

E. A. STIGGINS.
SHOE SUPPORTING JACK.
APPLICATION FILED MAY 25, 1906.

935,065.

Patented Sept. 28, 1909.

4 SHEETS—SHEET 1.

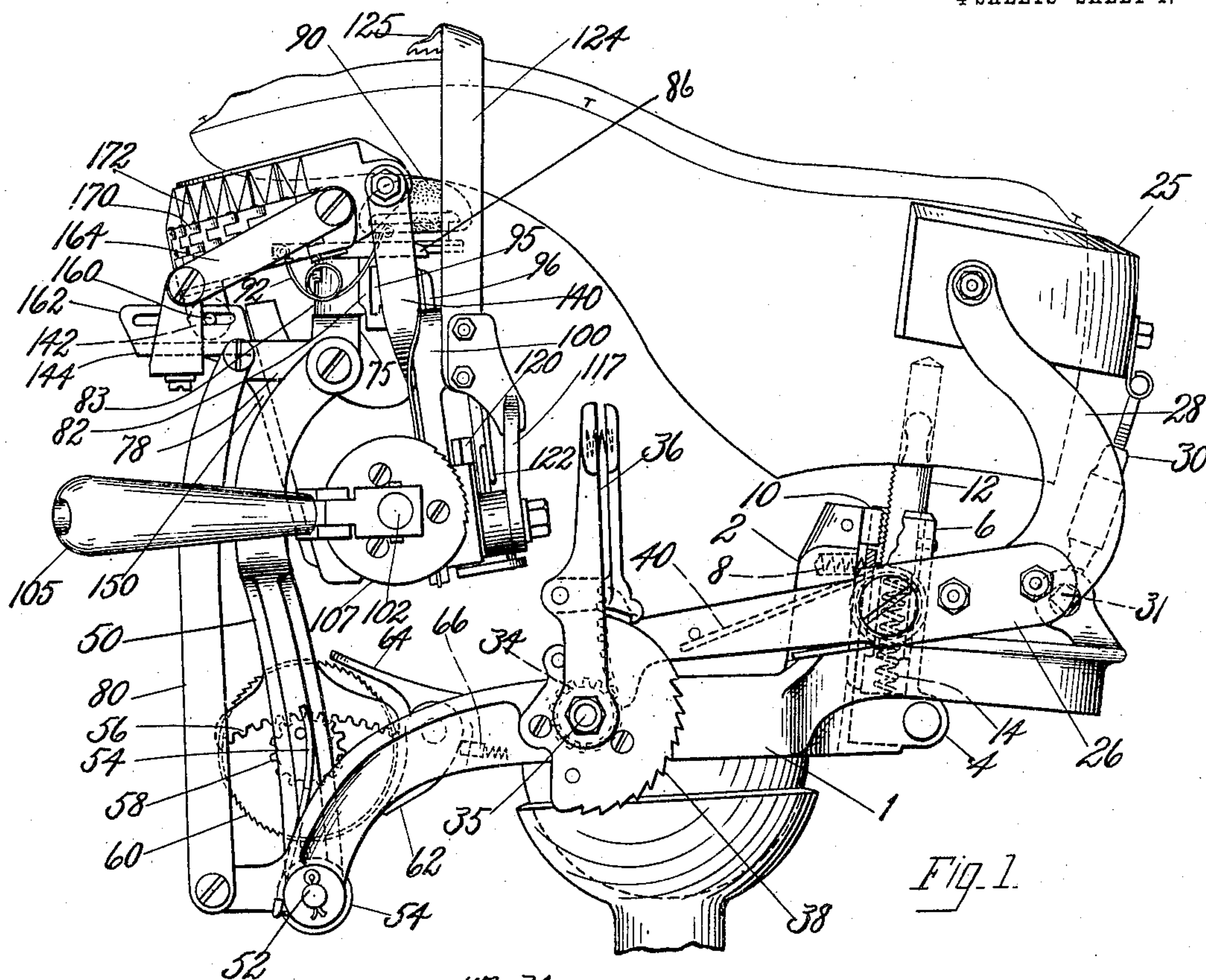


Fig. 1.

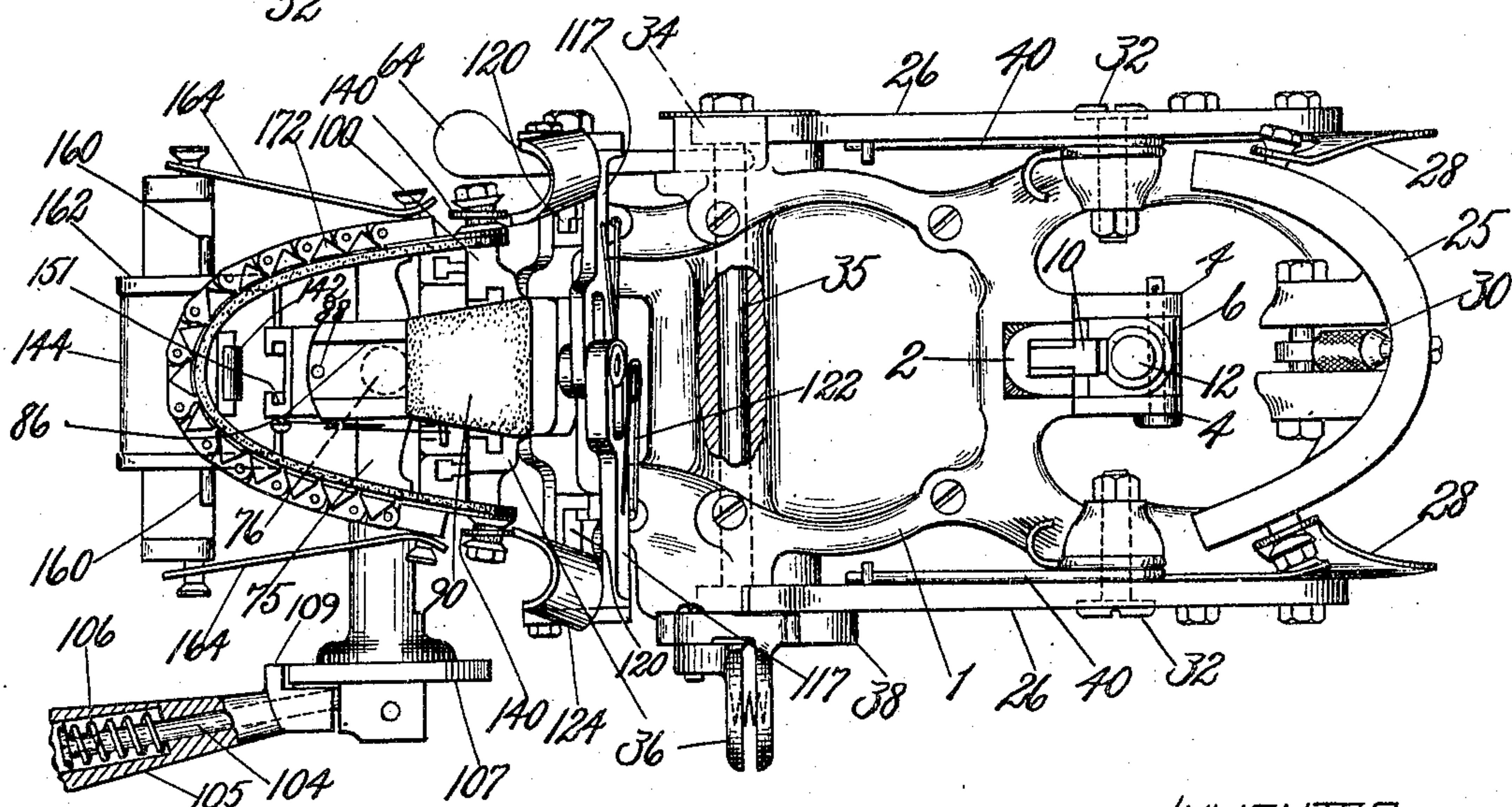


Fig. 2.

WITNESSES.

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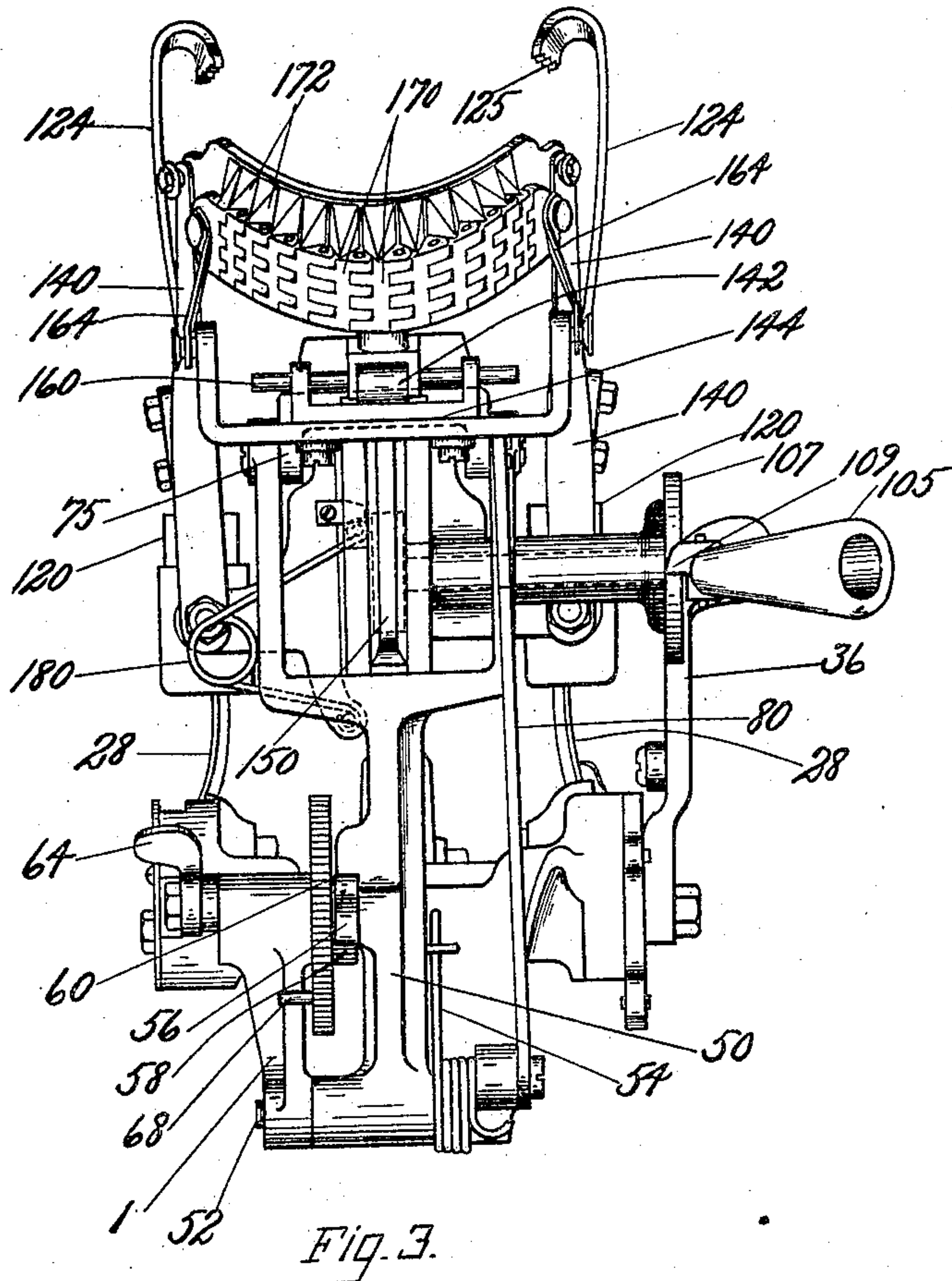


