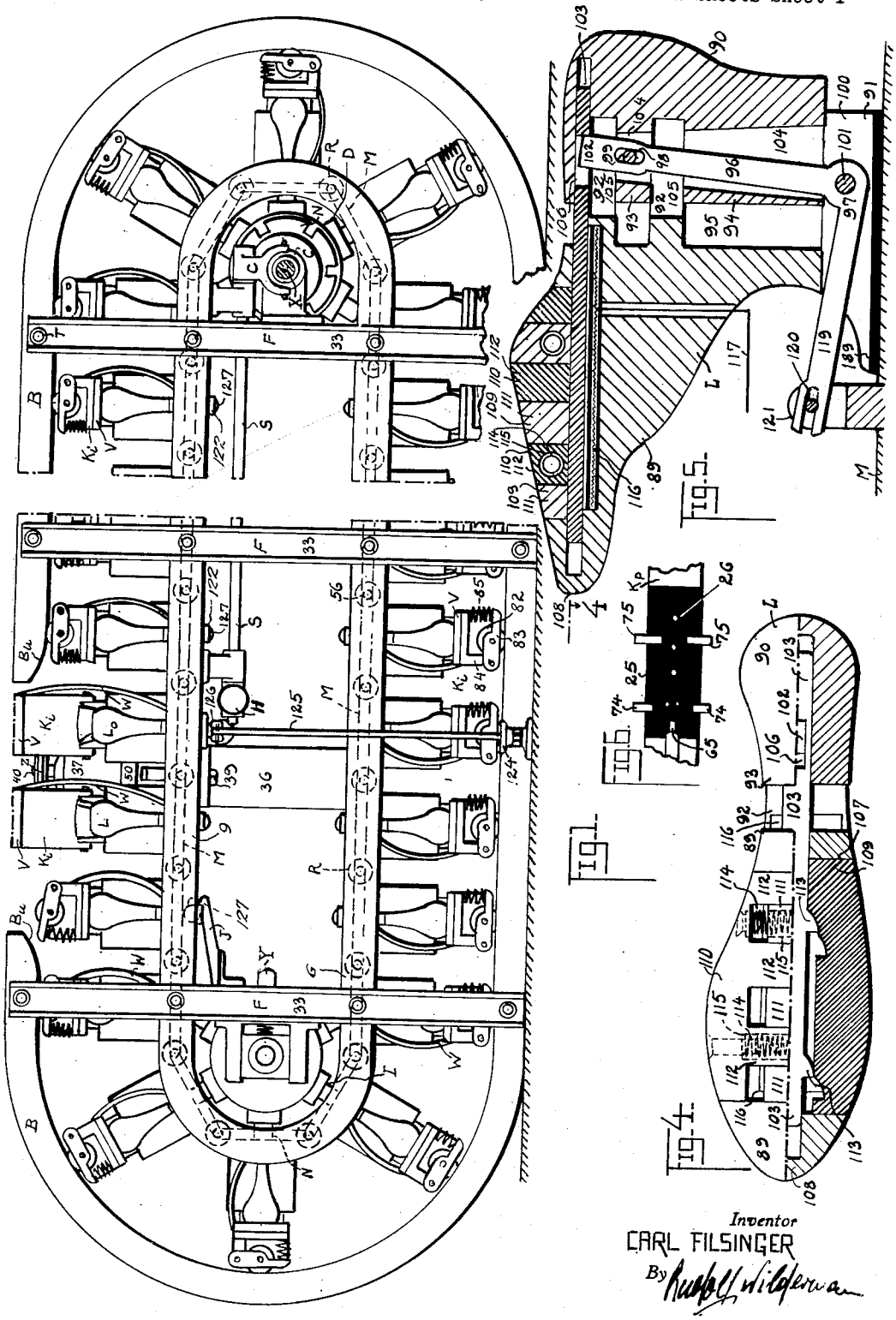
Nov. 24, 1942. C. FILSINGER 2,302,757

SHOE MAKING

Filed July 7, 1938 2 Sheets-Sheet 1



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Nov. 24, 1942. C. FILSINGER 2,302,757

