

APPLICATION FILED AUG. 13, 1908.

Patented Aug. 31, 1909.

5 SHEETS—SHEET 1.



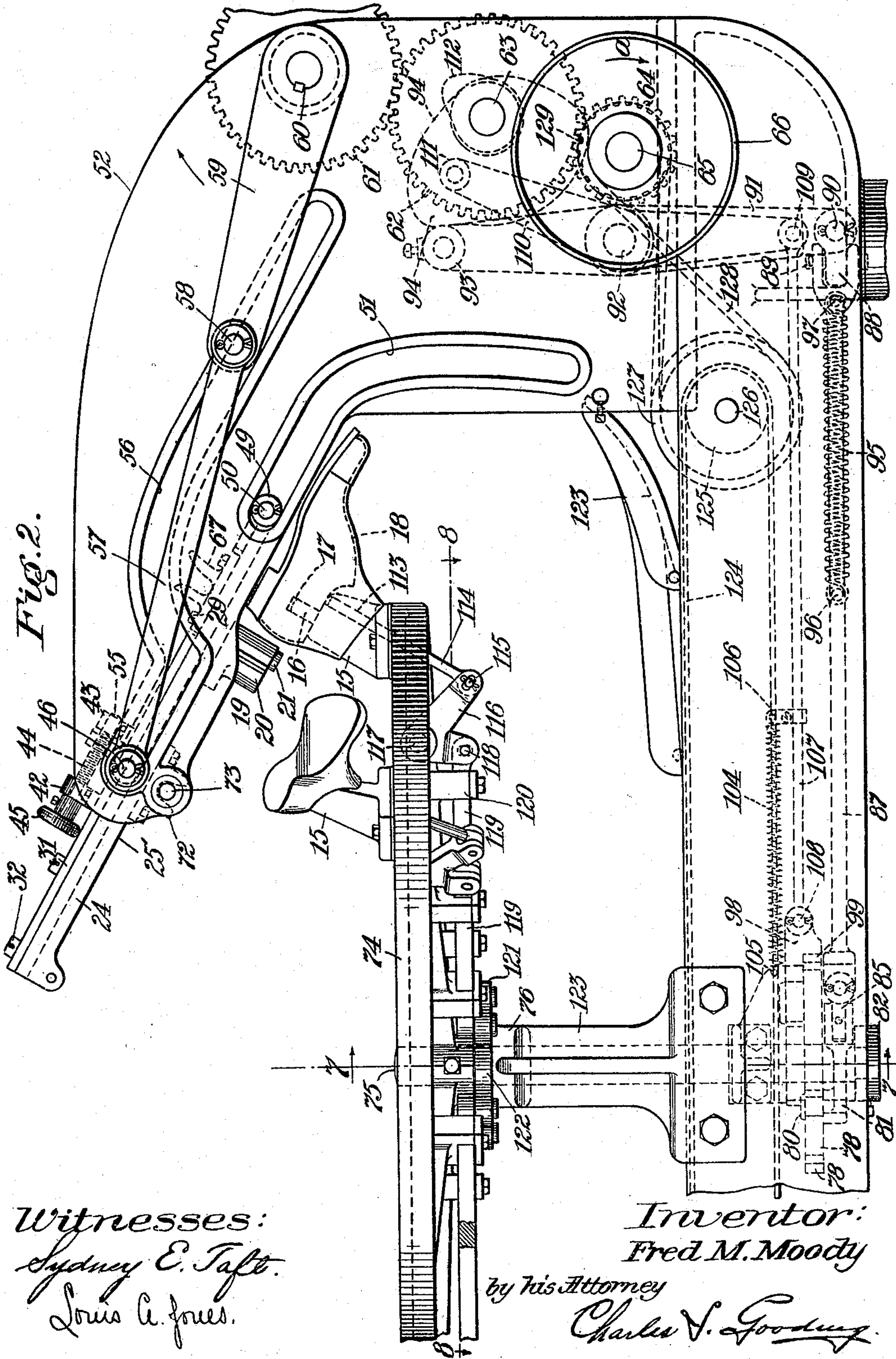


F. M. MOODY.  
MACHINE FOR REMOVING SHOES FROM LASTS.  
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6 SHEETS—SHEET 2.



