May 25, 1937. J. H. REED 2,081,207

LASTING MACHINE

Filed Aug. 10, 1934 7 Sheets-Sheet 1

Fig. 1

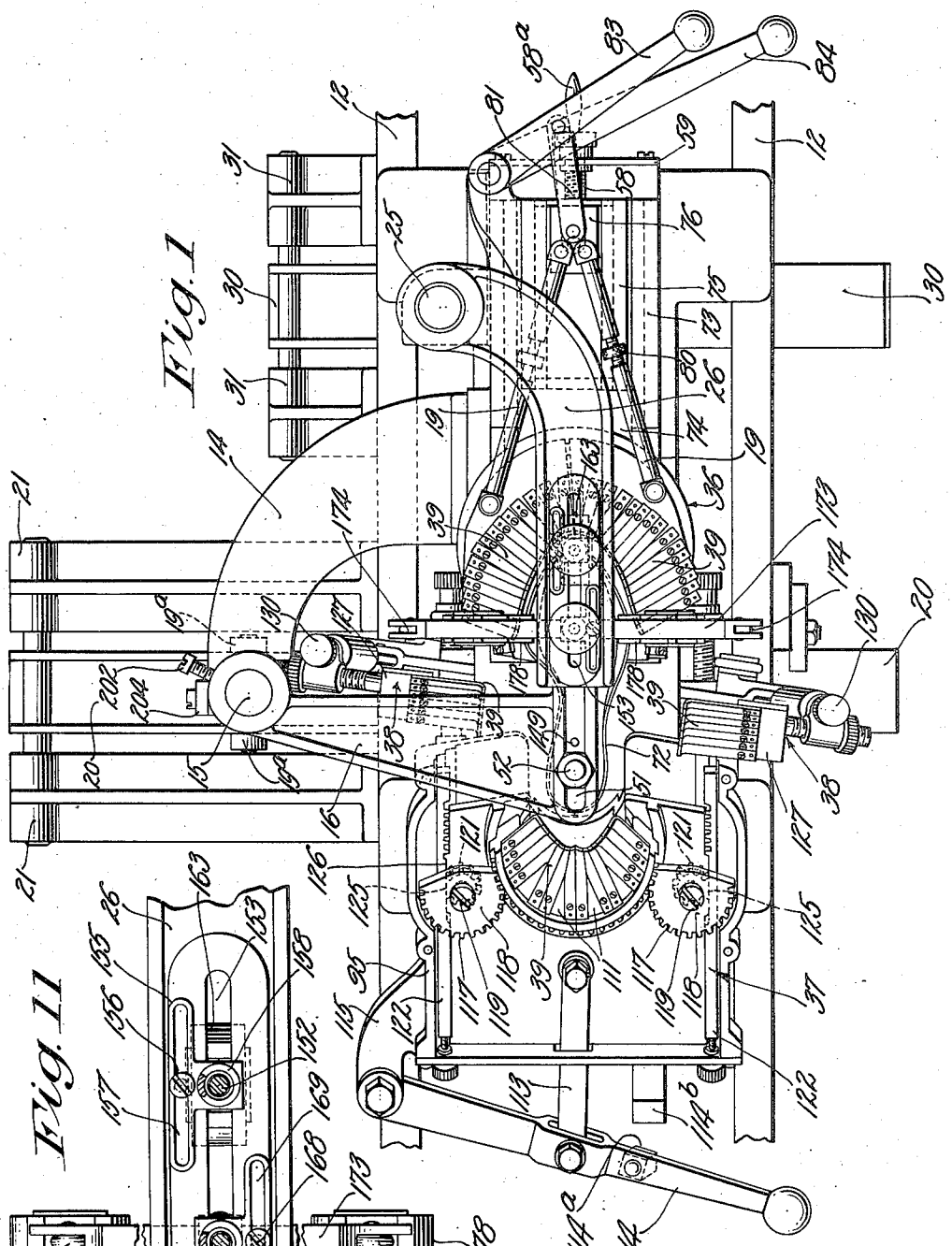


Fig. 11

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LASTING MACHINE

Filed Aug. 10, 1934 7 Sheets-Sheet 2

Fig. 2

