

J. E. CRISP.

WORK SUPPORT FOR SHOE MACHINES.

APPLICATION FILED JUNE 28, 1900. RENEWED MAY 4, 1909.

1,060,232.

Patented Apr. 29, 1913.

5 SHEETS-SHEET 1.

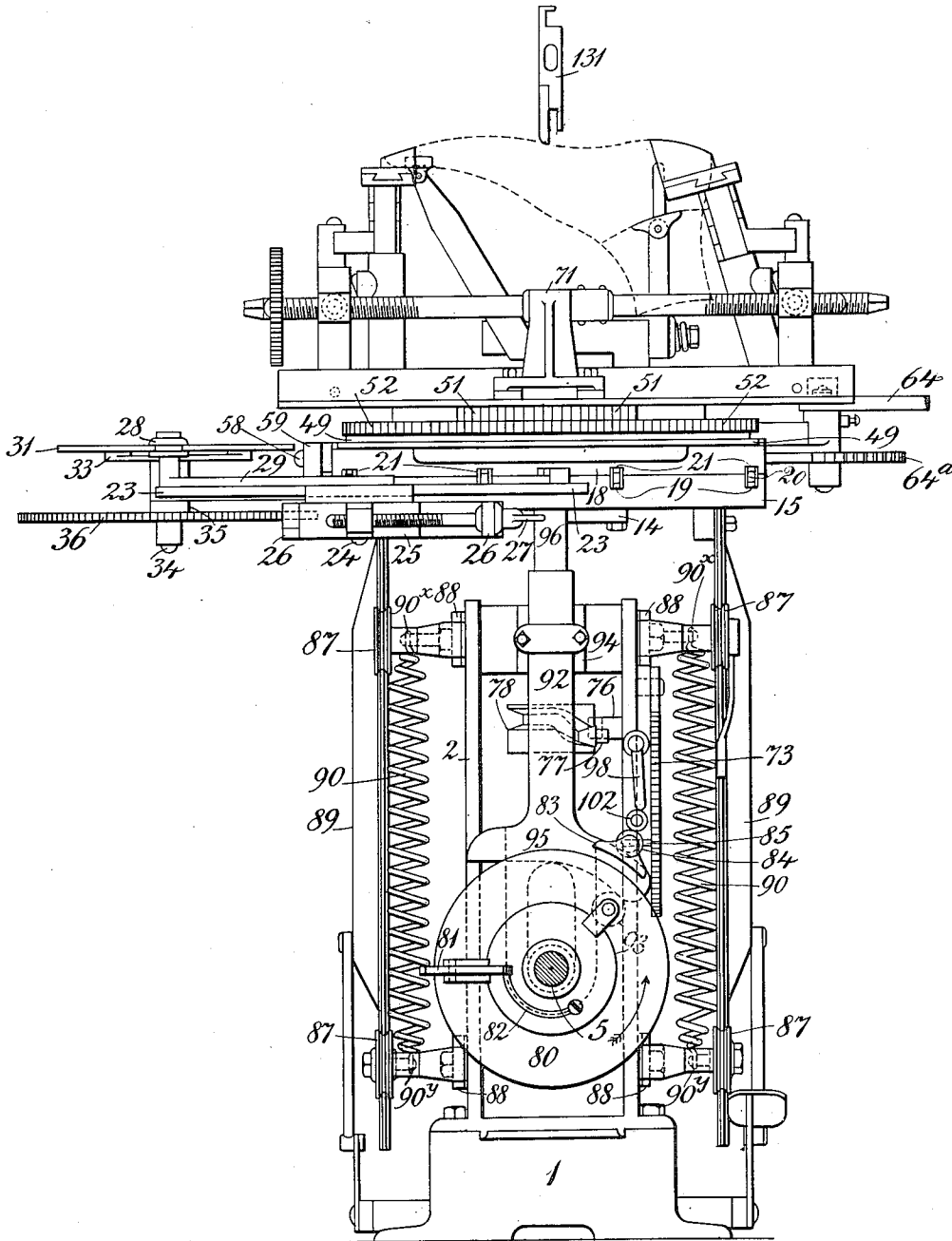


Fig 1

WITNESSES

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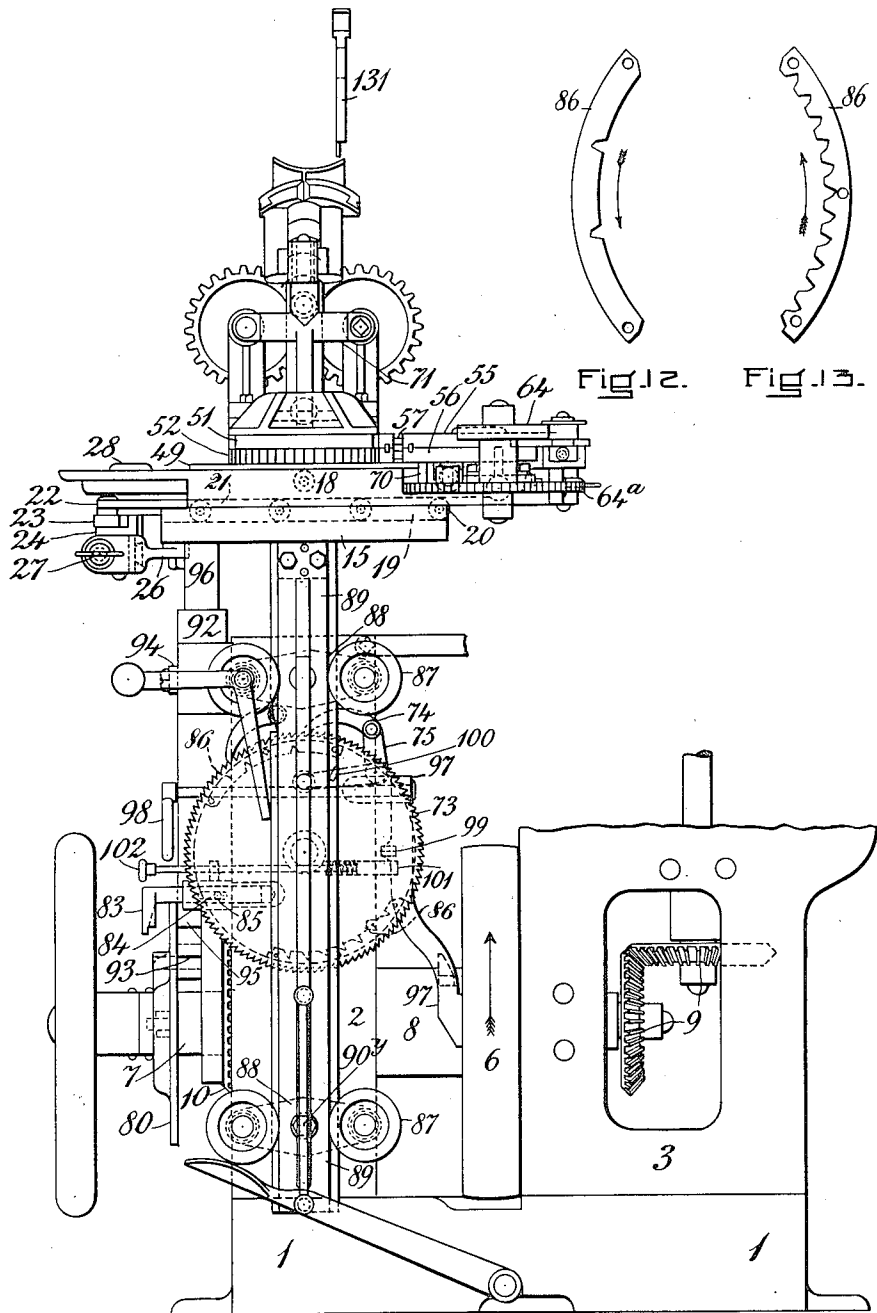


Fig. 2.