SHOE MAKING

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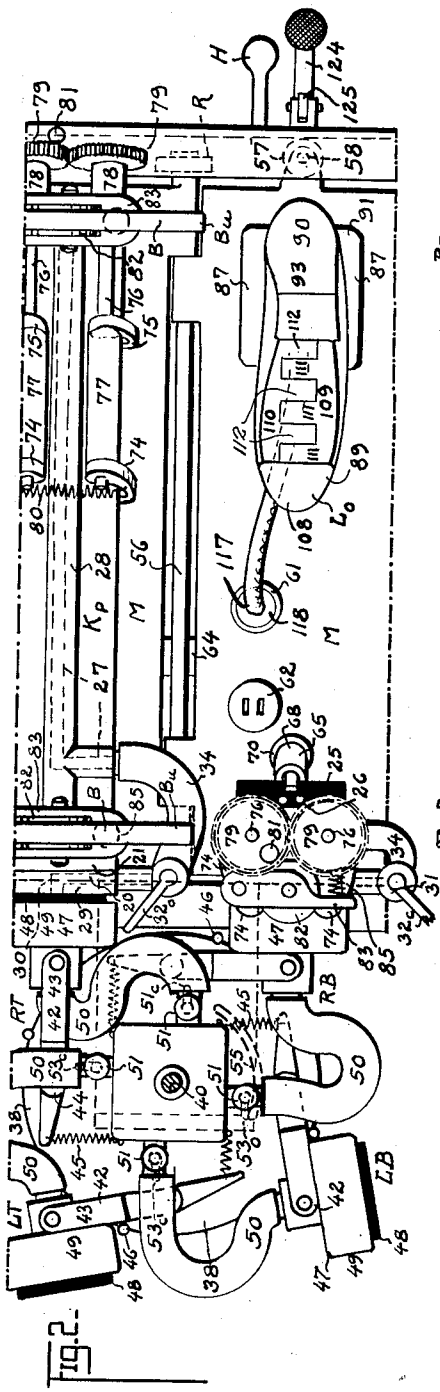


Fig. 2.

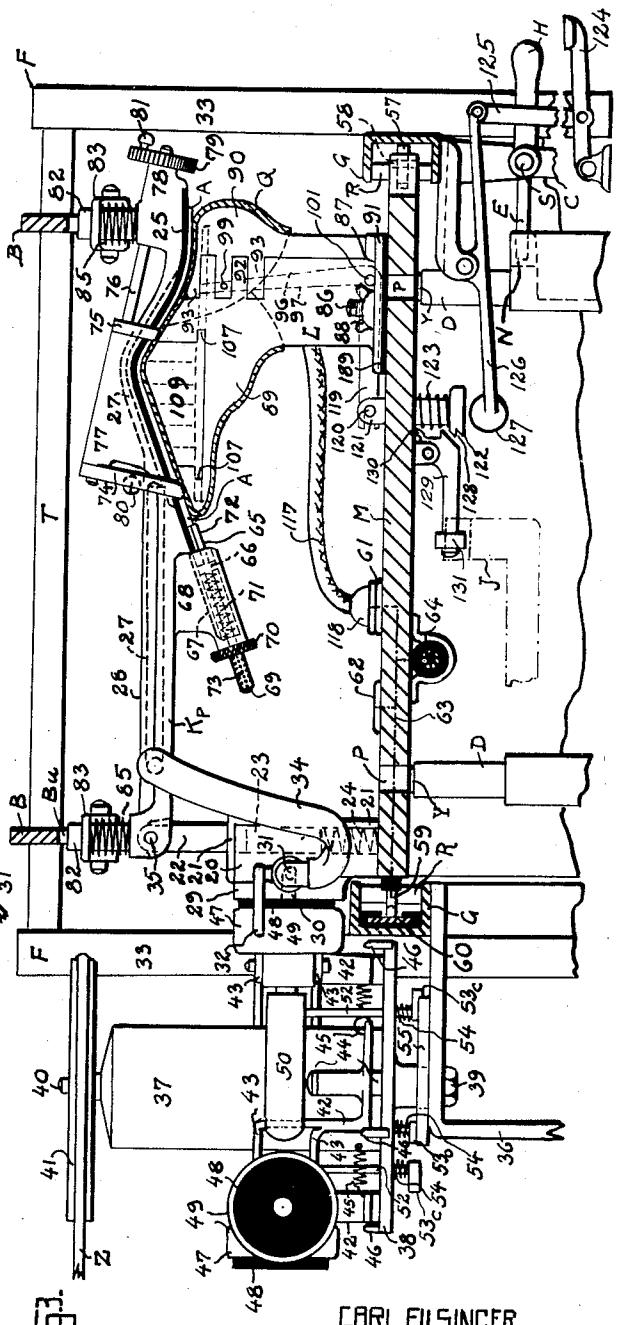


Fig. 3.

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SHOE MAKING

Carl Filsinger, Jersey City, N. J.

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12 Claims. (Cl. 12—1)

This invention concerns a method of and apparatus for making shoes. More particularly the invention relates to lasts, and to a method and means for performing operations in connection with a shoe arranged upon a last.

