No Model.)

8 Sheets—Sheet 6.



Witnesses

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No. 629,476.

Patented July 25, 1899.

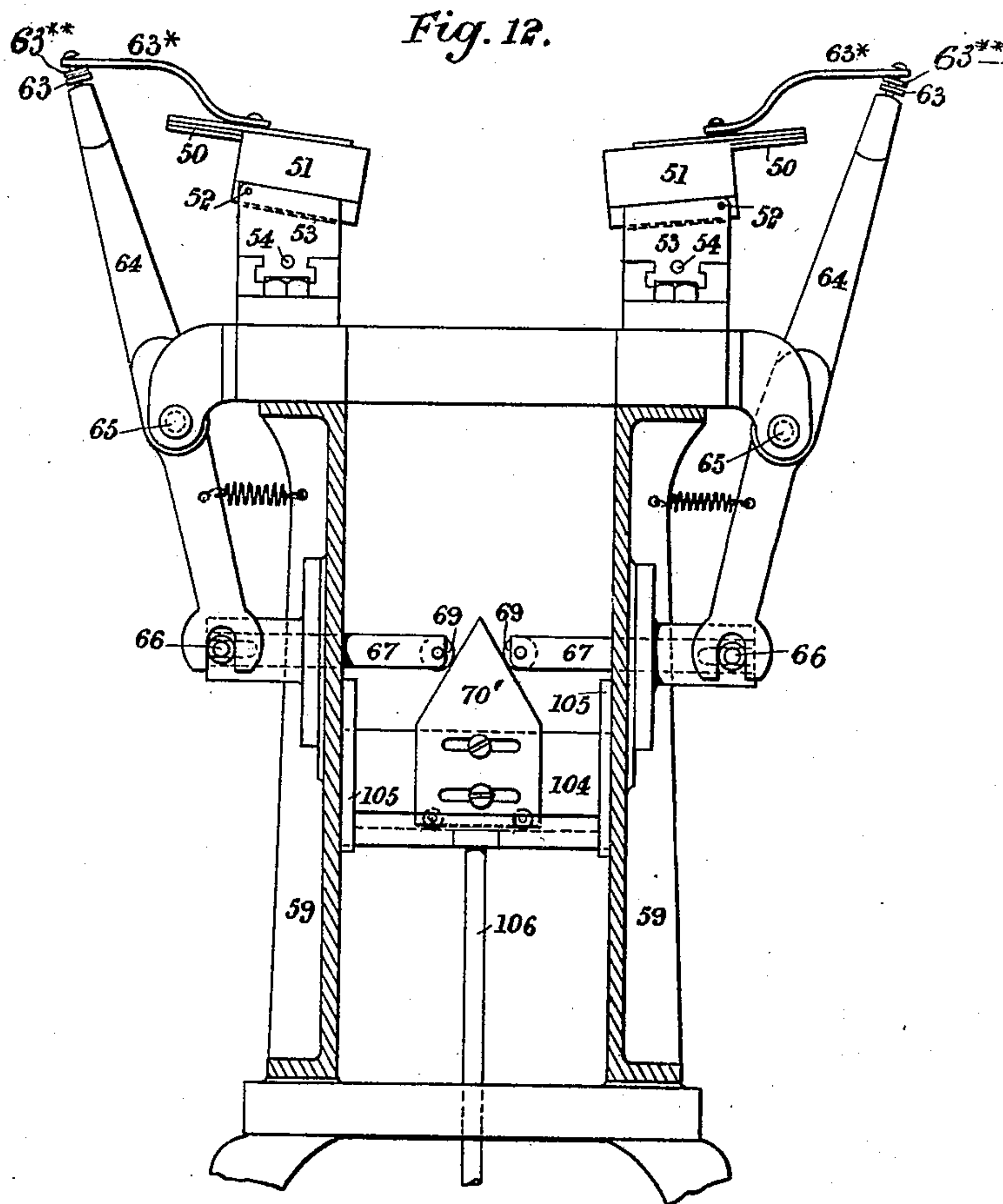
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(Application filed Dec. 24, 1897.)

(No Model.)

8 Sheets—Sheet 7.



Witnesses

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No. 629,476.

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8 Sheets—Sheet 8.