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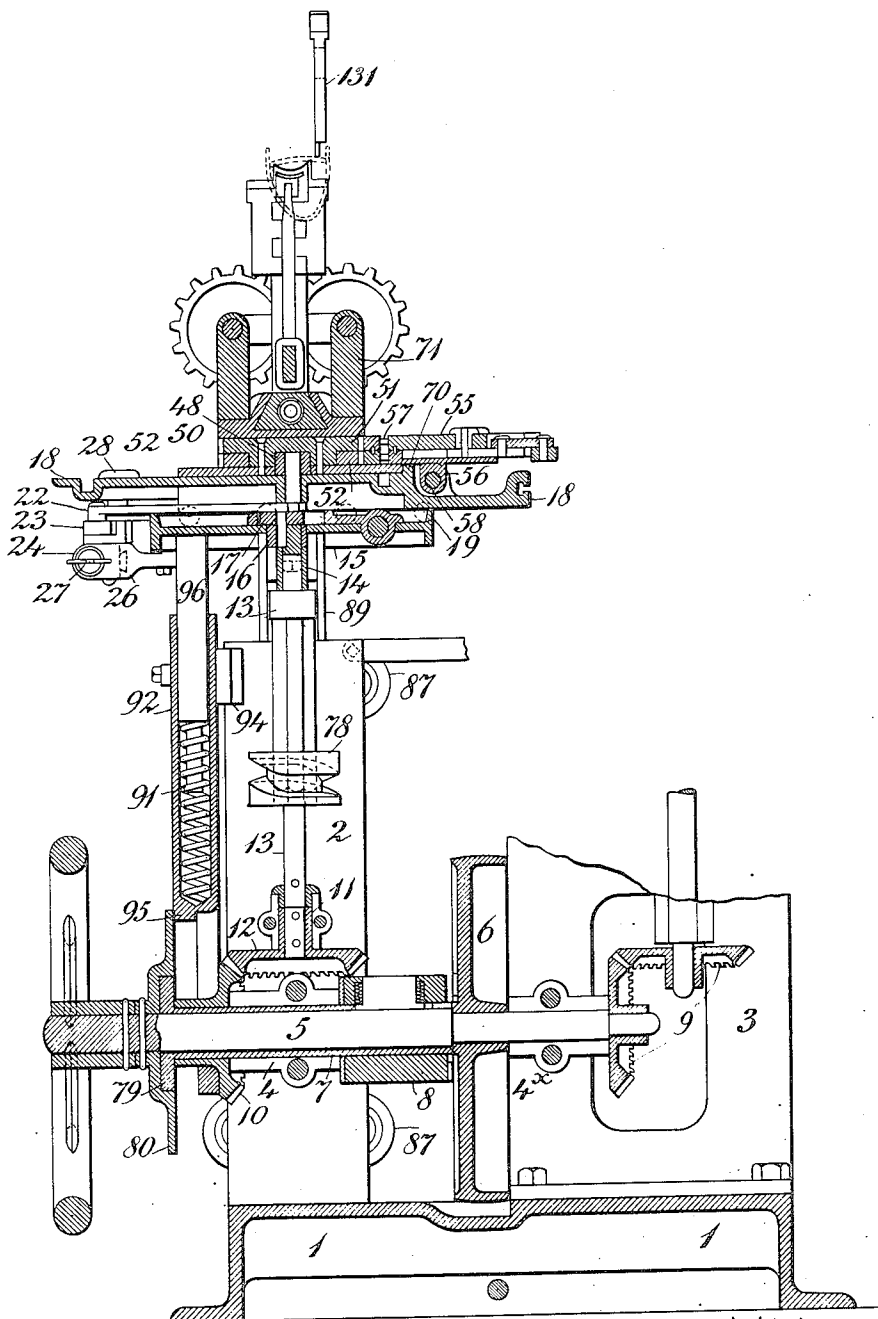
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FIG. 3.

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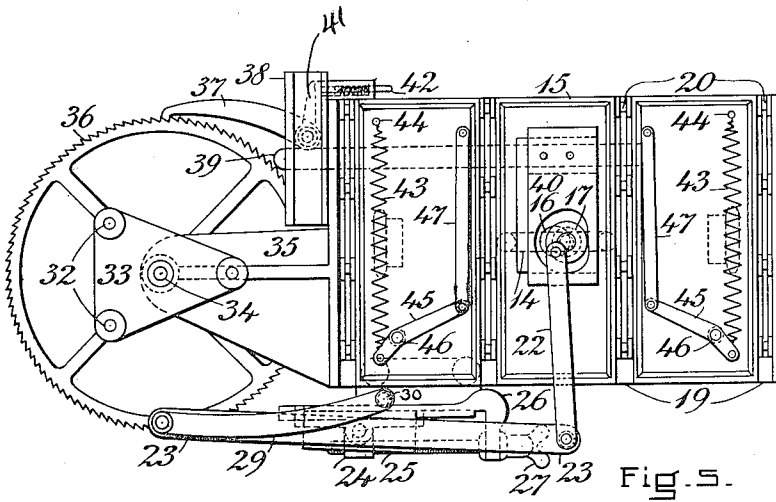


Fig. 5.

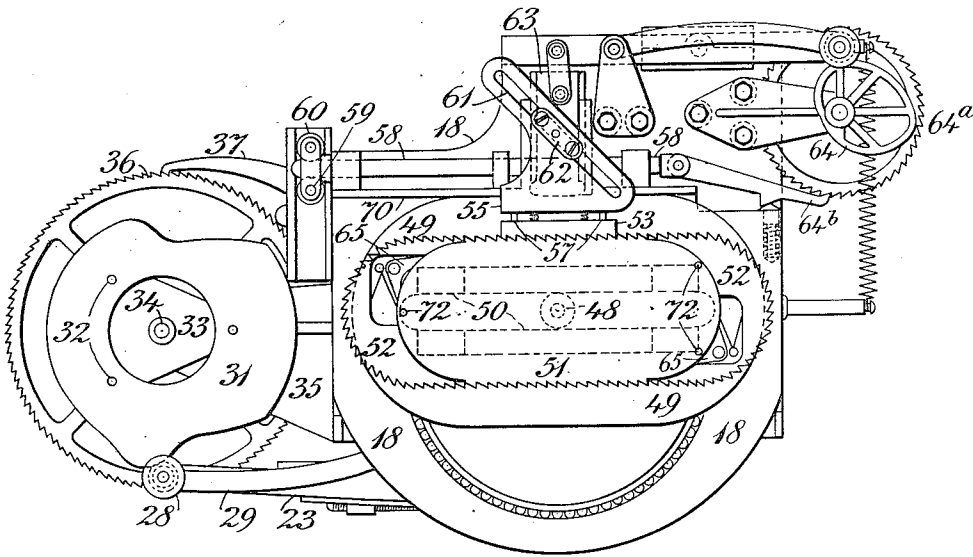


Fig. 4.