It is an object of this invention to provide for lasts in a predetermined order so that the shaping and finishing of shoes thereon may be expedited.

The invention further provides for adjusting lasts and for performing operations on shoes on a last in an automatic or semi-automatic fashion.

It is another object of this invention to provide for an adjustable last, e. g. it may be expanded or contracted in order to press or shape a shoe thereon, or in order to release the shoe.

Another object of this invention provides for expansion of a last in different directions in a predetermined rotation, and for reversing the said order of rotation in the collapsing operation.

Another object of this invention provides for expanding and collapsing of the last without substantially disturbing the continuity of contour of the last.

In accordance with another object of this invention, a machine is provided in which lasts move relatively to an operating position or positions. The lasts return to the said position in a predetermined order for a repetition of the said operation.

Another object of this invention provides for a machine with moving lasts in which the lasts are predeterminedly arranged in respect to means operating upon a shoe mounted on the last, or applying parts thereto.

This invention also provides for heating means, either upon or inside of a last, or outside of a last in supplemented implements, e. g. for ironing or treatment of the shoe on the last, or both.

The machine is further to provide for means predeterminedly aligning parts, e. g. soles, and predeterminedly aligning and moving them in respect to a last or to a shoe mounted on the last.

The invention also contemplates the application of pressure to a shoe upon the inside, or from the outside, or both. The invention further has the purview to provide for the commencing, e. g. cementing of parts of a shoe together, and for providing the necessary heat and pressure in predetermined chronological rotation and order.

A machine is also to be provided, which can be readily converted or adapted for operation on shoes of different sizes, and of different types, e. g. with soft and hard soles.

Other objects of this invention will be recognized from the following description. By way of illustration, but not of limitation, a preferred method and means of the instant invention will now be presented in connection with the accompanying drawings, in which:

Fig. 1 is an assembly front view of a machine for carrying out a method of this invention. Some upturned covers have been sectioned away at the top and also a repetitive portion of the machine in a transverse direction.

Fig. 2 shows a top view of a section of the machine, a pulley being omitted on top of the pump.

Fig. 3 is a corresponding cross-section of the upper level of the machine.

Fig. 4 is a partly sectioned top view of a last the level of the section being indicated by arrow and numeral 4 in Fig. 5.

Fig. 5 is a corresponding, cross-sectioned side view.

Fig. 6 shows a plan view of the rubber lining in a bottom view of part of the cover.

Figs. 2, 3 and 6 include means for aligning a sole on a cover, as used in fabricating shoes with hard soles.

Fig. 1 shows the vacuum unit as it is used in the manufacture of hard soles, but it is advanced for one position or units to the left, for the sake of clearness. The covers of Fig. 1 relate, however, to the manufacture of shoes with soft soles.

Similar numerals refer to similar parts throughout the various views:

A multiplicity of lasts may be presented on a suitable apparatus, e. g. an endless conveyor or turntable in a predetermined rotation, e. g. of pairs of right and left lasts. These lasts are moved, either continuously or intermittently. The maximum time required for a last in any particular operating position, and the time interval after which the said operation may be repeated at the same position upon another shoe, determine the number of lasts to be provided for, and the order of their cycle.

On the exemplary showing of the accompanying drawings, the last L of which one last L_0 is shown in an operating position, may be replaceably mounted upon the hingedly interconnected members or links M of a chain. At the hinge point between members or links M the rollers R may be provided upon opposite sides of the same,

said rollers running in endless U-shaped guide tracks G, which each have a straight upper and a lower extent, and semi-circular interconnecting loops at the ends, which loops are concentrically disposed in respect to gearing, e. g. a driving gear D and an idler gear I. The teeth Y of gears D and I may extend into the perforations P in each of the members or links M.

The gears D and I and the guide tracks G are mounted between the sides F of the frame, which are relatively spaced by tie rods T. Such tie rods also retain the pressure bars or rails B in the frame, said bars or rails extending in spaced parallelism around the chain and more particularly in relation to its links M. Rails B are upturned at their ends B_u where there is a gap between the said ends in the top extent of said bars or rails B.

The driving gear is connected by a clutch C to the shaft X of a motor or another suitable source of power (not shown). The clutch lever shaft S extends in front of the machine to the position L_o, where it may be controlled by a handle H. Shaft S is weighted or tensioned in a counter-clockwise direction, seen from the left, so that the clutch is normally in an open position. But against that tension or weight, the clutch C is retained in a close position by an extension E of the clutch lever, which rides upon the periphery of a notched disc N mounted upon the shaft of driving gear D. After each sixth rotation the driving gear D will therefore come to a stop because the extension E drops into a notch of the notched disc N so that the clutch is disengaged and the driving gear comes to a rest. Operation may then be resumed if the operator presses the handle H down, lifting the extension E out of the notched disc N, the extension E then riding again upon the periphery of disc N, and retaining the clutch in an engaged position, until extension E drops into the next notch in notched disc N.