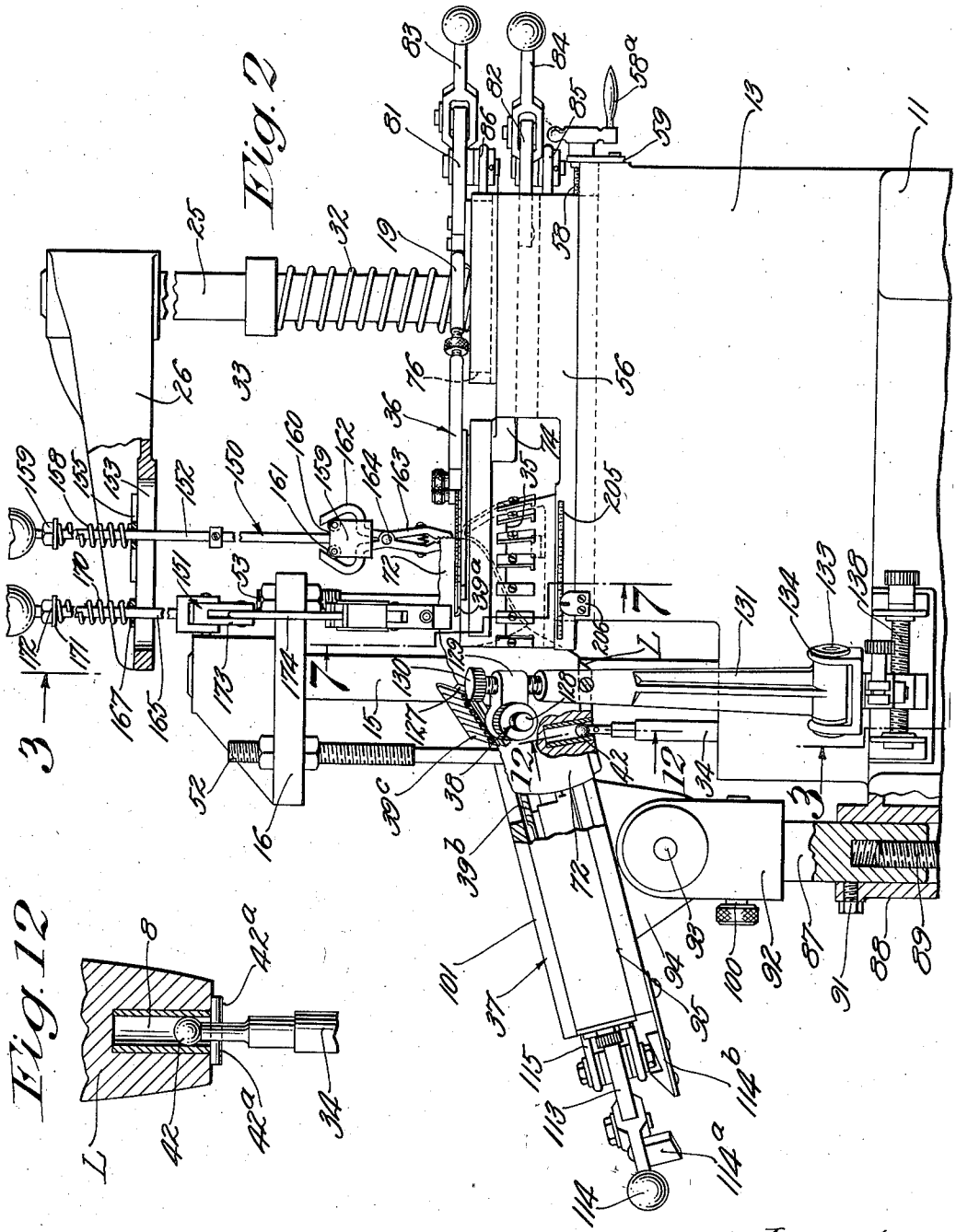


Fig. 12

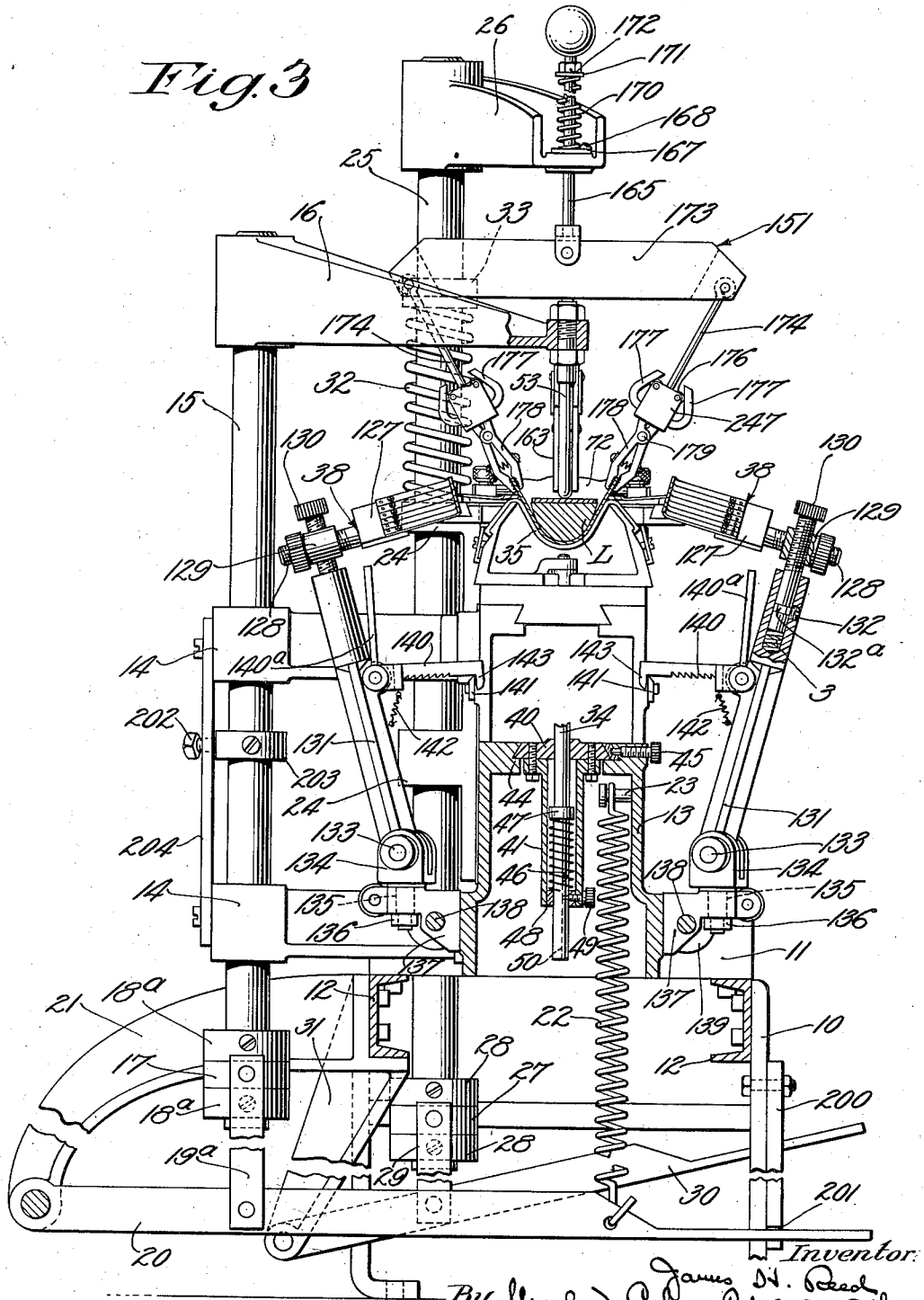
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LASTING MACHINE

Filed Aug. 10, 1934 7 Sheets-Sheet 3

Fig. 3



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May 25, 1937. J. H. REED 2,081,207