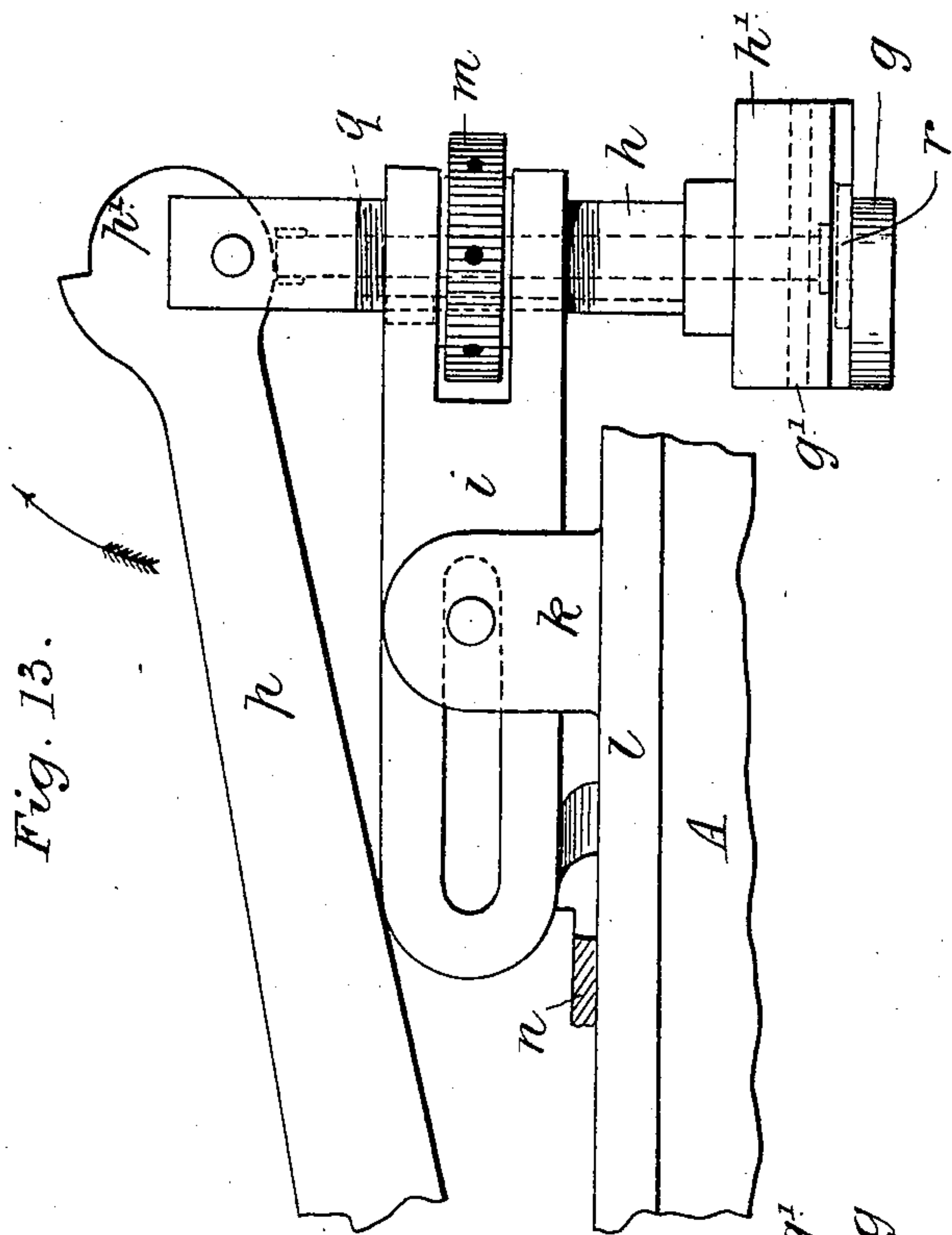


Fig. 13.

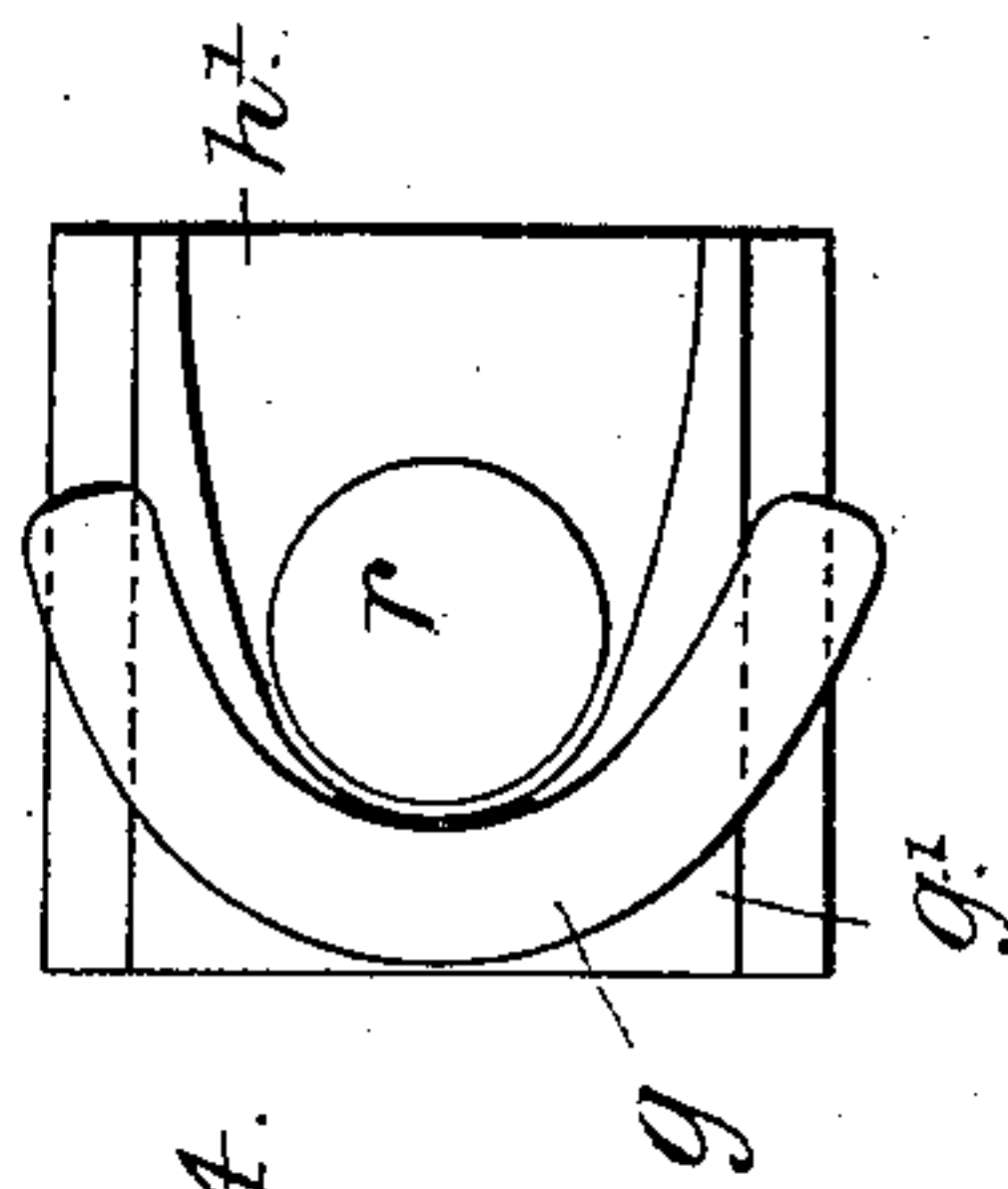


Fig. 14.