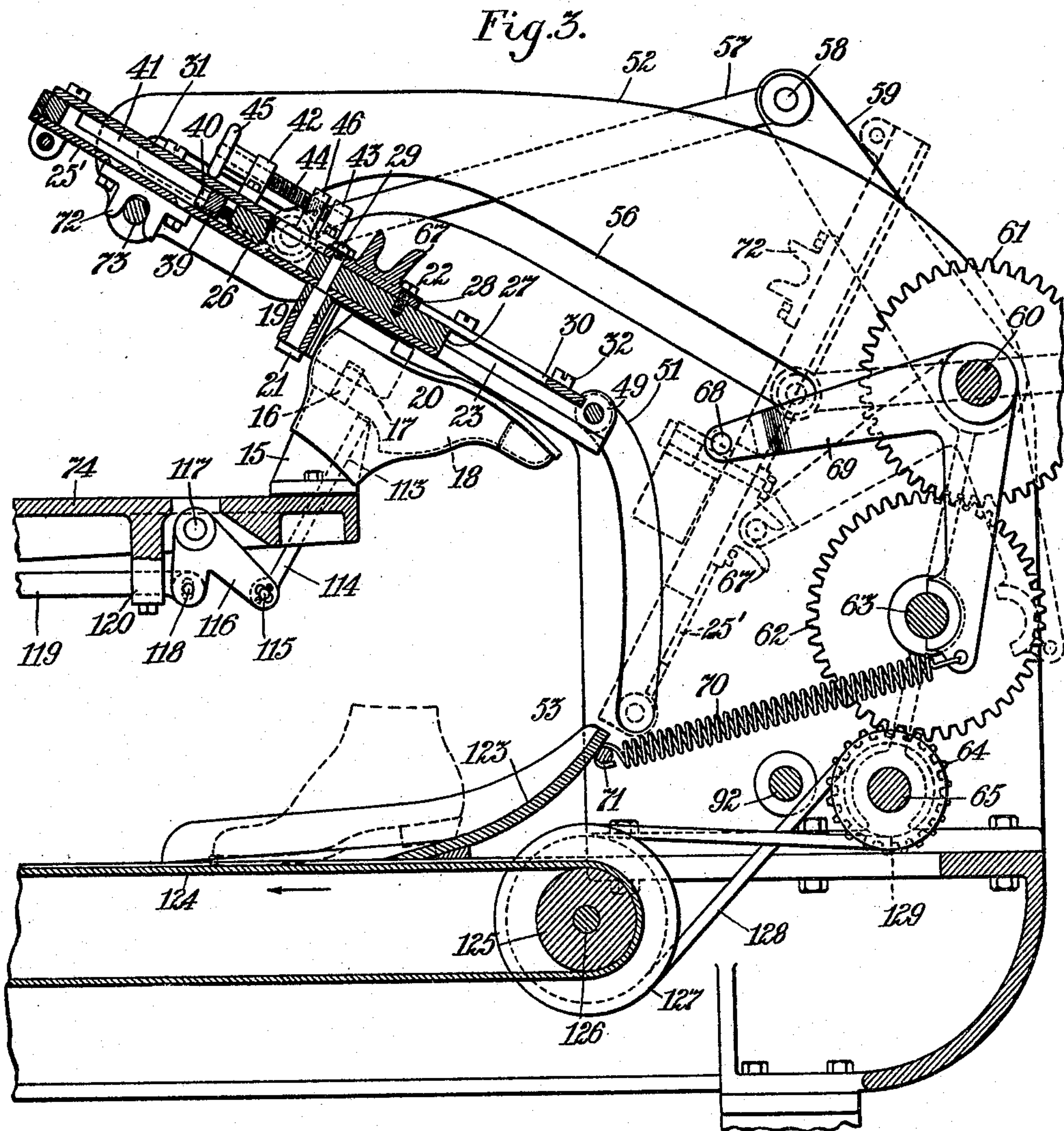


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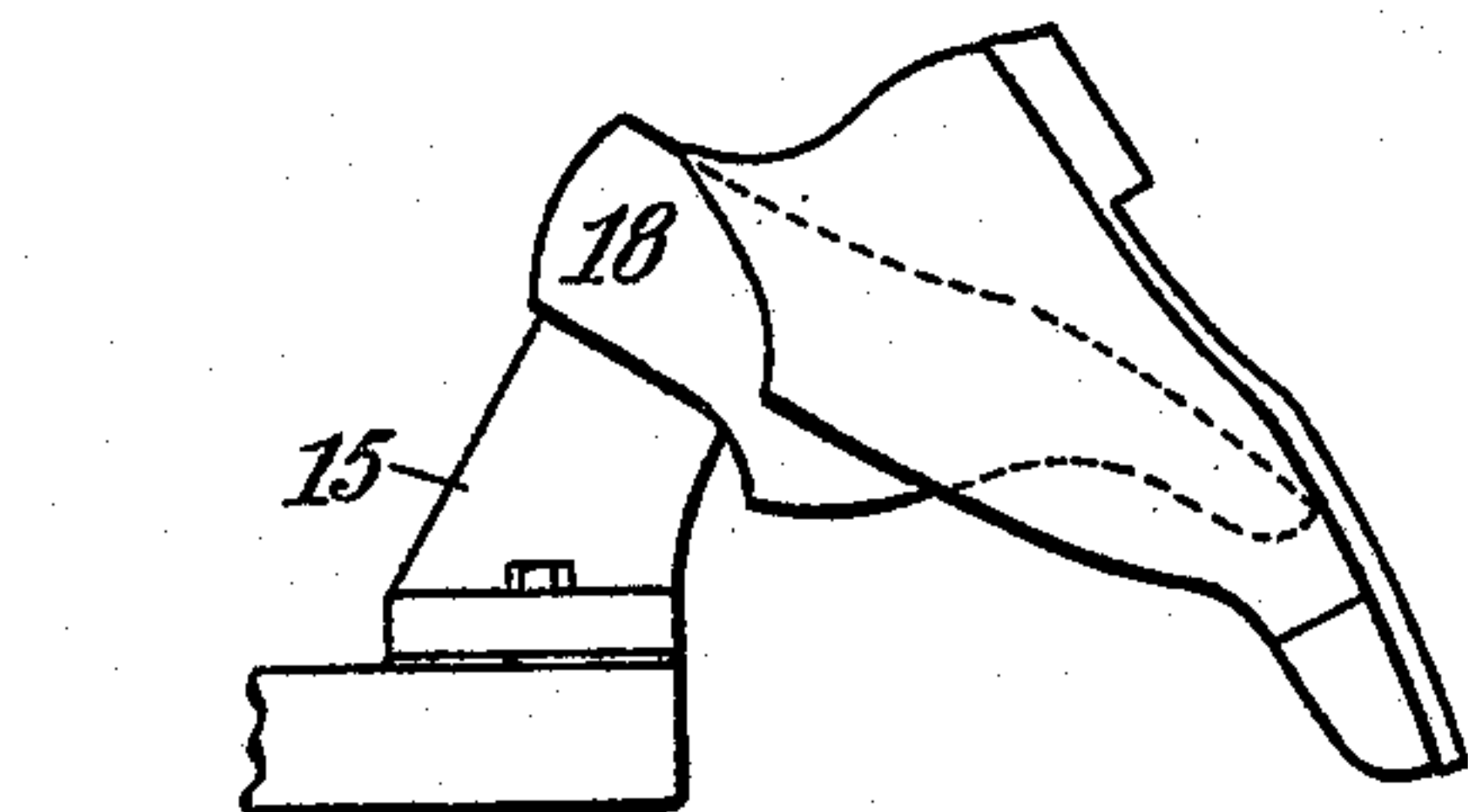
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6 SHEETS—SHEET 3.



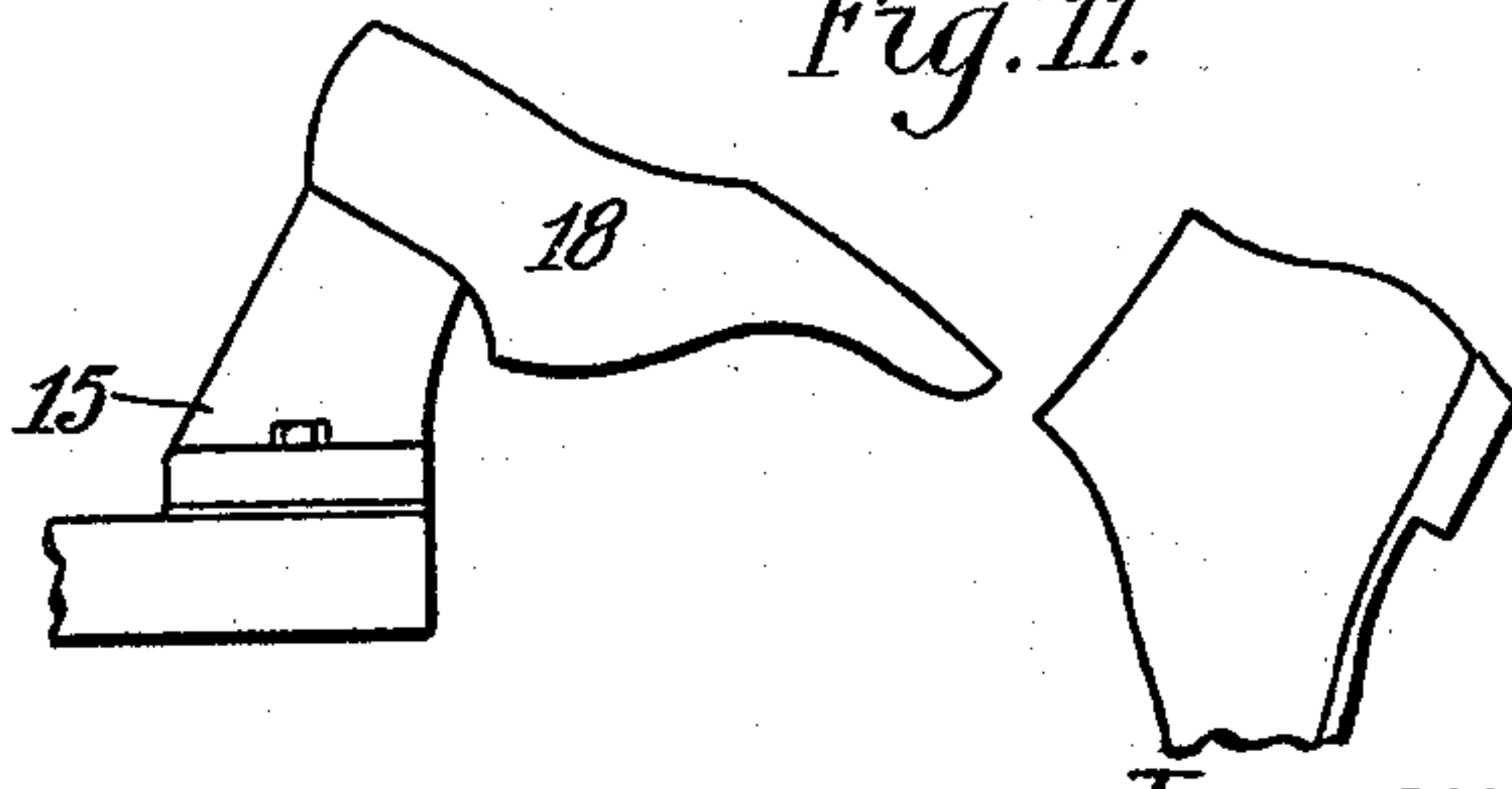
*Fig. 10.*



Witnesses.