LASTING MACHINE

Filed Aug. 10, 1934 7 Sheets-Sheet 4

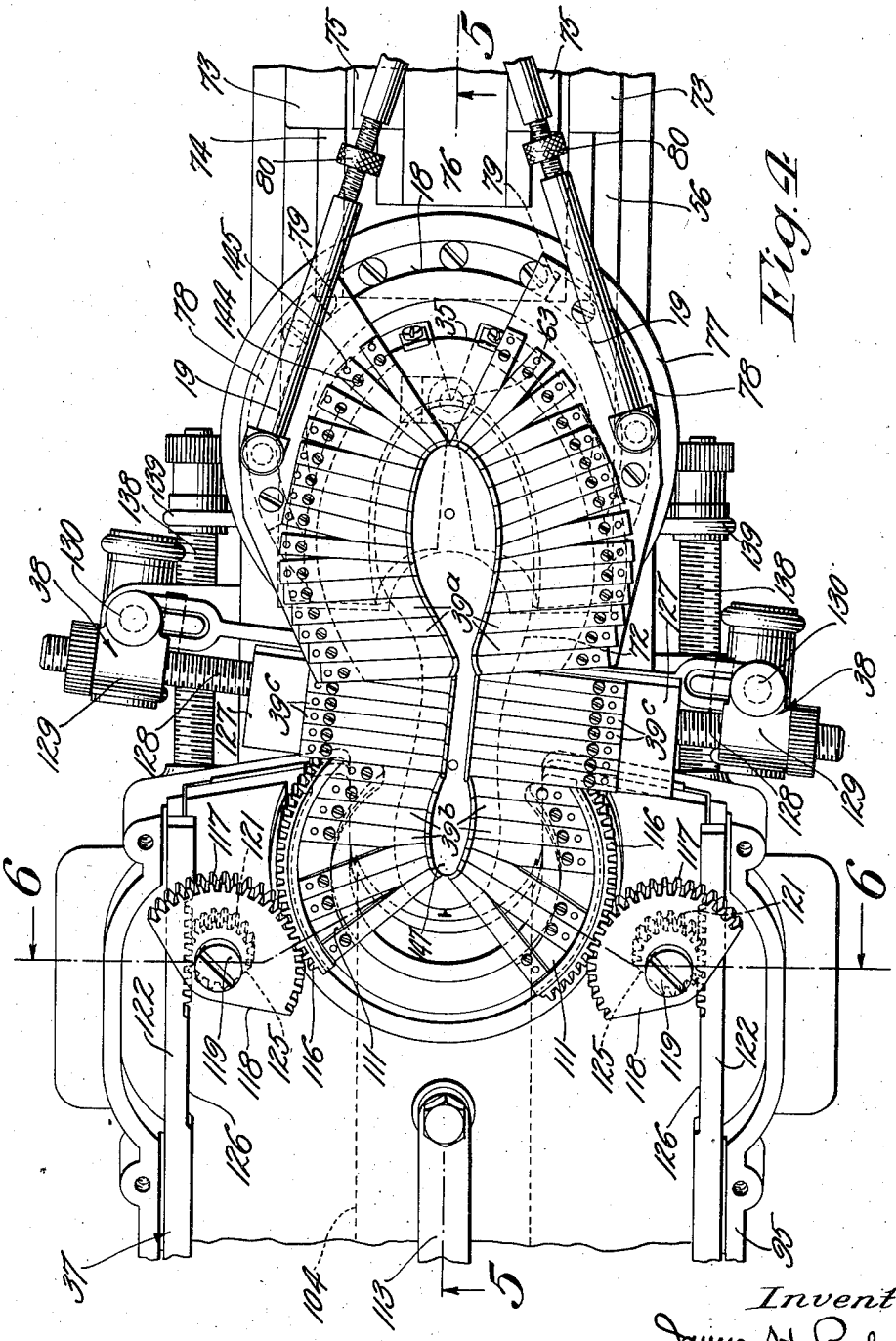


Fig. 4

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LASTING MACHINE

Filed Aug. 10, 1934 7 Sheets-Sheet 5

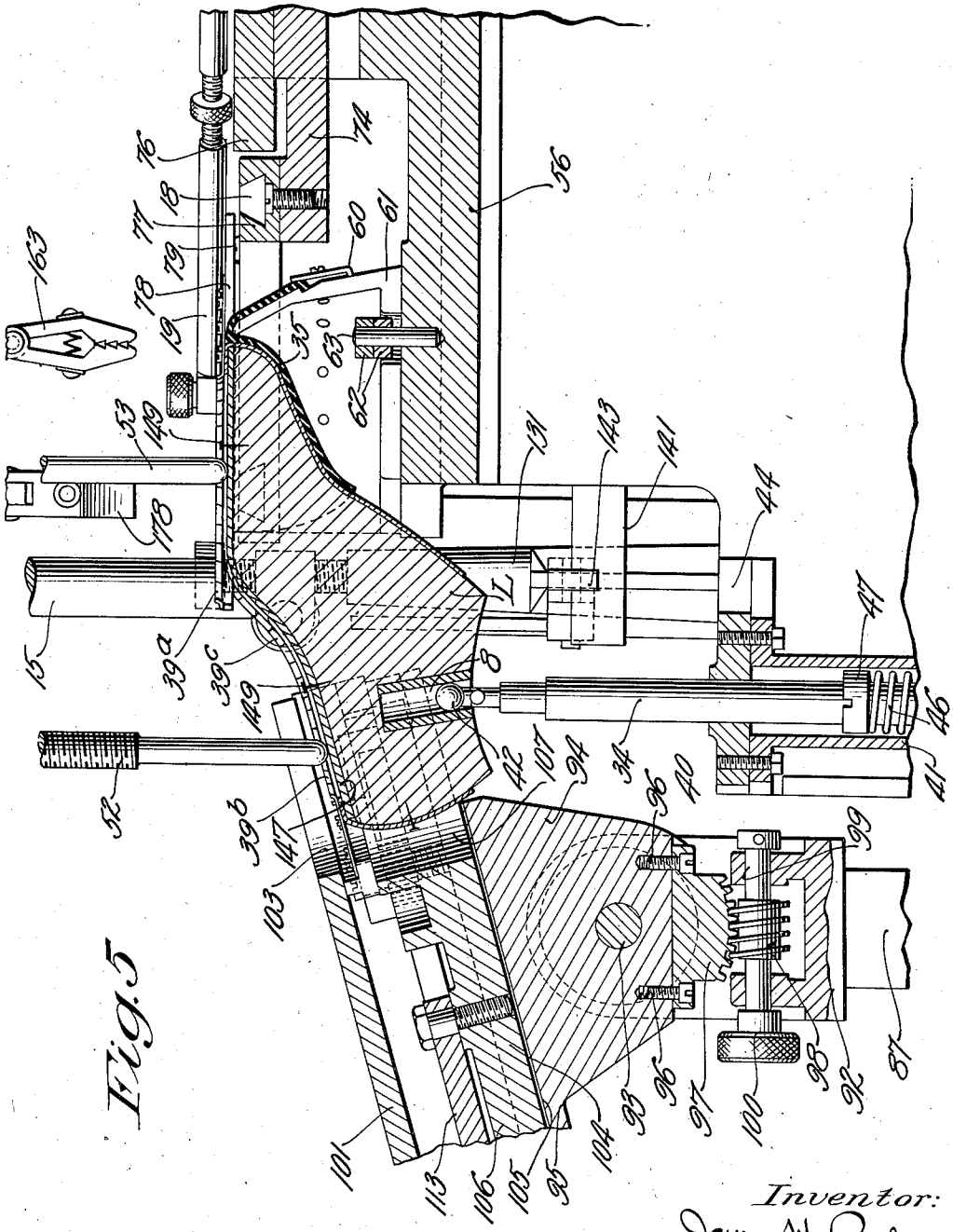


Fig. 5