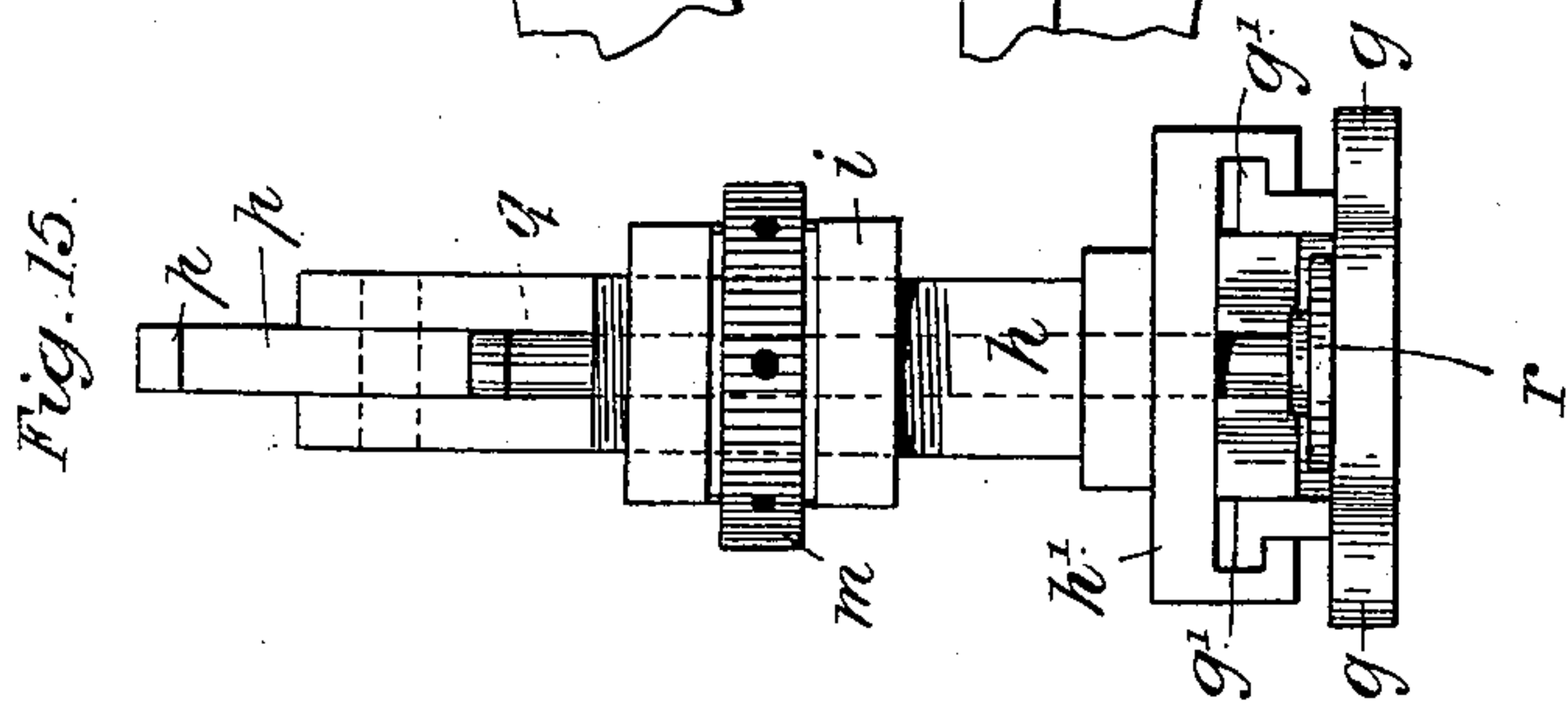


Fig. 15.

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# UNITED STATES PATENT OFFICE,

ALBERT E. STIRCKLER, OF NORTHAMPTON, ENGLAND.

## MACHINE FOR LASTING BOOTS OR SHOES.

SPECIFICATION forming part of Letters Patent No. 629,476, dated July 25, 1899.

Application filed December 24, 1897. Serial No. 663,364. (No model.)

*To all whom it may concern:*

Be it known that I, ALBERT E. STIRCKLER, engineer, a citizen of the United States, residing lately at Kettering road, but now at 26 Billing road, in Northampton, in the county of Northampton, England, have invented certain Improvements in Machines for Lasting Boots or Shoes, (for which I have obtained a patent in Great Britain, No. 422, dated January 7, 1896,) of which the following is a specification.

My invention relates to that kind of machines for lasting boots and shoes in which wiper-plates are employed for forcing the upper at the heel and toe portions of the last over the inner sole placed on the sole of the last and the upper-leather at the sides or waist of the last is stretched or wiped over and onto the inner sole at these parts by nipper-wipers.

My invention has for its object to provide a machine of this description which is capable of lasting boots and shoes of any size and shape in one and the same machine, whether for men, women, or children and of any material, with the proper draft and without danger of abrading the upper.

The importance of good lasting is, next to the quality of the leather used, the most important item in the manufacture of boots and shoes, and having regard to the appearance and wear of the articles in question second to none. Good lasting is of vital consequence.

Before proceeding further it would, perhaps, simplify matters somewhat if a brief definition of the term "lasting" were given in the sense that it is proposed using it unless stated to the contrary. Lasting, then, denotes the operation of drawing an upper (into which a stiffener, toe-puff, and side linings have been inserted) over a last, removing the stretch by pulling in proper directions, so as to give draft, and, lastly, the complete attachment of the upper to the inner sole, which attachment may be temporary or permanent. In the ordinary method of hand-lasting there is no preparation of either the upper or bottom stuff by the manufacturer, the hand-laster attending to the tying up of the uppers, the skiving of the toes, rounding and feathering of the inner soles, and skiving of stiffeners, toe-puffs, and side linings and their insertion

into the uppers. At the conclusion of this preparation the man is ready to commence the actual work of lasting. The first operation is what is known as "drafting" the upper. The laster draws the upper forward over the toe of the last and tacks it to the inner sole at the center of the toe. The sides of the upper at the toe are next pulled over and tacked to the inner sole, and if the position of the cap and seams is correct the upper is pulled up at the back and tacked down in the center of the heel-seat. The sides of the heel-seat are next pulled up and tacked down and this, with the drawing up and over of the upper and tacking it to the inner sole at the joints, completes the operation known as "drafting." When finishing lasting, the laster has to exercise great skill and care in taking out the stretch of the upper between the drafting-tacks in order to pull it with an equal strain, according to the quality and elasticity of the leather in the upper. During this portion of the operation it frequently becomes necessary to remove the drafting-tacks. When all the necessary stretch has been taken out of the upper and it has been fastened to the inner sole, (the lines of the boot being correct,) the operation of lasting proper is complete.