The foregoing explanation of Fig. 1 suggests, in general, a means for carrying out the method of this invention. There are a multiplicity of lasts, each last remaining in an operating position for a predetermined interval or an interval which may be timed by the operator. Automatically the said last returns later, after a predetermined path of travel, to a position in front of the operator, successive lasts going through the same, continuous cycle.

There may be covers K which fit onto the lasts, being for instance swung thereonto. These covers may be elaborate, serving to align and assemble a sole on the shoe on the last. These are the covers K_p. Instead thereof, simpler cover K_l may be used which serve for ironing a soft sole shoe mounted upon the last.

These covers K_p or K_l may be replaceably hinged upon the upper end **22** of a vertical slide, the lower end **23** of such a slide being wider, and being slidably accommodated in a slide box **20** having a cover **21**, said slide boxes arising from the backs of the members or links M. In the slide boxes **20** coiled springs **24** press the slides **22** up, the wider bottom part **23** of the slides, seating, therefore, normally against the top of cover **21** of slide boxes **20**.

It may be desirable to retain a sole A upon the bottom of the cover K_p by suction. In that case the part of the bottom of the cover K_p onto which the sole is to be placed, may have a rubber lining **25** which is large enough to accommodate the largest sole to be applied. Soles are aligned on this lining in a predetermined position, and within the area upon which the smallest sole is to be aligned, there may be a number of perforations **26** which connect with a manifold **27** accommodated, for instance in a rib **28** on the top of the cover K_p. If vacuum is applied to this manifold, a sole A placed onto the rubber lining **25** will be retained in position by the pressure of the outside air.

The slide boxes **20** may be equipped as vacuum heads. For such purpose they may have a round hub **29** with a central opening **30**, and a lateral opening accommodating a valve **31** with handle **32**. In handle position 32_c the valve is closed whereas the valve **31** is open when the handle is in position 32_o. When the valve **31** is in an open position, and the machine is in operation so that the members or links M are moving, the handles 32_o, will strike the risers **33** of the frame F and will be swung into the closed position 32_c. Valve **31** is therefore normally closed, and will be in a closed position when the unit arrives in the position of last L_o. If in the said position suction is applied by way of opening **30**, the valve **31** may be opened by hand, said valve being connected by a rubber hose **34** to the manifold **27** in the cover K_p. By reason of the flexible connection of the hose **34**, there will be no interference with a swinging of the cover K_p around its fulcrum **35** on slide **22** between an upright position, in which it is shown in Fig. 2 in connection with lasts L_o or a horizontal position, in which the cover K_p is shown in connection with the other lasts of Fig. 2 or in Fig. 3.

Between the positions of the lasts just referred to, extends back from the frame F, and more particularly from the rear guide track G, a support **36**. This support **36** accommodates a vacuum pump **37** upon a turntable **38**. Turntable **38** is rotatable upon a mandrel **39** arising from support **36**. The driving shaft **40** arises vertically, centrally from pump **37** and carries a pulley **41**. By a belt Z this pulley **41** may be connected to a motor (not shown), which will therefore operate the pump independently of any rotation of turntable **38**. Four levers **42** with forked ends **43** are arranged upon a circle at fulcrum points **44** on turntable **38**. Each one of these levers **42** is normally pulled by a spring **45** against the stop **46**. Between the forked ends of levers **42** are suspended the vacuum connectors **47**. Each vacuum connector **47** has a rubber ring **48**, which may be fitted against a hub **29**, said rubber ring being retained in a bushing **49**. Bushings **49** are connected by hose **50** to a valve **51** on the pump, said hose **50** normally tensioning said bushing **49** into a position of alignment with, and abutment upon the forked ends **43** in which position they are shown at the upper left and at the bottom left and right of the pump of Fig. 2. The valves **51** have stems **52**, which are tensioned in a counter-clockwise direction coiled by springs **54** below the turntable **38**.

Springs **54** tension valves **51** into normally close positions, in which the valve handles **53** extend radially from the pump. But the handles **53** strike a cam **55** mounted upon support **36**, when the turntable **38** rotates in counter-clockwise direction. Cam **55** is an annular sector in Figs. 2 and 3, which has just swung one of the valve handles **53** into the position 53_o, in which the respective valve **51** is open. Thus evacuation effected by pump **37** will extend from said pump through the said one valve, the handle **53** of which is in an open position, to the cover K_p of the last L_o after the respective valve **31** has been

opened. The cover K_p just referred to is in an upright position, so that a sole may be aligned upon the lining **25** thereof, and will then be retained by vacuum thereon, after the respective valve **31** has been turned on.