Fig. 3.

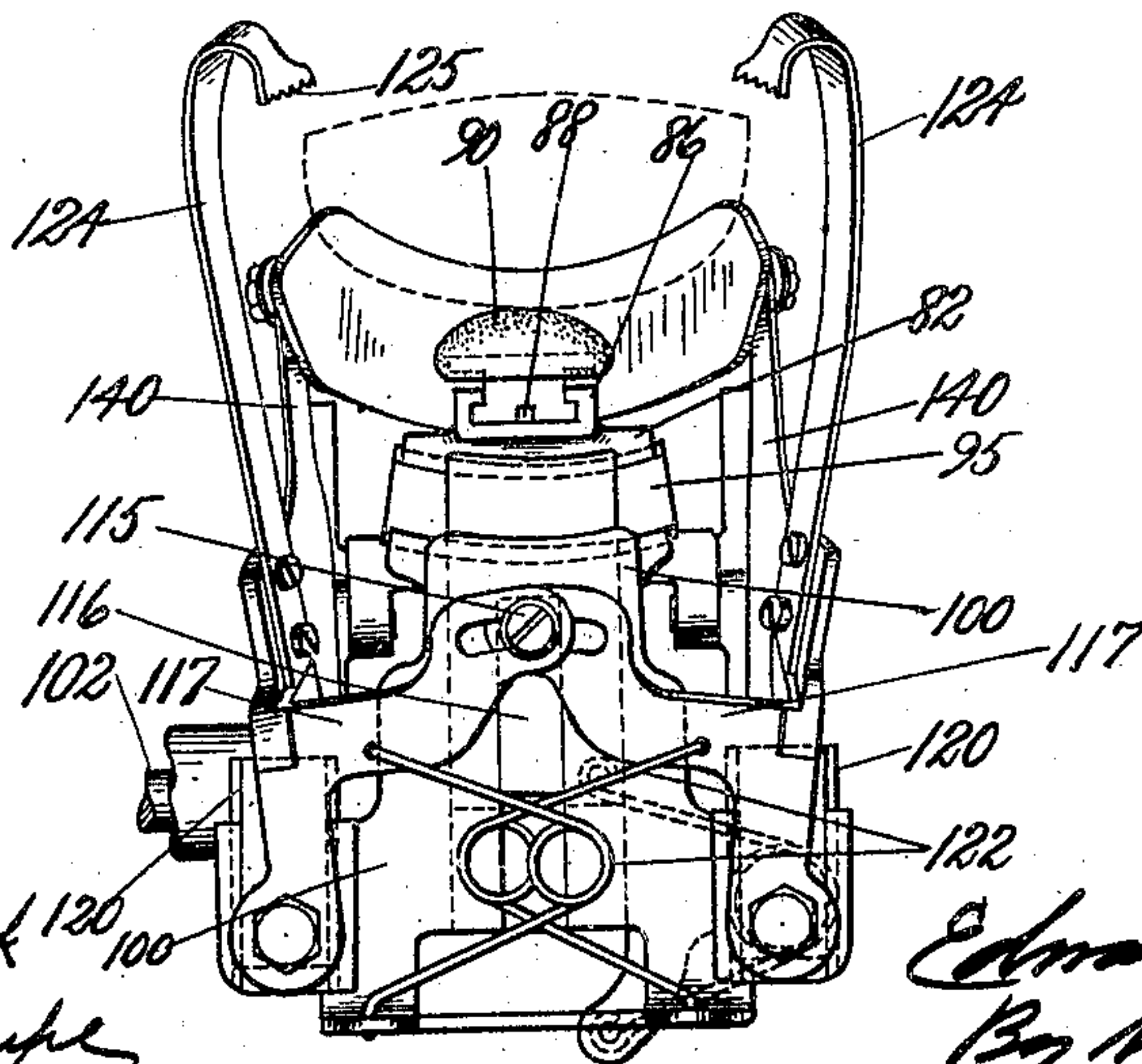


Fig. 4.