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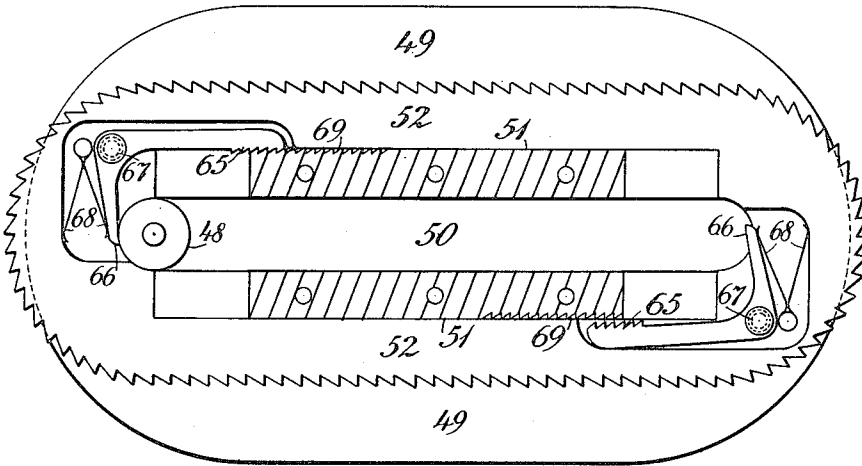


Fig. 8.

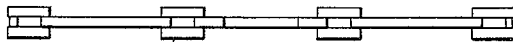


Fig. 6.

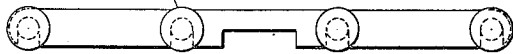


Fig. 7.

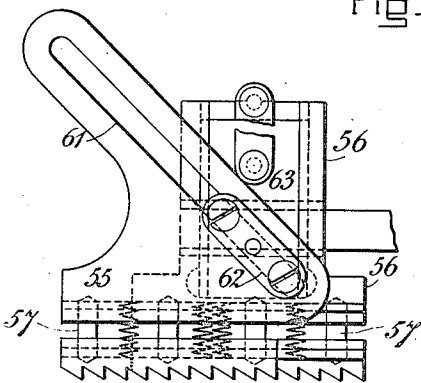


Fig. 9.

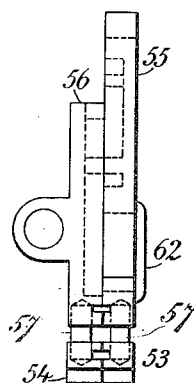


Fig. 10.

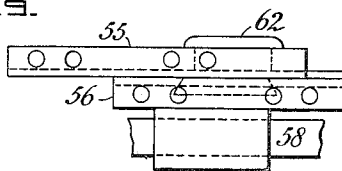


Fig. 11.

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UNITED STATES PATENT OFFICE.

JOSEPH E. CRISP, OF SOMERVILLE, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

WORK-SUPPORT FOR SHOE-MACHINES.

1,060,232.

Specification of Letters Patent.

Patented Apr. 29, 1913.

Original application filed February 8, 1899, Serial No. 704,978. Divided and this application filed June 28, 1900, Serial No. 21,959. Renewed May 4, 1909. Serial No. 493,931.

To all whom it may concern:

Be it known that I, JOSEPH E. CRISP, a citizen of the United States, residing at Somerville, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Work-Supports for Shoe-Machines, of which the following is a specification.

The present invention relates to machines for operating upon boots and shoes, and more particularly to a shoe supporting jack and means for actuating the same to bring the shoe supported thereon into proper position with relation to the tool or tools of the machine as the point of operation of the tool or tools is transferred around the shoe.

The object of the invention is to provide a shoe supporting jack and actuating mechanism therefor of improved and simplified construction and mode of operation whereby the jack may be actuated to bring the shoe into the proper position with relation to the tool as the point of operation of the tool is transferred around the shoe, and whereby the actuating mechanism may be readily and conveniently adjusted for operation upon different styles and sizes of shoes.

With the above objects in view, the invention consists in the features of construction and combination of parts hereinafter described and claimed, the advantages of which will be readily understood by those skilled in the art.

In the drawings:—Figure 1, is a front elevation showing the jack-presenting mechanism and the presser-foot, or gage for height, which is mounted on the co-acting mechanism and operates in combination therewith, also showing the jack in side elevation and a last indicated by dotted lines clamped therein. Fig. 2, is a side elevation of Fig. 1, also showing a portion of the co-acting mechanism, and the jack in end elevation. Fig. 3, is a vertical central section of Fig. 2. Fig. 4, is a plan of the upper plate of the jack-feed mechanism, with the jack removed. Fig. 5, is a plan of the table, or lower plate of the jack-feed mechanism with the cam which moves the jack to the curvature of the sides of the last removed. Figs. 6 and 7, are plan and side elevation of a set of the supporting-table guide-rolls. Fig. 8, is an enlarged plan

of the end-turning devices. Fig. 9, is an enlarged plan of the combined pawls and carriers for the jack-feed mechanism. Fig. 10, is a side elevation of Fig. 9. Fig. 11, is a front elevation of Fig. 9 with the ratchet feed-pawls removed. Figs. 12 and 13, are enlarged plans of the segments which govern the movements of the co-acting mechanism when the jack is swinging from side to side, showing the two extremes in their construction.

The invention is illustrated as embodied in a lasting machine, the lasting devices of which are the same in construction as the devices shown in Patent No. 1,018,965, dated February 27, 1912, of which the present application is a division. It will be understood, however, that the invention is not limited in its application to this type of machine, but may be embodied in machines for performing other operations upon boots and shoes.