I will describe my invention with reference to the accompanying drawings, of which—

Figure 1 is a front elevation, Fig. 2 a plan, and Fig. 3 an end elevation, of a machine constructed according to my invention, Fig. 3 being shown on a slightly-larger scale than Figs. 1 and 2. Fig. 4 is a plan of the toe head or clamp with the top plate removed, the parts being in their normal position. Fig. 4<sup>a</sup> is a similar view showing the parts in operative position. Fig. 5 is a longitudinal vertical section of the same, the section being taken along the line 5 5, Fig. 4. Fig. 6 is a transverse section on the line 6 6, Fig. 4. Fig. 7 represents in elevation an arrangement of ball-and-socket or articulated support for the clamps or heads to admit of the said clamps or heads inclining or being inclined in any required direction. Figs. 8 and 9 represent in elevation and plan, respectively, an arrangement for adjusting the distance apart of the side nipper-wipers by the movement of the heads or clamps or one of the heads or clamps when clamping the



last in the machine. Figs. 10 and 11 are elevations at right angles to each other of a modified arrangement of the blocks which carry the side nipper-wipers, and Fig. 12 shows an arrangement for forcing the side nipper-wipers over toward the center of the last. Figs. 13, 14, and 15 represent in side elevation, plan, and front view the mechanism for raising the toe head or clamp, whereby the toe end of upper is stretched to give it the proper draft before the wiper-plates are caused to operate to wipe the edge of the upper onto the inner sole.

Referring to Figs. 1, 2, and 3, A A<sup>2</sup> represent, respectively, the toe and heel clamps or heads between which the last with the upper thereon is held while the upper is being lasted. As the heel clamp or head is mainly similar in construction to the toe clamp or head, a description of the latter will be sufficient to describe the former, the parts which correspond in both heads or clamps being indicated by the same references, while the parts which differ in the two clamps are indicated by special references. The clamp A is hinged at 1 to a block 2, carried on the upper ends of rods 1\*, which are surrounded by springs 3, which tend to retain the forward end of the head or clamp in its normal position. The block 2, is shown as being fitted to slide in guides 4 on a plate 5, which plate, together with the head or clamp, is capable of sliding horizontally in guides 6, Fig. 2, on a table or support 7. The table or support 7 has projecting from its under side a hollow stem or shank 8, arranged to slide vertically in a cylinder 9, formed in one with or attached to the main table 10 of the machine. Fitted to turn, without moving longitudinally, in a boss on the bottom of the cylinder is a screw 11, engaging in an internally-screwed boss 12 on the bottom of the stem or shank 8, so that by turning the screw 11 by means of a handle or hand-wheel 13 the table or support 7 and the parts carried thereby can be raised or lowered as required to suit lasts of different spring and so that the wiper-plates will operate in practically a horizontal plane. The stem or shank 8 is prevented from turning in the cylinder 9 by a key or spline 14 entering a groove or key-way in the stem 8, means being provided to permit of the stem turning to a slight extent in the cylinder 9. The clamps A and A<sup>2</sup> are adjustable longitudinally on the tables or supports 7 by screws 15, carried in lugs or bosses 16 on the said tables, so as to turn therein without moving longitudinally. Each screw 15 works in a nut 17, carried by the plate 5, which supports the head or clamp, so that by turning the screw 15 by means of a handle or hand-wheel 17\* the head or clamp can be moved inward or outward, as required, according to the length of the last or the drafting-points of the mechanism hereinafter described for wiping the upper over the sides of the last. On the screw 15 is a collar 18, between which and the lug or boss 16, in which the screw turns, is a spring 19, which admits

of the head yielding slightly in a longitudinal direction by the pressure of the last when being clamped in position and on being removed from the machine, and so prevent the upper from being abraded. The head or clamp can be caused to incline to any desired angle in a longitudinal direction to suit the dip of the last by means of screws 20, working in screw-threads at the rear end of the head, the ends of the screws bearing on spring-buffers 21, which can yield during the operation of lasting and which are free to move on the plate 5 as the angle of the head is being adjusted. The heel clamp or head instead of being hinged to a vertically-sliding block, as described with reference to the toe clamp or head A, is shown as being hinged at 22 to a plate 23, which is hinged at 24 to lugs on the plate 5, so that in addition to its capability of being inclined in a longitudinal direction on the hinge 24 it is also capable of inclining in a lateral direction on the hinge 22 to suit the lateral inclination of the heel of the last. The inner end of the heel head or clamp bears on springs 3<sup>x</sup>, carried by lugs 25 on the plate 5. The screws 20 for adjusting the longitudinal inclination of the heel head or clamp work in screwed lugs 26 on the rear end of the plate 23.

Instead of hinging the heads or clamps to their supports, as hereinbefore described, either or each head or clamp may be connected to the plate or support 5 by a ball-and-socket or articulated joint 27, as shown in Fig. 7. The stem 29, carrying one part of the articulated joint 27, passes through an opening in the plate 5, a spring 31 being interposed between the plate 5 and the joint 27, tending to force the head upward. The stem 29 is screw-threaded to receive a nut 30, by means of which the height to which the head is permitted to rise may be regulated as required. The spring 29 normally maintains the head at the height to which it is adjusted, but admits of the head yielding and inclining to any required angle to suit the shape of the last.

The wiper-plates 32 for forcing the upper over the toe and heel ends of the last are carried in the heads or clamps A A<sup>2</sup>, the wiper-plates in each head or clamp being arranged, as shown, in the toe head or clamp, Figs. 4, 4<sup>a</sup>, 5, and 6, to turn as a hinge on an axis or imaginary pivot 32<sup>x</sup>, the said axis or imaginary pivot being a point in a straight line passing longitudinally through the center of the heads A A<sup>2</sup>. The wiper-plates 32 of each pair are capable of turning individually in opposite directions on the axis or imaginary pivot 32<sup>x</sup> and also of turning both together on the said axis or imaginary pivot to the right or to the left to adjust themselves to the shape of the boot to be lasted whether it be a "right" or a "left." The turning action of the wiper-plates about the imaginary pivot or axis is in the plane of the "swing" of the plates—that is, the plane in which the plates move when wiping an upper onto a last. The



wiper-plates are shown as being fastened by screws 33<sup>x</sup> to carrier-plates 33, so that wiper-plates of different shapes may be fitted to the machine; but the wiper-plates may, if desired, be each formed in one piece of the required shape. Each carrier-plate 33 is provided at the rear end with a slot 33<sup>x</sup>, with which a stud on bars 34 engages. The bars 34 are free to slide to a limited extent in grooves or recesses in a plate 36, having projections 37 on its front edge, which bear against the rear ends of the wiper-plate carrier 33. The plate 36 is pivoted at 37<sup>x</sup> to a plate 38, fitted to slide longitudinally between guiding-ribs or raised edges 39 on a plate 40, which is also capable of sliding longitudinally in the head or clamp. The plate 40 is connected by links 40<sup>x</sup> to arms or levers 46, pivoted to the rear end of a longitudinally-movable bar 41, the opposite or forward end of which bar is carried on the pivot 37<sup>x</sup>, to which the plates 36 and 38 are connected and on which is also pivoted the operating-lever 44. (Shown by dotted lines in Fig. 4.)