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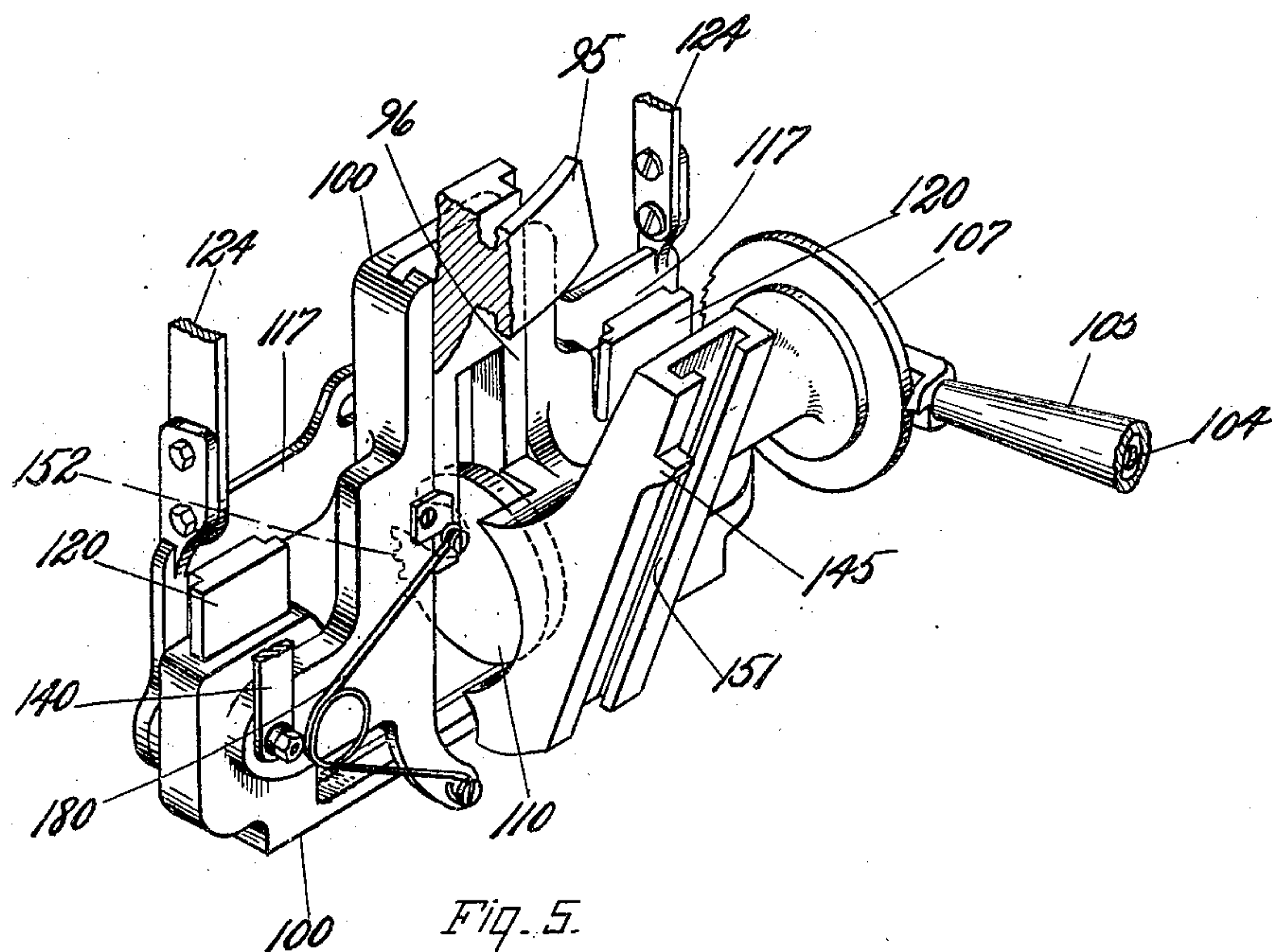
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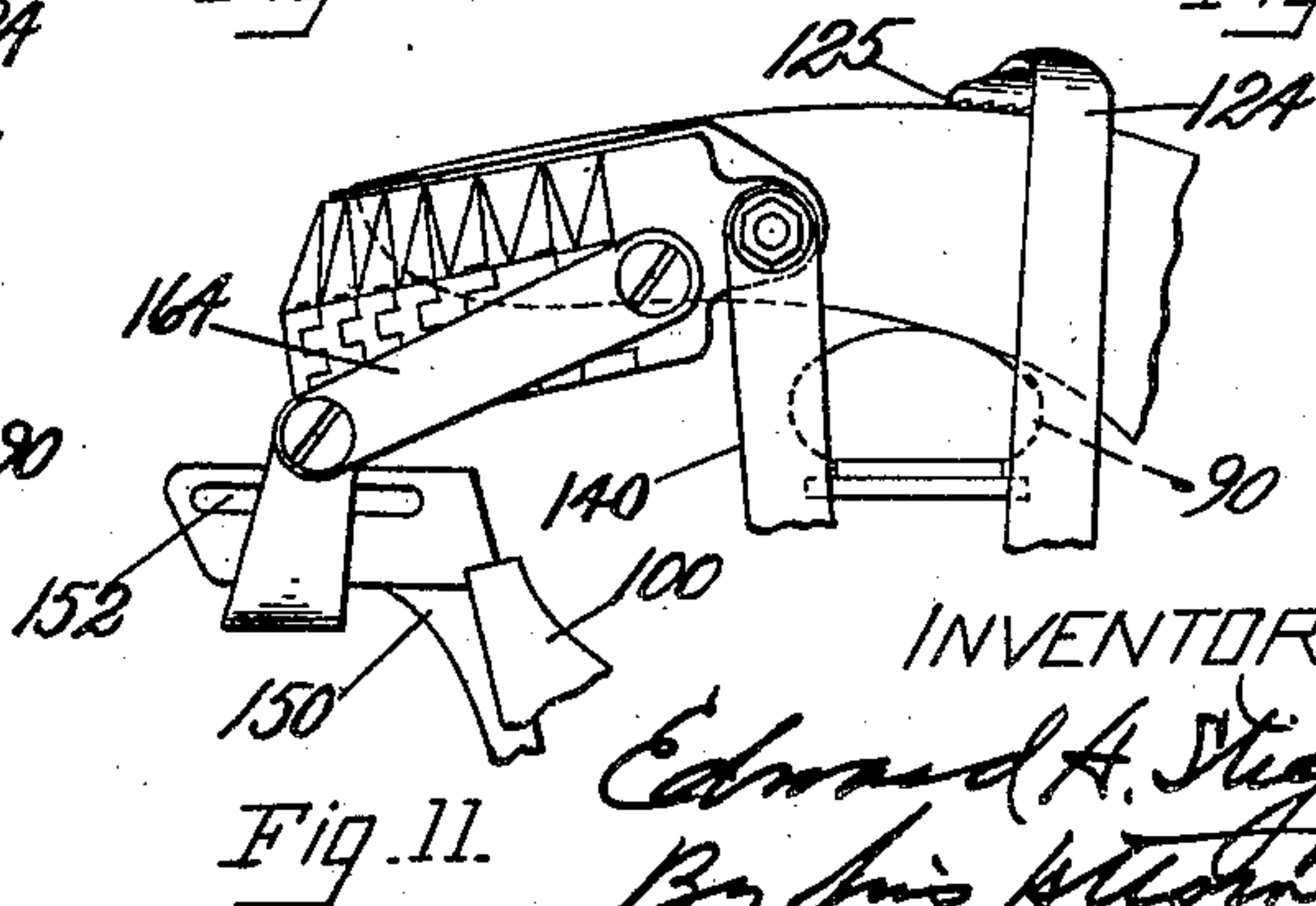
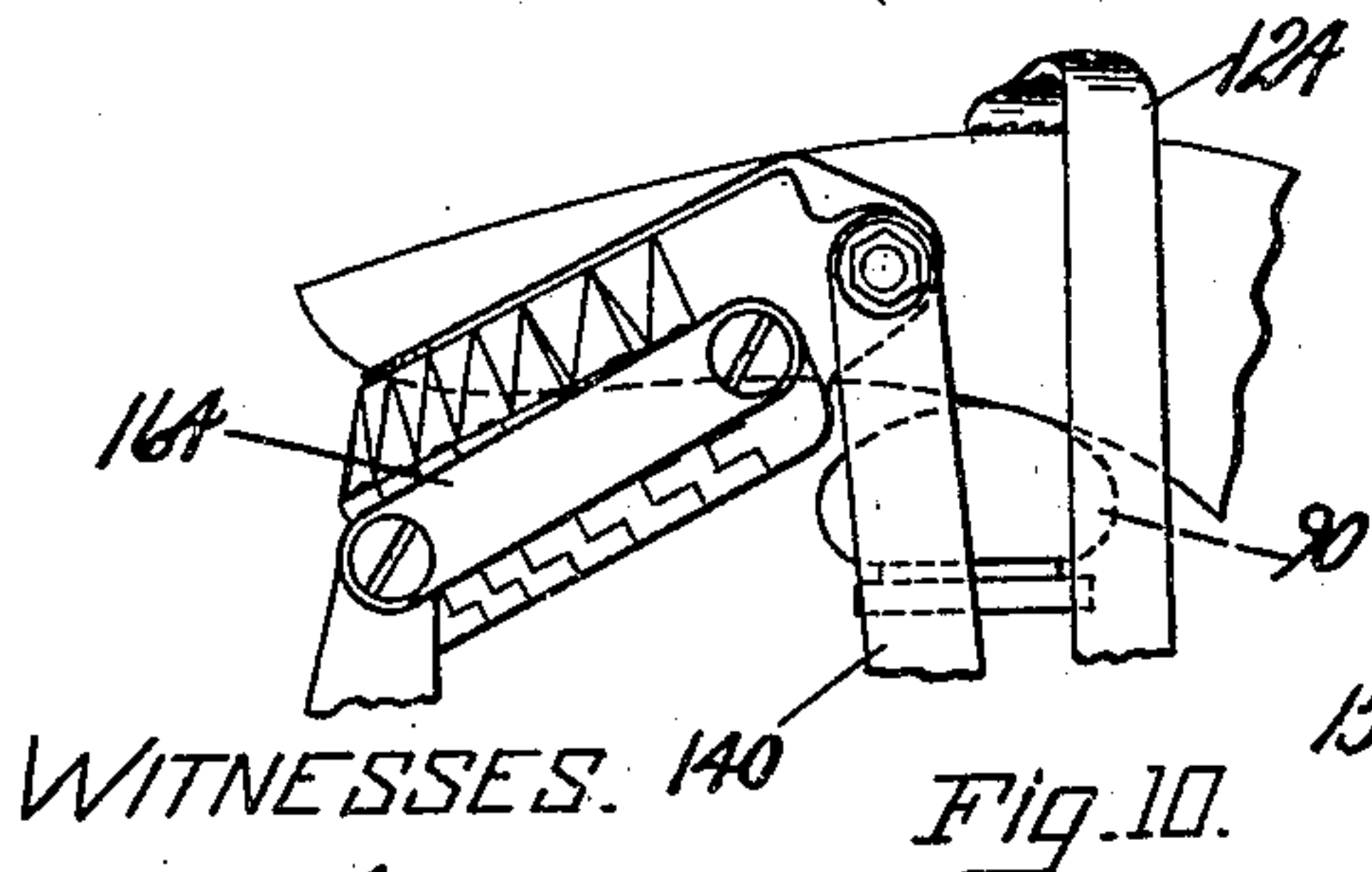