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May 25, 1937. J. H. REED 2,081,207

LASTING MACHINE

Filed Aug. 10, 1934 7 Sheets-Sheet 6

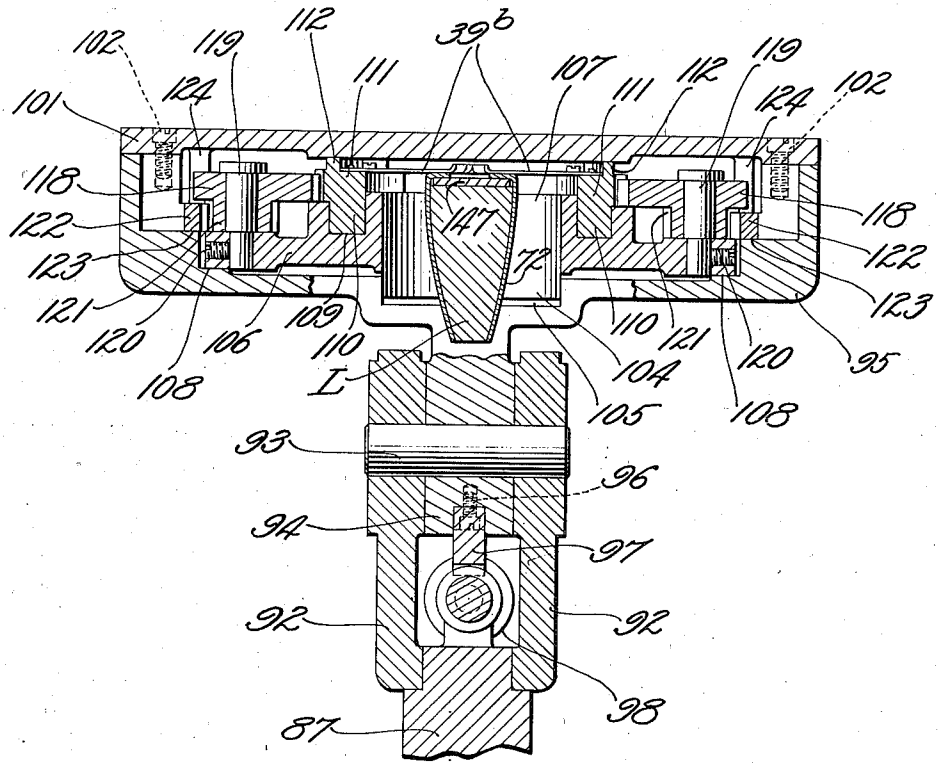


Fig. 6

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May 25, 1937. J. H. REED 2,081,207