Progressing from the left top position of the pump unit in clockwise direction through the right top and bottom positions to the left bottom position, the positions have been called LT, RT, RB and LB respectively. Let us go back to the last intermittent movement of members or links M of the chain, when one of the lasts is swung into the position L_o of Fig. 2. The connector now at position RT was pressed during said movement onto the respective hub **29**, swung therefore from RB to RT and carried the vacuum unit and turntable through an angle of 90°. At the beginning of said movement the lever **42**, which is now in the position RB, rested against the respective stop **46**, until the respective rubber ring **48** swung into abutment upon the respective hub **29** and pressed the respective lever **42** away from the respective stop **46** in counteraction to the respective spring **45** until the parts arrived at the RB position at the end of said movement. During the last part of said movement rubber ring **48** was and is in abutment upon the respective hub **29** of position RB, and the respective handle **53** was also swung into the position 53_o of an open valve **51** at position RB. But at the end of said intermittent movement the valve **51** relating to position RT was closed, because the respective handle slipped off the cam **55** and swung into the closed position 53_c. Thus vacuum is available at the position RB but not in the position RT. The vacuum is shut off just before position RT is reached, but before the vacuum is shut off the respective pressure cover K_p has proceeded underneath the pressure bar or rails B and has been placed under pressure by the rails B, as it will be hereinafter described.

During the next intermittent movement, when the connector head at RT swings to LT, the respective rubber ring **48** disengages from the respective hubs **29**, and is snapped through substantially 90° back in counter-clockwise direction against the respective forked ends **43**, due to an uncoiling of the hose **50** from the strained position at RT into the released position of LT. Lever 42 now may also swing back against stop **46**.

Provisions may be made on the members or links M to take up the reaction of the pressures from the right (Fig. 3) exerted upon these members by the connectors **47** abutting upon hub **29**, as well as other pressures occurring in this direction, as they will be presently described. For such reaction we may provide upon each member M, e. g. centrally between the rollers R mounted on the right (Fig. 3), on the hinge pin **56**, rollers **57** journalled upon vertical pins **58** in the member M, said rollers **57** running upon the inside of the right guide track G (Fig. 3). Rollers **57** also serve to take up the reaction of flat springs **59**, which serve as electric contact brushes or trolleys and press upon the "third rail" **60**. The "third rail" **60** serves to provide a supply of electric current to members M. Only one electrical line is indicated; it is presumed that the members or links M are grounded for purposes of closing the electrical circuit. The "third rail" **60** is insulatedly set back in the left track G (Fig. 3) and is suitably connected to a source of electric power (not shown). Flat springs or trolleys **59** are insulatedly mounted upon the members or links M and may, as shown by a dot-dash line, be connected by insulated wiring to suitable outlets, e. g. plug receptacles **61** and **62**, and possibly also to a flexible cable **64**. The flexible cable **64** is provided for interconnecting the electric supply of all members or links M, and assures a continued supply of current on all members or links M, so that all members or links M must not be provided with trolleys **59** or must not contact the rail **60** at all times.

In connection with most types of shoes Q the curvature of the sole in a longitudinal direction may be the same for all sizes, although the toe and heel of the sole may extend variously in the respective planes. Under these conditions it is possible to use one cover K_p for all sizes of shoes, the soles extending more or less to the front and also to the back for larger or smaller sizes. The last, or various sizes of lasts, may be exchangeably mounted in predetermined alignment underneath the cover case K_p upon the member or links M.

Various arrangements may be made in order to allow an operator to align a sole quickly in a predetermined position upon the bottom of cover K_p when said cover is in an upright position, for instance in connection with last L_o, or in connection with a position prior thereto. An arrangement, which requires one adjustment only for various sizes of soles, will be suggested by the following example: Facing the cover K_p in an upright position, the operator sets the tip of the toe of a sole A down upon an adjustable stop **65**. The stop **65** comprises a keyed, but otherwise round lug **66**. From lug **66** in one direction the screw stud **69**; and in a frontward direction the flat **72** serves as a finger upon which the tip of the toe of the sole A is set, i. e. as stop proper. From the cover K_p depends a bracket **68**, which has a hole with a feather keyway **67** slidably accommodating the lug **66**. The hole in the bracket **68** is contracted in the back so that it slidably accommodates the threaded stud **69**. Thus the bracket also provides a reaction surface for a compression spring **71**, which is coiled around the threaded stud **69**, and presses the lug **66** to the front. Against the tension of spring **71**, the stop **65** is retained in bracket **68** by a knurled nut **70** engaged upon the threaded stud **69**. Rotation of the knurled nut **70** will adjust the finger **72** towards or away from the tip of the sole, and the operator may orient himself by way of suitable marking **73** as to the proper position of stud **65** for a certain size shoe Q. The spring **71** is stiff enough to retain the stop normally in a fixed position, when the sole is set up on top thereof. But when, later, the cover K_p is swung down onto a shoe Q spread on the last L_o, it may be desirable that the stop yield, and such yielding is obtained by compression of spring **71**.

