

March 25, 1941.

J. S. KAMBORIAN

2,235,888

LASTING MACHINE

Filed Sept. 14, 1939

8 Sheets-Sheet 1

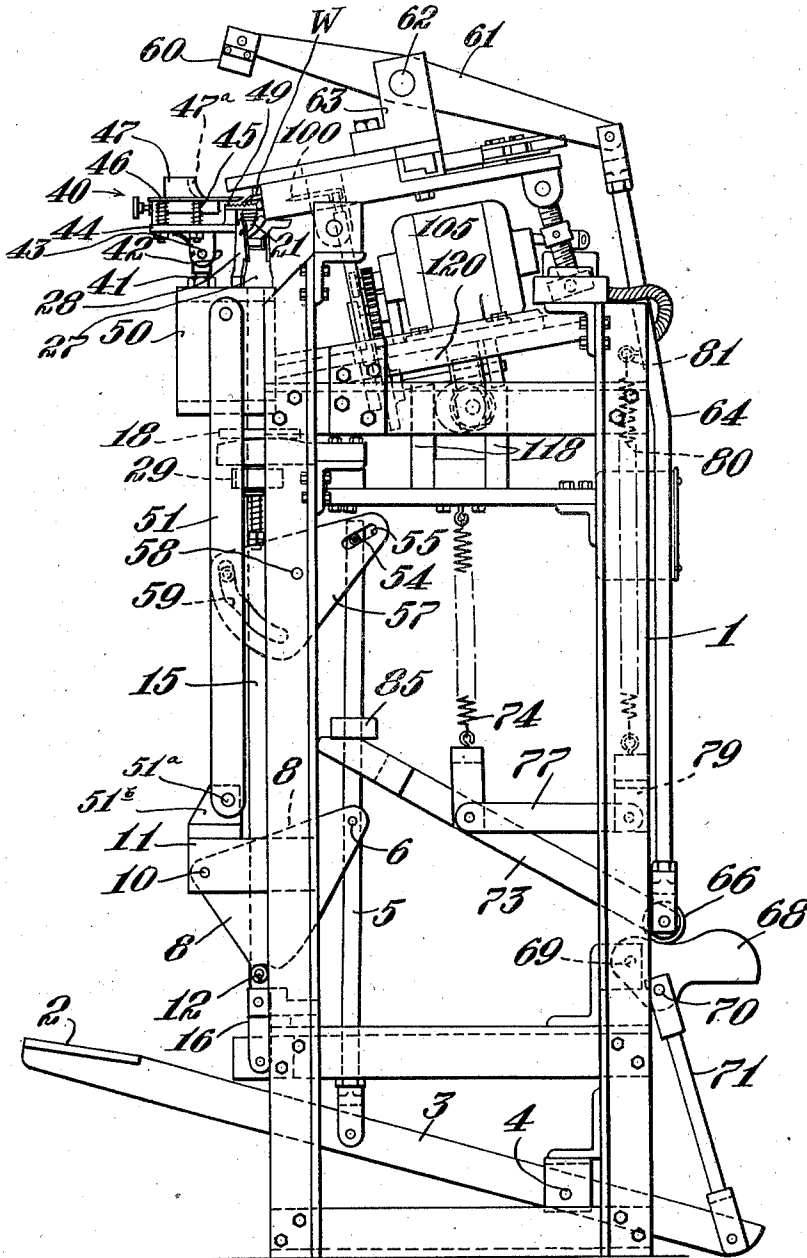


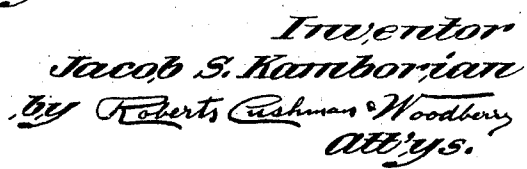
Fig.1

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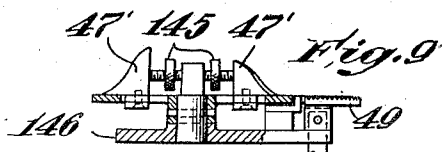
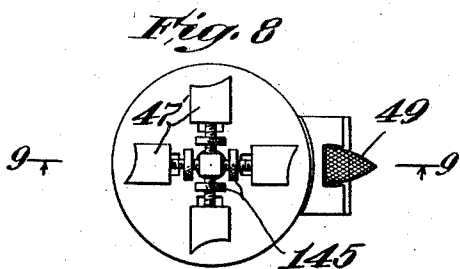
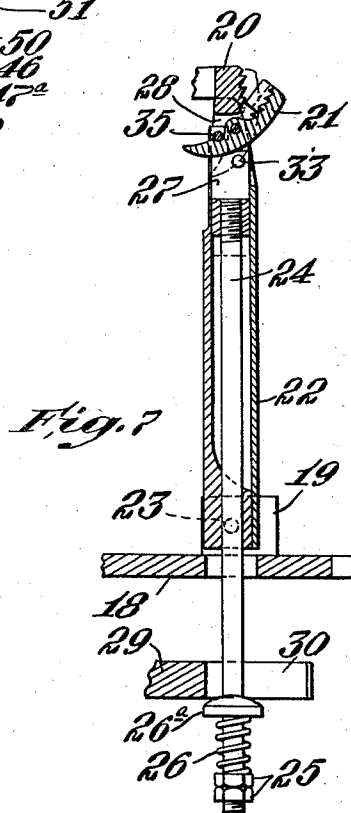
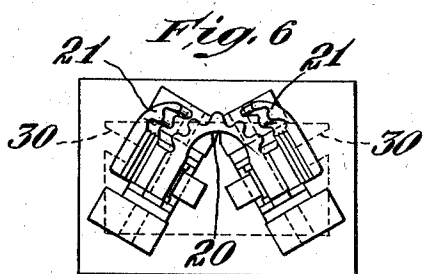
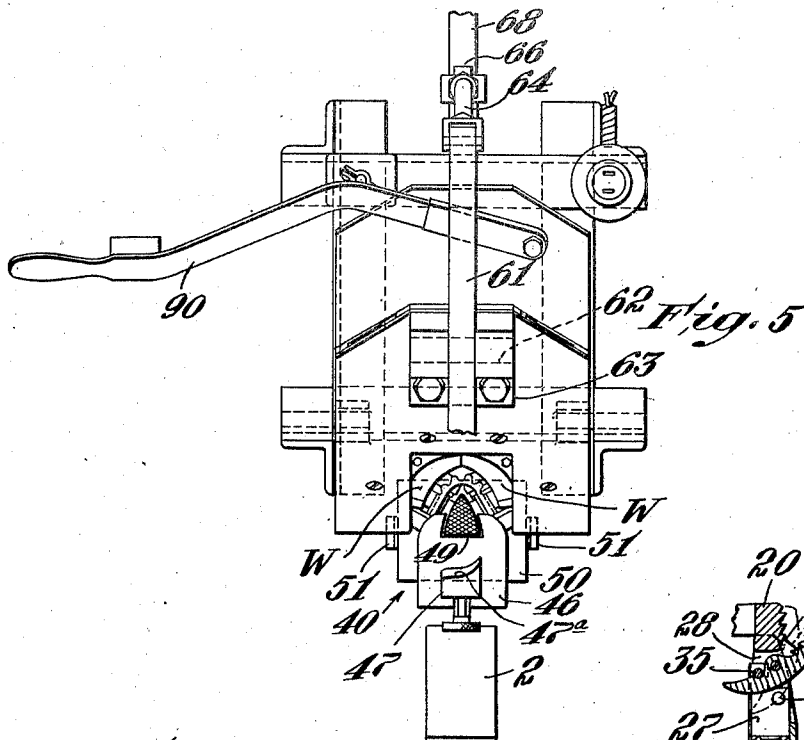
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Fig. 10