LASTING MACHINE

Filed Aug. 10, 1934 7 Sheets-Sheet 7

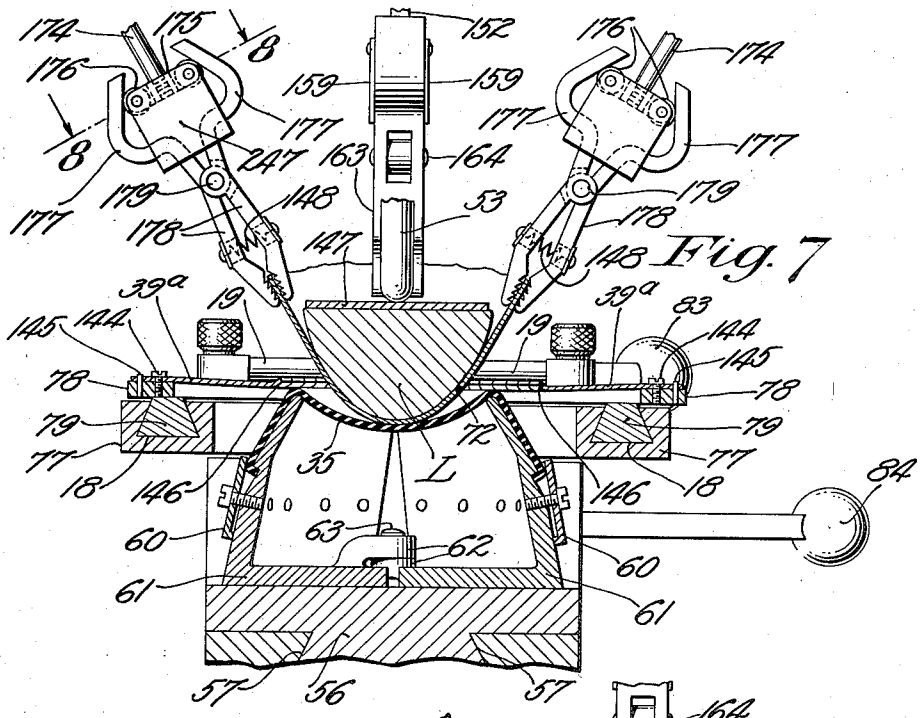


Fig. 7

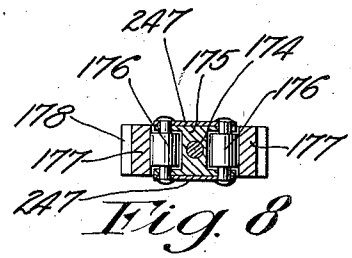


Fig. 8

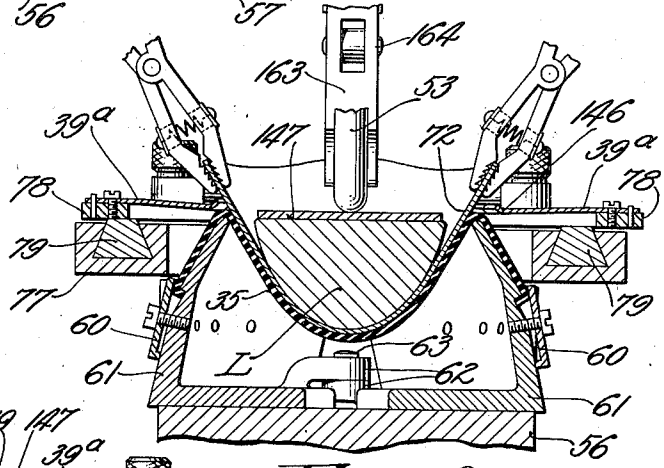


Fig. 9

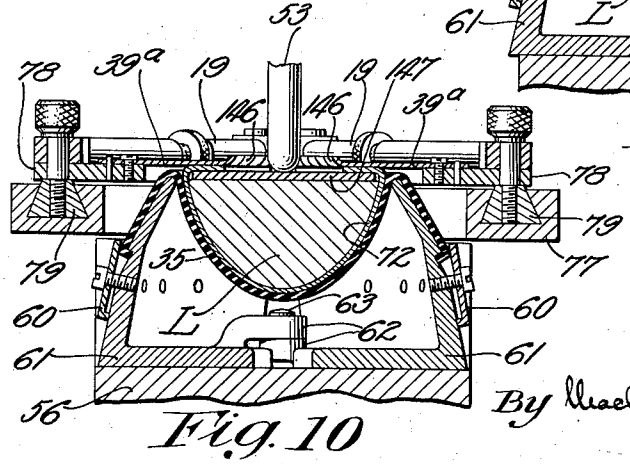


Fig. 10

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Patented May 25, 1937 2,081,207

UNITED STATES PATENT OFFICE

2,081,207

LASTING MACHINE

James H. Reed, Marblehead, Mass.; Annie L. Hosmer administratrix of said James H. Reed, deceased

Application August 10, 1934, Serial No. 739,247

1 Claim. (Cl. 12—7)

This invention relates to the manufacture of cemented shoes, sometimes known as "Ago" or "Compo" shoes, in which the insole, upper and outsole are secured together wholly by a suitable cement without the use of stitching, tacks or other fasteners.

In the manufacture of such shoes, the steps prior to final bottoming have heretofore presented certain difficulties resulting in more or less defective shoes. In accordance with the usual procedure heretofore followed, the upper and insole are assembled on the last, the upper being pulled over in the usual way, the shoe lasted either by hand or by the use of hand method lasting machines, and the edges of the upper (to which cement has been applied) secured to the insole by temporary fasteners until the cement, which constitutes the permanent connection between the insole and upper, has set. The temporary fasteners usually comprise clamping strips which are secured over the edges of the lasted upper by means of tacks or staples. This lasting of the shoe and application of the temporary fasteners is a slow and laborious operation requiring highly skilled labor. After the setting of the cement, the temporary fasteners must be removed before the outsole is applied. Also, the edge of the upper, being somewhat bunched, must be smoothed down, and, due to its wrinkled condition and the lack of adequate pressure tending to cause it to lie flat and smooth on the insole, the setting of the cement is uneven, resulting in more or less defective work. The uneven setting of the cement is further aggravated by the time consumed in the lasting of the shoe and the application of the temporary fasteners.

In my co-pending application, Serial No. 705,576, filed January 6, 1934, there is described a method to overcome the above difficulties and a mechanism whereby that method can be conveniently practiced by simple manipulations requiring relatively little skill. In accordance with this method the edges of the upper are tightly lasted over and smoothed down upon the insole and held under adequate pressure until the cement has set, without the use of temporary fasteners.

The present invention contemplates the provision of an improved mechanism for the practice of the method described in the above mentioned co-pending application and also contemplates certain improvements in that method and a mechanism whereby the improved method may be conveniently practiced.

The more particular objects of the invention, together with the preferred mode of carrying it into effect, will best be understood from the following description of the construction and operation of one form of apparatus in and by which it can be embodied and practiced, reference being had to the accompanying drawings. It will be understood, however, that the particular constructions and operations shown and described have been chosen for purposes of exemplification merely, and that the invention, as defined by the claim hereunto appended, may be otherwise embodied and practiced without departure from its spirit and scope.

The invention will be more clearly understood from the following description in conjunction with the accompanying drawings: in which,

Fig. 1 is a plan view of the machine showing the lasting instrumentalities in retracted position prior to the lasting operation;

Fig. 2 is a side elevation, partly broken away;

Fig. 3 is a vertical section taken substantially on the line 3—3 of Fig. 2;

Fig. 4 is an enlarged plan view of certain of the parts shown in Fig. 1, illustrating the positions of the parts after the lasting operation and during the setting of the cement;

Figs. 5 and 6 are sections taken substantially on the lines 5—5 and 6—6, respectively, of Fig. 4;

Fig. 7 is a section taken substantially on the line 7—7 of Fig. 2 showing an initial step in the operation;

Fig. 8 is a section taken on the line 8—8 of Fig. 7;

Figs. 9 and 10 are views similar to Fig. 7 showing subsequent steps in the operation;

Fig. 11 is a plan view of a portion of the mechanism; and

Fig. 12 is a section taken on the line 12—12 of Fig. 2.