Aside from the variations of the length of a sole, there are variations in the width for the various sizes of soles, which widths vary proportionately for certain points along the length of the soles for different sizes of soles. As suitable guides I provide pairs of fingers **74** and **75**, e. g. one pair to the front of the sole and another pair **75** to the back of the sole, the pairs of fingers being mounted upon pairs of shafts **76**, which are journalled in lugs **77** and **78** arising from the cover K_p and are interconnected by a pair of meshing gears **79**. Like the stop **72** the tips of the fingers **74** and **75** extend from the sides over the bottom of cover K_p, e. g. over the rubber lining **25** thereon. The fingers may be tensioned to-

gether, for instance by a spring 80 extending between the fingers 74. Thus the fingers 74 and 75 will open in opposite direction equally, although there may be a difference between the proportionate movements of the tip of the fingers of each pair, as the widths of soles at different points of their lengths may vary at different ratios, such varied ratios being provided by disposing the shaft 76 at such angle where the fingers 74 and 75, as levers of different lengths yield different movement of the tips of the fingers. A suitable means may be provided for the operator, e. g. a knob 81 upon one of the gears 79, so that he may open up the pairs of fingers in jaw fashion, when he sets up a sole A on the back stop 65; whereupon the fingers 74 and 75 will centrally and predeterminedly align the sole resting on back stop 65, when the operator releases knob 81. When the sole is then pressed laterally, after the cover K_p is swung down and pressed onto a shoe Q on the last below, then the fingers 74 and 75 may give evenly, reacting upon spring 80.

It has been indicated before that after a cover K_p has been swung down onto a last therebelow, the suction transmitted by manifold 27, which has been turned on by way of valve 31 after the fingers 74 and 75 have centrally aligned the last on stop 65, will tightly retain the last when it has moved out of the position L_o, until mechanical pressure is applied from the top to the cover K_p, by one or more bars or rails B extending above the cover K_p, in the direction of its travel. The bars B are arranged apart at suitable distances, so that they may press the cover K_p evenly down after pressure has been slowly increased by way of the upturned ends B_u of said bars. In accordance with such arrangement of the bars B, suitable lugs or rollers may be arranged upon each of the cover B_u, such lugs or rollers slidably or rotatably engaging underneath the bar B and travelling there along.

The pressure members coacting with the bars B may for instance be executed as rollers 82, which are centrally supported in forked levers 83. The forked levers are fulcrumed at one end upon lugs 84 extending up from the cover K_p, the other, free end of each forked lever resting upon a compression spring 85 arising from cover K_p. According to the relative spacing of the bars B and tracks G, the springs 85 will therefore produce any desired pressure upon the cover K of the link M of the chain upon which the covers K may be superimposed.

Each last L is mounted upon one of the members or links M in registration with the respective cover K, e. g. by way of threaded guide studs 86 slidably fitting into gears 87 extending from each last in opposite directions. By way of such studs the last may then be strapped down, e. g. by wing nuts 88. If the lasts are to be heated, an insulating layer 189 may be interposed between the last L and the respective member or link M. For lasts of the common construction with a central guide hole in the shank, a suitable arbor may arise from the members or links M, and various means suggest themselves for arranging the lasts fixedly in the desired direction of alignment with a sole A depending from cover K_p. But as a preferred last, which may be expanded and heated, I suggest the following:

The last may have a front pad and a rear part or heel, said parts being arranged to move relatively to each other, e. g. by swinging or sliding. In addition the front part should be expansive. According to the example here illustrated, the front part 89 is stationary, and carries the gears 87 just referred to. Upon the base 91 of said front part 89, said base 91 comprising gears 87, slidably rest the rear part or heel 90. At their tops the back of the front part and the front of the heel are notched, so as to provide lobes 92 and 93, respectively, which horizontally overlap each other in tongue and groove fashion. These lobes may extend across the last. A narrower, rectangular lug 94 projects frontward from the lower portion of heel 90, said rectangular lug 94 slidably fitting between the relatively spaced sides 95 projecting backwardly from the front part 89. The lobes 92 and 93, and plug 94 have central, rectangular clearances, with the exception of the top lobe 93 of the heel, said clearances accommodating in width the upright shank 96 of crank lever 97, whereas longitudinally said clearances allow play for said shank 96. Shank 96 is vertically slotted at 98, where it engages upon a pin 99 extending across one of the lobes 93. The base of the front part is also slotted at 100 to the width of the crank lever 97 and here the crank lever is fulcrumed by a pin 101 upon the front part 89. Counter-clockwise movement of the crank lever will therefore close the front part and heel of the last upon each other, whereas movement in an opposite, clockwise direction (Fig. 5), will stretch a shoe Q mounted upon the last. The tip 102 of the shank 96 extends, with play, into a longitudinal slot 106 of a slide bar 103 which is longitudinally guided in suitable clearances 104, 105 of the heel 90 and front part 89 of the last. The slot 106 in slide bar 103 is longer than the tip 102 protruding thereinto, so that the slide bar 103 will only participate in the movement of the heel in opposite directions at the end of each movement.

A transverse groove, with undercut bottom clearances 107 is cut across the top of the front part 89, between the solid toe 108 and the rear portion thereof. This groove slidably accommodates the ball portions 109 and 110, which overlap at their tops by way of the transverse lobes 111 and 112, respectively and which conform with the extended contour of the last, when they are stressed apart. Such stressing apart is effected by the slanted projections 113 extending from opposite sides of the bar 103, when said bar is retracted by the crank lever 97. But when bar 103 is pushed to the front the slanted projections 113 fall into corresponding clearances in the bottoms of the ball portions 109 and 110. The ball portions 109 and 110 are tensioned together in order to close over the bar 103 moved to the front by tension springs 114 engaged in the bottoms of registering holes of the ball portions 109 and 110. The flat surface of the front part 89, upon which the bar 103 is longitudinally, and the ball portions 109 and 110 are transversely slidably arranged, is recessed by way of a cavity 115 accommodating a heating element 116, said heating element being electrically connected by way of a suitable cord 117 and plug 118 to one of the receptacles 61 and 62. The other receptacle may receive cord O for connection to a heating element in the cover K_1 serving for instance for ironing purposes.

Following the movement of the crank lever, we observe, that connection with a clockwise motion of the crank the wheel 90 is first projected back from the last, and then the ball portions 109 and 110 are moved apart. In the reversed

movement of the crank lever the heel 90 first closes in upon the front part 89 of the last and then the two ball portions 109 and 110 close upon each other.

The substantially horizontal arm 119 of the crank lever is longitudinally slotted and engages by way of said slot upon a pin 120 in the forked upper end of a plunger 121 which has a head 122 at its lower end. The head 122 is normally in a low position, being depressed by a compression spring 123 extending between said head and the member or link M. When the head 122 is in a low position, the crank is swung into its extreme position in counter-clockwise direction, and the last is collapsed. At the position of a last L_o each last, and the respective member or link M and the respective head 122, are stationed above a foot pedal 124. Foot pedal 124 is connected by rod 125 and lever 126 to a point of the machine, at which a ball formation 127 on the end of lever 126 registers with the head 122 in the position referred to just above.

There may be notches 128 upon one side of the head 122, and the pawl 129 depending from the member or link M will fall into said notches and automatically will retain the plunger 121 in its top-most position, against the reaction of spring 123, a shoe mounted on last L_o being now in a stressed state.

Having thus arranged a shoe on the last, the operator may now turn his attention to the cover K. If the operator is making shoes with soft soles, he may merely use an ironing cover K_I, having a heater plate V which now is swung down from an upright position, into which it had been swung previously for the purpose of removing the shoe last finished from the last L_o from said last. After the operator has swung the cover K_I down onto a soft sole on the last, he depresses handle H, causing the last L_o to proceed to the next, following position, the cover K_I being placed under the pressure of the rails or bars B before it arrives at said next position. The unit referred to will remain under said pressure until it has travelled over the right end of the machine down and up again on the left side of the machine, where the cover K_I is released from pressure by the top rails B, when the cover moves up from under the curved ends B_u of the rails B. When the last unit has emerged from under the rails B, a piece of slanted rail J, which is fastened upon the frame F, engages underneath and lifts up the roller 131, said roller being mounted upon an extension of pawl 129. Thus pawl 129 is swung in clockwise direction (Fig. 3 or seen from the left end of the machine), and will release the head 122, which drops down under pressure of spring 123, causing the last to collapse into a closed position. Now the operator may lift up the cover K_I, and may remove the shoe from the last. The pawl 129 may be provided with a lug 130 upon the side opposite to the roller 131, said lug checking against the bottom of the member or link M, when the pawl is released by the short rail J and drops under its own weight. If a shoe with a hard sole is to be fabricated, the operations just described are modified in the manner first described above. I. e. a cover K_P is used, upon which a sole is aligned by the mechanical means, such as stop 65 and fingers 74 and 75 described above, or by the suction applied through the lining 25, or both.