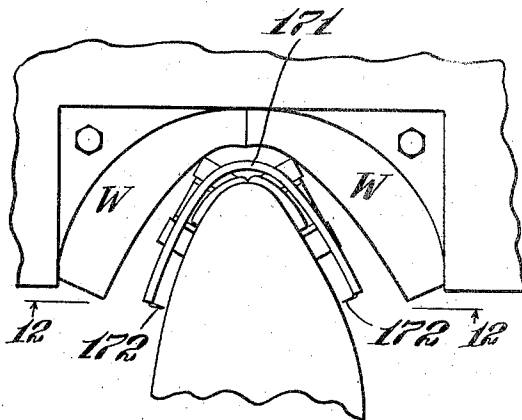
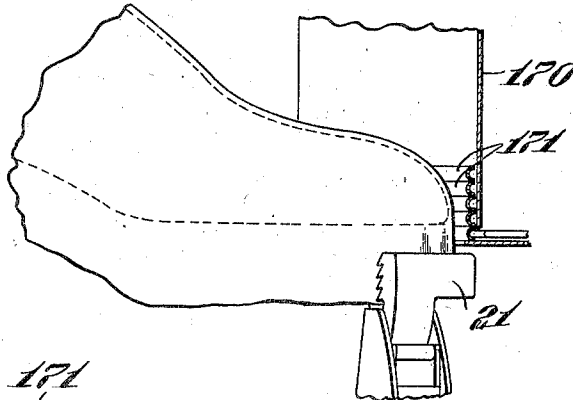


Fig. 11

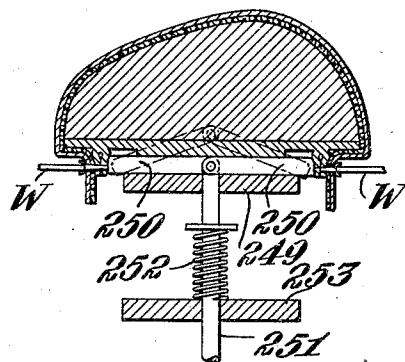


Fig. 12

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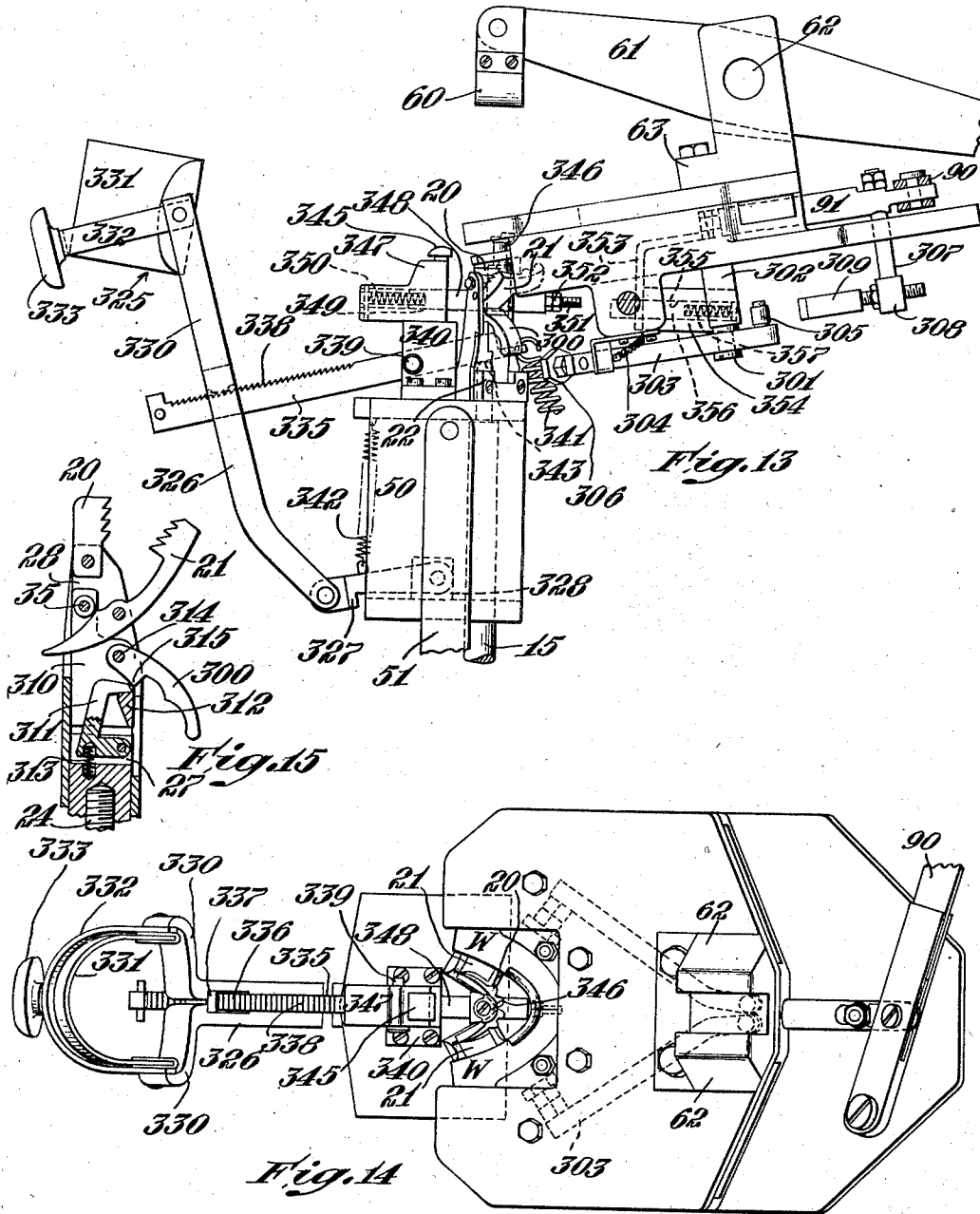
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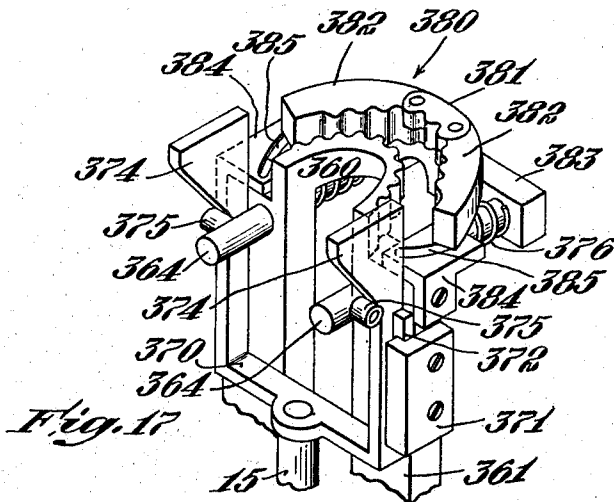
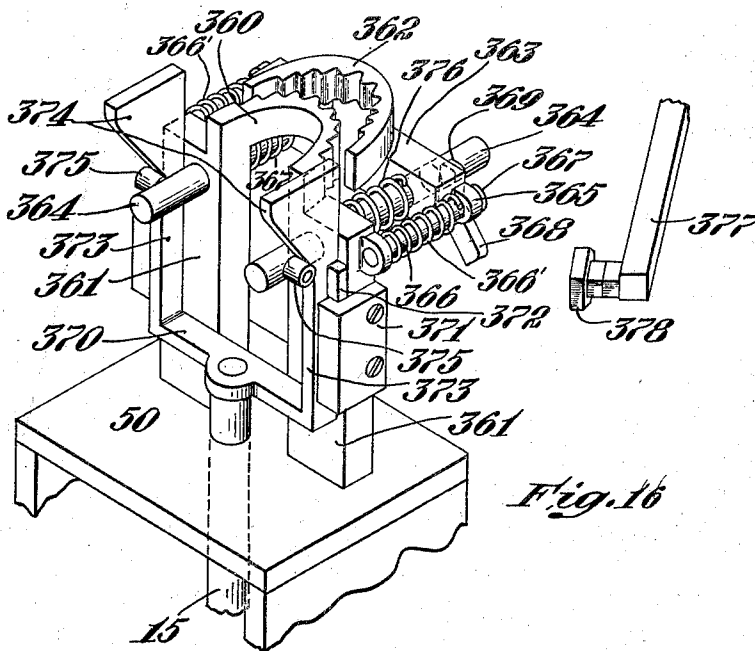
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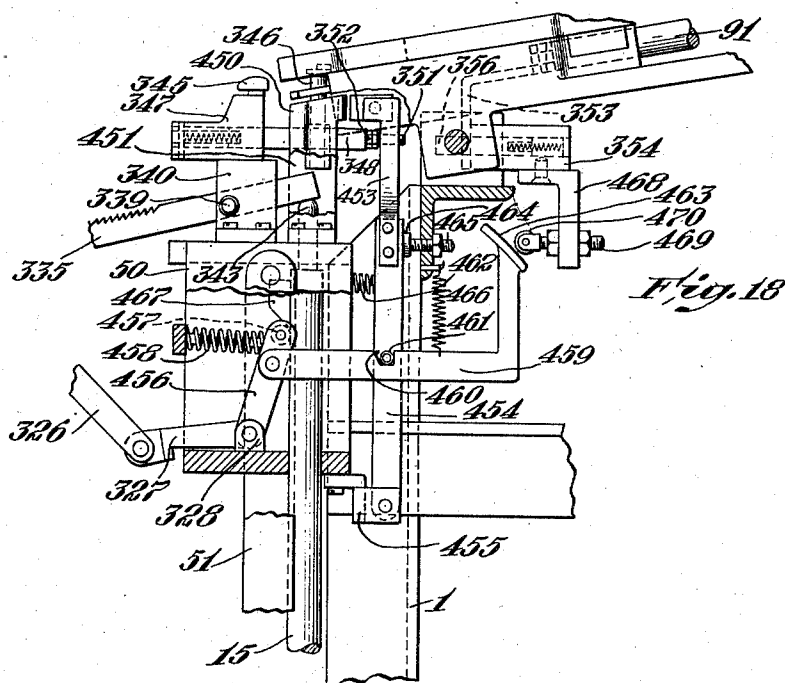