Referring to Fig. 3, the apparatus as a whole comprises a bench 10 adapted to support the lasting unit, of which a plurality, adapted for interchangeable or successive use, may be provided. Each lasting unit comprises a base 11 adapted to be supported on rails 12 constituting parts of the bench 10 and from which rises a frame 13 suitably designed to afford the necessary supports, bearings and guides for the several instrumentalities. These instrumentalities include a last support 34 (Figs. 3 and 5), a forepart or toe-part support 35, and wiper mechanisms including a forepart wiper mechanism 36 (Fig. 1) and a heel wiper mechanism 37 and side wiper mechanism 38. The several wiper mechanisms include a plurality of independently yielding spring fingers 39 (Fig. 1) of such number and arrangement as, when moved into operative position, collectively to engage substantially the complete margin of the upper of the shoe throughout the entire outline of said shoe, as shown in Fig. 4, wherein the forepart wiper fingers are designated 39*a*, the heel wiper fingers 39*b*, and the side wiper fingers 39*c*.

Brackets 14 extending from and suitably secured to the frame 13 are provided with suitable

bearings in which a slide 15 is slidably and rotatably mounted. A depresser arm 16 is suitably fixed to the upper end of the slide 15. A collar 17 is loosely mounted upon the other end of the slide 15 between spaced collars 18a fixed to the slide. The collar 17 is connected by a link 19a with a treadle 20 intermediate the ends thereof. One end of the treadle 20 is pivotally connected to brackets 21 carried by the bench 10. The slide 15 normally is held in raised position by a spring 22, one end of which is connected to the treadle 20 and the other end of which is connected to a pin 23 fixed in the frame 13. A latch 200 is pivotally carried by the bench 10 and is provided with a notch 201 adapted to engage and lock the treadle 20 in its depressed position. The inward position of the depresser arm 16 is limited by a stop screw 202 carried by a collar 203 fixed to the slide 15 and adapted to engage a bar 204 extending between and secured to the spaced brackets 14.

Brackets 24 extend from and are suitably secured to the frame 13 and provide bearings for slidably and rotatably receiving a slide 25. An arm 26 is suitably secured to the upper end of the slide 25. A collar 27 is loosely mounted upon the other end of the slide 25 between spaced collars 28 fixed to the slide. The collar 27 is connected by links 29, with a treadle 30 intermediate the ends thereof. The end of the treadle 30 is pivotally carried by brackets 31 fixed upon the bench 10. The slide 25 normally is maintained in a raised position by a spring 32 surrounding the slide and extending between the upper bracket 24 and a collar 33 fixed upon the slide.

The work support 34 comprises an upright post guided for vertical movement in a slide 40 and in a tubular barrel 41 bolted thereto and depending therefrom. The slide 40 is mounted in a guideway 44, formed in the frame 13, and may be adjusted therein forwardly and rearwardly to vary the position of the work support, being clamped in adjusted position by a set screw 45 (Fig. 3). The work support 34 is provided with a substantially spherical upper end 42 adapted to engage in a socket 8 formed in a last L. A pair of arms 42a extend laterally from the work support adjacent the spherical end 42 and are adapted to receive the top of the last L. The work support is normally urged upwardly by a spring 46 surrounding the post 34 and interposed between a collar 47 on the latter and the lower end 48 of the barrel 41, said post being guided and held against turning by a stud 49 carried by said barrel and engaging a groove 50 in the post.

The spring 46 tends normally to hold the work support in an elevated position from which it may be depressed against the tension of the spring by the presser. The latter, as shown in Figs. 2, 3 and 5, comprises the presser arm 16 which is provided with an elongated slot 51 in which studs 52 and 53 are adjustably mounted and adapted to engage the heel and forepart of the bottom of the shoe on the last L.

The toe support 35 and the forepart wiper mechanism 36 are carried by a slide 56 (Figs. 2, 4 and 7) guided in longitudinally disposed ways 57 in the frame 13, said slide being movable in said ways to adjust the longitudinal position of the parts carried thereby in accordance with the length of the shoe being operated upon, by means of an adjusting screw 58 in threaded engagement with said slide and journalled in but held against longitudinal movement by a plate 59 (Figs. 1 and 2) secured to the frame 13 and operated by a crank 58a. The longitudinal adjustment of the slide 56 is facilitated by the provision of a scale 205 carried by the slide and an index marker 206 carried by the frame 13.

The toe support 35 (see particularly Figs. 5, 7, 9 and 10) comprises a strip of flexible and elastic material, preferably rubber, secured at its edges, as by clips 60, to a pair of hollow supporting members 61 having ears 62 pivoted to each other and to the slide 56 by a pin 63.

Referring to Figs. 1, 2, 4, 5 and 7, the slide 56 is provided with longitudinal ways 73 in which is guided a slide 74. The latter slide in turn is provided with longitudinal ways 75 in which is guided a second slide 76. Secured to the forward end of the slide 74 is an arcuate guideway 77 having an undercut arcuate groove 18 to receive dovetailed arcuate slides 79 (Figs. 4, 5 and 7), secured to the forepart end wiper members 78 which constitute the operative parts of the forepart wiper mechanism 36 and by which the spring wiper fingers 39a of that mechanism are carried. The wiper members 78 are connected with the slide 76 by separate links 19 which are independently adjustable in length to vary the initial relative positions of the wiper members 78 in accordance with the swing of the last and to adapt the mechanism to right and left shoes. To this end in the construction shown each link 19 comprises two end sections connected by an intermediate section 80 having right and left thread screw connections with the adjacent sections respectively.

The slides 74 and 76 are connected by links 81 and 82, respectively (Fig. 2) with hand levers 83 and 84 (see also Fig. 1) pivoted to ears 85 and 86 projecting from the slides 56 and 74, respectively. By this construction the lever 83 may first be operated to advance the wiper elements 78 as a unit, with the slide 74 toward the shoe until the wiper fingers 39a at the center of the series have moved longitudinally over the extreme toe portion of the upper 72 after which the lever 84 may be operated to move the slide 76 and swing the wiper members 78 toward one another transversely of the shoe, thereby causing the wiper fingers 39a which are adapted collectively to engage substantially the complete margin of the upper of the forepart of the shoe from the extreme forward end to the shank to move inwardly and wipe in said margin at the sides.