Upon the base of the machine 1 the stands 2 and 3 are fixed, and formed upon or fixed to the inner sides of these stands are the bearings 4 and 4*, in which the main driving-shaft 5 and its attachments are mounted. Figs. 1, 2 and 3. A sleeve 7 is fitted to turn free on the shaft 5 and in the bearing 4 fixed to the jack-supporting stand 2, and on the inner end of this sleeve there is the sliding-clutch 8 which connects the sleeve to the belt-pulley 6 when it is desired to operate the machine. The gears 9 at the inner end of the main-shaft serve to actuate the co-acting mechanism in unison with the feeding and presenting mechanism. Outside of the bearing 4 of the stand 2, a miter-gear 10 is secured to the sleeve 7, and its mate 12 is mounted in the bearing 11 and forms the connection to operate the jack-feeding mechanism. The lower end of the extensible-shaft 13 is fixed in the gear 12 and the upper end of this shaft is mounted in the bearing 14 secured to the table 15 of the jack-presenting mechanism. Above the bearing 14 the shaft 13 is provided with a crank 16 whose crank-pin carries the large roll 17 which operates the jack-feed mechanism. Figs. 3 and 5. The jack-feed mechanism moves the jack horizontally by a combination of right angular steps when moving the sides of the lasts (clamped in the jack) by the point of action

of the co-acting machine, and swings the jack around, from side to side, when moving the ends of the lasts with reference to the same point. If the ends of the lasts are a true circle the movement is that of pawl and ratchet-wheel, step by step; if the ends of the lasts are other than true circles, ovals, square or pointed, etc., which they most always are, the movement is by a series of oblique steps which vary for each different shape of end. The jack-feed mechanism can be adjusted for length or width from any determined size or shape, pantographically or otherwise as desired, and it can be constructed to move the jack in any desired lines without reference to the shape or curvature of the last clamped in the jack. The horizontal movements of the jack-feed mechanism are governed by cams—one for length which is a fixture, and one for width which is correct for rights and lefts of a series of the same style of lasts, and which is changed for style.

The jack-feed mechanism is constructed and operates as follows:—The width adjustments are made by moving the plate 18 horizontally in and out on the table 15 with reference to the point of action of the co-acting mechanism. Figs. 2, 3, 4 and 5. The table 15 is provided with parallel grooves 19 on its upper face, and in each of these grooves a set of rolls 20 are fitted to run whose distance apart is maintained by suitable spreaders. Figs. 6 and 7. The sets of rolls are fitted to the grooves 19 so that their ends will contact with the sides of the grooves, and the rolls project about two-fifths of their diameter above the top of the table 15 where they engage in a similar manner with the grooves 21 formed in the under side of the plate 18, the relation of grooves and rolls being clearly shown in Figs. 1, 2, 3, and 5. This combination of rolls and grooves permits the plate 18 to reciprocate free to and from the devices operating upon the last, and at the same time causes the plate to move on the table 15 perfectly parallel with its longitudinal center line. The plate 18 is connected by the link 22 to the end of the oscillating-lever 23 which is provided with the adjustable-fulcrum 24 and is swung in one direction by a cam and in the other direction by the action of springs, which always keep the cam-roll and the face of the cam in contact. This combination gives accuracy of movement regardless of lost motion of parts.

The adjustable-fulcrum 24 is pivoted to swing on the slide 25 which slides in the stand 26, the stand being formed upon or attached to the table 15, and the screw 27 is mounted in a projection of said stand to give and maintain the set position of the fulcrum 24. The lever slides in the fulcrum 24 and at the outer end of the lever there is mounted

the grooved cam-roll 28, and pivoted to the cam-roll pin is one end of the link 29, whose other end is pivoted to the stand 26 at 30. By this combination the roll end of the lever 23 swings in an arc determined by the length of the link 29, and the part of the lever 23 in the fulcrum slides a little therein when the pivot of the fulcrum is set either side of the point 30 where the link 29 is pivoted. In Fig. 5 the fulcrum 24 is shown to the extreme left.

The width-cam 31 is made from a thin plate of metal, the two opposite segments of which are formed to cause the jack-support to move to or from the point of action of the co-acting mechanism between the points of turning the jack to present the ends of the lasts. The other segments of the cam 31 are formed to move the jack-support to and from the same point when it is swinging from side to side, if the ends of the last operated upon are other than a true circle. The cam 31 is mounted upon the steady-pins 32 fixed in the plate 33, Fig. 4, and is held thereon by the grooved cam-roll 28 which causes it to maintain a horizontal position as it revolves.

Each style of work requires a width-cam adapted to that style, and when it is desired to change the action of the cam from right to left or vice versa, the cam is turned over; this may be done by swinging the grooved cam-roll clear of the edge of the cam against the action of the springs which hold the roll against the face of the cam.

The plate 33 is fixed to the upper end of the shaft 34 which is mounted to revolve in a bearing formed at the outer end of the bracket 35, and to the lower end of this shaft there is fixed the ratchet-wheel 36 which gives a step by step movement to the width-cam. The ratchet-wheel 36 is operated by the pawl 37 which is pivoted to the grooved-block 38 fixed to the slide-bar 39, and on the opposite end of this bar is fixed the cam-plate 40 which is actuated by the cam-roll 17, and each revolution of the shaft 13 causes the ratchet-wheel to advance one step. The pawl 37 is provided with the lever 41 upon which the spring actuated plunger 42 acts to press the pawl 37 toward the teeth of the ratchet-wheel at all times. The inward movement of the plunger 42 is limited and when it has reached its limit of movement, it also acts to press the end of the pawl 37 firmly into the teeth of the ratchet-wheel 36 and thus lock it until another movement is required. The ratchet-wheel is also provided with the usual retainer-pawl (not shown) to prevent retrograde movement.

The springs 43 are secured to the table 15 at 44, and to their other ends are secured the short ends of the bell-crank levers 45, which are pivoted to the table at 46. To the long

ends of the bell-crank levers 45 the links 47 are pivoted whose opposite ends are pivoted to the under side of the plate 18. This transmits the stress of the springs 43 to the plate 18 and then through the medium of the link 22 to the swinging-lever 23 and the cam-roll 28, the springs 43 being strong enough to insure the contact of cam and roll under all conditions of operation.

When the oscillating-lever 23 has the adjustable-fulcrum 24 located in its center the extreme width movement is given by the operation of the cam 31. By moving the fulcrum away from the cam the movement of the lever 23 at the end connected to the link 22 can be decreased in any required ratio, the swing of the lever 23 being constant at the end carrying the cam-roll (by reason of the link connection 29) and variable at the end connected to the link 22.

The jack-support and its attachments are moved longitudinally and swung around on the plate 18 to present the sides and ends of the lasts to the point of action of the co-acting mechanism by the following described devices attached to the plate 18 and the base of the jack-support. Figs. 1, 2, 3, 4 and 6. On the top of the plate 18 in the center there is pivoted the roll 48. The base of the jack-support is a thin plate 49 provided with the slot 50 which engages with the roll 48 and aligns the longitudinal movements of the jack-support. Fixed to the base of the jack-support 49 are the parallel ratchet-racks 51 which are made the length of the shortest last of the series to be operated upon between the points of turning for operation on the heel or toe. Fitted to slide between the base 49 and the racks 51 are the ratchet-racks 52 connected by semi-circular ratchet ends. These racks are made the length of the longest last of the series between the points of turning for operation on the heel or toe, and the diametrical line of the semi-circular ends of the racks is provided with semi-circular recesses which engage with the roll 48, as shown by Fig. 8, during the time the jack is swinging from side to side.

To operate the racks 51 and 52 the ratchet-pawls 53 and 54, Figs. 2, 3, 4, 9, 10 and 11, (whose working faces are somewhat longer than the range of motion of the racks 52 under the racks 51,) are mounted in the pawl-carriers 55 and 56 upon the sliding-pins 57, and are provided with suitable springs which press the pawls toward the racks. The pawls and carriers are tongued and grooved together, as shown by Figs. 9, 10 and 11, so that 53 and 55 can be moved on 54 and 56 parallel to their line of reciprocation which is parallel to the longitudinal center line of the table 15.