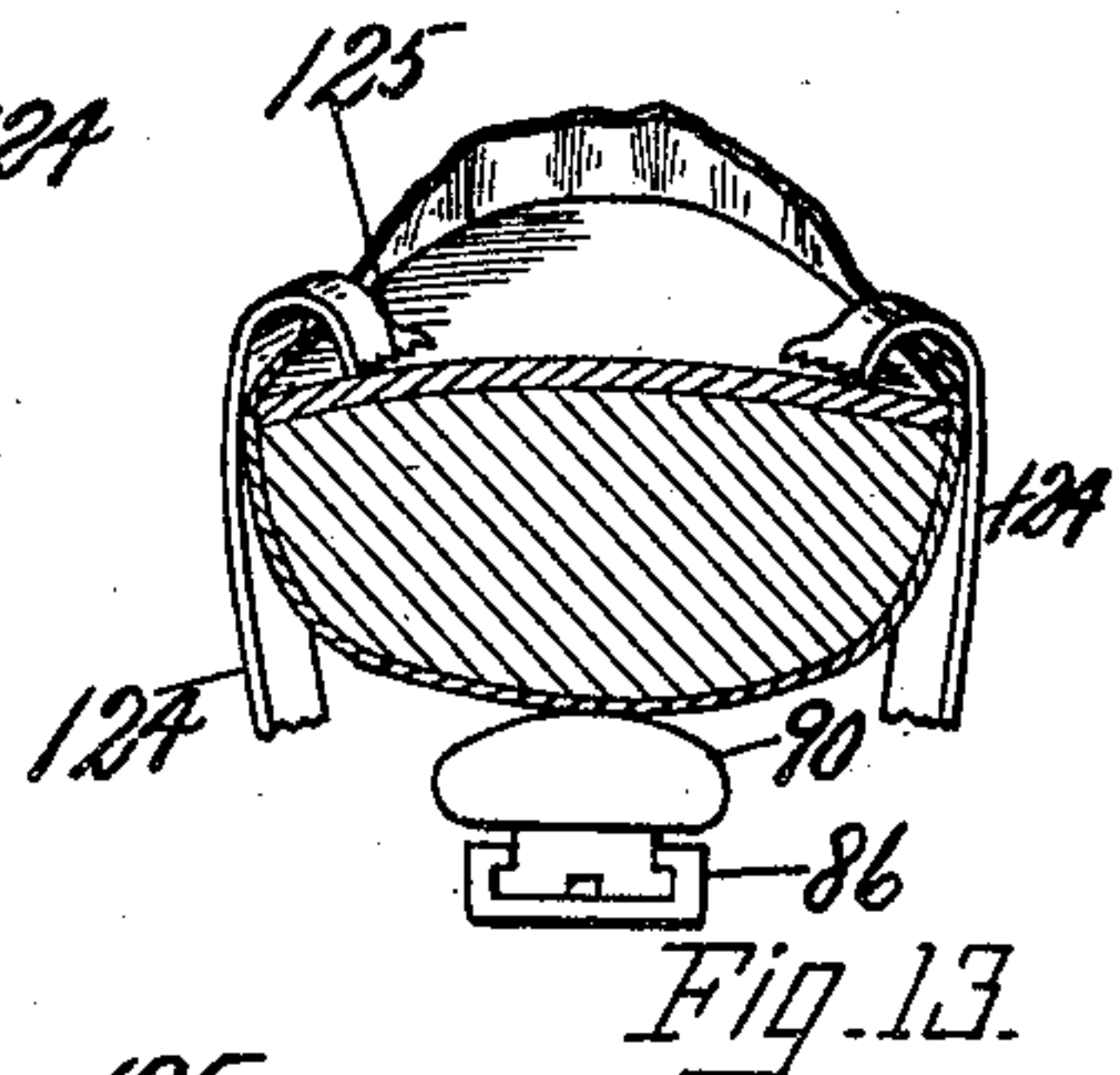
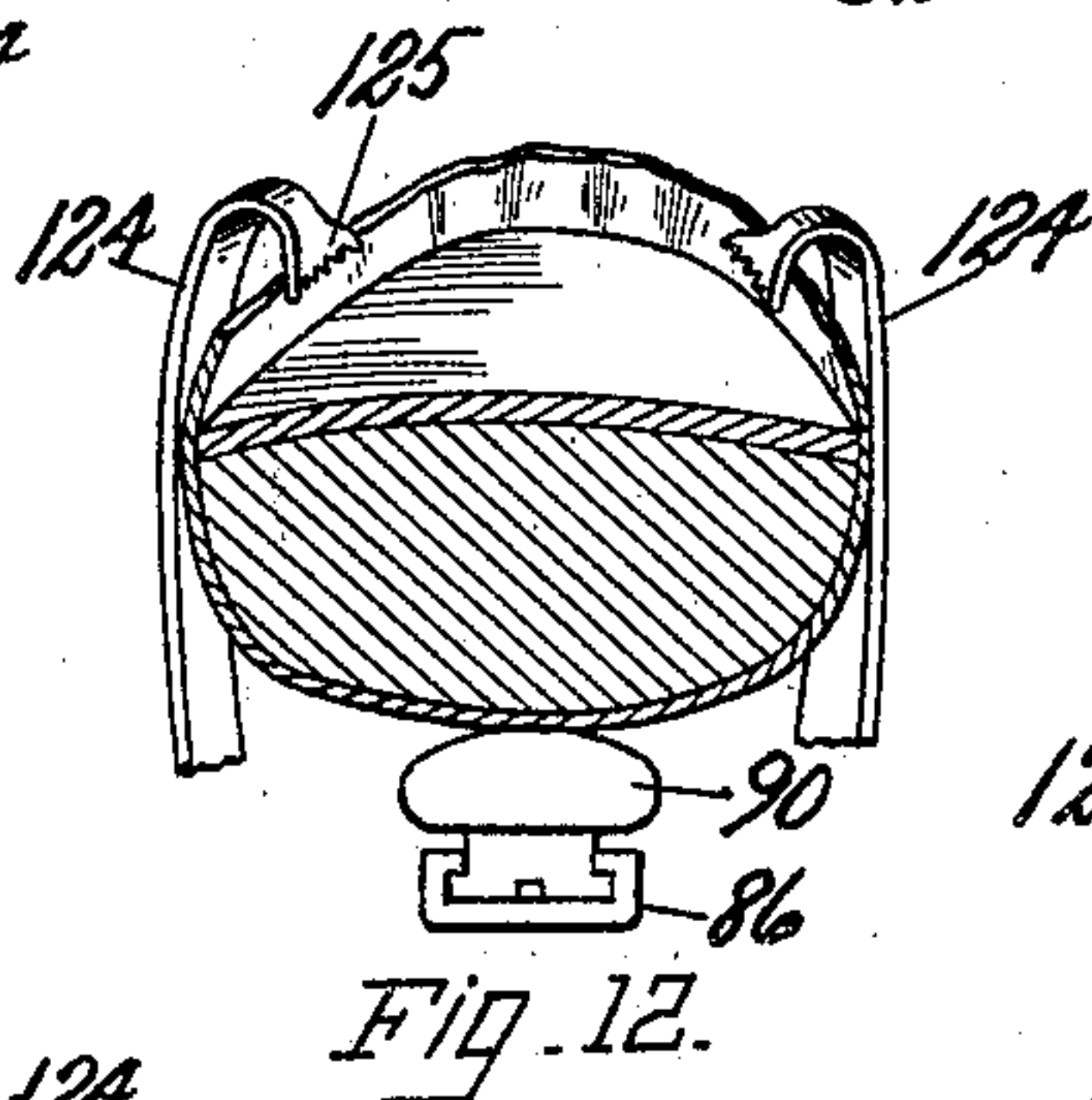
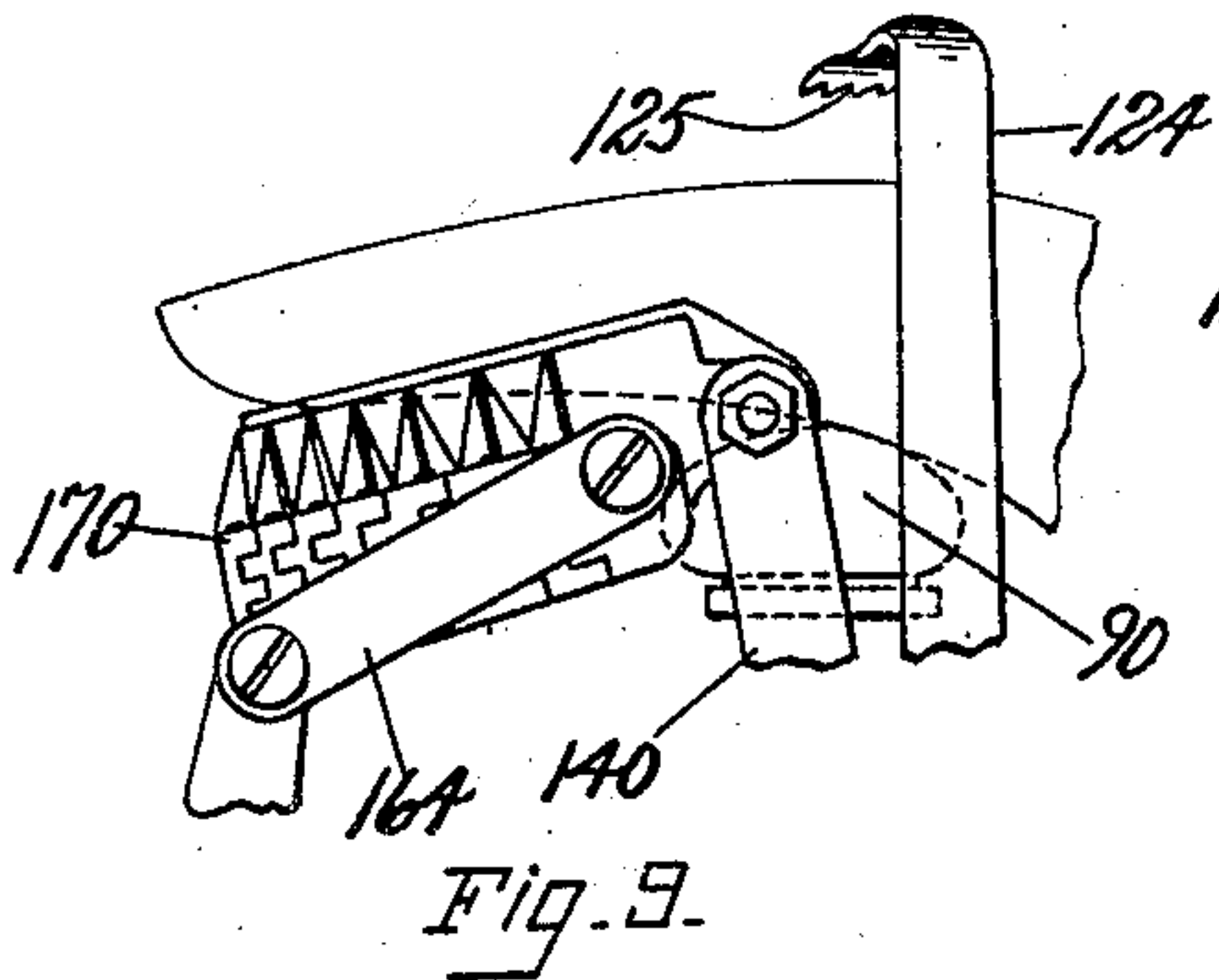
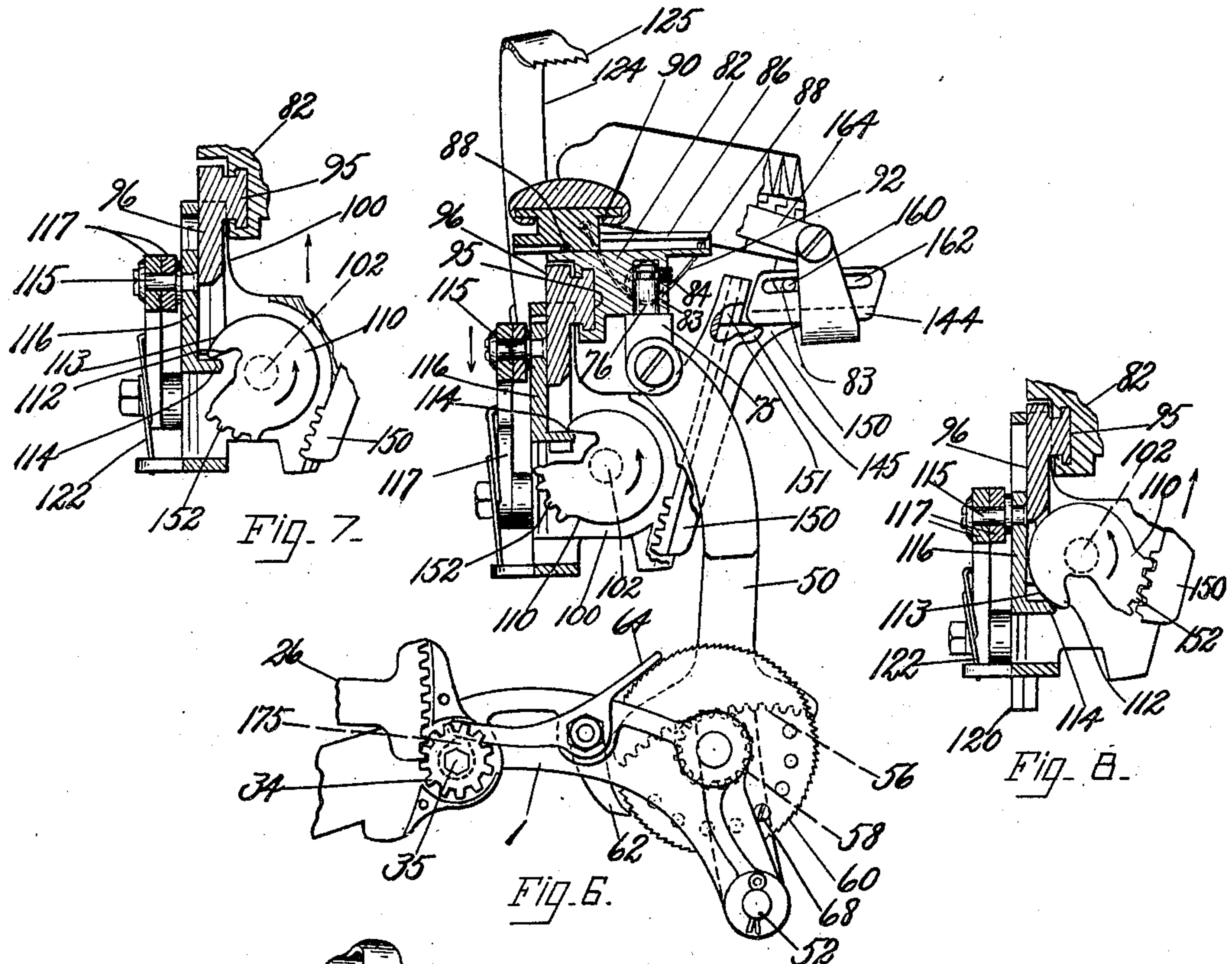
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