Fig. 18

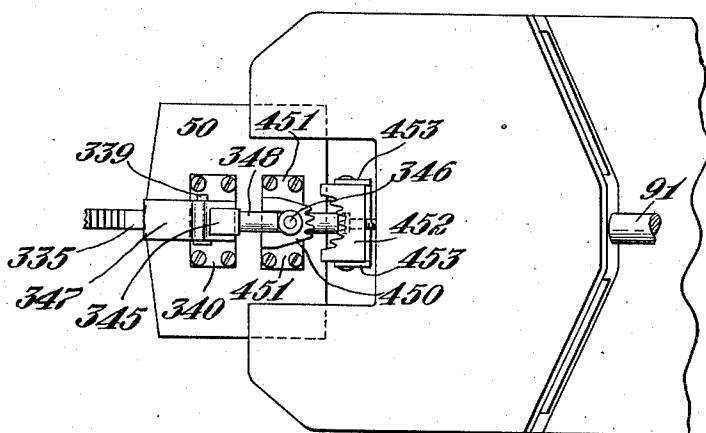


Fig. 19

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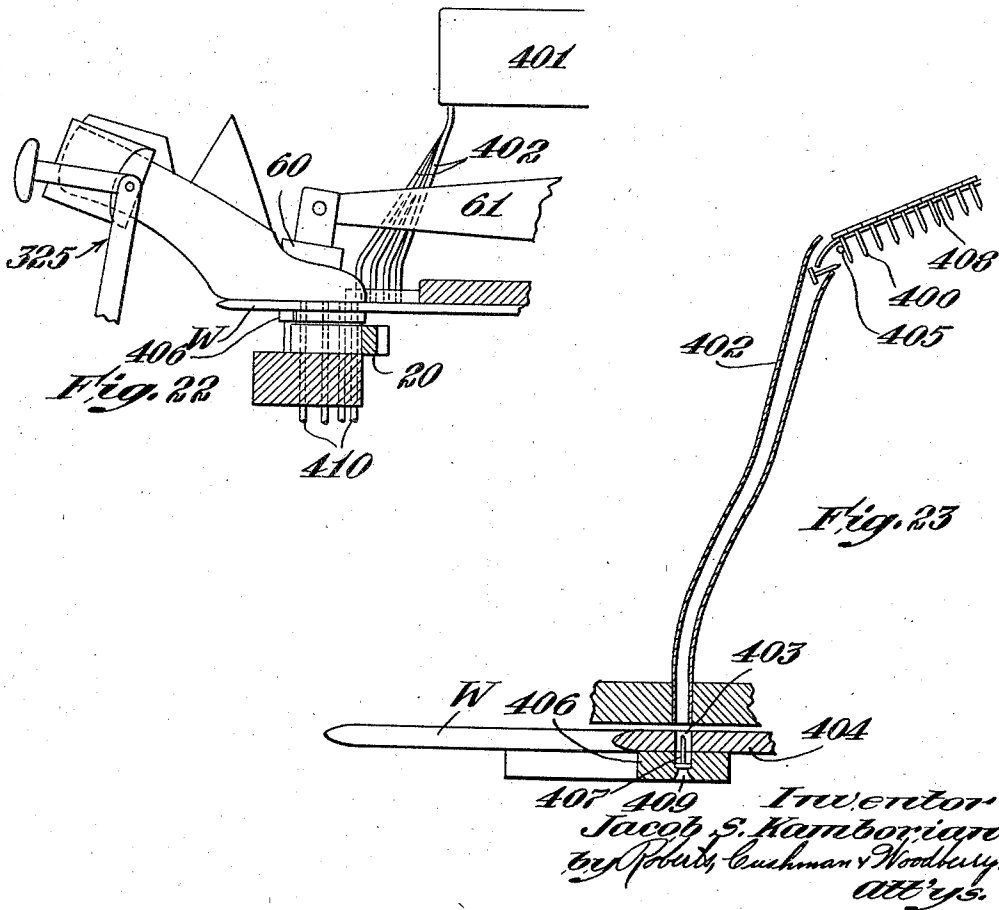
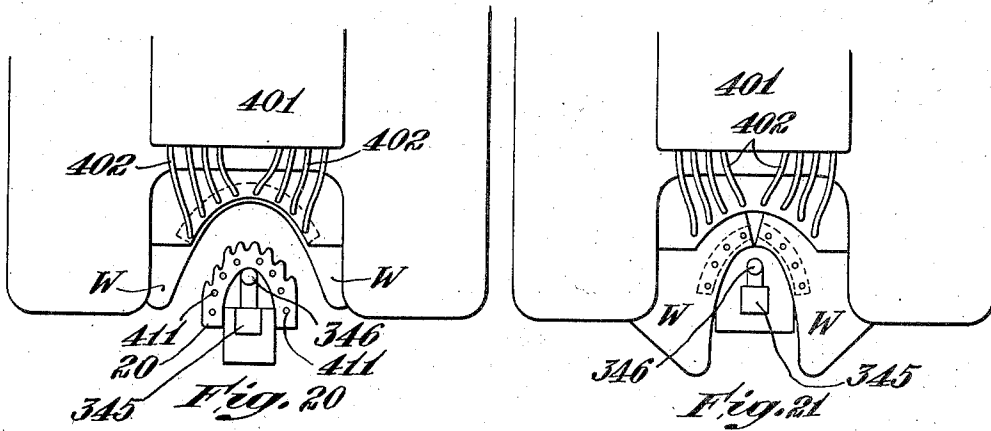
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LASTING MACHINE

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8 Sheets-Sheet 8



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UNITED STATES PATENT OFFICE

2,235,888

LASTING MACHINE

Jacob S. Kamborian, West Newton, Mass., assignor to General Research, Inc., Boston, Mass., a corporation of Massachusetts

Application September 14, 1939, Serial No. 294,879

17 Claims. (Cl. 12-4)

This invention relates to a machine for lasting footwear, and more particularly to a machine for lasting the toe portions of shoes. A lasting machine of this type is particularly suitable for use in practicing the method disclosed in my co-

pending application Serial No. 231,939, filed September 27, 1938.

In accordance with the usual prior practice, the insole and upper are first assembled on the last and, after the spindling, pulling-over and side-lasting operations, the last, together with the assembled shoe parts, is mounted bottom-up in a bed-lasting machine wherein the toe portion of the upper is first smoothed about the sides of the last by an upward movement of the wiper members and is then wiped-in over the bottom of the insole by repeated in-and-out movements of the wipers. At some intermediate point in the operation, the surplus stock at the toe, particularly the projecting edge of the toe box, is usually trimmed away.

In ordinary bed-lasting, the upward movement of the wipers is principally relied upon to draw the upper snugly and smoothly about the toe portion of the last, but during this wiping action the shoe is upside down so that the worker is unable to observe the operation and the upper is not always tensioned as much or as evenly as might be desired.

A principal object of the present invention is to provide an improved machine for lasting the toe portions of shoes and which is effective to stretch the upper as snugly and evenly as desired about the tip of the last, the degree of stretch being wholly within the control of the operator and the machine being so devised that the operation of stretching the upper over the tip of the last is observable at all stages by the operator.