The carrier 56 which operates the pawl 54 is fixed to the slide-rod 58, to one end of

which is fixed the block 59 provided with the rolls 60. These rolls engage with the groove in the block 38 and cause the carrier and its attachments to reciprocate in unison with the pawl 37 operating the width-cam 31, and at the same time allow the plate 18 to move in and out on the table 15.

The carrier 55 which operates the pawl 53 is provided with the slot 61 which is set at an angle of forty-five degrees to the line of movement of the carrier 55 and the pawl 53 on the tongues and grooves, and the slide-block 62 is fitted to slide in this groove. On the top of the carrier 56 there is the dove-tail slide 63 which can be reciprocated in the carrier at right-angles to the tongues and grooves, and to this slide 63 the slide-block 62 is firmly fixed; the flanged top of the slide-block acting to hold the two carriers and their attachments in sliding contact. When the slide 63 is reciprocated in the carrier 56 the block 62 acts on the angular-slot and causes the carrier 55 and the pawl 53 to reciprocate on the tongues and grooves, as will be understood by reference to Figs. 4, 9, 10 and 11. The slide 63 is reciprocated by the cam 64 which is operated by the ratchet-wheel 64^a and the pawl 64^b, which are connected to and move in unison with the rod 58 and its attachments, the connecting mechanism between the slide 63 and the cam 64 being substantially the same as that described in connection with the cam 31 and the plate 18.

The length-cam 64 serves for all styles of lasts and revolves twice for each full revolution of the jack-support causing its oscillating-lever to make an active movement when the pawl 53 is moving either of the racks 51, and a return movement when the jack-support is swinging from side to side and moving the ends of a last by the point of action of the co-acting mechanism.

When the adjustable-fulcrum of the length movement lever is set opposite the center of the slide 63 there is no movement given to said slide by the action of the cam 64, and the block 62 acts to lock the carriers 55 and 56 together and they are reciprocated as one by the slide-rod 58, the effect on the longitudinal movement of the jack-support being the same as if the racks were a fixture thereto, and the result being to bring the end-turning ratchets into action to turn the longest last of the series, the distance between whose points of turning is the length of the racks 52. When the shorter lasts of the series are to be operated upon, the adjustable-fulcrum of the length governing lever is moved to the right to allow the pawl-carrier 55 to move to the left on the top of the pawl-carrier 56 the difference in length between the longest last of the series and the one to be operated upon. For instance, for a machine designed to operate on lasts from

size four to size thirteen inclusive, the movement of the carrier 55 and the pawl 53, to the left, on the carrier 56 and the pawl 54, (during the time the racks 51 and 52 are moving between the points for turning the shortest last of the series,) would be three inches and the length of the pawl about four inches. This position of the adjustable-fulcrum of the length movement lever is substantially shown in Fig. 4, and the full operation of the mechanism for either of the shortest longitudinal movements of the jack-support, is as follows:—At the termination of the end-turning movement of the jack-support the racks 51 and 52 are at the extreme limit of their movements, to the left, with the center of an end-turning ratchet coincident with the center of the roll 48, and the center of the toe or heel in the jack vertically above said center. With the jack removed as in Fig. 4, one of the rounded ends of the plate connecting the racks 51 would just reach to the base of the end-turning ratchet-teeth and the other end disclosing nearly all of one of the pawls 65 and its attachments. At the same time the action of the cam 64 has caused the length-movement lever to move the slide 63 to the full limit of its backward movement and the block 62 is moved to the rear of the angular-slot 61. This causes the pawl 53 and the carrier 55 to move to the limit of their movement, to the right on the top of the pawl 54 and carrier 56.

When the action of the ratchet-pawls 53 and 54 commence to move the racks 51 and 52 to the right, the action of the cam 64 and its described connections allow the pawl 53 and the carrier 55 to move to the left on the pawl 54 and the carrier 56 a fractional portion of a single ratchet-tooth for each reciprocation of the pawls and carriers. The denominator of this fraction is the length of the longest last of the series between the points of turning for the heel and toe, and the numerator is the difference between this length and the corresponding length of the last being operated upon. Were the respective lengths seven and ten inches, the fraction would be three-tenths, and the pawl 53 and the carrier 55 would have moved to the left on the pawl 54 and carrier 56 three inches at the termination of the longitudinal movement of the jack-support. As the jack-support is swinging around the pawl 53 and carrier 55 make a return movement to the right the termination of which brings the slide-block 62 again to the rear end of the slot 61 and causes the pawl 53 and the carrier 55 to project an equal distance over the right side of the pawl 54 and the carrier 56, as at the commencement of the active movement, ready to engage with the other rack 51 and move the other side of the last, as described. Be-

tween the extreme points of movement described movement of the adjustable-fulcrum of the length-lever will give any desired adjustment to move the jack-support the same number of steps for any last of the series. That is, the racks 51 move the jack-support a varying distance in a given number of steps of varying length and the racks 52 move the end-turning ratchets an invariable distance in the same number of steps which correctly position said ratchets for the end-turning movement, regardless of the length of the steps made by the racks 51. That is to say, the jack carrier is moved endwise a distance varying with the length of the last while the rack 52 is always moved a distance equal to the distance between the semicircular recesses which engage the roll 48 when the semicircular ratchet ends of the rack are concentric with the roll.

When the jack is carrying the longest last of the series and the jack-support is swinging around, the ends of the slot 50 and the semi-circular recesses of the end-turning ratchets coincide, and one of the ends of the slot and one of the recesses are in contact with the roll 48 fixed on the plate 15, as in Fig. 8, and the relative positions of the jack-support and the racks 51 are maintained during the swinging movement. With any other last of the series in the jack, and the correct adjustments made, the ends of the slot 50 will not contact with the roll 48 and the action of centrifugal force would move the racks 51 and the jack-support out from the desired position unless some means were used to prevent it. In the present instance, these means are the ratchet-pawls 65 provided with the bell-cranks 66 and pivoted at 67 in suitable recesses formed in the sliding-racks 52, as shown by Fig. 8. The springs 68 act to swing the ratchet-pawls away from their engaging racks 69, which are formed upon or attached to the supporting parts of the racks 51.

The variation in the lengths of lasts is by one-half sizes and as the movement of the racks 52 under the racks 51 for varying sizes is made with reference to the transverse center line of the jack-support, from the position shown in Fig. 4 the pitch of the ratchet-pawls 65 and the racks 69 should be one-half of said half-size to correctly locate the end-turning ratchets under the racks 51 each side of the transverse center line of the jack. When the roll 48 is brought in contact with one of the recesses of the racks 52 it depresses the spring at that end by contact with one of the bell-cranks as shown by Fig. 8, and swings one of the pawls 65 in, to engage with one of the racks 69. This automatically locks the racks 51 on the racks 52 against the action of centrifugal force during the swinging around movement. The sides of the jack-support 49 engage with the

projection, or rib 70, formed upon the plate 18 which in combination with the roll 48 acts to guide the jack-support during its straight journeys.