*Sydney E. Taft.*  
*Louis A. Jones.*

*Fig. 11.*



Inventor:  
*Fred M. Moody*

by his Attorney *Charles J. Gooding*

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6 SHEETS—SHEET 4.

Fig. 4.

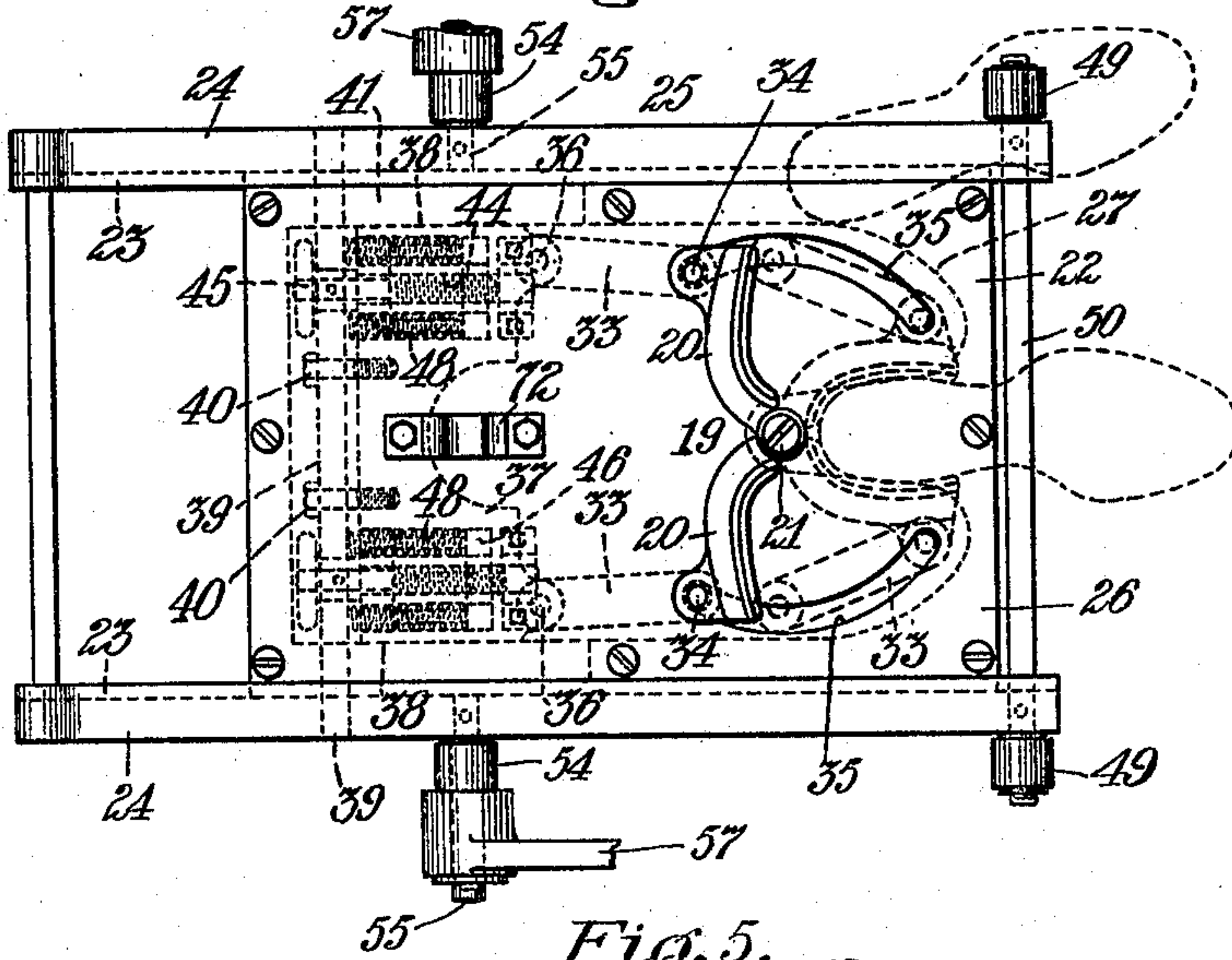


Fig. 5.

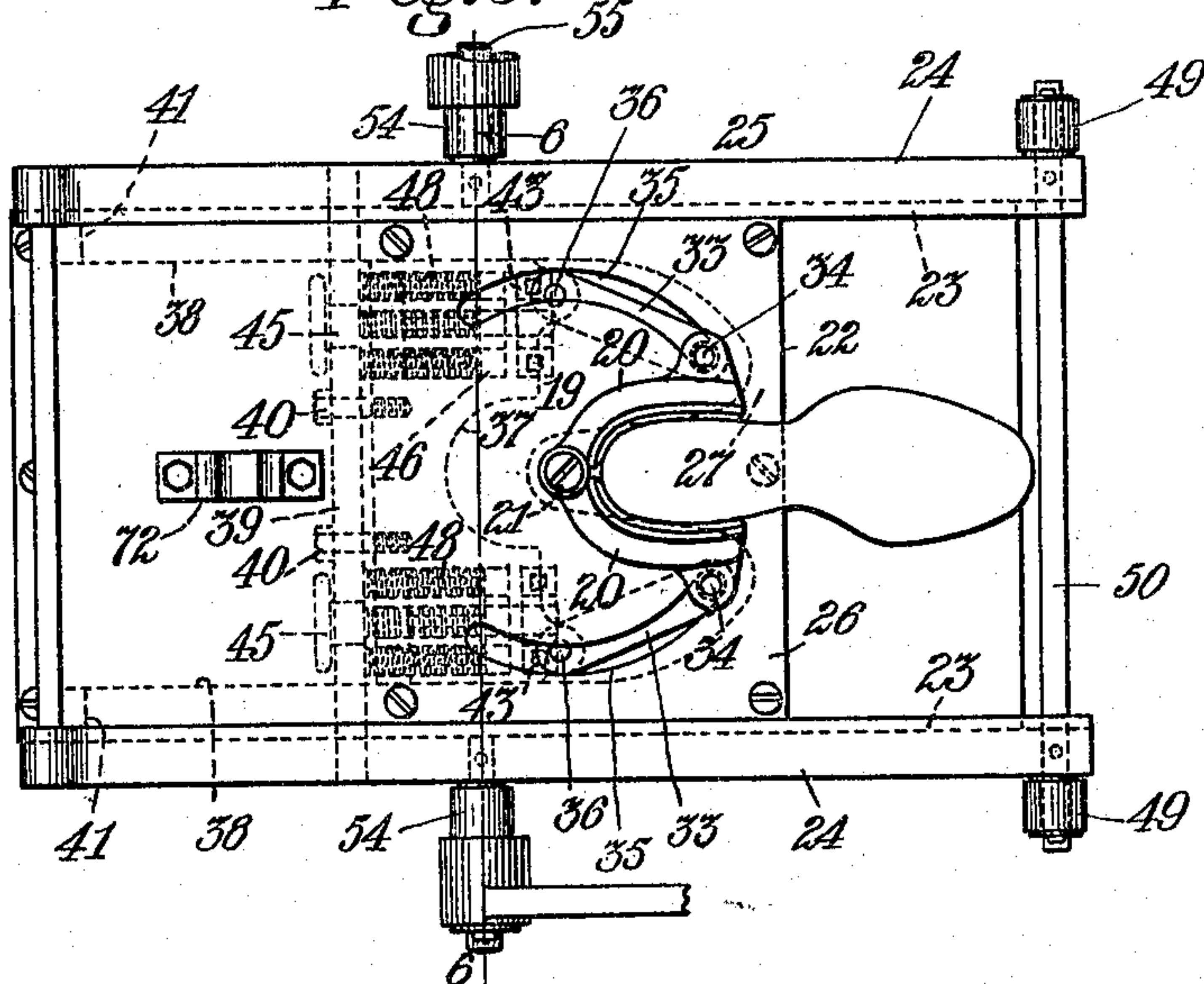
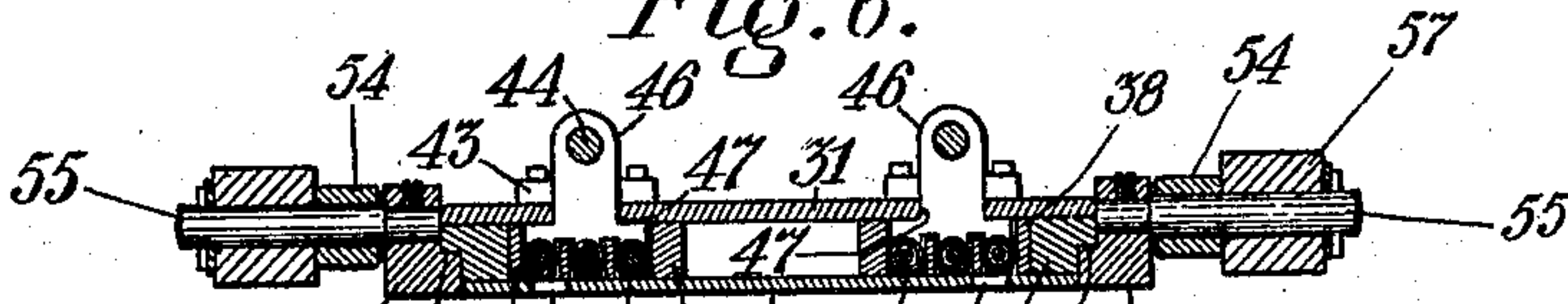