A further object is to provide a machine for lasting the toe and also, if desired, the forepart portions of shoes, and including means operative to exert a positive pull on the upper rather than merely depending upon the rubbing or frictional action of moving wipers, the machine preferably including a shoe support which may be rocked about a transverse horizontal axis after the marginal portion of the upper material has been seized by suitable gripping means whereby the upper material may be stretched very tightly about the toe portion of the last.

A further object is to provide a machine such that, after the positive stretching of the upper in full view of the operator, the shoe and the upper-stretching means may be moved as a unit relative

to wiping means so as to bring the shoe with the tensioned upper material into the field of action of the wiping means, whereby the upper material at the toe may be wiped inwardly over the bottom of the insole without releasing the stress imposed upon such upper material by the action of the gripping and stretching means.

A further object is to provide a machine having provision for automatically severing the upper material between the gripping means and the wipers after the latter have clamped the upper firmly against the bottom of the insole.

A further object of the invention is to provide a machine having appropriate mechanism for attaining the above objects and novel functional advantages and comprising simple and efficient mechanical connections for actuating the several parts.

Other and further objects and advantages of the invention will be pointed out in the following more detailed description and by reference to the accompanying drawings, wherein

Fig. 1 is a side elevation of a lasting machine embodying the present invention;

Fig. 2 is a front elevation of the machine;

Fig. 3 is a side elevation illustrating upper severing mechanism in detail;

Fig. 4 is a front elevation of the parts shown in Fig. 3;

Fig. 5 is a plan of the upper part of the machine, including the shoe support, a portion of the wiper mechanism and portions of the grippers;

Fig. 6 is a plan view showing details of the gripper mechanism;

Fig. 7 is a vertical section through the gripper mechanism;

Fig. 8 is a plan view of a modified form of shoe support;

Fig. 9 is a vertical section substantially on the line 9-9 of Fig. 8, certain parts being in elevation;

Fig. 10 is a fragmentary diagrammatic view, partly in vertical section, illustrating a modified construction useful in lasting welt shoes;

Fig. 11 is a plan view of the arrangement shown in Fig. 10;

Fig. 12 is a transverse vertical section substantially on the line 12-12 of Fig. 11;

Figs. 13 and 14 illustrate in side elevation and plan views respectively another embodiment of this invention;

Fig. 15 is an enlarged sectional view of a portion of such embodiment;

Figs. 16 and 17 are perspective views illustrating other embodiments of this invention;

Figs. 18 and 19 are views in side elevation, partly in section, and in plan respectively illustrating still another embodiment of this invention; and

Figs. 20 to 23 inclusive illustrate in plan and section yet another embodiment of this invention.

In accordance with this invention the improved 10 lasting machine includes a suitable frame 1 upon which the shoe support, gripper means, wipers, shoe-engaging pad, and upper covering means are mounted. The machine also comprises suitable controls for actuation by the foot and/or 15 hand of the operator thereby to carry out the various steps in the toe lasting operation, it being understood, however, that it is within the purview of the invention to provide power-driven connections for operating the various elements 20 of the machine, if desired.

As illustrated, a foot pedal 2 (Fig. 1) is mounted on a long pedal bar 3 which swings about a fixed pivot 4 at the lower part of the machine frame. An upwardly extending link 5 is pivotally 25 connected to the mid-portion of the pedal bar 3. A pivot pin 6 projects from opposite sides of the link 5 intermediate its height and provides pivotal connections for a pair of similar, parallel cam plates 8, each of which is of generally triangular 30 form. The forward corner of each of these plates has pivotal connection at 10 with a fixed bracket 11 at the front of the machine. The lower corner of each of the cam plates 8 is provided with a suitably shaped edge surface to engage a follower roll 12 on a gripper-actuating link 15 which extends upwardly at the front of the machine. The 35 lower end of this link 15 slides in a guide block 16 which is pivotally supported at the front of the machine so as to permit slight rocking of the lower end of the link. The upper end of the 40 link 15 passes through a plate 18 which rests upon a pair of fixed arms 17 having convex upper faces (Fig. 1).

The gripper means (Figs. 6 and 7) comprises 45 a single inner gripper jaw member 20 and a pair of outer gripper jaw members 21 each cooperating with the inner member, the jaw members 20 and 21 having suitable corrugated or toothed faces which are adapted firmly to grip the marginal portion of the upper material. Each end 50 of the plate 18 supports a block 19 on which a vertically elongate box-like housing 22 is pivotally mounted, as indicated at 23 (Fig. 7). Within each housing 22 slides a corresponding gripper-actuating rod 24. The lower end of each 55 rod 24 is screw threaded and is provided with nuts 25 which form a stop for the lower end of a coil spring 26 whose upper end engages a washer 26^a having a convexly curved upper surface bearing against the under surface of a plate 29 fixed to the link 15 and vertically reciprocated 60 thereby to actuate the gripper mechanism. Each end of this plate 29 is slotted, as designated by numeral 30, to permit the corresponding rod 24 to extend freely upward therethrough. The 65 upper end of each rod 24 carries a block 27 which slides in the upper part of the corresponding housing 22.

One of the gripper elements 21 is pivotally 70 mounted between the ears 28 at the top of each of the respective housings 22. The lower or tail portion of each element 21 extends between pins 33 and 35 carried by the block 27, the pin 33 being below and the pin 35 being above, as shown 75 in Fig. 7. Downward movement of the rod 24

will cause the pin 35 to swing the gripper element 21 about its pivot toward the gripper member 20. This movement of the rods 24 is effected by operation of the pedal 2 and the resultant actuation of the link 5, the cam plates 8, the 5 link 15, and the plate 29.

Adjoining the gripper means is the shoe support, designated generally by the numeral 40 (Figs. 1 and 5). This shoe support includes a supporting stud 41 having an upstanding boss 10 disposed between parallel lugs projecting downwardly from a bracket 42 which is pivotally connected at 43 to the stud 41 so as to rock about a horizontal axis. The bracket 42 is integral 15 with a plate 44. A plurality of parallel rods extend upwardly from the plate 44, each rod being embraced by a coil spring 45. The several springs collectively form a resilient support for a shoe-supporting plate 46 which is normally 20 parallel to the plate 44, the plate 46 constituting a rest for the insole of a shoe properly assembled upon a last.

At the rear end of the plate 46 an adjustable abutment block 47 is mounted. This block 47 25 has an inner surface designed to engage the heel end of the shoe upper and to form an abutment thereby to prevent rearward movement of the shoe relative to the supporting plate 46 during the operation of the wipers hereinafter to be described. Preferably the block 47 has a forwardly extending part 47^a designed to reach forwardly to engage the shank of the shoe. The 30 toe portion of the shoe support is desirably constituted by a plate 49 of a contour more or less corresponding to that of the toe end of a last bottom, the part 49 being rigidly mounted upon the plate 44 and preferably having its upper surface corrugated to assist in properly holding the insole and last in position. 35

The stud 41 on which the shoe support is 40 mounted is carried by a box-like frame 50, the front and rear sides of which may be open. This frame 50 is pivotally supported by and between a pair of links 51 whose lower ends are 45 pivoted on a shaft 51^a carried by brackets mounted on a crossbar 51^b forming part of the frame. By reason of the length of these links 51, movement of the frame 50 from front to rear does not appreciably change the elevation of the shoe 50 support.

The link 5 extends upwardly beyond the cams 8 and carries a transverse bar 56 (Fig. 2) having rolls 54 at its ends which are movable in slots 55 in parallel cam plates 57. These plates are pivotally mounted on a shaft 58 having its ends 55 supported by the frame of the machine, and have cam slots 59 (Fig. 1) which are so shaped that the upper ends of the links 51 are swung rearwardly, that is to say, away from the operator, as the pedal 2 approaches the mid-portion 60 of its downward path. Accordingly such a movement of the links 15 results in rearward movement of the box-like frame 50 and of the entire shoe support 40 relative to the frame of the 65 machine. Since the housings 22 extend through the frame 50, the gripper members themselves also move rearwardly as a unit with the shoe support.