EDWARD A. STIGGINS, OF BEVERLY, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SHOE-SUPPORTING JACK.

935,065.

Specification of Letters Patent. Patented Sept. 28, 1909.

Application filed May 25, 1906. Serial No. 318,705.

To all whom it may concern:

Be it known that I, EDWARD A. STIGGINS, a citizen of the United States, residing at Beverly, in the county of Essex and Commonwealth of Massachusetts, have invented certain Improvements in Shoe-Supporting Jacks, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to jacks for shoe machines and particularly to jacks employed in connection with lasting machines.

The object of the invention is to provide an improved jack which is capable of ready adaptation or adjustment to different styles of lasts and which requires a minimum of movements for properly jacking and unjacking shoes of various shapes and sizes.

The invention is shown as embodied in a jack comprising a rest for the toe or forepart of an inverted last and a heel pin for entering the usual pin hole in a last to support the heel end of the last. The jack herein shown also includes a heel band for embracing the heel end of the last to clamp and hold the upper materials against the sides of this portion of the last preparatory to said materials being worked over the bottom of the last into position to be secured to the inner-sole. The jack is also provided with a toe band and with means for actuating said band forwardly and upwardly along and over the upper of the forepart of the shoe for wiping the upper on the top and sides of the forepart of the last toward the last bottom whereby this portion of the shoe is partially lasted. A band arranged to last or partially last a portion of the shoe may be regarded as one form of lasting means.

As is well known, some lasts are twisted or so shaped that the plane in which the bottom face of the forepart lies is not parallel with the plane in which the bottom face of the heel of the last is located, but is inclined thereto transversely of the last so that if the heel part is properly positioned in the jack one side of the forepart is higher than the other side. It is important in lasting shoes upon twisted lasts that the last and the toe band be relatively adjusted angularly so that the upper edge of the toe band will bear the same relation to the bottom of the last on both sides of the jack. An important

feature of this invention consists in improved means by which the toe band and the last are relatively adjusted for this purpose. As herein shown, the toe band is adjusted relatively to the last by moving it about an axis extending longitudinally of the jack and the last, and located substantially in the plane of the shoe bottom. This is effected in the illustrated construction by mounting the toe band upon a movable carriage and providing devices, herein termed "feelers", for engaging the shoe bottom near its opposite edges to ascertain the relative positions or altitudes of the engaged portions of the bottom. The feelers preferably are connected with the movable carriage to operate there-through for moving said toe band automatically into the desired relation to the transverse plane in which the bottom of the forepart of the last is located.

Lasts vary in thickness or height of the forepart, so that the bottoms of lasts of different sizes and styles occupy different altitudes when sustained upon the toe rest. It is desirable that the toe band be moved upwardly into the same relation with the bottom of the last, whatever may be the size of the last, for wiping the upper toward the last bottom. According to another feature of this invention provision is made for insuring that the toe band shall always be moved into the same relation to the bottoms of lasts of different heights. To this end the feelers before mentioned determine not only the relative positions of the two edges of the last supported on the toe rest and heel pin, but said feelers also find the height of the last or the altitude of the last bottom and automatically determine the distance which the toe band shall be elevated by its actuating mechanism. In the construction herein shown the feelers are mounted for vertical movement relatively to the carriage upon which the toe band is mounted and said carriage is itself arranged for vertical movement upon a supporting member. An actuating device, shown as a cam, is mounted in the carriage and engages a slide connected to the feelers for moving said feelers downwardly until they engage the last bottom, whereupon they become fixed points with relation to which the carriage is moved upwardly by the cam during the remainder of the throw of the cam. It will be understood that as the whole throw of the cam is utilized

ized in effecting the relative movement of the feelers and toe band toward each other, these parts will be moved by the cam to the same relative positions. It will also be obvious that because the feelers are moved downwardly until they engage the last bottom and the toe band is then moved upwardly into predetermined relation with said feelers, the toe band will always be moved into the same position with relation to the last bottom. For example, if a thin last is in the jack the feelers will be moved downwardly during a large portion of the throw of the cam before they contact with the last bottom and the toe band will thereafter be moved upwardly along the toe of the thin last during a proportionately smaller portion of the throw of the cam. If a large last is in the jack the feelers will meet the bottom of the last after a relatively small portion of the throw of the cam has been given and the toe band will be raised along the thicker last during the correspondingly greater remaining portion of the throw of the cam. It is to be noted that the actuation of the feelers for finding the relative altitudes of the two edges of the last bottom and the rocking of the toe band in accordance with the relative position of said edges, and also the actuation of the toe band upwardly toward the last bottom are effected by the same cam so that only one operation is required for effecting the two results.

After the toe band has been rocked to conform to the relative altitudes of the two edges of the last bottom, and has been raised to the desired level with relation to the last bottom, the closed end of the band is required to be swung upwardly for wiping the upper material on the top and sides of the last toward the edge of the last. In the embodiment of the invention shown herein this swinging of the toe band for wiping the upper toward the edge of the last and, preferably, partially lasting this portion of the upper as before suggested, is also effected by a continued movement of the shaft carrying the cam by which the before-mentioned movements of the feelers and the toe band are effected. In the illustrated construction the closed end of the toe band is connected to a rack bar adapted to be engaged by a segmental gear which is formed on said cam. The segmental gear is so located on the cam that the rack bar is actuated for swinging the toe band after the band has been raised to the proper position depending upon the height of the particular last. This provision for effecting the several movements of the feelers and the toe band by a continuous operation is an important feature of this invention, for it enables the operator to jack the forepart of the last very quickly by a single actuation of the cam shaft.

Right and left lasts usually vary in swing

or inclination of their side edges with relation to the median line of the last and a feature of the present invention consists in mounting a band for movement relatively to the last about a center located under the last whereby the relative positions of the band and last may conform to the swing of the last. As herein shown, the support which sustains the carriage for the toe band and feelers is mounted for pivotal movement about a vertical axis located under the forepart of the last at a distance back from the toe end of the last, whereby said toe band may turn laterally to adapt its position to the swing of the last being jacked. Preferably means is provided for ascertaining the shape or swing of a last in the jack and for automatically turning the toe band in accordance with the ascertained shape of said last. In the illustrated construction the feelers comprise swinging arms located at the rear of said vertical axis and extending from the carriage upwardly at either side of the jack. The feeler arms are connected to their actuating cam by means which causes the arms to move together toward and from the sides of the last before they are moved downwardly to bring the feelers into contact with the last bottom, as has been before described. The arrangement is such that the arm which first engages the adjacent side of the last in the jack, whether it be a right or a left last, causes the support to turn about said vertical axis until the other feeler arm engages the side of the last adjacent to it. The connection between the feeler arms and the cams by which they are actuated is shown to include bell-crank levers fulcrumed on sliding blocks which are vertically movable in the carriage. The feeler arms are secured to the vertical arms of the levers, while the horizontal arms of the levers are slotted and are connected by a pin to the vertically movable slide which is engaged by the operating cam. This arrangement insures that the levers shall be rocked to throw the two feeler arms toward each other until they both engage the last, after which continued movement of said slide carries the levers downwardly with the feeler arms in contact with the sides of the last until the feelers engage the bottom of the last for the purposes heretofore stated. For enabling the toe band further to adapt itself to the swing of the last the closed end of the band may be so connected with the rack bar by which said closed end is supported and actuated that it may slide laterally on the rack bar and conform freely to the position of the toe end of the last. The band is shown as consisting of a chain having a leather lining. The links of the chain have beveled lugs extending approximately to the top of the leather lining and serving to support said lining near its edge and prevent it from

stretching during the operation of wiping the upper along the last.