5 By the preceding description it will be seen that the sliding racks 52 are moved in straight lines by the action of the pawl 54 with the roll 48 as a center until one of the semi-circular recesses of the end-turning
10 ratchets contacts with said roll, as shown by Fig. 8, when they are swung around said roll (by the action of the pawl 54 on one of the end-turning ratchets) in a semi-circle for another straight journey; the only func-
15 tion of the racks 52 being to correctly locate the end-swinging ratchets which swing the jack-support from side to side.

The length position of the jack-support, with reference to the racks 52 is determined
20 by the set position of the fulcrum of the oscillating-lever operating the slide 63, which positions the racks 51; whose only operative function is to move the jack-support in straight lines which vary in length as do the
25 lasts clamped in the jack between the points of turning for the operations upon the heel or toe. The action of the length-cam 64 and its connections varies the length of those lines by permitting the pawl 53 and
30 its carrier 55 to move or slide back on the pawl 54 and the carrier 56 the difference in length the last operated upon is shorter than the longest last of the series the racks 52 are designed for. The only operative function
35 of the length-cam 64 is to reduce the distance the jack-support moves the shorter lasts endwise, and to divide the reduction equally between the teeth of the racks 51. The width position of the jack-support is
40 determined by the cam 31, and the width graduations by the set position of the fulcrum of the oscillating-lever 23 operated by said cam.

Each time the extensible-shaft 13 is re-
45 volved the width-cam 31 and its connections move the jack-support a step to or from the point of action of the co-acting mechanism, and the length-cam 64 and its connections move the jack-support a step forward;
50 the combination of the two right-angular steps being a point of the curvature of the sides of the bottom of a last where action is desired.

The jack 71 is located on the top of the
55 racks 51 by the steady-pin 72 shown in Fig. 4 from which it can be removed at will, its special function being to bring the median line of lasts, either rights or lefts, in correct vertical alinement with the center line of
60 the slot 50 of the base of the jack-support.

With a last correctly clamped in the jack, the teeth of the racks 51 represent one point
of action of the co-acting mechanism for each tooth between the points of turning the
65 jack for operation upon the heel or toe.

These are of varying size, some toes not requiring more than three actions, others perhaps twelve, which is about correct for most heels.

As herein shown and described 2, 3, 4, 6, 8
70 or 12 points for action can be presented to the co-acting mechanism as the last is swung from one side to the other. This is accomplished by automatically stopping the action of the co-acting mechanism when the pawl
75 54 is operating the ratchet-ends of the racks 52 to allow said pawl to move the ratchet-ends 2, 3, 4, 6, 8 or 12 teeth between each action of the co-acting mechanism; the number of teeth in the ratchet-ends being the
80 least common multiple of those numbers. This mechanism is illustrated in Figs. 1, 2, 12 and 13 of the drawings, and is constructed and operates as follows:—The ratchet-wheel
85 73 is mounted to revolve on the jack-supporting stand 2 and is provided with as many teeth as there are teeth in the ratchet-racks 52 and their semi-circular ends. The ratchet-wheel 73 is revolved, tooth by tooth,
90 by the pawl 74 hung on the end of the swinging-lever 75 which is fixed to a suitable shaft mounted in a bearing 76 formed upon or attached to the stand 2. To the inner end of this shaft there is fixed the lever 77 provided with a cam-roll which engages with the cam
95 78 fixed to the stationary part of the extensible-shaft 13; and each revolution of the cam 78 moves the ratchet-wheel 73 one tooth.

As shown by Fig. 3, the feeding mechanism is connected to the sleeve 7 by gears
100 and is operated by connecting the clutch 8 to the belt-pulley 6, and the driving-shaft 5 is free to turn in the sleeve and is connected to the operating-shaft of the co-acting mechanism by the gears 9.
105

To connect or disconnect the shaft 5 from the sleeve 7 and its attachments, the outer end of the sleeve is provided with the disk
79 and the recessed disk 80 is fixed to the corresponding end of the shaft; the disk 79
110 being free to turn in the recess of 80. The latch 81 is hung to swing through a suitable slot in the disk 80 and the spring 82 acts to swing the inner end of the latch into a
115 suitable slot in the disk 79 and lock the two together, to revolve in unison. The outer end of the latch 81 is extended beyond the circumference of the disk 80 and is inclined. To swing the latch clear of the disk
120 79 and separate the sleeve and shaft, the guide of the curved incline 83 is fitted to slide free in a suitable bearing 84 formed upon or attached to the stand 2, which incline at the proper time is moved in to engage with the inclined outer end of the latch
125 81 and swing the inner end thereof clear from the disk 79.

The angular position of the incline 83 is maintained and its motion is limited by the
pin 85, whose end next to the ratchet-wheel
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73 is inclined on the side. To engage with the projecting inclined end of the pin 85 and to move and hold the incline 83 in position to swing the latch 81 out of contact with the disk 79, removable segments 86 are fixed (by steady-pins) to the inner side of the ratchet-wheel 73, one for the heel and one for the toe. Figs. 2, 12 and 13. These segments are of such length, that, if their inner edges were plain they would engage with the inclined end of the pin 85 and move in, and hold, the incline 83 in position to swing the latch 81 out of contact with the disk 79 during the whole time the jack-support is swinging from side to side, and there would be no action on the ends of the last. In the inner edges of the segments 86 there are cut as many recesses for the inclined end of the pin 85 to enter as there are sections of the last to be operated upon at the heel or toe, as shown by Figs. 12 and 13.

The normal position of the latch 81 is in the slot of the disk 79 and when the clutch is connected to the belt-pulley the shaft 5 and the sleeve revolve in unison, and the inclined end of the latch 81 passes clear of the inner side of the incline 83. When the jack-support is swinging for the heel or toe and it is requisite to stop the shaft and its attachments, a plain part of the proper segment 86 contacts with the pin 85 and moves the incline 83 in and there holds it. When the inclined end of the latch 81 contacts with the working-face of the incline 83 the spring 82 yields, the latch is swung clear of the disk 79 and the shaft and its attachments stop by the time the latch has reached the highest part of the incline 83. The stress of the spring 82 by pressing the outer end of the latch 81 against the face of the incline 83 serves to brake the momentum of the shaft and its attachments, the only moving parts then being the belt-pulley 6, the sleeve 7, the clutch 8 and the jack-feed shaft and its attachments. The rest of the shaft 5 continues until the sleeve 7 and its attachments have made the desired number of revolutions the ratchet-wheel 73 moving a step for each revolution, and finally leaving a recess in a segment opposite the pin 85. The spring 82 then acts and swings the latch 81 into the slot in the disk 79, at the same time moving the pin 85 into the recesses, and the shaft and sleeve again revolve in unison until it is again requisite to stop the shaft, or the swinging movement of the jack-support is finished.