The forepart lasting mechanism above described and which is carried by the slide 56 and includes the slides 74 and 76 and wiper members 78, is mounted for adjustment and operation in a single, preferably horizontal direction, while the heel wiper mechanism (generally indicated at 37 in Figs. 1 and 2) is mounted for angular and vertical adjustment with respect to the forepart wiper mechanism in accordance with the longitudinal contour of the bottom of the shoe being operated upon and particularly the angular relationship of the forepart and heel part thereof.

Referring to Fig. 2, said heel wiper mechanism is supported by an upright or standard 87 vertically adjustable, in a tubular guide 88 formed in the base 11, by means of a screw 89 and is held in adjusted position by a set screw 91. The upright 87 is provided with a bifurcated head 92 (see also Figs. 5 and 6) between the arms of which is pivoted at 93 a depending flange or ear 94 on a second head 95. Secured to the lower end of the ear 94 as by screws 96 is a segmental

worm gear 97 which meshes with a worm 98 on a shaft 99 journalled in the head 92 and provided with a hand wheel 100. It will be seen that by operating the hand wheel 100, the angular position of the head 95 may be adjusted while by operating the screw 89, its vertical position can likewise be adjusted. As shown most clearly in Fig. 6, the head 95 is formed hollow to constitute a casing for the heel wiper mechanism and is partly closed at its upper side by a cover plate 101 (omitted in Figs. 1 and 4) secured thereto by screws 102 and cut away as shown at 103 in Fig. 5, to permit the presser stud 52 to engage the rear end of the shoe. The head or casing 95 is formed in its bottom with a longitudinal guideway 105 (Fig. 6) to receive a rib 104 (see also Fig. 4) on the bottom of the slide 106, said rib and slide being cut out at 107 to provide clearance for the rear end of the shoe. The slide 106 is guided at its outer edges on ways 108 formed on the bottom of the head or casing 95 and is itself formed with an arcuate way 109 to receive depending arcuate ribs 110 on heel end wiper members 111 formed with upstanding ribs 112 guided on the under surface of the cover plate 101, said wiper members carrying the spring wiper fingers 39b which are operated collectively to engage substantially the complete margin of the upper of the heel portion of the shoe from the extreme rear end thereof substantially to the shank. The slide 106 is connected by a link 113 (Figs. 1 and 4) with a hand lever 114 pivoted to an ear or bracket 115 on the head 95. A latch member 114a is secured upon the lever 114 and is adapted to cooperate with a latch member 114b fixed upon the head 95 to lock the heel wiper mechanism in its forward operative position. The wiper members 111 are provided with segmental racks 116 meshing with segmental portions 117 of pinions 118 rotatably mounted on studs 119 secured as by set screws 120 (Fig. 6), in the slide 106. The pinions 118 have formed thereon or secured thereto coaxial segmental portions 121 which mesh with fixed racks 122 seated on shoulders 123 in the casing 95 and held in position on said shoulders by depending lugs 124 on the cover plate 101. The pinion portions 121 are formed with flattened faces 125 (Fig. 4) which, when the parts are in the position shown in Fig. 1, engage the flattened surfaces 126 on the rack bars 122.

It will be seen that by operation of the hand lever 114, the slide 106 may be moved inwardly from the position shown in Fig. 1 to that shown in Fig. 4 and locked in the latter position by the latch members 114a and 114b. During the first part of this movement, engagement of the faces 125 with the surfaces 126 locks the pinions 118 against rotation on their studs 119 so that the wiper members 111 are moved as a unit without movement relative to each other until the wiper fingers 39b at the center of the series pass over the extreme left end of the upper 72. Thereafter, engagement of the two pinion portions 121 with the toothed portions of the racks 122 causes the pinions 118 to be rotated and, acting through the arcuate racks 116 swing the wiper members 111 toward one another transversely of the shoe to cause the wiper fingers 39b to last the upper along the sides of the heel portion of the shoe.

Referring particularly to Figs. 1, 2 and 4, the side wipers 38 comprise side wiper members 127 carrying the side spring wiper fingers 39c and having shanks 128 in threaded engagement with the heads 129 whereby the positions of said wiper members and their range of movement laterally of the shoe, may be set in accordance with the requirements. The heads 129 are threaded to receive screws 130 which are freely rotatable in the socketed upper ends of the arms 131, axial movement of said screws being prevented by set screws 132 engaging an annular groove 132a in the screws 130. Springs 3 are positioned in the socketed upper ends of the arms 131 and engage the screws 130 to retard the free rotation thereof. The free rotation of the screws 130 in the socketed upper ends of the arms 131 gives the side wiper assembly freedom to accommodate itself to the exact angle of the bottom of the shoe. By adjusting the screws 130 the vertical position of the side wiper members 127 may be adjusted in accordance with the requirements. At their lower ends the arms 131 are pivoted at 133 between the arms of bifurcated heads 134 having shanks 135 secured as by nuts 136, in slides 137. By loosening the nuts 136 the shanks 135 can be turned in the slides 137 to vary the angular positions of the side wiper members 127 in accordance with the requirements. The slides 137 are in threaded engagement with adjusting screws 138 journalled in brackets 139 secured to the base 11. By turning the screws 138, the slides 137 can be moved longitudinally of the machine to adjust the position of the side wiper members 127 longitudinally of the shoe. Pivoted to the arms 131 are latches 140 having serrated under surfaces urged into engagement with keepers 141 on the frame 13 by springs 142, said latches having at their ends fingers 143 to engage said keepers and limit the outward movement of the levers 131. The latches 140 may be released by means of handles 140a fixed upon the latches 140.

The several spring wiper fingers 39a, 39b and 39c referred to generally in Fig. 1 by the numeral 39 are secured to their respective wiper elements by screws 144, and each is held in its proper angular position by a stud 145. Each of said wiper fingers is composed of resilient material, preferably spring steel, and is formed with an upwardly curved free end 146.