The outer edges 47 of the wiper-plate carriers 33 are arcs of a circle struck from the axis or imaginary pivot 32<sup>x</sup>, on which the wiper-plates turn, and the said edges bear against corresponding concave surfaces 39<sup>x</sup> in the raised edges or ribs 39 on the plate 40. The operating-lever 44 is pivoted at 44<sup>x</sup> to the head or clamp, and when the lever is in its normal position (shown by dotted lines in Fig. 4) the wiper-plates are separated or opened out practically to their full extent and the plates 36, 38, and 40 are in their rearmost position. When a last with the upper to be lasted thereon is placed in position in the machine, the pressure of the toe of the last, according to whether it be a right or a left, will by pressing against the front edges of the wiper-plates cause them to turn both together on the axis or imaginary pivot 32<sup>x</sup> either to the right or to the left, as the case may be, and cause the plate 36 to turn on the pivot 37<sup>x</sup>, the projections 37 on the said plate 36 being maintained in contact with the wiper-plate carriers 33 in whichever direction the plate is turned. 38<sup>x</sup> are springs which normally retain the plate in position parallel to the plate 38. The ends of the plate 36 bear against the rib or raised guiding edge 39 and are curved to admit of the plate turning on the pivot 37<sup>x</sup>, as described, the bars 34 being free to slide in the plate 36 to the required extent to admit of the pivoting movement of the said plate, as described. When the last with the upper to be lasted thereon is clamped in position between the heads or clamps A A<sup>2</sup>, the lever 44 is moved in the direction of the arrow in Fig. 4, thereby moving forward the plates 36 and 38 and by the projections 37 on the forward edge of the plate 36 pressing on the rear edges of the wiper-plate carriers 33 causing the wiper-plates 32 to turn on the axis or imaginary pivot 32<sup>x</sup> and bring their operating edges toward each other. By

the same movement of the lever 44 the plate 40, through the bar 41, connecting-arms 46, and links 40<sup>x</sup>, is caused to slide forward and force the wiper-plates longitudinally over the toe of the last. Thus the said wiper-plates receive simultaneously a longitudinal forward movement and a movement on the axis or imaginary pivot 32<sup>x</sup>, whereby the upstanding edge of the upper at the toe end of the last is efficiently wiped over onto the sole of the last. By returning the lever 44 into the position shown in dotted lines in Fig. 4 the several parts will be moved to their normal position ready for the next operation. The forward movement of the wiper-plates can be regulated as required by means of a spindle  $\alpha$ , provided with right and left hand screw-threads, as shown in Fig. 6, working in nuts  $b b$ , to which are pivoted blocks  $c c$ , fitted to slide in slots or openings  $d d$  in the arms 46, to which the plate 40 is connected. The blocks  $c c$  constitute the fulcrum on which the arms pivot, so that by turning the screw-spindle  $\alpha$  in one direction or the other the blocks will be caused to slide in the slots or openings nearer to or farther from the point of connection of the said arms with the longitudinally-sliding bar 41, and consequently increase or decrease the extent of movement of the plate 40, according to the direction in which the screw-spindle  $\alpha$  is turned. Projecting from the forward end of the clamp or head A, beneath the wiper-plates 32, is a pad  $d'$ , which is caused to bear against the toe end of the upper on the last with a yielding pressure, so as to assist in stretching the upper at the extreme end of the toe of the last when the head is being raised, as hereinafter described. The said pad is removably fitted to a holder  $d^2$  to admit of pads of different shape being used, as required, which holder is screwed onto one end of a rod  $d^3$ , which is capable of sliding longitudinally in an opening provided for it in the head or clamp and is surrounded by a helical spring  $d^6$ , one end of which bears against a shoulder  $d^4$  in the hole, the opposite end of the said spring bearing against a shoulder  $d^5$ , formed on the said rod, so that when pressure is exerted on the pad  $d'$  the said pad and rod  $d^3$  will yield and compress the spring  $d^6$ , so as to cause the pad to press against the last with the required pressure. The outer rear end of the rod  $d^3$  is screw-threaded, as shown at  $d^7$ , to receive nuts  $d^8$ , by screwing which nuts along the screw-thread  $d^7$  the spring  $d^6$  can be compressed more or less and so regulate the pressure of the pad upon the toe of the last. The distance to which the pad is made to project from beneath the wiper-plates may be regulated, without altering the power of the spring, by screwing the rod  $d^3$  more or less into the piece  $d^2$ , which carries the pad. The pad  $d'$  is formed with a tapered projection at its rear side which fits into a corresponding recess formed in the holder  $d^2$ , so that the said pad can be readily removed and replaced by a pad of



different shape to suit the shape of the last placed in the machine. The pivoted pads  $e$ , which bear on the upper at the sides of the toe end of the last for smoothing the leather at these parts, are mounted on sliding pieces  $e'$ , capable of being adjusted in position to suit boot-toes of different widths by means of nuts  $e^2$  screwed onto screwed extensions  $e^3$  of the sliding pieces and which normally bear against the sides of the head A. Springs  $e^4$  are arranged to bear on the nuts, so as to force the pads with the requisite pressure against the last and so that the power of the springs will remain the same to whatever position the sliding pieces  $e'$  are adjusted. The springs  $e^4$  are secured to the sides of the head A by screws  $e^5$  passing through slots in the springs and screwing into the sides of the head, so that by screwing these screws more or less into the holes in the head the power of the said springs may be regulated as required.

$f$ , Fig. 6, is a spring for imparting to the lever 44 sufficient friction to retain it in the position to which it has been moved, the said springs being interposed between a nut  $f'$  and washer  $f^2$  on a stud  $f^3$ , fixed to the lever 44, and adapted to slide in a slot  $f^4$  in the top plate of the head or clamp.