The machine is also provided with a shoe- 70 engaging saddle or pad 60 designed to engage and press upon the upper part of the forepart of the shoe upper thereby to hold the forepart of the shoe firmly down upon its support. The saddle member 60 is mounted on a rigid lever 75

arm 61 which is pivotally supported at 62 upon a fixed bracket 63 at the upper part of the machine frame. The rear end of the frame 61 is articulated to a link 64, the lower end of which carries a roll 66 which engages a cam 68. This cam is pivoted at 69 to a fixed bracket on the frame and has a second pivotal connection 70 with a link 71 articulated to the rear end of the pedal bar 3. The lower end of the link 64 is articulated to a swinging bar 73, the intermediate portion of which is connected to a tension spring 74 whose opposite end is anchored to a fixed part of the frame. The intermediate part of the bar 75 also has pivotal connection with a radius rod 77 that is pivotally connected at its rear end to the machine frame. A tension spring 80 has its lower end secured to a block 79 fixed to the frame and has its upper end fastened to an eye 81 projecting from the upper part of the link 64. The upper front extremity of the bar 73 engages the lower surface of a stop collar 85 on the link 5. When the pedal 2 and the bar 3 reach the intermediate point in their downward paths, the cam 68 has been so turned that it has moved the link 64 upwardly and swung the saddle 60 downwardly so as to engage the forepart of the shoe mounted on the support 40.

The machine is also provided with suitable wipers W (Figs. 1 and 5) which preferably, although not necessarily, may be provided with heating means to assist in ironing the wiped-over material against the bottom of the insole. These wipers are arranged above the gripper means and, as here shown, are actuated by a hand-operated lever 90 conveniently located at one side of the machine. Such wipers and the actuating means therefor may be of any conventional type. As indicated in Fig. 2, electrical heating units 92 are associated with the wipers W.

The machine as illustrated is provided with an electrically operated vibratory cutter 100 (Fig. 3). This cutter is mounted on the upper end of an oscillatory bar 101 (Figs. 3 and 4), the lower end of this bar being pivotally connected to a base member 104. An electric motor 105 is mounted on this base member and has a shaft extension carrying an eccentric 106 housed in a slot 107 in the bar 101. By this means rotation of the motor shaft causes a rapid oscillatory or vibratory movement of the cutter 100 substantially in the direction of the extent of its cutting edge. The motor shaft also carries a pinion 110 meshing with a gear 111 which meshes with a similar gear 112 mounted on a shaft 113 which carries a worm 114 engaging a worm wheel 115. The worm wheel 115 is fixed to a transverse shaft 116 which carries an eccentric 117 mounted between two upstanding bars 118 which are fixed to the machine frame. The base 104, on which the motor is mounted, has its opposite edges arranged to slide in inclined guideways 120 (Fig. 1), the plane of these guideways being substantially parallel to the plane of the cutter 100, and both of these planes being inclined downwardly and forwardly at an angle of approximately 15°.

A control switch 130 is conveniently mounted on the wiper actuated lever 90. This switch may be provided with two buttons for starting and stopping the motor 105, respectively, and is connected to the motor by a flexible conductor 121. When the motor is actuated, a rapid vibratory movement is imparted to the cutter 100 while at the same time the gearing and eccentric 106

cause a gradual advance movement of the base 104 along the guideways 120 so that the cutter is brought into position to sever the upper material at the toe portion of the shoe.

Before the shoe and last are mounted on the support 40, the upper is pulled over the last and tacked to the insole in accordance with the usual procedure; thereafter the three foremost pulling-over tacks are removed and the upper is turned back at the toe to expose the projecting lower edge of the toe box so that this edge and any surplus backing or lining material may be trimmed away. After trimming, the upper material is turned back over the tip of the last and the toe is steamed, and adhesive, for example rubber latex, is applied. This adhesive preferably is applied both to the inner surface of the upper material at the toe and to the toe end of the exposed surface of the insole.

After these preliminary steps have been performed, the shoe is mounted on the support 40 with its toe portion resting upon the member 49 of the support and with the heel end of the shoe upper engaging the abutment member 47. In this position of the shoe the marginal material of the upper at the forepart projects below the insole and is in a position to be engaged by the gripper means. Since the shoe is right side up and since at this stage of the proceeding the shoe support and gripper means are in their most forward position (that is to say, nearest to the operator) where the toe of the shoe is out of the field of action of the wipers, the entire upper is clearly exposed to view so that the progress of the operation of stretching the upper about the toe is clearly observable by the operator at all times.

When the parts are satisfactorily positioned, as just described, the operator initiates the downward movement of the pedal 2. The first part of this downward movement swings the cam 8 and draws down the link 15, which results in engagement of the marginal portion of the upper material between the jaws 20 and 21 of the gripper means. Having thus gripped the marginal material, the operator then presses manually down upon the rear part of the last so as to rock the shoe support about its pivotal support at 43. Since the axis provided by the pivot 43 extends transversely of the last bottom and is located substantially mid-way between the toe and heel of the last, such downward movement of the heel end of the last rocks the toe portion of the last upwardly relatively to the gripper means, the latter being incapable of upward movement as a whole with reference to the horizontal plane of the pivot 43 on which the shoe support is mounted. Such downward rocking of the heel of the last thus draws and stretches the upper material very snugly about the toe portion of the last, the degree of stretch being wholly within the option of the operator and depending upon the force which he exerts in pressing downwardly upon the rear end of the last.

While the operator maintains this downward pressure upon the rear end of the last, he then further moves the pedal 2 downwardly, thus swinging the links 51, by the action of cams 57, in a rearward direction. This causes a bodily movement of the shoe and last in a rearward direction together with the grippers, the several parts moving as a unit but without any relaxation of the stretching tension which has been applied to the upper material at the toe. This rearward movement of the shoe support and gripping means carries the shoe into the field of action of

the wipers W. With the parts thus positioned, further downward movement of the pedal brings saddle 60 down with very heavy pressure, for example, pressure of the order of one thousand pounds, onto the forepart or arch portion of the upper, thus holding the insole very firmly against the support. While the pedal is held in this position, the operator actuates the wipers W by means of the handle 90. The wipers thus force the material inwardly against the lower surface of the insole while the lower marginal portion of the upper material is still held by the gripper means. Thus the material is laid very taut about the toe portion of the shoe and against the bottom of the insole.

As previously described, the wipers W may be heated, thus to iron and flatten the wiped-in material against the insole. While the wipers are maintained in this position, the switch 130 is actuated to start the motor, thereby causing the latter to advance while vibrating the cutter thereby to sever the stretched material between the grippers and the point at which the material is clamped against the bottom of the insole by the wipers. Thereupon the pedal 2 and the handle 90 are released, the motor 105 is stopped, and, by the action of the various springs, the parts are restored to normal position, whereupon the shoe may be removed from the machine.

Fig. 6 illustrates a preferred form of gripper device wherein those parts of the gripper jaws which are to operate closely adjacent to the tip of the toe are provided with substantially vertically disposed uniform ribs or corrugations, thus to form uniform crimps in the corresponding portion of the upper material, such crimps extending perpendicular to the bottom of the insole. Rearwardly of these vertical corrugations, that is to say, farther from the tip of the toe, the grippers preferably are provided with teeth extending transversely and which are effective to prevent slippage of the upper material from between the gripper jaws.

Figs. 8 and 9 illustrate an optional form of shoe support, which also comprises a single toe supporting plate 49, but which is furnished with a plurality of abutment blocks 47' of different size and shape and adapted to fit shoes of different ranges of size. Each of these blocks, however, corresponds in function to the block 47 above described. These blocks 47' may be adjustably mounted on a rotary plate or turntable 146 corresponding to the plate 44 above described. Adjusting screws 145 are provided for varying the positions of the respective blocks 47' relative to the vertical axis of rotation of the turntable.

A lasting machine of this type, while particularly advantageous for lasting shoes wherein the upper material is adhesively secured to the toe portion of the insole, may also be employed when a shoe of the welt type is to be lasted. For this purpose the machine may be modified, if desired, as follows:

In the region of the toe portion of the shoe support there is provided an upstanding guide 170 (Fig. 10) of generally U-shape in horizontal section and constituting a magazine for the reception of a plurality of pronged toe wires 171 which may be stacked therein, each of these wires being of substantially U-shape and each having inwardly directed prongs 172 (Fig. 11) adjacent to its free ends. A plate 249 (Fig. 12), which corresponds to the plate 49 of Fig. 1, has assembled with it a toggle arrangement com-

prising a pair of toggle arms 250 arranged when aligned to seat in a transverse recess in the plate 249, the adjoining ends of the toggle arms being pivotally connected to each other and to a vertically movable actuating rod 258. A spring 252 is so arranged as normally to urge the pivotal connection between the toggle arms upwardly into the position indicated in dot and dash lines in Fig. 12. However, when a shoe with its last has been placed on plate 249 and clamped down by saddle 60, the toggle arms are moved downwardly by the last and also, if desired, by a rod 251, the movement of such rod being obtained by a foot pedal or equivalent means (not shown), until the arms are in substantial alignment with each other. Thus their outer ends press against the inner ends of the prongs 172 of a toe wire which has been delivered from the magazine 170 and which is being pressed inwardly toward the rib of the insole by the wipers W, thus clenching the ends of these prongs against the corresponding inner surface portions of the rib so that the wire 171 is firmly anchored in place and holds the upper material against the rib around the toe portion of the shoe.