To facilitate the insertion and the removal of lasts and also to adapt the jack for shoes of different sizes it is desirable to move the toe band longitudinally of the jack away from its operative position. To this end the toe band and the toe rest, together with their carriage and support are mounted on a swinging arm with which the toe band may be moved toward and away from a last supported upon the heel pin. A pawl and ratchet secures the arm in the position to which it is moved toward the last and a spring moves the arm away from the last when the pawl is released. A stop limits the swinging movement of the arm away from the last and the stop may be adjusted to permit only so much movement as is necessary to give the desired clearance for the size of lasts being jacked. In the construction herein shown the heel band is also moved away from the last to facilitate the application of the last to the heel pin and its removal from the pin. To this end the heel band is mounted on the upper arms of bell-crank levers, the horizontal arms of which are provided on their end faces with segmental racks and are engaged by pinions on a shaft having a hand lever by which it may be actuated for advancing the heel band into engagement with the last. A pawl and ratchet locks the heel band in its advanced position and the band is reversely moved by springs.

According to a further feature of my invention provision is made for automatically releasing the arm which carries the toe band and the toe rest to permit said arm to move away from the last when the heel band is retracted from the last. As illustrated the pawl which locks said arm in its advanced position is fast to a rock shaft having an arm extending into engagement with a cam on the shaft which carries the pinions by which the heel band is moved. The cam is so arranged that when its shaft is turned in the direction to retract the heel band the pawl is tripped to release the arm and permit the spring to act on said arm to move the toe band away from the last. As already stated the toe band and connected parts are arranged to turn about a vertical axis. In the construction shown the carriage sustaining these parts is mounted upon an upright pivot post carried by the swinging support. It is desirable that the upright position of this post be maintained constant in the different positions to which the swinging support is moved for operative relation to lasts of different lengths and to this end the pivot post is carried by a cross bar which has connection also with a link extending approximately parallel with the swinging support. By this arrangement of the pivot post upon

parallel links the axis about which the toe band and associated parts turn is always maintained in substantially vertical position whatever the position of the supporting arm.

It will be understood that the arm carrying the toe rest is adapted to be moved longitudinally of the jack and that this movement may take place while the last is sustained on the toe rest and the heel pin. To avoid liability of the shoe upper being abraded by the toe rest in such movement of its carrying arm the rest is mounted to permit sliding movement longitudinally of the last with relation to the support upon which it is carried. This provision allows the supporting arm to be shifted for moving the toe band toward or from the last without causing the toe rest to move with relation to the last and thereby avoids all danger of the upper being marred by the toe rest. It is desirable to employ a yieldingly supported heel pin by which lasts of different heights can be supported with their bottom faces in the same relation to the heel band. It is also desirable to lock the heel pin against vertical movement when it has once been positioned for the last applied to the jack. As herein shown, means is provided by which the heel pin is automatically locked against movement either upwardly or downwardly while the shoe is jacked and automatically unlocked when the shoe is released. This result is secured by arranging the heel pin for movement forwardly by the pressure of the heel band against the rear end of the last and providing the heel pin and an adjacent fixed part of the jack with cooperating means for locking the heel pin against vertical movement in either direction when the heel pin is pressed forwardly. A spring presses the heel pin backwardly to unlock it when the heel band is moved for unjacking the shoe.

These and other features of the invention, including certain details of construction and combinations of parts, will be hereinafter described and pointed out in the claims.

In the drawings which represent a preferred construction embodying my invention; Figure 1 is a side elevation of a shoe-supporting jack. Fig. 2 is a plan view. Fig. 3 is a front view of the mechanism comprising the forepart of the jack. Fig. 4 is a rear view of a portion of the mechanism shown in Fig. 3. Fig. 5 is a perspective view of parts of the mechanism shown in Figs. 3 and 4, this view illustrating particularly the form of the block 100. Fig. 6 is a view of mechanism comprised in the forepart of the jack as seen from the opposite side from that shown in Fig. 1, certain parts being illustrated in section. Figs. 7 and 8 are details showing different positions of parts shown in Fig. 6. Figs. 9, 10 and

11 show successive positions occupied by the feelers and the toe band during the operation of jacking a shoe. Figs. 12 and 13 are other views showing successive positions of the feelers in the operation of jacking a shoe.

The base 1 of the jack is adapted to be mounted on any suitable sustaining means and is provided near its rear end with a post 2. Ears 4 extend rearwardly from the post and support pivotally a socket member 6 which is spaced sufficiently far from the post to permit it to have a limited rocking movement. A spring 8 mounted in a recess in the post bears against the socket member and holds it tipped rearwardly. The post has in its upper end a block 10 which projects through an opening in the front wall of the socket member and is provided on its inner end with corrugations. The last pin 12 is yieldingly supported in the socket member by a spring 14 and is provided on its front face adjacent to the block 10 with corrugations which are adapted to interlock with the corrugations on the block and hold the pin and the last sustained on it in the desired vertical position. The pin is normally out of contact with the block 10, but when the last is clamped by the heel band, later to be described, the last is pressed forwardly and caused to rock the pin and socket member toward the post until the corrugations on the pin engage those on the block. This construction enables the operator to depress the last and pin for bringing the bottom of the last to the desired altitude with relation to the heel band and then to lock the last pin at this elevation by clamping the heel band about the last and thereby forcing the pin against the corrugated block 10. It is to be noted that the corrugations not only prevent the last from rising under the influence of the spring 14, but also rigidly sustain the last against downward movement occasioned by the insertion of tacks or any other operation performed upon the shoe tending to depress the last.

The heel band 25 is supported by levers 26 having twisted yielding arms 28 connected to the front ends of the band, and is further supported by an adjustable post 30 pivotally connected to the rear portion of the band and to the base at 31. The levers 26 are fulcrumed at 32 upon the base and their front ends are formed as segments movable in guides in the base and engaging with pinions 34 secured to a shaft 35 mounted in bearings in the base. The shaft has a hand lever 36 which carries a pawl adapted to engage with a ratchet 38 secured to the base. The levers 26 may be rocked by manipulating the hand lever and the heel band will be thereby moved longitudinally of the jack for clamping and releasing the upper material at the heel of the last. The pawl

and ratchet secure the heel band in the position to which it is moved. The advance movement of the heel band for clamping the upper presses the last and the heel pin forwardly, as before described, for causing the corrugations on the heel pin to interlock with the corrugations on the block 10, whereby the last is secured against vertical movement either upwardly or downwardly. Springs 40 encircle the pivots upon which the levers 26 are mounted and move the heel band rearwardly when the pawl is released from the ratchet 38.

The devices for sustaining and operating upon the forepart of a last are supported by a swinging arm 50 pivotally connected at 52 to the front end of the base of the jack. A spring 54 normally swings the arm 50 forwardly away from the last. The swinging arm carries a rack segment 56, which engages with a pinion 58 mounted on a short shaft in the base 1. The shaft also carries a ratchet wheel 60 engaged by a locking pawl 62 for holding the swinging arm and the parts supported by it from reverse movement when it has been moved toward the last. The locking pawl 62 is mounted on a short rock shaft to which is secured a finger-piece 64 by means of which the pawl may be disengaged from the ratchet. A spring-pressed plunger 66 actuates the pawl toward the ratchet and holds it normally in engagement therewith. When the pawl is released from the ratchet the spring 54 swings the arm 50 forwardly to free the parts carried by the arm from the last. The extent of the forward movement of the arm is limited by a stop 68 carried by the ratchet wheel 60 and adapted to engage a portion of the base. The ratchet wheel may be provided with a series of openings, as shown in Fig. 6, to permit the adjustment of the stop 68 for the purpose of varying the distance which the arm shall swing away from the last. It is found in practice that it is advantageous to have the arm and the parts carried by it swing forwardly to a more advanced position, in order to give the desired clearance for inserting and removing the last, when large lasts are being operated upon than when smaller lasts are in the jack.

The upper portion of the swinging arm 50 is forked and to the ends of the forks is pivoted a cross bar 75, see Figs. 1 and 6, provided with a central pivot post 76 upon which the devices for supporting and acting upon the forepart of the shoe are mounted for turning movement in a substantially horizontal plane. The cross bar 75 has a forwardly extending arm 78, which is connected by means of a link 80 with the base of the machine, see Fig. 1. The swinging arm 50 and the link 80 constitute parallel links by means of which the pivot post

76 is maintained in a substantially vertical position as the swinging arm and the parts carried by it are adjusted forwardly and backwardly. A block 82 is provided with a hub 83 by means of which it is pivotally sustained upon the pivot post 76. A screw 84 extends through a horizontal slot in the hub 83 and limits the turning movement of the block 82 and also prevents the block being lifted from the post. The block 82 is provided with an elongated head 86 having a guideway extending longitudinally of the jack, in which is movably mounted the toe rest 90. Stops 88 extending into the guideway limit the movement of the toe rest and the spring 92 normally presses said rest rearwardly toward the heel pin. The provision for sliding movement of the toe rest in the part upon which it is supported permits said supporting bar to move forwardly and rearwardly in the operation of jacking and unjacking a shoe, as will hereinafter be described, without causing the rest to rub over the surface of the shoe and possibly mar or abrade the upper.