The drafting nipper-wipers for pulling the upper over onto the sole at the sides of the last for proper drafting-points are arranged in sets of three on each side of the last. Each nipper-wiper 49 is pivoted to a bar 50, slidable toward and from the longitudinal center line of the last in a block 51, pivoted on a horizontal axis 52 to a block 53, so as to permit of the nipper-wipers being raised and lowered. The two side blocks 53 of each set of three can be adjusted nearer to or farther from the center block by a rod or spindle 54, having right and left handed screw-threads fitting corresponding nuts carried by the two outer blocks 53, so that by turning the spindle 54 in one direction or the other the two outer blocks may be accordingly drawn nearer to or separated farther from the central block to suit the drafting-points of the last placed in the machine. The blocks 51 of each set of nipper-wipers are connected at their forward ends by rods 55 to levers 56, carried by a plate 57, fitted to slide vertically up and down in guides 58 in the frame or standard 59 of the machine. The two plates 57 on opposite sides of the machine are connected together by a yoke 60, to which is attached, by a rod 61, a treadle 62. By depressing the treadle 62 the plates 57 are forced upward in their guides 58, and through the levers 56 and connecting-rods 55 the forward ends of the blocks 51 are elevated, together with the nipper-wipers 49. The bars 50 of each set of nipper-wipers are connected by a rod  $63^x$  to levers 63, pivoted to the upper end of a lever 64, centered at 65 to the frame of the machine, the lower end of the said lever 64 being connected at 66 by a pin-and-slot connection to a rod or bar 67, fitted to slide horizontally in guides 68 in the frame

of the machine. Near one end of the lever 63 is pivoted a shorter lever  $63^{xx}$ . The center nipper-wiper of each set of nipper-wipers is connected to the inner end of the upper and shorter lever  $63^{xx}$ , and one of the outside nipper-wipers is connected to the outer end of the said short lever, while the other outside nipper-wiper is connected to the free end of the lower and longer lever 63. The point where the lever  $63^{xx}$  is pivoted to the lever 63 is situated at a distance from the point where the said lever 63 is connected to the lever 64 equal to about one-half the distance between the latter point and where the outside nipper-wiper is connected to the free end of the lever 63, and a similar arrangement is provided with reference to the levers 56, to which the blocks 51 are connected. By this arrangement of the connections the best drafting-points are obtained for producing the proper draft on the upper at the sides of the last. The two rods or bars 67 are arranged in line one with the other and each carries at its inner end a roller 69, on which a rotary wedge 70 acts to separate the rods. The wedge 70 is mounted on a shaft 71, carried in bearings  $71^x$  in the frame of the machine, and is provided with a hand-wheel 72, by which to rotate the shaft and wedge. The wedge is situated between the inner ends of the two rods or bars 67, so that when it is rotated it operates on both rods 67 at the same time to separate or move them farther apart and so through the levers 64 and the two sets of levers  $63$   $63^{xx}$  on the opposite sides of the machine force the nipper-wipers 49 toward the longitudinal center line of the last. The wedge 70 is free to slide longitudinally on the shaft 71, so as to admit of one set of nipper-wipers on one side of the last moving onward when the other set of nipper-wipers on the opposite side of the last comes to rest or cannot advance farther, the sets of nipper-wipers on both sides of the last being thus operated by a single rotary wedge. Fast on the shaft 71 is a ratchet-wheel  $72^*$ , with which a detent 73 engages to retain the shaft and wedge in the position to which it is turned, and consequently retain the nipper-wipers in the position to which they are moved by the rotation of the wedge. The detent 73 is pivoted to a lug 74 on the bearing  $71^x$ , in which the shaft 71 rotates. The detent 73 is provided with a tailpiece 75, which tends to normally maintain the detent in engagement with the teeth of the ratchet-wheel  $72^*$ . To permit of the parts being returned to their normal positions, the detent 73 must be first disengaged from the ratchet-wheel  $72^*$ , and this is effected by the movement of a lever 76, fast on a rock-shaft 77, mounted in bearings in the lower part of the frame of the machine. The lever 76 carries a projection 78, which when the lever is moved into the position shown in Fig. 1 presses against the tailpiece 75 of the detent 73, so as to disengage the detent from the teeth of the ratchet-wheel  $72^x$  and admit of the shaft 71 and wedge 70 being rotated in the reverse direc-



tion to restore the parts to their normal position. The rods or bars 67 are returned inward to their normal position by grooves 70<sup>x</sup> in the boss of the wedge 70 engaging with prolongations of the pins on which the rollers 69 turn, and the levers 64, and with them the nipper-wipers, are returned to their normal positions by springs 64<sup>x</sup>. When the lever 76 is moved outward, so as to remove the projection from the tailpiece 75, the detent 73 is free to engage the teeth of the ratchet-wheel, so that when the shaft is rotated in the direction to cause the nipper-wipers to advance over the sole of the last the detent will click into the teeth of the wheel as it rotates and prevent it from moving back until released by the projection 78 on the lever 76, as hereinbefore described. The rock-shaft 77, on which the lever 76 is mounted, has an arm 79, on which bears the lower end of a rod 80, the upper end of which rod is connected to one end of a bar 81, on which the heel-rest 82 and toe-rest 89 can slide with the movements of the head or clamps A and A<sup>2</sup>. By the movement of the lever 76 in the direction indicated by an arrow in Fig. 1 the rock-shaft 77 is turned in its bearings, and the arm 79 raises the bar 81, with the heel-support, to the desired height. The lever is retained in the position to which it is moved, and consequently the heel-support 82 retained in the raised position, by a detent 83, carried by the lever 76, engaging with a rack 84, pivoted at 85 to the frame of the machine, the said rack being supported by and passing through a piece 86, swiveled to the lever 76, to which swiveled piece the detent 83 is pivoted. The detent 83 is disengaged from the rack 84 (to admit of the parts being returned to their normal position) by a spring-handle 87 and rod 88, carried on the lever 76. The rest 89 for the toe end of the last is supported on the bar 81, along which it can slide to follow the longitudinal movements of the toe head or clamp A. The end of the bar 81, on which the toe-rest is mounted, is connected to a rod 90, supported on a spring 91, which can be compressed more or less to alter its power by screwing the nut 91<sup>x</sup> down the rod 90, and the height of the bar 81 can be adjusted by a nut 91<sup>xx</sup>, screwed onto the lower end of the rod 90, so that the toe-rest can be caused to press against the upper on the last with the desired yielding pressure.

The toe-rest 89 is carried on the upper end of a rod 89<sup>x</sup>, the lower end of which enters a socket or sleeve 89<sup>xx</sup>, slidable on the bar 81, and on the rod 89<sup>x</sup> is a screw-thread, on which is screwed a nut-wheel 90<sup>x</sup>, which bears upon the sleeve 89<sup>xx</sup>, so that by turning the nut-wheel the height of the toe-rest can be adjusted as required.