Fig. 6.



Witnesses:

*Sydney C. Taft*  
*Louis A. Jones*

Inventor:

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by his Attorney

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5 SHEETS—SHEET 6.

Fig. 7.

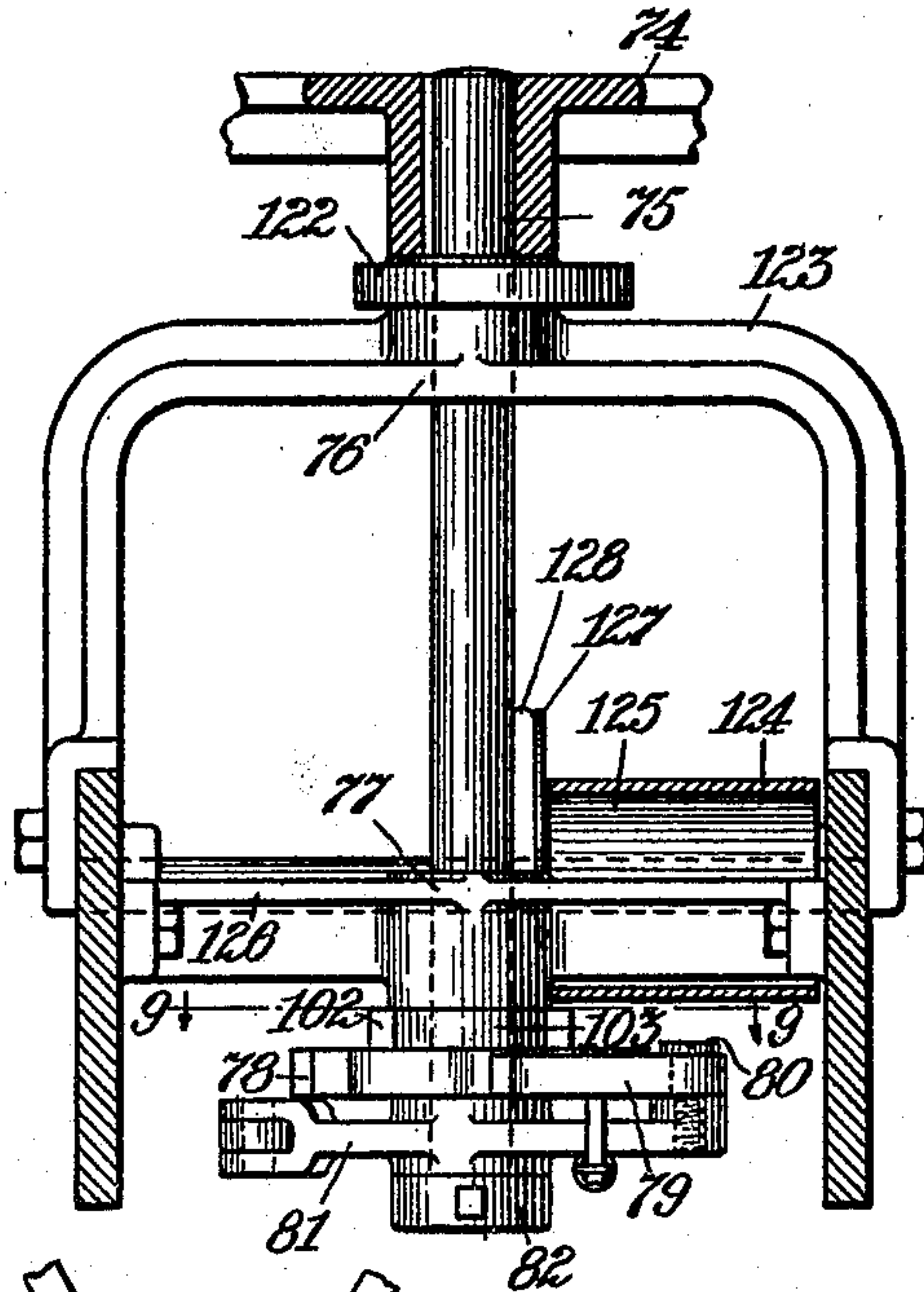


Fig. 8.