The toe rest is preferably provided with a rubber cushion or cover to reduce danger of injuring the shoe upper. The block 82 has in its rear face a guideway curved about a center located above the jack and substantially in the plane of the shoe bottom, as shown in Fig. 4. The guideway is formed to receive a T-shaped rib 95 on the upper end of a plate 96 which extends downwardly from the rib. The plate itself is T-shaped in cross section and forms a guide upon which is vertically movable a block 100 which is shown most clearly in Fig. 5. The block is provided with a bearing for a shaft 102 having an arm 104, see Fig. 2, provided with a sleeve 105 longitudinally movable on the arm and having a pawl 109 for engagement with a ratchet disk 107 secured to the bearing. The shaft 102 is provided at its inner end with a cam disk 110 having a hook-shaped tongue 112 arranged to engage a hook-shaped lug 114 projecting forwardly from a slide 116 which is vertically movable in a guide slot formed in the rear side of the block 100. The slide 116 has a rearwardly projecting stud 115 which extends through elongated slots in the inner arms of bell-crank levers 117, the lower arms of which are fulcrumed on sliding blocks 120 which are movable in vertical guideways in the side portions of the block 100, as shown in Fig. 4.

Two bent springs 122 have their lower ends connected with the block 100 and their upper ends connected with the slotted arms of the bell-crank levers and act to rock the slotted arms of the levers upwardly and outwardly. Each of the bell-crank levers 117 supports a bar 124 having its upper end portion 125, herein termed a feeler, bent for-

wardly and inwardly and adapted to engage the bottom face of the last or the inner sole thereon when the hand lever 104 is actuated for turning the cam disk and forcing the slide 116 downwardly. This downward movement of the slide 116 first rocks the bell-crank levers for swinging their vertical arms and the bars 124 inwardly until they contact with the sides of the last, the sides of the last preventing further inward rocking of the levers. The continued downward movement of the slide 116 causes the levers to move downwardly with the slide, the slide blocks 120 of course moving in their guideways in the block 100. This downward movement continues until feelers 125 engage the inner sole on the last. If the last is so shaped that its bottom face is higher on one side than on the other, as is the case with twisted lasts, one of the feelers 125 will contact with the bottom of the last before the other. In that case the block 100 and the plate 96 will swing laterally in the curved guideway, heretofore described as formed in the block 82, this swinging movement continuing until the other feeler 125 engages with the bottom of the last, after which the two feelers will press the forepart of the last firmly down on the toe rest. When the feelers can descend no farther by reason of the last being pressed firmly against the toe rest, the lug 114 against which the cam disk engages becomes a fixed support for the disk and in the further turning of the cam disk said disk and the block 100 are raised with relation to the toe rest and the last. The toe band is supported for vertical movement with the block 100, the rear ends of the toe band being sustained by twisted spring arms 140 which are pivotally connected at their opposite ends to the toe band and to the lower portion of the block.

The front closed end of the toe band is provided with a depending block in which is mounted a roller 142 adapted to rest upon a plate 144. A forward extension of the block 100 has a lug 145, shown best in Fig. 6, upon which the plate 144 is normally sustained for supporting the closed end of the toe band at a convenient elevation for permitting the last to be placed in the jack. The plate 144 has a depending bar 150 which is movable in a guideway 151 in the front face of the block 100 and is provided on its rear side with rack teeth which are adapted to be engaged by teeth 152 formed on the cam disk 110. The teeth 152 are so located on the cam disk with relation to the tongue 112 on said disk that the rack bar is engaged and elevated by the disk after the slide bars 124 have been moved into engagement with the last and the block 100, together with the toe band, has been elevated to cause the toe band to embrace the forepart of the last. The cam disk is

formed at 113 to hold the block 100 and the toe band in their elevated position while the slide 150 is being raised by the teeth 152 to swing the closed end of the toe band upwardly about the forepart of the last. In this swinging movement it will be understood that the toe band wipes the upper material toward the last bottom and in wiping it around the extreme toe portion of the last tends to draw the upper at this point somewhat longitudinally of the last.

The toe band is capable of movement to adapt its position to the swing of the last. This may be done by a movement about the vertical stud 76 as before described, or by a lateral shifting of the closed end of the toe band which is free to move transversely of the jack upon the plate 144. As herein shown, means is provided, in the arms 124, for ascertaining the swing or irregular shape of the last and for moving the toe band about the stud 76 before the band is raised. The first movement of the bell-crank levers 117, effected by the downward movement of the slide 116, is an inward swinging of the vertical arms by which the bars 124 engage the side of the last. If one of the bars 124 meets the side of the last before the other it causes the block 100 and all the parts carried thereby, including the toe band, to turn about the stud 76 to bring the sides of the band into approximate alinement with the sides of the last. It is to be noted that the center 76 about which the toe band turns is located under the last at a distance from the end of the last, and as herein shown about midway between the front and the rear ends of the band. For the purpose of confining the closed end of the toe band against vertical displacement a pin 160 extends laterally in each direction through the block which carries the roller 142 and the end portions of the pin are received and guided in slots in flanges 162 of the plate 144. The plate 144 is provided with arms at either end to which are pivotally attached links 164 connected to the toe band near its rear ends for supporting the rear ends of the band against forward yielding when the band is swung upwardly for wiping the upper over the toe of the last. It is to be noted that the altitude of the two side edges of the bottom of the last was found by the feelers 125 on the bars 124 and that the block 100 and the toe band were automatically swung about a horizontal axis. This swinging movement adjusts the toe band so that when the band has been raised into its operative position about the forepart of the last its upper edge may be flush with the bottom of the last at both sides of the last.

The toe band herein shown comprises a chain, the links 170 of which are formed as shown in Fig. 3 and are each provided with

an upstanding lug 172 having a beveled outer face and a straight inner face. The band also is provided with a leather lining which is secured to the chain. The lugs 172 serve to support firmly the upper edge of the leather lining and prevent said portion of the leather lining from being unduly stretched or distorted in the use to which it is subjected in wiping the upper over the toe of the last. In unjacking the shoe it is desirable to retract both the heel band and the toe band from their respective ends of the shoe. The retraction of the heel band is effected by means of the hand lever 36 which turns the pinions 34 to raise the forward ends of the levers 26. The shaft 35 is provided with a cam 175, as shown in Fig. 6, adjacent to the pinion 34 at the left-hand side of the jack, and the finger piece 64, by means of which the pawl 62 is elevated from the ratchet 60, has a rearwardly extending arm adapted to be engaged by the cam 175 for actuating said finger piece to elevate the pawl and the ratchet and thereby permit the spring 54 to move the swinging arm 50 and the parts supported by it away from the forepart of the last.

In the use of the jack a last with an upper and inner sole thereon is applied to the heel pin and the heel pin and last are depressed by the operator to position the bottom of the last flush with the upper edge of the heel band. The last is held in this position while the hand lever 36 is operated for swinging the heel band forwardly and causing it to clamp the last. In this forward movement of the heel band the last pin and its socket are swung forwardly to bring the corrugations on the last pin into engagement with the corrugations on the block 10, whereby the last pin is locked against vertical movement either upwardly or downwardly. This provision for locking the last pin enables the last to be pounded—as, for instance, in driving tacks therein or beating the heel seat without danger of the last being forced downwardly. The swinging arm 50 carrying the devices for supporting and operating upon the forepart of the last is now moved toward the last, the extent of this movement being determined by the size of the particular last in the jack, and the pawl 62 engages the ratchet 60 for automatically securing these parts in the position to which they are moved. The hand lever 105 is now operated for turning the cam disk 110. The first result of this movement of the cam disk is the rocking of the bell-crank levers 117 for swinging the arms 124 inwardly against the last, which effects the angular adjustment of the toe band for the swing of the last as shown in Figs. 9 and 12, the extent of this inward movement being determined automatically by the width of the last. The next action is the depression of the bell-cranks

and the arms 124 until one or the other of the feelers 125 engages the bottom of the last. Thereafter the block 100 and all the parts supported by it are automatically moved laterally about a horizontal axis in the curved guideway of the block 82 until the other feeler 125 engages the bottom of the last as shown in Fig. 13, this movement automatically shifting the toe band so that when it is raised its upper edge will be in alignment with the bottom of the last. When the feelers have pressed the last firmly against the toe rest and can descend no farther, the lug 114 on the slide 116 by which said bars have been depressed becomes a fixed support for the cam disk 110, which in its further movement rolls over said stationary lug and raises the block 100 and all the parts sustained by it. This latter movement raises the toe band with relation to the last from the position shown in Fig. 9 until, as herein shown, the rear ends of the toe band are approximately flush with the bottom of the last, as shown in Fig. 10. At this point the outer face 113 of the cam disk comes into engagement with the lug 114, see Fig. 8, and holds the block 100 and the rear portion of the toe band in the position to which they have been raised. At this time also the teeth 152 on the cam disk engage the teeth of the rack bar 150 and cause the closed end of the toe band to be swung upwardly about the pivotal connection of said band with its supports 140. The upward swinging of the toe band continues until the front end thereof is brought flush with the bottom of the last, as shown in Fig. 11. The flexibility of the band permits it to conform accurately to the contour of the last, whatever the shape of its forepart.

Having explained the nature of my invention and fully described one mechanism embodying the invention, I claim as new and desire to secure by Letters Patent:—

1. An apparatus of the class described having, in combination, lasting means, feelers arranged at opposite sides of the last and movable laterally and downwardly theretoward having separate contact points to engage the inner sole on the bottom of the last near its side edges for ascertaining the plane in which the bottom of the last is located, and connections between said lasting means and the feelers for relatively adjusting the lasting means and the last angularly.

2. An apparatus of the class described having, in combination, a toe band, feelers movable laterally from and toward operative position over the last bottom and having separate contact points arranged to engage the inner sole on the bottom of the last near the rear ends of the toe band for ascertaining the plane in which the bottom of the last is located, and connections between

the feelers and the band for adjusting the band angularly transversely of the last.

3. An apparatus of the class described having, in combination, lasting means and two feelers separately connected with the lasting means at opposite sides of the last and arranged to engage the bottom of the last near its opposite side edges, and connected means for actuating the feelers together into engagement with the last including provision for permitting each feeler to continue its movement until it contacts with the work and for moving the lasting means into predetermined angular relation to the portions of the last engaged by the feelers.