The vertical rise of the jack-support is alined by the grooved guide-rolls 87 mounted in pairs on the stands 88 which are secured to the stand 2 by bolts centrally located between the pairs of guide-rolls. The stands 88 can be swung on the central bolts to adjust the bearings of the grooved guide-rolls on the guide-bars 89 and at the same

time keep said bars in line with the jack-feed shaft 13. The ribbed guide-bars 89 move vertically between the pairs of guide-rolls and are secured to the table 15 as shown in Figs. 1 and 2.

The jack-support and its attachments and the gage 131 constitute the mechanism which present the last in accurate vertical alinement of the point of action of the co-acting mechanism, when said parts are raised by the elastic elevating mechanism, which comprises the balance-springs 90 and the auxiliary-spring 91 which is mechanically operated as follows:—

The balance springs 90 are secured to the studs 90^a projecting from the bolts holding the upper guide-roll stands, and to suitable studs 90^b adjustably fixed in slots in the lower ends of the guide-bars 89. Figs. 1 and 2. The springs 90 are adjusted to hold the jack-support and its attachments partially elevated and bring the face of an insole upon a last (on the highest curves of the last bottom) near to the contacting end of the gage 131, when said gage is elevated. When held in this manner the jack-support and its attachments are susceptible to the slightest vertical impulse. The final rise of the jack-support and its attachments is given by the action of the auxiliary-spring 91 mounted in the socket-slide 92 which is raised by the roll 93 mounted on and revolving with the disk 80. The upper end of the socket-slide reciprocates in the bearing 94 formed upon or attached to the inner sides of the stand 2 (for which it forms a tie) and the lower end is slotted to pass over the sleeve 7 and is provided with a lower face 95 upon which the roll 93 acts to raise it at the proper times.

Above the auxiliary-spring 91 in the socket-slide 92 there is the plunger 96 which contacts with the under side of the table 15 and transmits the elastic action of the spring to give the final rise of the jack-support and its attachments, once for each reciprocation of the co-acting mechanism as long as the latch 81 is in contact with the disk 79. Mounted on part of the co-acting mechanism, as near as possible to its point of action there is the reciprocating gage 131 which is operated at the proper times by said mechanism. This gage is locked down to oppose the thrust of the spring 91 and govern the vertical position of the last in the jack by contact with the face of the sole at points where action is desired on the face of said sole. It also forms the upper member of the clamp which holds the work for said action. When the jack-support and its attachments are raised by the action of the auxiliary-spring 91 to bring the face of the sole in contact with the gage 131 they form the lower member of the holding-clamp, and when the spring 91 has reached its limit of

action the table 15, the jack-support, the jack, the last and the sole are rigidly clamped between the opposing ends of the gage 131 and the plunger 96, for any desired action upon the work clamped in the jack. The auxiliary-spring always brings the face of the sole into intimate contact with the working end of the gage 131 with the requisite force, and at the same time is capable of sufficient vertical variation to automatically provide for the variations of thickness in soles and height of lasts.

The shipper-lever 97 swings on a shaft mounted in a bearing formed upon one of the sides of the stand 2 and is provided with the handle 98 to swing it toward the clutch 8 and stop the mechanism at any time, Figs. 1 and 2. The shipper-lever is also provided with an inclined projection 99 which engages with a similar projection 100 fixed on the ratchet-wheel 73 and automatically stops the mechanism after each full revolution of the jack-support. To prevent the shipper-lever 97 from swinging out of contact with the incline of the clutch 8 and allowing the machine to start when not desired, the sliding spring-operated catch 101 is fitted to slide in bearings on the side of the stand 2, and when the shipper-lever is swung into position to engage with the incline of the clutch, the inclined end of the catch passes over the edge of the shipper-lever and holds it as desired. To the outer end of the catch 101 there is fixed the pull-button 102 for drawing the inclined end of the catch away from the shipper-lever and allowing the machine to start.

I claim:—

1. A machine for operating on shoes, having, in combination, a longitudinally movable and rotatable shoe supporting jack, and jack feeding mechanism acting independently of the shoe to move the jack by a series of longitudinal and transverse movements with relation to the point of operation of the devices acting upon the shoe carried by the jack to transfer the point of operation along the sides of the shoe and to swing the jack to transfer the point of operation around the heel or toe, substantially as described.

2. A machine for operating on shoes, having, in combination, a longitudinally movable and rotatable shoe supporting jack, and feeding mechanism acting independently of the shoe to move the jack by a series of longitudinal and transverse movements with relation to the point of operation of the devices operating upon the shoe carried by the jack to transfer the point of operation along the sides of the shoe, and to move the jack by a series of turning and transverse movements to transfer the point of operation around the heel or toe, substantially as described.

3. A transversely reciprocating-plate having a pivot-pin fixed therein, a clamping-jack which swings around said pivot when moving the ends of uppers and insoles assembled on a last with reference to the point of action of devices which operate upon said ends, means to move and swing said jack, and ratchet and pawl mechanism to locate and hold said jack in varying relation to the pivot pin for swinging varying lengths of lasts with reference to said central pivot.

4. Jack-feeding mechanism comprising a horizontally fixed table, a plate mounted to reciprocate transversely thereon, an oscillating-lever for reciprocating said plate, a cam-roll pivoted to one of its ends, an adjustable-fulcrum for said lever mounted between its ends, and a swinging-link connection between the cam-roll pivot and a fixed part of the mechanism which guides the cam-roll in a fixed arc as said lever is oscillated.

5. Jack-feeding mechanism comprising a reciprocating-plate, an oscillating-lever for reciprocating said plate, a grooved cam-roll journaled on one end of the lever adapted to hold a rotating plate-cam in position on steady-pins, a rotating member provided with steady-pins, said plate-cam and a spring to maintain the contact of cam and roll.

6. A jack, a jack-support, a rotatable cam-support, a cam fixed to said support to graduate the length movement of lasts clamped in said jack, a cam support, a plate-cam removably mounted upon its support and adapted to be turned over from side to side, to present the varying curves of the sides and ends of a series of lasts, either rights or lefts, to the point of action of devices operating upon the uppers and insoles assembled upon said lasts, and suitable connecting and operating mechanism for said cams.

7. Jack-feeding mechanism comprising a horizontally fixed table, a plate mounted to reciprocate transversely thereon, an oscillating-lever provided with an adjustable-fulcrum mounted on the table to reciprocate said plate, a cam to oscillate said lever and suitable mechanism mounted on said table to turn said cam.

8. Jack-feeding mechanism comprising a vertically reciprocating table horizontally fixed, a plate mounted to reciprocate transversely thereon, a central pivot fixed on said plate, a jack-support mounted to be moved longitudinally on and swung around the pivot on said plate, and suitable mechanism acting during the operation of the jack feeding mechanism to reciprocate said table and to move and swing said jack-support.