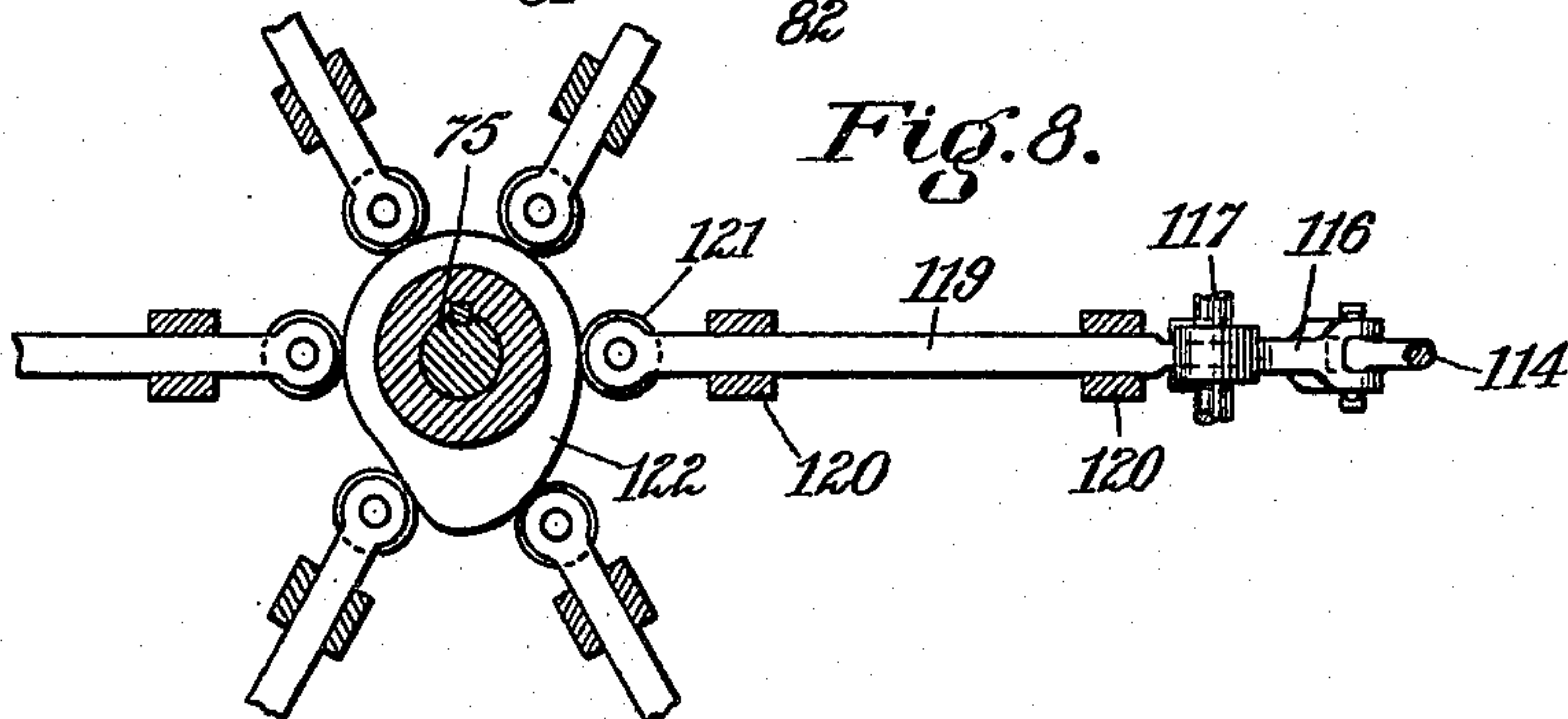
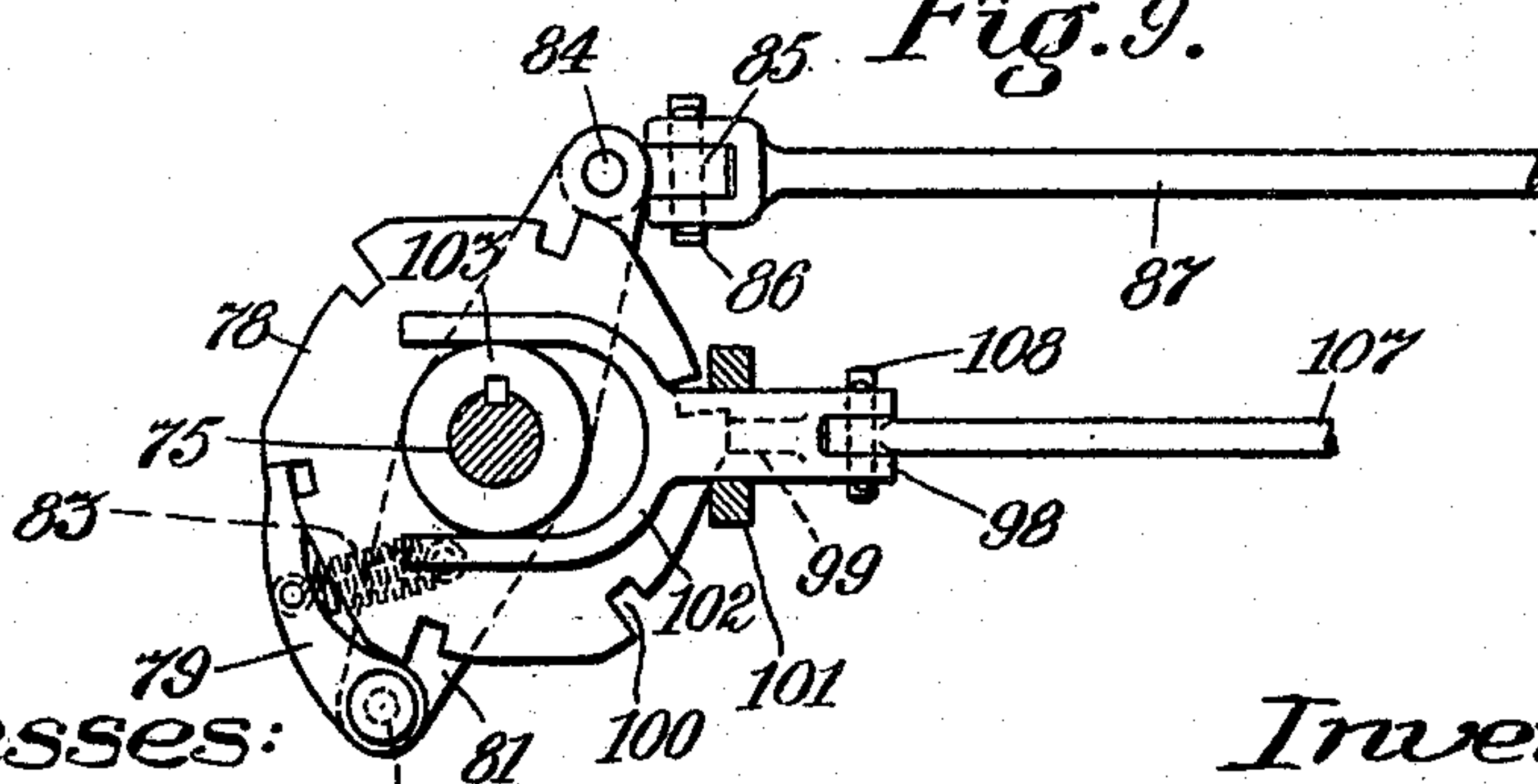


Fig. 9.



Witnesses:

Sydney C. Taft.  
Louis A. Jones.

Inventor:

Fred M. Moody  
by his Attorney Charles S. Gooding.



# UNITED STATES PATENT OFFICE.

FRED M. MOODY, OF WHITMAN, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO CHARLES S. GOODING, OF BROOKLINE, MASSACHUSETTS.

## MACHINE FOR REMOVING SHOES FROM LASTS.

932,632.

Specification of Letters Patent.

Patented Aug. 31, 1909.

Application filed August 13, 1908. Serial No. 448,321.

*To all whom it may concern:*

Be it known that I, FRED M. MOODY, a citizen of the United States, residing at Whitman, in the county of Plymouth and State of Massachusetts, have invented new and useful Improvements in Machines for Removing Shoes from Lasts, of which the following is a specification.

This invention relates to a machine for removing shoes from lasts.

In the manufacture of shoes heretofore, after the completion of a shoe the same has been removed from the last either by hand or by hand-power, or foot-power machines, which are necessarily slow in operation. Shoes fit the last so tightly that great physical strength and endurance are required to perform this operation rapidly hour after hour and day after day and the operators who do this work command good wages.