4. An apparatus of the class described having, in combination with a shoe supporting jack, a toe band arranged to turn about an axis extending lengthwise of the jack, feelers located at the sides of the fore part of the last adjacent to and operatively connected with the ends of the toe band, means for actuating the feelers substantially perpendicularly to the plane of the last bottom, and connections between the feelers and the toe band for adjusting the band about said axis.

5. An apparatus of the class described having, in combination, members for sustaining a last in inverted position, devices for ascertaining the relative vertical positions of the two side edges of the bottom of the last at the ball, an end embracing band, and connections between the band and said devices for adjusting the band in accordance with the relative positions of the two side edges of the last bottom.

6. An apparatus of the class described having, in combination, toe lasting means, a laterally fixed shoe supporting means including a toe rest, a base in which the toe rest and the lasting means are mounted, a carriage for the lasting means, and a rib and groove connection located between said base and carriage and curved in an arc of a circle having its center substantially in the plane of the bottom face of a last sustained on the toe rest.

7. An apparatus of the class described having, in combination, lasting means, shoe-supporting means, a carriage for the lasting means, a base for the carriage and an interlocking arc-shaped rib and groove connection located between the lasting means and the base arranged to permit lateral rocking movement of the lasting means and to direct that movement about an axis extending lengthwise of the shoe and located substantially in the plane of the bottom face of the shoe.

8. An apparatus of the class described having, in combination, means for supporting a shoe in position to be lasted, lasting means, a laterally rocking carriage for said

lasting means, a support for the carriage, said support and carriage having transverse interlocking arc-shaped ribs and grooves formed and arranged to permit the lasting means to be adjusted about an axis extending lengthwise of the shoe, and means for actuating the lasting means to conform the shoe upper to the last.

9. An apparatus of the class described having, in combination, means for supporting a shoe in position to be lasted, lasting means, a carriage therefor, a support, means arranged to permit tipping of the lasting means about an axis extending transversely of the last, and cooperating arc-shaped bearing portions and correspondingly curved guideways formed on the carriage and the support and arranged to permit the lasting means to rock laterally to adjust said means in accordance with different transverse inclinations of last bottoms.

10. An apparatus of the class described having, in combination, lasting means, a carriage upon which the lasting means are sustained, a base upon which the carriage is supported for lateral rocking movement, a transverse arc-shaped guideway formed in the base, transverse curved guiding devices on the carriage and movable in the arc-shaped guideways, and means for rocking the carriage to position the lasting means in accordance with the transverse inclination of the last bottom.

11. An apparatus of the class described having, in combination, the toe lasting band, the carriage 96 therefor having the vertically curved transverse rib 95, and the block 82 arranged to maintain a relatively fixed position and having a curved guideway to receive the rib 95 and permit movement of the toe lasting band to position it for the different transverse inclinations of the bottoms of lasts.

12. An apparatus of the class described having, in combination, lasting means constructed and arranged to act upon a shoe simultaneously at opposite sides of the end portion of the last, means for supporting the shoe, means for sustaining the lasting means, and a sliding connection between the lasting means and its sustaining means including a transverse guideway for the moving part curved in an arc of a circle having its center substantially in the plane of the bottom face of the shoe.

13. In a shoe supporting jack, the combination with means for sustaining a last in inverted position and an end embracing band arranged for movement about an axis extending longitudinally of the jack, of means operating automatically during the movement of the band into end embracing position for adjusting the band about said axis to position it in predetermined relation to the side edges of the last.

14. In a shoe supporting jack, the combination with means for sustaining a last, lasting means, and means for ascertaining the height of the last, of connections between said last-named means and the lasting means for relatively adjusting the lasting means and the last in the direction of the height of the last.

15. In a shoe supporting jack, the combination with means for sustaining a last, an end embracing band, and means for ascertaining the height of the last, of connections between said last-named means and the band for adjusting the band vertically with relation to the last.

16. In a shoe supporting jack, the combination with means for sustaining a last, of lasting means, and a feeler for engaging the bottom of the last, of means for actuating said feeler to ascertain the height of the last and for moving the lasting means into predetermined vertical relation to the last.

17. In a shoe supporting jack, the combination with means for sustaining a last, and an end embracing band, of means for moving the band vertically, said band actuating means having provision for predetermining the position with relation to the bottom of the last to which the band may be raised.

18. In a shoe supporting jack, the combination with means for sustaining a last, and a toe band, of means for relatively moving the toe band and last vertically, and means for automatically determining the extent of said movement whereby the band and last are caused to occupy predetermined relative positions.

19. In a shoe supporting jack, the combination with means, including a toe rest, for sustaining a last in inverted position, of means for ascertaining the height of the last bottom above the toe rest, a toe band, and means for moving the toe band vertically through a distance governed automatically by the ascertained height of the last bottom.

20. In a shoe supporting jack, the combination with a support, a carriage movably mounted on the support, lasting means on said carriage, a feeler movable relatively to the carriage, and a cam mounted in the carriage and operatively connected with the feeler, of means for operating the cam to move the feeler into engagement with the last, and thereafter actuate the lasting means to perform its work while continuing the feeler in holding engagement with the work.

21. In a shoe supporting jack, the combination with a toe band, a feeler, an actuator operatively connected with said toe band and feeler and arranged to move the feeler downwardly until it engages the bottom of the last and then to move the toe band upwardly toward the bottom of the last while the feeler remains in holding engagement with the work.

22. In a shoe supporting jack, the combination with a toe band and feelers, of an actuator having a constant throw operatively connected with said toe band and feelers and arranged to move the feelers toward the toe band until they engage the bottom of the last and then while maintaining the feelers in working position to move the toe band toward the feelers during the remainder of the throw of the actuator, whereby the toe band will always be moved to the same position with relation to the bottom of the last independently of the height of the last.

23. In a shoe supporting jack, the combination with a toe band, of means arranged to move the band vertically toward the last bottom and then to swing the band forwardly and upwardly for wiping the upper over the toe of the last.

24. In a shoe supporting jack, the combination with a toe band, of connected mechanism for ascertaining the altitude of the bottom of the last and for moving the toe band vertically into predetermined relation to the bottom of the last and then swinging the closed end of the toe band upwardly to wipe the upper over the toe of the last.

25. In a shoe supporting jack, the combination with a toe band, of mechanism for ascertaining the altitude of the bottom of the last at its side edges, for moving the toe band about an axis extending longitudinally of the last into predetermined relation to the side edges of the last, and then swinging the toe band about an axis extending transversely of the last for wiping the upper over the toe of the last.

26. In a shoe supporting jack, the combination with means for sustaining a last in inverted position, and an end embracing band, of mechanism arranged for continuous movement to ascertain the position of the last bottom, to adjust the band about an axis extending longitudinally of the last and to adjust the band vertically with relation to the last.

27. In a shoe supporting jack, the combination with means for sustaining a last in inverted position, and an end embracing band, of mechanism arranged for continuous movement to turn the toe band about an axis extending longitudinally of the last and then to swing the band about an axis extending transversely of the last.

28. In a mechanism of the class described, the combination with means for sustaining a last, of lasting means mounted for movement relatively to the last about a vertical axis located back of the end of the last, and means connected with said lasting means and arranged to engage the sides of the last in the rear of said axis for turning the lasting means.

29. In a mechanism of the class described, the combination with means for sustaining a last in inverted position, and an end embracing band, of means movable independently of the band for ascertaining the swing of the last, and connections between said means and the band for adjusting the band laterally.

30. In a shoe supporting jack, the combination with a toe band mounted for lateral movement to adapt it to the swing of the last, and levers connected with the toe band and located on opposite sides of the last, of means for actuating said levers into engagement with the sides of the last whereby turning of the toe band into alinement with the sides of the last is effected before the band is closed and for actuating the band to embrace the toe portion of the last.

31. In a shoe supporting jack, the combination with means for sustaining a last, of an end embracing band arranged for movement toward and from the sustaining means, means for locking said band in its position adjacent to the sustaining means, other devices for operating upon the shoe, and means for automatically unlocking said band and moving it away from the sustaining means in connection with the movement of said other devices.

32. In a shoe supporting jack, the combination with means for sustaining a last, of a toe band arranged to swing toward and from the sustaining means, means for locking said toe band in its position adjacent to the sustaining means, a heel band, means for moving the heel band toward and from the sustaining means, and means for automatically unlocking the toe band when the heel band is moved away from the sustaining means.

33. In a shoe supporting jack, the combination with means for sustaining a last, of a toe band mounted on a vertical pivot post, a swinging support upon which the pivot post is carried, and means for maintaining the pivot post in vertical position in different positions of said swinging support.

34. In a shoe supporting jack, the combination with means for sustaining a last, of an end embracing band arranged to swing toward the last for embracing it and away from the last to give clearance for the insertion and removal of the last, means for securing the band in its position adjacent to the last, and an adjustable stop for limiting movement of the band away from the last.

35. In a shoe supporting jack, an end embracing band comprising a chain and a non-metallic lining, the links of the chain being provided with beveled lugs extending to the upper edge of the lining.

36. In a shoe supporting jack, the combination with means for sustaining a last, of

5 bell-crank levers, a heel band connected at its ends to an upright arm of each lever, teeth formed on a forwardly extending arm of each lever, a shaft, and means carried by the shaft for engaging the teeth to actuate the levers for moving the heel band toward and from the last.

10 37. In a shoe supporting jack, the combination with means for sustaining a last, of bell-crank levers, each provided with a yielding twisted arm, and a horizontal forwardly extending arm, a heel band connected at its ends to the yielding arms of said levers, and means operatively connected
15 with the forward arms of the two levers for actuating the levers together to force the heel band against the end of the last and

cause the twisted arms to force the ends of the band against the sides of the last.

38. In a machine of the class described, 20 the combination with means for sustaining a last, of a toe band, and means for ascertaining the swing of the last, said mechanism having provision for movement of the closed front end of the toe band laterally to adapt the position of the band to the swing
25 of the last.

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

EDWARD A. STIGGINS.

Witnesses:

ARTHUR L. RUSSELL,
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