Figs. 13, 14 and 15 set forth another embodiment of this invention which differs from that previously described with respect to the operation of the gripper jaws 20 and 21 and the support of the shoe upper, insole and last during the lasting operation.

The outer gripper jaw members 21 are in this embodiment automatically released after the wipers W have acted to force the material inwardly against the insole of the shoe. Adjacent the members 21 are mounted outwardly and downwardly projecting fingers 300 which coact with and release the members 21 in a manner to be described below. Pivotaly supported upon studs 301, attached to posts 302 which are suspended from the wiper bed plate, are a pair of arms 303 normally held by springs 304 with the rear ends in contact, as shown in dotted lines on Fig. 14. At the rear ends of the arms 303 are mounted rotatable rollers 305 and at the forward ends thereof are mounted hammers 306. Attached to the reciprocal bar 91 of the wiper mechanism is a post 307 which projects through a slot in the bed plate. Adjustably carried by a block 308 at the lower end of the post 307 is a finger 309, wedge shaped at its forward end. As the bar 91 is advanced by movement of the lever 90 to actuate the wipers, the finger 309 forces its way between the rollers 305 and separates the rear ends of the arms 303. This separation causes the hammers 306 to strike the fingers 300 and swing the gripper members 21 away from the inner gripper jaw member 20, thereby releasing the material of the upper so that the wipers continue their movement unhindered by the gripper jaw members.

As shown in Fig. 15, the inner jaw member 20 is fixed to ears 28 upon which the outer jaw members 21 are pivotally mounted, and the members 21 are swung toward the member 20 by pins 35 upon the downward movement of the rod 24. This is similar to the embodiment first described, as illustrated in Fig. 7. The pins 35 are carried by a slide 310 which is normally connected to the block 27 by a latch 311 carried by the block and yieldably held in engagement with a ledge 312 by a spring 313. The fingers 300 are pivoted to the slide by studs 314 and are provided with tongues 315. The tongues 315 are in the

planes of the latches 311, and while in contact with the tips thereof do not, since they are freely movable, interfere under normal conditions with the operation of the latches.

5 In this embodiment the heel end of the shoe upper is engaged by an adjustably mounted support 325 which includes a post 326 pivoted to an arm 327 which is in turn pivotally supported in a block 328 mounted upon the bottom of the frame 50. The upper end of the post 326 is divided to provide a pair of arms 330 to which is secured a strap 331 of leather or other flexible material against which the heel end rests. A curved strip 332, preferably of metal, encloses the 10 strap 331 and is secured at its ends to the arms 330 and is provided with a knob 333 or other type of handle by which the post 326 may be swung manually upon its pivot. A bar 335 passed through a slot 336 in the post 326 holds the post at the desired position. Teeth 337 at the upper 20 end of the slot 336 selectively engage teeth 338 in the bar. The bar 335 is pivoted intermediate its end upon a pin 339 carried by a pair of flanged plates 340 fixed to the frame 50 and is normally held by a spring 341 with the teeth 337 and 338 in mesh. A spring 342 attached to the arm 327 serves to support the arm yieldably in opposition to the weight of the post 326 and the elements associated therewith. Mounted upon the 25 top of the link 15 is a knob or button 343 which normally holds the bar against the urge of the spring 341 so that it is disengaged from the post 326.

The toe of the assembled last and upper rests 35 upon a button 345 and a stud pin 346. The button 345 is stationary and fixed to the top of a block 347 mounted upon the plates 340. The stud 346 on which the tip of the insole rests is carried by a bar 348 and is yieldably held in contact with the insole by any suitable means as, for example, by a coil spring (not shown). The bar 348 is supported by the block 347 which has a slot 349 therethrough to receive the forward end of the bar. The stud extends within the arc of the gripper member 20 and is yieldably held in contact therewith by a spring 350 within the slot 349 which acts upon the bar 348. The rear end of the bar 348 is provided with bolt 351 adjustable as to length by nuts 352. Carried by the forward 40 end of the wiper-actuating reciprocal bar 91 is an angle plate 353, to the rear face of which is fixed in any suitable manner a block 354. Carried within a slot 355 in the block and projecting beyond the forward face of the plate 353 is a bar 356. The bar 356 is substantially in alignment with the bar 348 and rests at its inner end upon a spring 357 within the slot 355. The bar 356, upon the forward movement of the wiper bar 91, strikes the bolt 351 of the bar 348 and shifts the stud 346 forwardly.

The lasting operation with a machine equipped with the embodiment shown in Figs. 13, 14 and 15 follows in general that previously described, and only the changes necessitated by this embodiment will be here discussed. The shoe, preliminarily prepared as set forth above, is placed 65 in position with the top resting on the button 345 and stud 346. The stud 346 bears against the insole near the tip and is depressed by the shoe as the latter is forced into the lasting position with the marginal material of the upper in position to be grasped by the gripper jaw members 20 and 21. Upon depressing the foot pedal, the marginal material is gripped by the members 20 70 and 21 and the knob 343 on the link 15 is de-

pressed so that the bar 335 is swung by the spring 341 into engagement with the post 326. The operator thereupon swings the support 325 into engagement with the heel end of the shoe, in which position it is held by the bar 335.

The shoe is then moved into the field of action of the wipers W and the insole clamped by the saddle 60 against the support. The shoe being so positioned by the depression of the foot pedal, the wipers W are actuated by the handle 90 to 10 force the marginal material inwardly against the lower surface of the insole. As the wiping action continues, the bar 356 is advanced by the plate 353 and bar 91 into contact with the bolt 351 of the bar 348 and moves it forward against 15 the urge of the spring 350. The stud 346 is thereby moved away from the tip of the insole so that the stud will not interfere with the movement of the wipers.

After the wiping action has continued a little 20 longer, the hammers 306, due to the advance of the finger 309, are swung into contact with the fingers 300. The fingers 300 are swung against the latches 311 to move them from the ledges 312 and release the slide 310 from the block 27. The 25 weight of the upper ends of the members 21 is such that the latter, under the force of gravity, will swing away from the member 20 and release the marginal portion of the upper. The wiping operation continues to completion, whereupon the 30 foot pedal is released and the elements actuated thereby resume their normal positions. The knob 343 on the rising link 15 then tilts the bar 335 to release the heel and support 325 so that it may be retracted and the shoe be removed.

Figs. 16 and 17 illustrate modifications of the gripper mechanism in that the outer jaw member is moved to and from the inner jaw member in a common plane and not as in the mechanism 40 described above in which the outer jaw members 21 are pivoted and swung through arcs into and out of engagement with the inner jaw member 20.

In Fig. 16 the inner gripper jaw member 360 includes legs 361 rigidly mounted upon the top of the frame 50. The outer gripper jaw member 362 is 45 mounted upon a crossbar 363 slidably supported upon rods 364 which are in turn slidably supported in the legs 361 of the member 360. One or both ends of the crossbar 363 are provided with an eye 365 which receives a guide bolt 366 50 projecting rearwardly from the member 360 and terminating at its rear end in a head 367. A spring 366' surrounding the bolt 366 normally holds the member 362 spaced from the member 360 at the distance fixed by the head 367 against 55 which the eye 365 bears. Catches 368 pivoted upon the rear face of the bar 363 normally engage notches 369 in the rods 364 for a purpose to be described. Only one catch 368 and one notch 369 are shown in the drawings. Slidable in contact 60 with the forward face of the inner gripper jaw member 360 is a U-shaped yoke 370. Angle brackets 371 secured to the sides of the legs 361 position the yoke laterally. Keys 372 fixed to the sides of the yoke arms 373 and extending between the legs 361 and the brackets 371 guide the reciprocation of the yoke 370. The upper ends of the arms 373 are enlarged to provide cams 374. Rollers 375 carried by the rods 364 ride against the forward edges of the arms 373 and 70 are held in contact therewith by springs 376 surrounding the rods 364 and fixed at the rearward ends to the rods. Arms 377 carrying hammers 378, similar in construction, function and operation to the arms 303 and hammers 306 of the 75

embodiment shown in Figs. 13 and 14, are provided for reasons which will be set forth below.