The object of my invention is to produce a machine which shall be capable of rapidly and automatically removing shoes from lasts and in the attainment of this object I have produced a machine which is capable of performing this operation much faster than the same can be accomplished by hand or foot power machines and the construction and operation are such that a boy or girl can easily attend the machine as there is nothing for the operator to do but to place the last with its shoe thereon onto the machine.

The invention consists in the combination and arrangement of parts set forth in the following specification and particularly pointed out in the appended claims.

Referring to the drawings: Figure 1 is a plan of a machine embodying my invention, part of the machine being broken away to save space. Fig. 2 is an elevation of the machine, partly broken away. Fig. 3 is a sectional elevation taken on line 3—3 of Fig. 1. Fig. 4 is a bottom plan of the shoe gripping device and its carrier showing the gripper open. Fig. 5 is a bottom plan of the shoe gripping device and its carrier showing the gripper closed onto the shoe. Fig. 6 is a detail sectional elevation taken on line 6—6 of Fig. 5, looking toward the right. Fig. 7 is a sectional elevation taken on line 7—7 of Fig. 2, looking toward the right. Fig. 8 is a detail plan section, partly broken

away, taken on line 8—8 of Fig. 2. Fig. 9 is a detail plan section taken on line 9—9 of Fig. 7. Fig. 10 is an illustrative diagrammatic view showing the shoe partly removed from the last. Fig. 11 is an illustrative diagrammatic view showing the relative positions of the shoe and last after the shoe has been removed from the last and before being released by the gripping device.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, 15 is a support for the last having projecting upwardly therefrom a pin 16 which is adapted to enter the usual hole 17 in a last 18. The shoe is removed from the last by a device adapted to engage the same, this device being preferably a gripping device 19 which may comprise two jaws or grippers 20, 20 pivoted on a stud 21 which is secured to a slide 22 arranged to slide in ways 23, 23 formed in guides 24, 24 constituting a part of a frame 25, said slide and said frame constituting a carrier 25' for the gripping device 19. The slide 22 comprises a plate 26, a plate 27, and a plate 28 through which the stud 21 extends and to which said stud is secured by means of a nut 29. The plate 28 extends through a slot 30 formed in a plate 31 which is secured by means of screws 32 to the guides 24. For the operation of the jaws or grippers 20, I provide two links 33, 33 pivotally connected to said grippers, respectively, by means of pins 34, 34 which are located in curved slots 35, 35 formed in the plate 26 and adapted to be guided thereby. The links 33, 33 are pivotally connected at 36, 36 to a slide 37 arranged to slide between ways 38, 38 formed on the plate 27, said slide being located between and guided by the plates 26 and 31. The slide 37 is connected to a rod 39 which constitutes a slide by means of screws 40, 40 which have screw-threaded engagement with the slide 37 and pass through holes formed in the rod 39, the heads of said screws having such relation with the slide 37 that a limited sliding movement of said rod with relation to said slide is permitted. The rod 39 extends through slots 41, 41 formed in opposite sides of the plate 27, said rod terminating at opposite ends thereof in holes provided in the



guides 24, 24 to which guides said rod bears a fixed relation.

Fast to the plate 31 are four bearing brackets 42, 42 and 43, 43 arranged in pairs, each pair consisting of a bracket 42 and a bracket 43, there being two screw-threaded rods 44 journaled in said pairs of bearing brackets, said rods having fast thereto hand wheels 45, 45, respectively. Two nuts 46, 46 having screw-threaded engagement with the rods 44, 44, respectively, extend through slots 47 formed in the plate 31, said nuts constituting abutments for a plurality of springs 48 arranged in two series of three each bearing at one set of ends against said nuts and at their other set of ends against the rod 39, said springs acting to normally hold said rod in contact with the heads of the screws 40. By means of the hand wheels 45, the screws 44 may be rotated to move the nuts 46 longitudinally thereof to increase or diminish the tension of the springs 48, as may be desired.

For the support and guidance of the carrier 25', I provide two rolls 49, 49 journaled on a rod 50 fast to the frame 25 and constituting a part thereof, said rolls being located in curved slots 51, 51, respectively, formed in side members 52, 52 constituting a superstructure for a frame 53 of the machine. The carrier 25' is still further supported and guided by two rolls 54, 54 journaled on studs 55, 55, respectively, fast to the guides 24, 24, said rolls being located in irregular slots 56, 56, respectively, formed in the side members 52, 52, respectively. The carrier 25' is actuated by the following mechanism. Two links 57, 57, are pivotally connected to the studs 55, 55, respectively, and are also pivotally connected to crank pins 58, 58, fast to cranks 59, 59 respectively, said cranks being fast to a crank shaft 60, journaled in suitable bearings in the side members 52 of the frame 53.

A crank shaft 60 is rotated by means of a gear 61 fast thereto, said gear meshing into a gear 62, fast to a shaft 63, journaled in suitable bearings, the gear 62 being driven by a pinion 64, fast to a driving shaft 65, journaled in suitable bearings on the frame of the machine. A driving pulley 66, fast to the shaft 65, may be connected to any suitable source of power to drive a machine. As the driving shaft 65 is rotated in the direction of the arrow *a*, Fig. 2, rotation is imparted to the crank shaft 60, and the cranks 59 act to impart a reciprocatory motion to the studs 55 and the carrier 25' is moved from the position shown in dotted lines in Fig. 3 to the position shown in full lines therein and thence said studs are moved into the position shown in Fig. 2 after which a reverse movement takes place and said carrier again occupies the position shown in dotted lines in Fig. 3, which latter

position will be considered the initial position of the carrier.

The plate 28 which constitutes a part of the carrier 25' is provided with a fork 67 consisting of two arms which, when said carrier is in its initial position, as shown in Fig. 3, straddle a pin 68, fast to a bell crank lever 69, which lever is loosely mounted on the shaft 60. A helical extension spring 70 fast at one end to the bell crank lever 69 and at its other end to a fixed pin 71 tends to hold the vertical arm of said lever in contact with the shaft 63 which constitutes a stop, which limits the swinging movement of said lever in one direction. When the carrier 25' is in its initial position as shown in dotted lines in Fig. 3, the fork 67 holds the bell crank lever 69 against the tension of the spring 70 in the position indicated in dotted lines of said figure. When the carrier 25' and bell crank lever 69 are in this dotted position the jaws or grippers 20 are slightly opened, having released the shoe previously removed from its last as hereinafter described. When the carrier 25' rises upwardly toward the left, Fig. 3, under the influence of the mechanism hereinbefore described which actuates the same, the first part of the rising movement of said carrier results in the closing of the jaws or grippers 20 in an idle movement due to the fact that while the spring 70 is moving the bell crank lever 69 from the position shown in dotted lines in Fig. 3 to the position shown in full lines therein, the pin 68 carried thereby will move upwardly faster than the frame 25 and will, therefore, move the fork 67 and frame 22 upwardly faster than the frame 25, thereby causing the rod 39 to act through the slide 37 and links 33 to close the grippers 20. Continued movement of the carrier 25' upwardly toward the left results in the jaws 67 passing out of engagement with the pin 68, after which time there is no relative movement between the slide 22 and the frame 25 until such slide and frame have reached the position shown in full lines in Fig. 3. During the latter part of the movement of the carrier 25' into the position shown in full lines in Fig. 3 a fork 72 fast to the plate 26 of the slide 22 passes into engagement with a rod 73, which rod is fixed to the side members 52 of the frame 53 and thus the slide 22 is locked against reciprocatory movement toward the left. Continued movement of the studs 55 in the straight part of the slots 56 from the position shown in Fig. 3 to the position shown in Fig. 2 results in the frame 25 being reciprocated toward the left with relation to the slide 22 from the position shown in Fig. 5 to the position shown in Fig. 4. During this movement of the slide 25 the rod 39 which is rigidly connected thereto acts through the screws 40, 40 to carry the slide 37 toward the left also there-



by acting through the links 33 to open the jaws or grippers 20 into the position shown in full lines in Figs. 2 and 4.