The sole is preferably prepared as follows:

A layer of cement has been applied thereto in the first instance, the layer having dried, in part at least. Now, when the sole is to be placed onto the machine, another layer of cement is placed onto the first layer, and then the sole may be placed onto the upright cover K_P in the manner heretofore described herein. When the cover K_P is then swung onto a shoe Q mounted upon a last on the position of last L_o and the cover is placed under pressure, as the last travels on underneath the bar B, the second layer of cement will engage upon the shoe Q, will redissolve the dried or partly dried first layer of the cement, until eventually, under the action of pressure, the sole properly adheres to the shoe extending on the last.

What I claim is:

1. A last suited for fabricating a shoe thereon, comprising a supporting member, an expansive front part and a heel part, one of said parts being mounted on top of said member and said parts being relatively longitudinally movable, and a single control element adapted for expanding said front part and for moving said parts apart.

2. A last suited for fabricating a shoe thereon, comprising a supporting member, a front part having a toe, a heel part, a transversely movable ball portion on said front part, said front part being affixed to said member and said portion and heel part being movable at right angles to each other and out from said front part, and gearing for moving said parts apart and moving said portion on said front part.

3. A last suited for fabricating a shoe thereon, comprising a supporting member, a front part having a toe, a heel part, a transversely movable ball portion on said front part, one of said parts being mounted on said member and said parts being relatively longitudinally movable, and gearing for "first" moving said parts apart and "then" moving said portion laterally out on said front part when said gearing is passed through a continuous motion.

4. As implements for manufacturing shoes, a plurality of interconnected movably arranged supporting members, lasts fixedly arising from said members in upside-down positions, said lasts comprising relatively transversely and longitudinally movable sections and control means mounted on said member, operatively connected with said sections and serving to expand a last in two directions at will.

5. As an implement for manufacturing shoes, a last comprising a heel oppositely movable front sections on opposite sides, tension means pulling said sections together, and a slide bar interposed between said sections and shaped as a wedge fitting into recesses in said sections, said slide bar being movable between said sections into different positions in which said sections are variously spaced apart against the reaction of said tension means and moved out on opposite sides relatively to said heel.

6. As implements for manufacturing shoes, a plurality of interconnected movably arranged supporting members, lasts fixedly arising from said members in upside-down positions, said lasts comprising relatively transversely and longitudinally movable sections, said sections having lobes interconnected in tooth formation and forming a substantially continuous surface, when said sections are moved together.

7. As an implement for fabricating shoes, a last, a cover fitting said last, a member fixedly supporting said last and movably supporting said cover, said cover being predeterminedly guided by said member relatively to a position of registering

abutment of said cover upon the sole of said last, a stop on said cover upon which may be set a sole to be applied to a shoe extended on said last, and means for adjusting said stop on said cover for soles of different sizes.

8. As an implement for fabricating shoes, a last, a cover fitting said last, a member fixedly supporting said last and movably supporting said cover, said cover being predeterminedly guided by said member relatively to a position of registering abutment of said cover upon the sole of said last, a suction manifold on said cover for engaging thereon a sole to be applied to a shoe on said last, a pump, and coupling means connecting and disconnecting said pump and said manifold as said member is moved.

9. As implements for manufacturing shoes, a plurality of interconnected movably arranged supporting members, lasts fixedly arising from said members in upside-down positions, said lasts comprising relatively transversely and longitudinally movable sections, and an electric heater interposed in said last between said sections.

10. As implements for manufacturing shoes, a plurality of interconnected movably arranged supporting members, lasts fixedly arising from said members in upside-down positions, said lasts comprising relatively transversely and longitudinally movable sections, and an electric heater interposed in said last between and contacting with all of said sections.

11. A shoe making machine comprising a rotation of units, each unit having a last and a cover aligned with said last, supporting means movably guiding said units along an endless path, and pressure means spacedly arranged along said path and serving to depress the covers onto the lasts of said units, said pressure means engaging said covers along part of said path only.

12. A last suited for fabricating a shoe thereon, comprising a supporting member, a front part having a solid toe, a heel part, and a longitudinally movable portion on said front part for expanding said front part, one of said parts being mounted on said member and said parts being relatively longitudinally movable.

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