Fig. 17 illustrates a gripper mechanism differing from that shown in Fig. 16 in that the outer gripper jaw member is articulated and the ends are swung into contact with the inner gripper jaw member. Those elements which are similar to those shown in Fig. 16 will be indicated by the same reference numerals and will not be described in detail. The outer gripper jaw 380 comprises a central section 381 and end sections 382 pivotally attached to the central section. The section 381 is rigidly secured to a crossbar 383 which is fixed to the rearward ends of the rods 364. Mounted upon the tops of the legs 361 are angle plates 384 having arcuate slots 385 which receive pins (not shown) in the forward ends of the sections 382.

When either of the forms of gripper mechanism are substituted for those previously described, the housings 22, rods 24, and associated parts are removed and the link 15 is extended through the frame 50 and attached to the yoke 370. Depression of the foot pedal will cause the link 15 to move the yoke 370 downwardly, whereupon the outer gripper jaw member is advanced to clamp the marginal material against the inner gripper jaw member 365.

The mechanism of Fig. 16 is released after the wipers have turned the upper inwardly, as in the embodiment of Figs. 13 and 14, through the release of the catches 368 by the hammers 378 of the arms 377. Upon the release of the latches, the springs 366' return the bar 363 and outer gripper jaw member 382 independently of the rods 364 which are returned by the springs 376 after the lasting operation has been completed and the foot pedal allowed to return to its normal position.

The mechanism of Fig. 17 remains in gripping relation until the lasting operation has been completed and the foot pedal released.

Figs. 18 and 19 illustrate another variation of the gripper mechanism shown in Fig. 16 applied for convenience to the embodiment shown in Figs. 13 and 14. Such elements as are the same as those disclosed and described in these embodiments will be indicated on Figs. 18 and 19 with the same reference characters and will be referred to below thereby. Detail descriptions of such elements are believed unnecessary and will be omitted.

The stationary inner gripper bar member 450 is supported upon suitable legs 451 on the top of the frame 50. The movable outer gripper bar member 452 is carried between the upper ends of arms 453 fixed at the lower ends to a rod 454 pivotally supported upon a bracket 455 projecting from the frame 50. A link 456 pivoted at its lower end to the block 328 carries at its upper end a roller 457 yieldably held by a spring 458 in contact with the forward face of the link 15. An angle arm 459 is pivoted at one end to the link 456 and is provided in its upper edge with a notch 460 with which normally engages a roller 461 on the rod 464. A spring 462 yieldably supports the arm 459. The arm 459 terminates in an inclined surface 463. Movement of the rod 454 in a clockwise direction is limited by a stop plate 464 adjustably carried by a bolt 465 projecting forwardly from the machine frame 1. Suitable means, for example a coil spring 466, hold the rod 454 in contact with the plate 464.

A cam block 467 carried by the link 15 is so positioned that when the link 15 is depressed

the cam block 467 is brought into contact with the roller 457. Supported by an angle bracket 468 secured to the under face of the block 354 is a bolt 469 carrying at its forward end a roller 470 which engages the surface 463 during the wiping operation for the purpose set forth below.

The operation of a lasting machine embodying these features is initiated in the usual manner by the depression of a foot pedal. As the link 15 descends, the cam block 467 thereon engages the roller 457 and swings the link 456 counterclockwise against the urge of the spring 458. This movement of the link 456 draws the arm 459 to the left thereby swinging the rod 454 counterclockwise and causing the outer jaw member 452 to coast with the inner gripper jaw member 450 to clamp the marginal material of the upper. After the marginal material has been gripped, the wiping operation begins, and as the margins are moved against the insole, the roller 470 carried by the bracket 468 is advanced by the block 354 into engagement with the inclined surface 463 of the angle arm 459. As this advance continues, the arm 459 is swung in a clockwise direction about its pivot against the urge of the spring 462 until the roller 461 on the rod 454 is released. Thereupon the rod 454 is moved in a clockwise direction by the spring 466 to separate the outer jaw member 452 from the inner jaw member 450 and thus release the marginal material of the upper so that the wiping operation can continue to its conclusion.

Figs. 20 to 23 inclusive collectively illustrate a lasting machine embodying this invention wherein the marginal material of the upper is tacked to the insole after having been moved into position by the wipers. The tacks 400 are fed from a hopper 401 through chutes 402 into openings 403 in the bases 404 of the wiper arms W. The tacks pass seriatim into the chutes 402 by the employment of suitable means well known in this art, such as a finger 405. Fixed to the bases 404 are plates 406 having pockets 407 in which the tacks are supported in the openings 403 (see Fig. 23). The hopper 401 is provided with a plurality of guides 408 along which the tacks slide with the heads up. Each tack released by the finger 405 from the guide 408 drops through the chute with the head down and rests on the base of the pocket in such position with the point in the opening 403 below the upper face of the wiper. A tapered passage 409 leads from the lower face of the plate 406. Supported below the inner gripper jaw member 20 are a plurality of vertically reciprocal rods 410 which extend into openings 411 in the member 20. The openings 411 are so positioned that, when the wiping of the marginal material of the upper is completed, they register with the passages 409 in the plates 406. At the proper time the rods 410 are elevated by any suitable means (well known in this art and not here shown) to raise the tacks 400 and secure the material to the insole.

For convenience the tacking instrumentalities are illustrated as employed with the modification of the gripper mechanism shown in Figs. 13, 14 and 15. The elements of those figures here shown are indicated on the drawings by the same reference numerals, but no detailed description is believed to be necessary.

While several embodiments of this invention have been shown and described in detail, it will be understood that the invention is not limited thereto and that other embodiments of the invention may be made without departing from the

split and scope of the invention as set forth in the following claims.

I claim:

1. A machine for toe lasting shoes comprising 5
a frame, a support carried by the frame designed to receive a last with an insole and upper assembled thereon, the support being pivotally mounted to rock about a transverse axis intermediate its front and rear ends whereby downward movement of the rear end of the last causes the toe end of the last to move upwardly, means for gripping the marginal upper material at the toe, said gripping means being relatively stationary as respects upward movement of the toe of the last, wipers operative to wipe the upper material inwardly at the toe and to hold it firmly against the bottom surface of the insole, and a cutter movably mounted on the frame and operative to sever the marginal material between the gripping means and the point where it is engaged by the wipers. 10

2. A machine for toe lasting shoes comprising a frame, a support carried by the frame designed to receive a last with an insole and upper assembled thereon, the support being pivotally mounted to rock about a transverse axis intermediate its front and rear ends whereby downward movement of the rear end of the last causes the toe end of the last to move upwardly, means for gripping the marginal upper material at the toe, said gripping means being relatively stationary as respects upward movement of the toe of the last, means for pressing the marginal upper material against the bottom of the insole, and a cutter movably mounted on the frame and operative to sever the upper material at a point between the gripping means and the last. 25

3. A machine for toe lasting shoes comprising a frame, a support carried by the frame designed to receive a last with an insole and upper assembled thereon, the support being pivotally mounted to rock about a transverse axis intermediate its front and rear ends whereby downward movement of the rear end of the last causes the toe end of the last to move upwardly, means for gripping the marginal upper material at the toe, said gripping means being relatively stationary as respects upward movement of the toe of the last, and wipers operative to wipe the marginal upper material inwardly at the toe so as to cause it to lie against the bottom surface of the insole, said gripping means having cooperating complementary ribbed surfaces operative to form uniform crimps in the marginal material of the upper. 30

4. A machine for toe lasting shoes comprising a frame, a support carried by the frame designed to receive a last with an insole and upper assembled thereon, the support being pivotally mounted to rock about a transverse axis intermediate its front and rear ends whereby downward movement of the rear end of the last causes the toe end of the last to move upwardly, means for gripping the marginal upper material at the toe, said gripping means being relatively stationary as respects upward movement of the toe of the last, wipers movably mounted on the frame and operative to press the marginal material at the toe against the insole of the shoe, and means for moving the support and gripping means as a unit to and from the field of operation of the wipers. 35

5. A machine for toe lasting shoes comprising a frame, a support carried by the frame designed to receive a last with an insole and upper assembled thereon, the support being pivotally mounted 40

to rock about a transverse axis intermediate its front and rear ends whereby downward movement of the rear end of the last causes the toe end of the last to move upwardly, means for gripping the marginal upper material at the toe, said gripping means being relatively stationary as respects upward movement of the toe of the last, wipers movably mounted on the frame for pressing the stretched marginal material of the upper against the insole of the shoe, a vibratory cutter operative to sever the stretched material between the gripping means and the insole, and actuating means for the grippers, the wipers and the cutter. 45