When the last, with the upper to be lasted thereon, is placed in position and clamped between the heads or clamps A A<sup>2</sup>, the edge of the upper at the toe end of the last is secured between the upper surface of the wiper-plates

in the head A and a toe-plate or gripping-jaw *g*, Figs. 13, 14, and 15, carried on the lower end of a screw-threaded hollow rod *h*, carried on a lever *i*, pivoted to lugs *k* on the top plate *l* of the head A. On the screwed hollow rod *h* is a nut *m*, situated between arms on the lever *i*, so as to prevent it rising on the screwed rod, but which can be turned so as to raise and lower the rod as desired. The nipping-jaw *g* is pressed onto the edge of the upper, which is laid onto the wiper-plates by means of an inclined projection on a lever *n*, forced between the rear end of the lever *i* and the top plate *l* of the head A. To the upper end of the hollow rod *h* is pivoted a cam-lever *p*, by turning which in the direction of the arrow in Fig. 13 the cam *p'* thereon is caused to bear upon the upper end of a rod *q*, fitted to slide in the hollow rod *h* and cause a button *r* on the lower end of the rod *q* to bear on the inner sole placed on the last and by a continued movement of the lever *p* in the same direction the head A, which, together with the jaw *g*, constitutes a powerful gripping device, will be raised in opposition to the power of the springs 3, which tend to retain the head in its lowered position. The upper-leather at the toe end of the last is thus pulled by the upward movement of the head toward the extreme toe end of the last until the wiper-plates 32 are above the sole of the last, thereby giving to the upper the proper forward draft. While the upper is being stretched by the rising of the head, the buffer *d'* assists in stretching and smoothing the leather at the extreme toe end of the last, while the swiveled smoothing-blocks *e*, Fig. 4, arranged to bear against the sides of the toe of the last, assist in smoothing the upper on both sides of the toe. While the head is in its raised position, the wiper-plates 32 are operated as hereinbefore described, whereby the upper is further stretched and the portion held above the last by the gripping device is wiped over onto the inner sole, to which it is secured in the usual manner. The toe-plate or nipping-jaw *g* is fitted in a recess *g'* in a block *h'*, carried on the lower end of the rod *h*, and can be slid therein, so that plates of different shapes and sizes can be readily substituted one for another as required. In the arrangement illustrated in Figs. 8 and 9 for adjusting the distance apart of the side nipper-wipers by the movement of the heads when clamping a last in the machine the blocks 53 are each capable of turning on a vertical axis 94\*, and the two outer blocks of each set of three blocks are provided on their inner ends with rollers 95. Fitted to slide vertically on studs 96 is a wedge-shaped plate 97, the openings 96\* therein, through which the studs 96 pass, being of sufficient length to admit of the maximum movement required to be given to the wedge. The rollers 95 are maintained in contact with this wedge by a spring 95\*, interposed between the outer ends of the said two outside blocks. The



wedge 97 is connected by a slot-and-pin connection 98 to one end of a lever 99, the opposite end of which lever is pivoted at 99\* to the table 6, on which the head or clamp A or A<sup>2</sup> slides. The lever 99 has in it an inclined slot 100, on which slides a roller or stud 101, carried in a bracket 102 on the plate 5, to which the head or clamp is hinged. When the head or clamp is in its extreme outward position, the stud or roller 101 is at the lower end of the inclined slot 100 in the lever 99, and the wedge 97 is raised to its highest position, the nipper-wipers carried on the blocks 53 being thereby separated by the wedge to their greatest extent. On moving the head or clamp forward to clamp the last in position in the machine the roller 101 slides in the slot 100, thereby depressing the lever 99 and lowering the wedge 97, and thus allow the nipper-wipers under the expansive action of the spring 95\* to approach nearer together, according to the extent of inward movement of the head or clamp, and which will be governed by the length of the last to be clamped in position.

In the arrangement illustrated in Figs. 10 and 11 the blocks 51 and 53, which carry the side nipper-wipers, are hinged together at 52, as in the arrangement illustrated in Figs. 1, 2, and 3, and the block 53 is hinged to another block 53\* at 52\*, the hinges 52 and 52\* being horizontal, but at right angles to one another, the block 53\* being capable of inclining more or less on the hinge 52\*, so as to separate the nipper-wipers to suit lasts of different lengths. 103 is an adjustable stop to regulate the extent to which the block 53\* is permitted to incline. The blocks 53\* may each be capable of turning on a vertical pivot, if desired.

Instead of the rotating wedge 70 hereinbefore described, and shown in Fig. 1, a wedge 70', as shown at Fig. 12, may be employed for operating the mechanism by which the side nipper-wipers are forced over toward the center of the sole of the last. The wedge 70' is carried in a frame 104, capable of sliding vertically in guides 105 in the frame of the machine and connected by a rod 106 to a treadle or other suitable device for sliding the frame 104 up and down. The wedge acts in the same manner on the rollers 69, carried on the ends of the bars 67, as described with reference to the rotary wedge, the wedge being free to slide in or on the frame 104 to admit of the nipper-wipers on one side of the last being moved after the nipper-wipers on the other side of the last come to rest.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a machine for lasting boots and shoes, the combination of adjustable heel and toe clamps with devices yieldingly holding one of said clamps against vertical and horizontal movement, substantially as described.

2. In a machine for lasting boots and shoes, heads or clamps between which the last is

held while the upper is being lasted, one of the said heads or clamps being universally adjustable to admit of the head inclining in any direction, and a longitudinal sliding plate in combination with a screw-threaded stem projecting from one member of the articulated joint, and passing through an opening in the longitudinally-sliding plate on which the head is mounted, a nut screwed onto the screwed stem beneath the slidable plate, and a spring interposed between the slidable plate and the articulated joint, to normally maintain the head at the height to which it is adjusted by the nut, but which spring will admit of the head yielding in a vertical direction substantially as hereinbefore described.

3. In a machine for lasting boots and shoes, a head or clamp combined with automatically-adjustable wiper-plates for forcing the upper over onto the inner sole at the end of the last, the adjustment being in the plane of the swing of the plates and about an imaginary pivot at the extreme end of the last, whereby the wipers automatically conform to the shape of a "right" or "left" last, substantially as described.

4. In a lasting-machine, a clamp or head combined with automatically-adjustable wiper-plates mounted in said clamp or head to turn in the act of adjustment relatively to said clamp in the plane of their swing about a point on the perimeter of the last when the latter is adjusted in the clamp, substantially as described.