Assuming now that a shoe mounted on a last has been previously brought into the position shown in full lines in Figs. 2 and 3 and in dotted lines in Fig. 4 by mechanism which will be hereinafter described, the grippers 20 now close upon and grip the shoe in the following manner. The slide 22 being held stationary by the coöperation of the fork 72 and rod 73, the movement of the studs 55, frame 25 and rod 39 toward the right, Fig. 3 and from the position shown in Fig. 4 to the position shown in Fig. 5 acts through the springs 48 to move the slide 37 toward the right and thereby acting through the links 33 to move the grippers 20 into contact with the shoe. After the grippers 20 have been moved into contact with opposite sides of the shoe as indicated in dotted lines in Fig. 4 and in full lines in Fig. 5 a slight continued movement of the rod 39 with relation to the slide 37 acts to compress the springs 48 and thus said grippers resiliently grip the shoe. The frame 25 has at this time reached the position shown in full lines in Fig. 3 and it will be understood that the shoe is tightly grasped by the grippers 20. Continued movement of the links 57 toward the right results in the fork 72 being moved out of engagement with the rod 73 and also results in the fork 67 being carried into engagement with the pin 68, and during this movement the grippers are carried in a curvilinear path which results in the shoe being pulled off of the last as shown in Figs. 10 and 11, Fig. 11 showing the shoe in the position which it occupies just prior to its being released by the grippers 20. After the fork 67 has been brought into engagement with the pin 68, continued downward movement of the carrier 25' results in the bell crank lever 69 being carried thereby against the tension of the spring 70 from the position shown in full lines in Fig. 3 to the position shown in dotted lines therein. During this movement of the bell crank lever the pin 68 carried thereby will move downwardly faster than the frame 25 and will, therefore, move the fork 67 forwardly and downwardly, thereby causing the slide 22 to be reciprocated with relation to the frame 25, with the result that the rod 39 acting through the slide 37 and links 33 slightly opens the grippers 20 thereby releasing the shoe.

I will now proceed to describe the carrier mechanism which carries the lasts having the shoes thereon successively into alinement with the mechanism hereinbefore described for pulling the shoes off from the lasts.

A plurality of supports 15 having pins 16 thereon are fast to a rotary carrier 74 which is fast to a vertical shaft journaled in bearings 76 and 77. While I have shown

but three of the supports 15 in Fig. 1 and but two of them in Fig. 2 it will be understood that in practice there will be provided a series of such supports fast to the carrier 74 and located at equal intervals therearound, said supports being preferably six in number. An intermittent rotary movement is imparted to the rotary carrier 74 by the following mechanism. A ratchet 78 fast to the shaft 75 is engaged by a pawl 79 pivotally mounted on a stud 80 on a pawl-carrier 81, said pawl-carrier being loosely mounted upon the shaft 75 and held in place thereon by a collar 82 fast to said shaft. The pawl 79 is held in engagement with the ratchet 78 by means of a helical extension spring 83 fast at one end to said pawl and at its other end to the pawl-carrier 81. The pawl-carrier 81 is pivotally connected at 84 to a link 85, said link being pivoted at 86 to a second link 87, the pivots 84 and 86 extending at right angles to each other so that the link 85 constitutes in effect a universal joint. The link 87 is connected at its other end to a short link 88 by means of a pivotal pin 89, the link 88 being pivoted at 90 to a lever 91, said short link constituting in effect a universal joint. The lever 91 which is mounted to rock on a pivotal shaft 92 has journaled thereon a cam roll 93 which bears against a cam 94 fast to the shaft 63, said roll being held in contact with the edge of said cam by means of a helical extension spring 95 which is connected at one end to a stationary pin 96 fast to the frame of the machine and at its other end to a pin 97 fast to the link 87. The contour of the cam 94 is such that at the proper time in the operation of the machine the same acts through the lever 91, the link 87, pawl-carrier 81, pawl 79 and ratchet 78 to rotate the carrier 74 intermittently one sixth of a rotation each time, whereby the lasts with shoes thereon are successively brought into alinement with the mechanism for pulling the shoes off of the lasts.

Fig. 9 illustrates the position which the parts occupy just prior to the bringing of the last and the shoe into alinement with the mechanism for pulling the shoe off of the last. In order that the carrier 74 may be securely locked against rotation during the operation of pulling the shoe off of the last, there is provided a locking slide 98 having a tooth 99 thereon which is adapted to enter notches 100 formed in the ratchet 78, the slide 98 being mounted to slide in a guide 101 and being still further guided by a fork 102 which straddles the hub 103 of the ratchet 78.

A helical extension spring 104 fast at one end to a stationary pin 105 is fast at its other end to a collar 106 which collar is fast to a link 107 pivoted at 108 to the slide 98, said spring tending to hold the tooth 99 in



contact with the periphery of the ratchet 78. When one of the notches 100 has been brought into alinement with the tooth 99 the spring 104 causes said tooth to enter  
 5 said notch and lock the ratchet 78 and consequently the carrier 74 against rotation. The link 107 is pivoted at 109 to a lever 110 pivoted to rock on the shaft 92, said lever having journaled thereon a cam roll 111  
 10 which at certain times in the operation of the machine is adapted to engage a cam 112 fast to the shaft 63, said cam at such times acting to rock said lever on its pivot 92 and acting through the link 107 to withdraw the  
 15 tooth 99 from the notch 100 in which it was located. After such withdrawal of the tooth 99 the pawl and ratchet mechanism acts to impart another sixth of a rotation to the carrier 74 bringing another last and  
 20 shoe into the proper position to be operated upon by the grippers for pulling the shoe off of said last. After the shoes have been removed from the lasts one by one it is desirable that said lasts shall be automatically  
 25 removed from the supports upon which they are located. To this end I provide the following mechanism. In each of the supports 15 there is provided a hole 113 in which there is slidably arranged a rod 114, the  
 30 upper end of said rod being adapted to engage the last 18 while the lower end of said rod is pivotally and slidably connected by means of a pin 115 to a bell crank lever 116. The bell crank lever 116 is pivoted to rock  
 35 on a pivot 117, said lever being slidably and pivotally connected by a pin 118 to a cam slide 119, said slide being arranged to reciprocate in two guides 120. A cam roll 121 journaled on the cam slide 119 engages the  
 40 periphery of a cam 122 fast to a yoke 123 constituting a part of the frame of the machine and acting to support the carrier 74. It will be understood that the rods 114 and their connections just described correspond in number to the number of last  
 45 supports 15 which in this instance are six in number. The cam 122 being stationary, as the carrier 74 is rotated, said cam acts successively through the cam rolls 121, cam  
 50 slides 119, and bell crank levers 116 to push the rods 114 upwardly to a sufficient extent to push the lasts off of their supports successively subsequent to the operation of pulling the shoes off of the lasts. After the  
 55 shoes have been removed from the lasts and dropped by the grippers they fall upon an inclined chute 123 down which they slide onto a traveling belt or apron 124 which may be driven by any suitable means as by  
 60 a pulley 125 which said belt extends part way around, said pulley being fast to a shaft 126 journaled in suitable bearings in the frame of the machine. A second pulley 127 also fast to the shaft 126 is connected  
 65 by a crossed belt 128 to a pulley 129 fast

to the main driving shaft 65. As the shoes slide onto the traveling belt 124 they are carried away to a suitable point.