9. A jack, a length feeding and end-turning mechanism therefor comprising two

- pair of ratchet-racks operating in conjunction, one pair of racks for the length having a variable movement, the other pair of racks for the end-turning having an unvariable movement, and means to vary the movement of the length governing racks.
10. A jack, a length feeding and end-turning mechanism therefor comprising two pair of ratchet-racks operating in conjunction, one pair of racks for the length movement, the other pair of racks for the end-turning movement, suitable feed-pawls, means to locate said racks with reference to each other for the end-turning movement, and means to lock them together when so located.
11. A jack, a length feeding and end-turning mechanism therefor comprising two pair of ratchet-racks operating in conjunction, one pair of racks for the length movement having a variable movement, the other pair of racks being provided with semi-circular ratchet-ends and having an unvariable movement, and suitable feed-pawls to engage with and move the combined racks.
12. A jack, a length-feeding and end-turning mechanism therefor comprising two pair of ratchet-racks operating in conjunction, a ratchet feed-pawl having a constant reciprocation for the end-turning movement, a ratchet feed-pawl having a variable reciprocation for the length movement, and suitable mechanism to reciprocate said pawls.
13. A transversely moving plate, a central pivot mounted thereon, horizontal jack-feeding mechanism, a jack-support movable around said central pivot, an assembling-jack removably positioned on said jack-support to carry lasts coincident with the longitudinal center line of said support, a cam support, a cam fixed to its support to graduate the length movements of the lasts operated upon, a cam adapted to be turned over, from side to side with reference to the center line of the jack-support, to present the varying curves of the sides and ends of a series of lasts, either rights or lefts, to the point of action of devices operating upon the upper and insole assembled upon the lasts, and connecting mechanism between the cams and jack support.
14. An assembling-jack, a jack-support on which the jack is centrally located and which moves longitudinally and rotates the lasts held in said jack around a center fixed in a transversely moving plate, said plate, jack-feeding mechanism, and a cam and suitable connecting mechanism to change relative horizontal distance between the center about which the lasts move and the point of action of devices operating upon the uppers and insoles assembled upon the lasts.
15. Jack feeding mechanism comprising a table, a plate mounted to move transversely thereon, a pivot on the plate, and a jack support mounted to move longitudinally on and swing around the pivot on said plate, mechanism for feeding and swinging the jack, and mechanism independent of the shoe for moving the plate transversely, substantially as described.
16. Jack feeding mechanism comprising a laterally movable plate, a jack support mounted to move longitudinally and swing on said plate, and mechanism for moving and swinging the jack support and mechanism independent of the shoe for moving the plate laterally.
17. Jack feeding mechanism comprising a vertically and transversely movable plate, a jack supporting plate mounted to move longitudinally thereon, and mechanism acting independently of the shoe for moving the jack supporting plate longitudinally and for swinging the jack supporting plate.
18. A machine for operating on shoes, having, in combination, a longitudinally movable and rotatable shoe supporting jack, and feeding mechanism acting independently of the shoe to move the jack longitudinally to transfer the point of operation of the operating devices along the sides of the shoe, and to move the jack by a series of turning and transverse movements to transfer the point of operation around the heel or toe, substantially as described.
19. A machine for operating on shoes, having, in combination, a shoe supporting jack, mechanism for imparting longitudinal feeding movements to the jack, mechanism for swinging the jack about an axis substantially normal to the bottom of the shoe supported on the jack to transfer the point of operation of the operating devices around the heel or toe, and a cam and connections for moving the jack laterally as it is swung to transfer the point of operation around the toe, substantially as described.
20. A machine for operating on shoes, having, in combination, a shoe supporting jack, feeding mechanism acting to move the jack longitudinally and transversely to transfer the point of operation of the operating devices along the shoe including a cam, a lever engaging the cam and connected with the jack, means for causing the end of the lever to move in a fixed path, and an adjustable fulcrum for the lever, substantially as described.
21. A machine for operating on shoes, having, in combination, a shoe supporting jack longitudinally movable and rotatable about an axis substantially normal to the bottom of the shoe supported on the jack, feeding mechanism acting to move the jack by a series of longitudinal and transverse movements with reference to the point of operation of the devices operating upon the shoe carried by the jack to transfer the

point of operation along the sides of the shoe, and means for varying the relative lengths of said movements in accordance with the length or width of the shoes being operated upon, substantially as described.

22. A machine for operating on shoes, having, in combination, a shoe supporting jack longitudinally movable and rotatable about an axis substantially normal to the bottom of the shoe supported on the jack to transfer the point of operation of the devices operating upon the shoe carried by the jack around the shoe, mechanism for imparting longitudinal and turning movements to the jack, and mechanism for imparting transverse movements to the jack including an intermittently operating cam and connections between the cam and jack, substantially as described.

23. A machine for operating on shoes, having, in combination, a shoe supporting jack longitudinally movable to transfer the point of operation of the devices operating upon the shoe carried by the jack along the shoe, mechanism for imparting longitudinal feeding movements to the jack, and a cam and connections for modifying the action of said mechanism adjustable to vary the feeding movements in accordance with the length of the shoe being operated upon, substantially as described.

24. A machine for operating on shoes, having, in combination, a shoe supporting jack longitudinally movable to transfer the point of operation of the devices operating upon the shoe carried by the jack along the shoe, a reciprocating pawl for imparting longitudinal feeding movements to the jack, and a cam and connections for varying the feeding movements of the pawl in accordance with the length of the shoe being operated upon, substantially as described.

25. A machine for operating on shoes, having, in combination, a longitudinally movable and rotatable shoe supporting jack, feeding mechanism for moving the jack longitudinally to transfer the point of operation along the sides of the shoe, turning mechanism to swing the jack about an axis substantially normal to the bottom of the shoe supported on the jack to transfer the point of operation around the heel or toe, and means for varying the relative movement between the feeding and turning mechanism for shoes of different lengths, substantially as described.

26. A machine for operating on shoes, having, in combination, a longitudinally movable and rotatable shoe supporting jack, jack feeding and swinging mechanism comprising relatively movable racks, and means for varying the relative movement between the racks for shoes of different lengths, substantially as described.

27. A machine for operating on shoes, having, in combination, a longitudinally movable and rotatable shoe supporting jack, jack feeding and swinging mechanism comprising relatively movable racks, means for varying the relative movement between the racks for shoes of different lengths, and means for locking the racks together during the swinging of the jack, substantially as described.

28. A machine for operating on shoes, having, in combination, a longitudinally movable and rotatable shoe supporting jack, mechanism for imparting longitudinal feeding movements to the jack, means for varying the extent of said movements for shoes of different lengths, and mechanism for swinging the jack about an axis substantially normal to the bottom of the shoe supported on the jack to transfer the point of operation about the heel or toe of the shoe, substantially as described.

29. A machine for operating on shoes, having, in combination, a plate having a pivot pin thereon, a jack which swings around said pivot in transferring the point of operation of the devices operating upon the shoe carried by the jack around the end of the shoe, mechanism acting independently of the shoe to feed the jack longitudinally and swing it about the pivot, and mechanism for locating and holding the jack to swing different lengths of shoes, substantially as described.

30. A machine for operating on shoes, having, in combination, a shoe supporting jack, mechanism for feeding the jack including a cam plate for determining the path along which the point of operation of the devices acting upon the shoe travels about the shoe, and a cam support, said cam plate and support having provision for turning the cam plate over to adapt it for right and left shoes, substantially as described.

JOS. E. CRISP.

Witnesses:

FRANK G. PARKER,
WILLIAM H. PARRY.