It will be observed that the end wipers are all guided for movement substantially in single planes and that the side wipers by reason of the length of the arms 131 also move substantially in single planes when in engagement with the upper, the vertical component of their lasting movement being very small. In operating the machine, the parts are so adjusted and the last is so depressed by the studs 52 and 53 carried by the presser arm 16 as to bring the bottom of the shoe, and particularly the bottom face of the insole 147, approximately co-incident with the planes of lasting operation of the several wiper flanges in the regions of their operation, respectively. This operation is illustrated in Figs. 9 and 10 wherein it will be seen that, as each wiper finger 39 is moved inwardly over the edge of the upper to last the same, its curved end 146 will engage the upper and deflect the finger slightly out of its normal position, said finger by its resilience exerting a substantial pressure on the upper so as to cause it to stretch the upper and press the same firmly against the outsole.

Referring to Figs. 1, 3 and 11, the arm 26 supports a mechanism adapted to engage and stretch the upper 72 tightly upon the intermediate portion of the last. This mechanism comprises a portion 150 adapted to engage the edge of the forepart of the upper and a portion 151 adapted

to engage the edges of the intermediate portions of the upper at opposite sides of the last. The portion 150 comprises a rod 152 extending through an elongated slot 153 in the arm 26 and through a hole in a plate 155 which is adjustably secured to the arm 26 (Fig. 11) by means of a set screw 156 engaging the arm 26 and passing through an elongated slot 157 in the plate 155. The rod 152 normally is urged upward by a spring 158 (Fig. 2) surrounding the rod 152 with one end in engagement with the plate 155 and its other end in engagement with a washer interposed between the same and a nut 159 on the rod. The lower end of the rod 152 is fixed to a block 160 carrying rolls 161 adapted to engage the inwardly inclined portions of the extensions 162 of the gripper jaws 163 which are pivotally connected by a pin 164. The jaws 163 normally are urged toward one another by a spring 154. Guide plates 159 depend from the block 160 on opposite sides of the extension 162.

The portion 151 of the stretching mechanism comprises a rod 165 which extends through the elongated slot 153 and a hole in a plate 167 which is adjustably secured to the arm 26 by a set screw 168 engaging the arm 26 and passing through an elongated slot 169 in the plate 167. The rod 165 is normally held in a raised position by a spring 170 surrounding the rod and extending between the plate 167 and a washer 171 interposed between the same and a nut 172 on the rod. The lower end of the rod 165 is pivotally connected to the intermediate portion of a bar 173. Rods 174 are pivotally connected at one end to the ends of the bar 173 and are secured at their other ends to blocks 175 similar to the blocks 160 and which carry rolls 176 adapted to engage the inwardly inclined portions of the extensions 177 of the gripper jaws 178 which are pivotally connected as by a pin 179. The jaws 178 normally are urged toward one another by a spring 148. Guide plates 247 depend from the blocks 175 on opposite sides of the extensions 177.

The method of lasting shoes by means of the apparatus above described is as follows:

The upper 72, including the usual lining (Figs. 7, 9 and 10) and the insole 147 are assembled on the last L, said insole being secured to the last by temporary tacks 149 (Fig. 1). The last is placed upon the last support with the spherical end 42 of the latter engaging the socket 8 of the former and with the last resting upon the cross arms 42*a*, and the various adjustments above referred to made in accordance with the size and shape of the shoe. The treadle 30 is then depressed and the gripper jaws 163 and 178 engaged with the edges of the forepart and intermediate portions of the upper 72. The treadle 30 is then released. The treadle 29 is depressed to cause the studs 52 and 53 to engage and move the last downward to bring the several portions of the bottom of the shoe into approximately the planes of operation of the several wiper fingers as determined by the adjustments of the several wiper mechanisms and work supports, and the treadle is locked in its depressed position by engagement with the notched latch 200. This causes the springs 158 and 170 to be compressed and tends to move the gripper jaws 163 and 178 upward to stretch the intermediate portion of the upper tightly over the intermediate portion of the last. The treadle 30 is again depressed so as to permit the gripper jaws 163 and 178 to be released from the edges of the upper. As the gripper jaws are released from the upper the pivoted members 61 swing inwardly and cause the forepart support 35 to fit the upper snugly against the portion of the last adjacent the bottom thereof. Cement is then applied to the edges of the upper or to the insole, or to both, in position to secure the edges of the upper to the insole. The several hand levers 83, 84 and 114 are then operated in the manner above described and the arms 131 swung inwardly, thereby bringing the several wiper fingers into the positions shown in Figs. 4 to 6, and 10, wiping the edges of the upper over the edges of the insole, and lasting the shoe. By virtue of the arrangement of the parts and the means for operating them, the spring fingers collectively engage substantially the complete margin of the upper, wiping the same over the insole smoothly and evenly, the complete operation being performed in a very few seconds, before the cement has had an opportunity to set, and without the exercise of any considerable amount of skill or care. The operation of the wipers as above described exerts a considerable pressure upon the edges of the upper, pressing the same against the insole, but since the direction in which this pressure is exerted is substantially perpendicular to the direction of movement of the wipers into the position shown in Fig. 4, said wipers are maintained in this position until positively withdrawn by further operation of the operating levers. In the case of the side wipers, such retention is assisted by the latches 140. The pressure on the treadle 29 is then released, thereby permitting the work support spring 46 to increase the pressure between the wipers and upper. The parts are then left in this position to hold the edges of the upper under pressure until the cement has set. If desired, during the setting of the cement the lasting unit can be replaced by another and the operations repeated. Under the relatively high pressure exerted, however, the setting of the cement takes place in a very short interval of time, so that ordinarily no change of units will be required during a run of shoes of the same size and style. The pressure exerted during the setting of the cement also causes the latter to set evenly, so as to secure the upper to the insole in a reliable and satisfactory manner, and also prevents the formation of any objectionable folds or wrinkles requiring subsequent smoothing. After the cement has set, the presser is again depressed to relieve the pressure of the last against the wipers, the latter are returned to their original positions, and the lasted shoe removed. When so removed the shoe is ready for bottoming without the removal of any temporary lasting tacks or other fasteners and without any further operations upon the upper.

I claim:

In a lasting machine having a plurality of wiper fingers arranged collectively to engage substantially the complete margin of the upper of a shoe on a last, means whereby the several fingers may be moved inwardly of the edges of the shoe over the bottom thereof, the combination therewith of a last support having a substantially spherical portion adapted to engage a socket in a last, and an arm carried by said support adapted to engage the top of the last.

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