6. A machine for toe lasting shoes comprising a movable support upon which a last with an insole and upper assembled thereon may be mounted bottom-down with the marginal portion of the upper at the toe projecting down below the last bottom, means for gripping the marginal upper material at the toe, the support being pivoted to rock about a transverse axis intermediate its ends whereby downward movement of the heel end of the last stresses the gripped upper material at the toe, toe-wiping means, means operative to move the support with the last thereon together with the gripping means and the stretched upper into the field of action of the wiping means, means for moving the wiping means inwardly in a plane substantially parallel to the bottom of the insole thereby to wipe the tensioned upper material against the bottom of the insole, and means for severing the tensioned material at a point between the gripping means and the wiper elements. 50

7. A machine for toe lasting shoes comprising a movable support upon which a last with an insole and upper assembled thereon may be mounted bottom-down with the marginal portion of the upper at the toe projecting down below the last bottom, gripping means operative to grip the marginal upper material at the toe, said gripping means comprising elements operative to form substantially uniform crimps in the upper material, such crimps extending substantially perpendicular to the last bottom, the supporting means being so devised as to permit relative movement between the toe portion of the last and the gripping means thereby to stress the gripped upper material about the toe of the last, wiper elements, means for moving the wiper elements inwardly in a plane substantially parallel to the bottom of the insole thereby to wipe the tensioned material inwardly against the insole bottom, and means for severing the tensioned material which extends between the gripping means and the wipers. 55

8. A machine for toe lasting shoes comprising a movable support upon which a last with an insole and upper assembled thereon may be mounted bottom-down with the marginal portion of the upper at the toe projecting down below the last bottom, the support being mounted to rock about a transverse axis intermediate its ends whereby the toe end of the last may be elevated by depressing its rear end, gripping means operative to grip the marginal upper material at the toe, said gripping means being stationary as respects upward movement of the toe of the last whereby such movement stresses the gripped upper material about the toe of the last, wiping means, and means operative to move the support and the gripping means as a unit in a direction lengthwise of the last toward and from the wiping means. 60

9. A machine for toe lasting shoes comprising 65

a movable support upon which a last with an insole and upper assembled thereon may be mounted bottom-down with the marginal portion of the upper at the toe projecting down below the last bottom, toe wipers operative to wipe in the marginal material of the upper against the bottom of the insole, the support being so normally positioned that shoe parts mounted thereon are out of the field of action of the wipers and freely exposed to view, means operative to grip the margin of the upper at the toe and to stress such margin by relative movement of the gripping means and the toe portion of the last, and means operative to move the support, gripping means and the shoe parts mounted on the support as a unit with the last disposed bottom-down into the path of action of the wipers, and means operative to move the wipers inwardly beneath the last bottom.

10. A toe lasting machine comprising a support for a last having an insole and an upper assembled thereon and with the last bottom-down and substantially horizontal and with the top surface of the upper freely exposed to view, upper gripping means, upper wiping means, the upper gripping means being operative to grip the marginal upper material at the toe, the support and gripping means being movable as a unit in a substantially horizontal direction to carry the upper, while gripped by the gripping means and with the last disposed bottom-down, into the field of action of the wiping means, and means for so moving the support and gripping means.

11. A toe lasting machine comprising a support for a last having an insole and an upper assembled thereon and with the last bottom-down and with the top surface of the upper freely exposed to view, means providing an axis about which the support may rock, said axis extending transversely of the support intermediate the toe and heel ends of the latter whereby downward movement of the heel end elevates the toe end, gripping means operative to grip the marginal upper material at the toe while the toe end of the last is in its lowermost position, said gripping means being incapable of upward movement, whereby depression of the heel end of the upper stresses the gripped upper material at the toe, and wiping means operative to engage the stressed upper at a point intermediate the last and the gripping means.

12. A toe lasting machine comprising a support for a last having an insole and an upper assembled thereon and with the last bottom-down and with the top surface of the upper freely exposed to view, means providing an axis about which the support may rock, said axis extending transversely of the support intermediate the toe and heel ends of the latter whereby downward movement of the heel end elevates the toe end, gripping means operative to grip the marginal upper material at the toe while the toe end of the last is in its lowermost position, said gripping means being incapable of upward movement whereby depression of the heel end of the upper stresses the gripped upper material at the toe, wiper means, means for actuating the wiper means, and means operative to actuate the gripping means and thereafter to move the support and gripping means as a unit into the field of action of the wiping means.

13. A toe lasting machine comprising a support for a last having an insole and an upper assembled thereon and with the last bottom-down and with the top surface of the upper freely ex-

posed to view, means providing an axis about which the support may rock, said axis extending transversely of the support intermediate the toe and heel ends of the latter whereby downward movement of the heel end elevates the toe end, gripping means operative to grip the marginal upper material at the toe while the toe end of the last is in its lowermost position, said gripping means being incapable of upward movement whereby depression of the heel end of the upper stresses the gripped upper material at the toe, wiper means, means for actuating the wiper means, means operative to actuate the gripping means and thereafter to move the support and gripping means as a unit into the field of action of the wiping means, means for delivering pronged toe wires into the path of the wipers whereby such a toe wire is caused to embrace the toe portion of the rib of a welt insole, and means operative to clench the prongs of the toe wire after it has thus been positioned by the wiping means.

14. A machine for toe lasting shoes comprising a frame, a support carried by the frame designed to receive a last with an insole and upper assembled thereon, the support being pivotally mounted to rock about a transverse axis intermediate its front and rear ends whereby downward movement of the rear end of the last causes the toe end of the last to move upwardly, means for gripping the marginal upper material at the toe, said gripping means being relatively stationary as respects upward movement of the toe of the last and including an inner gripper jaw member and an outer jaw member movable relative to the inner member to grasp the material, a stud pin against which the tip of the insole rests, wipers operative to wipe the upper material inwardly at the toe and to hold it firmly against the bottom surface of the insole, and means operable as the wipers act for moving said stud pin along the insole away from the tip thereof.

15. A machine for toe lasting shoes comprising a frame, a support carried by the frame designed to receive a last with an insole and upper assembled thereon, the support being pivotally mounted to rock about a transverse axis intermediate its front and rear ends whereby downward movement of the rear end of the last causes the toe end of the last to move upwardly, means for gripping the marginal upper material at the toe, said gripping means being relatively stationary as respects upward movement of the toe of the last and including an inner gripper jaw member and an outer jaw member movable relative to the inner member to grasp the material, a stud pin against which the tip of the insole rests, wipers operative to wipe the upper material inwardly at the toe and to hold it firmly against the bottom surface of the insole, and means operable as the wipers act for moving said stud pin along the insole away from the tip thereof, said means being actuated by the wiper operating mechanism.

16. A machine for toe lasting shoes comprising a frame, a support carried by the frame designed to receive a last with an insole and upper assembled thereon, the support being pivotally mounted to rock about a transverse axis intermediate its front and rear ends whereby downward movement of the rear end of the last causes the toe end of the last to move upwardly, means for gripping the marginal upper material at the toe, said gripping means being relatively stationary as respects upward movement of the toe of the

last and including an inner gripper jaw member and an outer jaw member movable relative to the inner member to grasp the material, a stud pin against which the tip of the insole rests, 5 wipers operative to wipe the upper material inwardly at the toe and to hold it firmly against the bottom surface of the insole, and means operable as the wipers act for moving said stud pin along the insole away from the tip thereof 10 and for moving said outer jaw member to release the marginal upper material.

17. A machine for toe lasting shoes comprising a frame, a support carried by the frame designed to receive a last with an insole and upper assembled thereon, the support being pivotally mounted 15 to rock about a transverse axis intermediate its front and rear ends whereby downward movement of the rear end of the last causes the toe

end of the last to move upwardly, means for gripping the marginal upper material at the toe, said gripping means being relatively stationary as respects upward movement of the toe of the last and including an inner gripper jaw member 5 and an outer jaw member movable relative to the inner member to grasp the material, a stud pin against which the tip of the insole rests, wipers operative to wipe the upper material inwardly at the toe and to hold it firmly against the bottom 10 surface of the insole, and means operable as the wipers act for moving said stud pin along the insole away from the tip thereof and for moving said outer jaw member to release the marginal upper material, said means being actuated by the 15 wiper operating mechanism.

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