The general operation of the machine  
 70 hereinbefore described in detail is as follows: The operator stands at the side of the machine which is opposite to the side shown in Fig. 2 and as the carrier 74 is rotated he places the lasts having shoes thereon one by  
 75 one onto the supports 15, the pins 16 entering the hole 17 in the lasts. The carrier 74 is rotated intermittently thus bringing the lasts having shoes thereon one by one into the proper relation with the grippers. The  
 80 grippers then close upon and firmly grasp the shoe by a yielding pressure due to the springs 48. The grippers are then moved by the carrier 25' in a curvilinear path in the proper direction to pull the shoe off of the  
 85 last, the beginning of this pulling movement being transverse to the pin 16 so that the last is not pulled thereby off of said pin. When the carrier 25' arrives in the position shown in dotted lines in Fig. 3 the grippers  
 90 20 release the shoe and allow the same to descend onto the traveling belt 124 by which the shoe is carried away. During the next 180° of rotation of the carrier 74 the lasts are pushed off of their supports successively  
 95 and there may be a suitable receptacle provided to receive the same as they fall.

Having thus described my invention what I claim and desire by Letters Patent to secure is:

1. A machine for removing a shoe from a  
 100 last, having, in combination, a device adapted to hold said last, means adapted to remove said shoe from said last, and means adapted to subsequently disconnect said last from  
 105 said holding device.

2. A machine for removing shoes from  
 lasts, having, in combination, a device adapted to engage a shoe, a device adapted to be connected to a last located in said shoe, and a carrier adapted to move said second  
 110 named device into alinement with said first named device, said devices being relatively movable whereby said shoe may be subsequently removed from said last.

3. A machine for removing shoes from  
 115 lasts, having, in combination, a device adapted to engage a shoe, a device adapted to be connected to a last located in said shoe, and a carrier adapted to move said second named device with said last and shoe into  
 120 alinement with said first named device, said devices being relatively movable and adapted to subsequently remove said shoe from said last, said carrier being adapted to finally  
 125 move said second named device out of alinement with said first named device.

4. A machine for removing shoes from  
 lasts, having, in combination, means adapted to engage a shoe, means adapted to be connected to a last located in said shoe, said  
 130



first named means and second named means being relatively movable whereby said shoe may be removed from said last, and means to subsequently disconnect said last from  
5 said second named means.

5. A machine for removing shoes from lasts, having, in combination, a carrier adapted to move a series of lasts having shoes thereon, in a pre-determined path suc-  
10 cessively to a pre-determined point, and means to remove said shoes successively from said lasts.

6. A machine for removing shoes from lasts, having, in combination, a carrier  
15 adapted to move a series of lasts having shoes thereon in a pre-determined path suc- cessively to a pre-determined point, means to remove said shoes successively from said lasts, and means to subsequently remove said  
20 lasts from said carrier.

7. A machine for removing shoes from lasts, having, in combination, a gripping de- vice adapted to engage a shoe on opposite  
25 sides thereof adjacent to the heel portion, means to actuate said gripping device to move the same into and out of operative en- gagement with said shoe, and a device  
30 adapted to be connected to a last located in said shoe, said means being adapted to move one of said devices relatively to the other whereby said shoe may be removed from  
said last.

8. A machine for removing shoes from lasts, having, in combination, a plurality of  
35 supports for lasts having shoes thereon, a carrier on which said supports are mounted, means to impart an intermittent movement to said carrier to move said lasts and shoes successively to a pre-determined point, and  
40 means to engage said shoes successively and remove the same from said lasts.

9. A machine for removing shoes from lasts, having, in combination, a plurality of  
45 supports for lasts having shoes thereon, a carrier on which said supports are mounted, means to impart an intermittent movement to said carrier to move said lasts and shoes successively to a pre-determined point,  
50 means to engage said shoes successively and remove the same from said lasts, and means to subsequently remove said lasts from said supports.

10. A machine for removing shoes from lasts, having, in combination, a plurality of  
55 supports for lasts having shoes thereon, a carrier on which said supports are mounted, means to impart an intermittent movement to said carrier to move said lasts and shoes successively to a pre-determined point,  
60 means to hold said carrier stationary at in- tervals, and means to engage said shoes suc- cessively during said intervals and remove said shoes from said lasts.

11. A machine for removing shoes from  
65 lasts, having, in combination, a plurality of

supports for lasts having shoes thereon, a rotary carrier on which said supports are mounted, means to impart a rotary move- ment to said carrier to move said lasts and shoes successively to a pre-determined point,  
70 and means to engage said shoes successively and remove the same from said lasts.

12. A machine for removing a shoe from a last, having, in combination, a device adapt- ed to hold said last, a device adapted to en-  
75 gage said shoe, a rotary shaft, and means connecting one of said devices to said shaft, whereby the rotation of said shaft is adapt- ed to impart a relative movement to said de- vices to automatically position said second-  
80 named device with respect to said shoe and subsequently remove said shoe from said last.

13. A machine for removing a shoe from a last, having, in combination, a device adapt- ed to hold a last, a clamp having two rela-  
85 tively movable parts adapted to engage op- posite sides, respectively, of said shoe, an ac- tuating member, and means connecting said member to said clamp whereby the move- ment of said member is adapted to first im-  
90 part a relative movement to said clamp parts to cause the same to clamp said shoe, said member being adapted to subsequently im- part a relative movement to said clamp and  
95 said devices to remove said shoe from said last.

14. A machine for removing a shoe from a last, having, in combination, a device adapted to hold said last, a device adapted to engage said shoe, an actuating member,  
100 and a spring interposed between said actu- ating member and said second-named de- vice, said actuating member being adapted to compress said spring to cause said first- named device to engage said shoe with  
105 spring pressure, said actuating member be- ing adapted to subsequently impart a rela- tive movement to said devices to remove said shoe from said last.

15. A machine for removing a shoe from a  
110 last, having, in combination, a device adapt- ed to hold said last, a device adapted to en- gage said shoe, an actuating member, a spring interposed between said actuating member and said second-named device, said  
115 actuating member being adapted to com- press said spring to cause said first-named device to engage said shoe with spring pres- sure, said actuating member being adapted to subsequently impart a relative movement  
120 to said devices to remove said shoe from said last, and means to vary the tension of said spring.

16. The combination in a machine for re- moving a shoe from a last of two devices,  
125 one of which is adapted to engage a shoe, the other being adapted to be connected to a last located in said shoe, and means to rela- tively actuate said devices to first properly position said first-named device with respect  
130



to said shoe, said means being adapted to subsequently relatively actuate said devices to remove said shoe from said last.

17. The combination in a machine for removing a shoe from a last of two devices, one of which is adapted to engage a shoe, the other being adapted to be connected to a last located in said shoe, and means to relatively actuate said devices to first properly position said first-named device in engagement with said shoe, said means being adapted to subsequently relatively actuate said devices to remove said shoe from said last.

18. A machine for removing shoes from lasts, having, in combination, a gripping de-

vice adapted to engage a shoe upon opposite sides thereof adjacent to the heel, a device adapted to be connected to a last located in said shoe, and means to move said gripping device into operative engagement with said shoe, said means being adapted to subsequently relatively actuate said devices to remove said shoe from said last.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

FRED M. MOODY.

Witnesses:

LOUIS A. JONES,  
ERNEST A. TELFER.