5. In a machine for lasting boots and shoes, the combination of adjustable heel and toe clamps provided with devices yieldingly holding said clamps against vertical and horizontal movement, with automatically-adjustable wiper-plates carried by said heel and toe clamps, substantially as described.

6. In a machine for lasting boots and shoes the combination with heads between which the last is held while the upper thereon is being lasted and wiper-plates by which the upper is laid over onto the toe and heel ends of the last, of a plate 40 on one of said heads or clamps fitted to slide longitudinally in the head or clamp, a plate 38, slidable on the plate 40, a plate 36 pivoted to the plate 38 and provided with projections 37 which bear on the rear edges of the wiper-supports, springs for normally retaining the plate 36 parallel to the plate 38, bars 34 carried in slots or grooves in the plate 36 and provided with studs engaging in slots 33<sup>x</sup> in the wiper-plates, a plate or bar 41 pivotally connected to the plates 36 and 38 and arranged to slide longitudinally in the head or clamp, arms or levers 46 each connected at one end to the plate or bar 41, links 40<sup>x</sup> connecting the arms or levers to the plate 40, and an operating-lever, fulcrumed to the head and connected to the pivot on which the plate 36 turns so that by the movement of this lever in one direction the wiper-plates will be caused to move forward and also turn on their axis or imaginary



pivot 32<sup>x</sup> to wipe the upstanding edge of the upper over onto the last, and by the movement of the lever in the opposite direction the wiper-plates and parts connected therewith will be returned to their normal position, substantially as hereinbefore described.

7. The combination with the wiper-plates and an operating lever or device suitably connected thereto, of means controlling the throw of the wiper-plates in the act of wiping, consisting of a pair of toggle-levers, fulcrum for said levers adjustable toward and from each other, and connections between said toggle-levers and the wiper-plates, substantially as described.

8. In a lasting-machine, the combination of wiper-plates, a longitudinally-sliding support therefor, means for sliding said support to and fro, a pair of toggle-levers, fulcrum for said levers adjustable toward and from each other and links connecting said toggle-levers with said sliding support, substantially as described.

9. The combination with the wiper-plates and means for operating them as described, the arms or levers 46 provided with slots, pivoted blocks fitted to slide in the said slots and means for adjusting the position of the pivoted blocks in the slots and connections between the arms or levers and the wiper-plate operating means whereby the movement of the wiper-plates is varied, substantially as hereinbefore described.

10. In a machine of the kind hereinbefore referred to, for lasting boots and shoes, the combination with the toe head or clamp, of a yielding pad arranged beneath the wiper-plates to press against the toe end of the last; a screwed spindle onto which the pad is screwed; a spring arranged to act on the screwed spindle to force the pad forward against the last; nuts screwed onto the screwed spindle for altering the power of the spring, and means for turning the screwed spindle in the pad so as to cause the said pad to project more or less as required from beneath the wiper-plates without altering the power of the spring, substantially as hereinbefore described.

11. In a machine for lasting boots and shoes, the combination with nipper-wipers, of levers operatively connected to said wipers, oppositely-extending bars connected to said levers, and a wedge capable of movement between the adjacent ends of said bars, substantially as described.

12. In a machine for lasting boots and shoes, the combination with nipper-wipers for forcing the upper over onto the sole at the sides of the last of sets of levers connected to the nipper-wipers on both sides of the last, pivoted levers connected at their upper ends to the sets of levers; horizontal sliding bars or rods engaged with the lower ends of the pivoted levers, a wedge situated between the adjacent ends of the horizontal rods or bars; a vertically-sliding frame carrying the wedge

and in which the wedge is free to slide in a horizontal direction and means for raising the frame and wedge for the purpose of forcing the nipper-wipers on each side of the last toward the center of the last, substantially as hereinbefore described.

13. In a machine for lasting boots and shoes the combination with nipper-wipers for forcing the upper over the edges onto the sole at the draft-point of the sides of the last; of blocks on which the nipper-wipers are carried, the said blocks being each mounted on a vertical pivot so as to be free to turn in a horizontal plane, springs for retaining the blocks in their normal position; wedges and means for operating them so as to cause them to act on the blocks to alter the distance apart of the nipper-wipers, to suit the drafting-points of the last, substantially as hereinbefore described.

14. In machines for lasting boots and shoes the combination with nipper-wipers for forcing the upper over the edges onto the sole at the sides of the last of compound blocks or supports, on which the nipper-wipers are mounted, each block or support being made in three parts hinged together one above another, the lower part being pivoted on a vertical axis so as to admit of the block turning in a horizontal plane; the next part above being hinged to the lower part so as to be capable of inclining sidewise, and the upper part on which the nipper-wiper slides being connected to the part below by a horizontal hinge, so as to permit of the said parts turning in a vertical plane; and adjustable stops for governing the degree of the sidewise inclination of the blocks; substantially as hereinbefore described.

15. In a machine of the kind hereinbefore described for lasting boots and shoes the combination with the toe head or clamp, of means for securely gripping between the upper surface of the wiper-plates and a gripping-jaw carried by the head or clamp the edge of the upper at the toe end of the last, means for holding the last practically immovable in the machine and means for raising the head or clamp so as to draw the upper over the toe end of the last in the direction to give to the leather the proper draft, substantially as hereinbefore described.

16. In a machine of the kind hereinbefore described for lasting boots and shoes, the combination with the toe head or clamp movable in a vertical direction of springs for normally holding the said head or clamp in its lower position; a lever pivoted to the head or clamp; a hollow rod carried adjustably in one end of the lever; a toe plate or jaw carried on the lower end of the hollow rod; means for forcing the end of the lever carrying the hollow rod down toward the last so as to forcibly grip the edge of the upper between the toe plate or jaw and the upper surface of the wiper-plates; a rod slidable in the hollow rod; a cam-lever pivoted to the upper end of the



hollow rod and provided with a cam-surface which can be caused to act on the upper end of the sliding rod so as to force it outward from the lower end of the hollow rod into contact with the sole of the last and raise the head so as to pull the upper upward into position for the wiper-plates to force the upper over onto the toe end of the sole of the last, substantially as hereinbefore described.

10 17. In a lasting-machine the combination of a head or clamp bearing wiper-plates with a gripper-jaw removably attached to the head,

and means for operating the gripper-jaws and thereby raising the head, whereby interchangeable gripper-jaws may be employed, substantially as described. 15

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

A. E. STIRCKLER.

Witnesses:

WILLIAM FREDERICK UPTON,  
RICHARD BUNDY.