Aug. 17, 1948. J. P. FREDERICKSEN 2,447,062

MACHINE FOR LASTING SHOES

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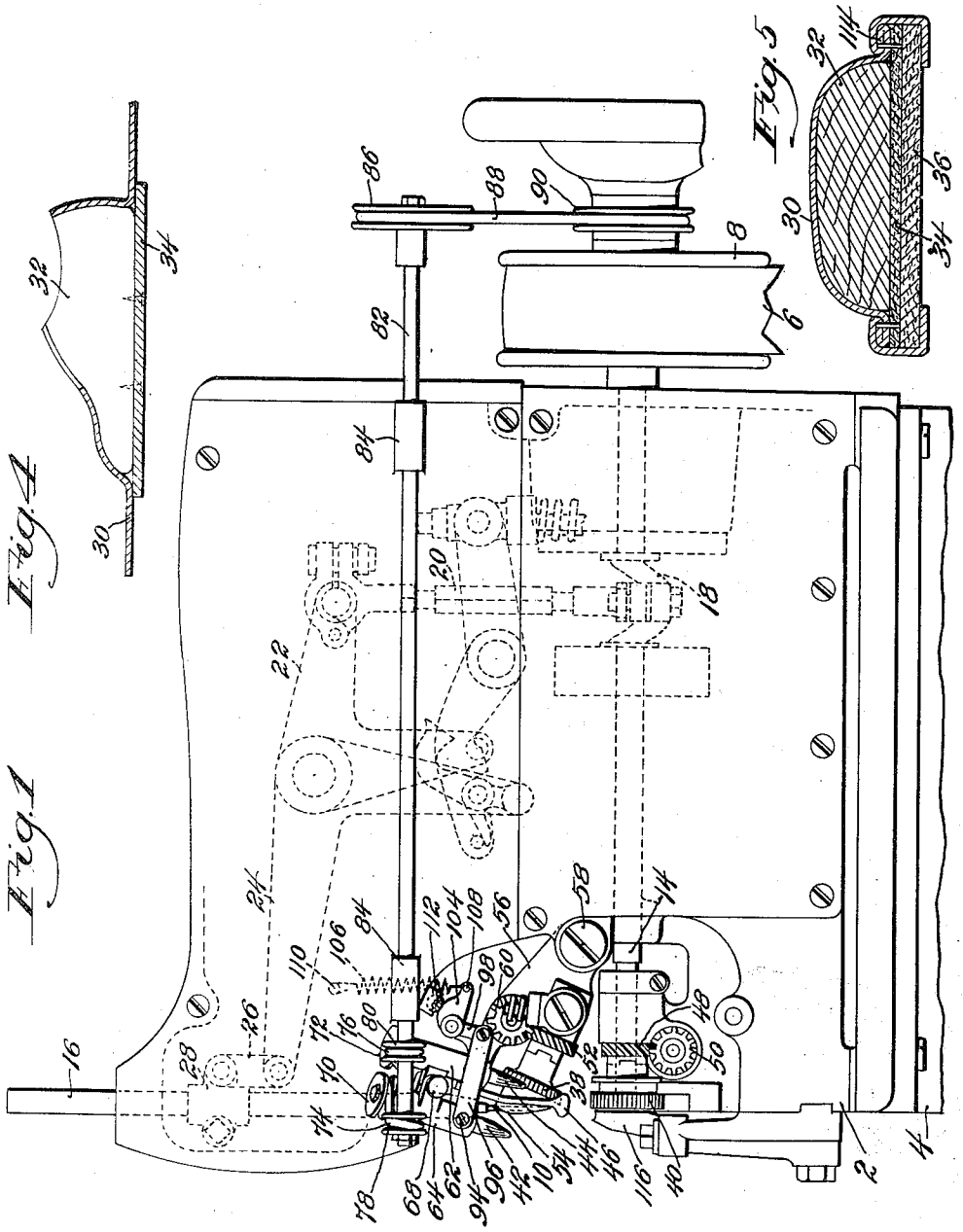


Fig. 1

Fig. 4

Fig. 5

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Fig. 3

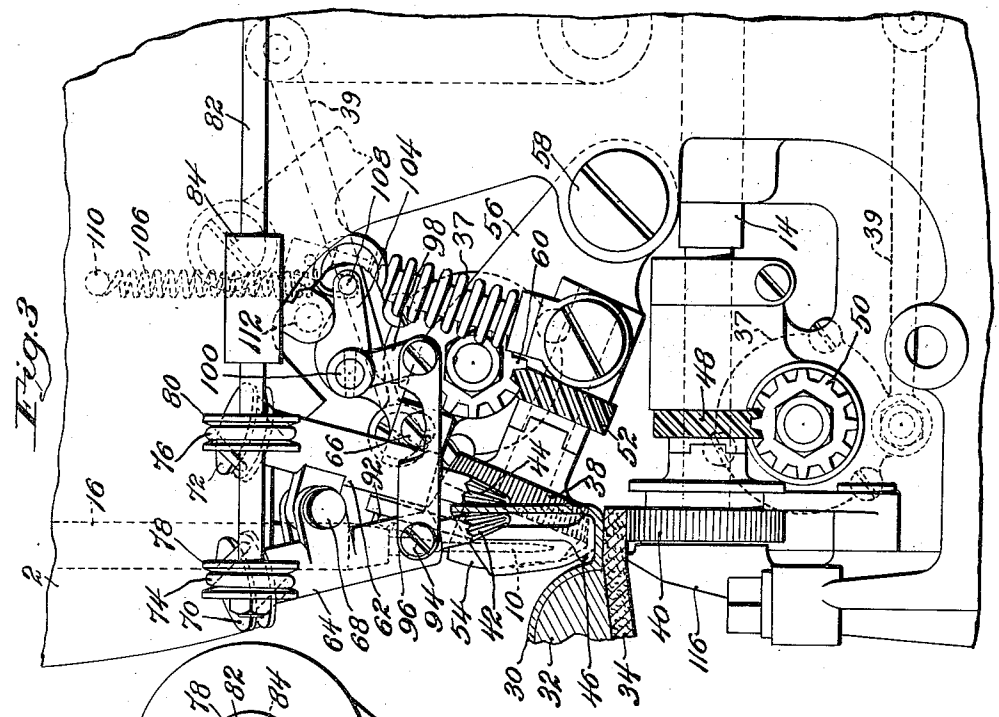
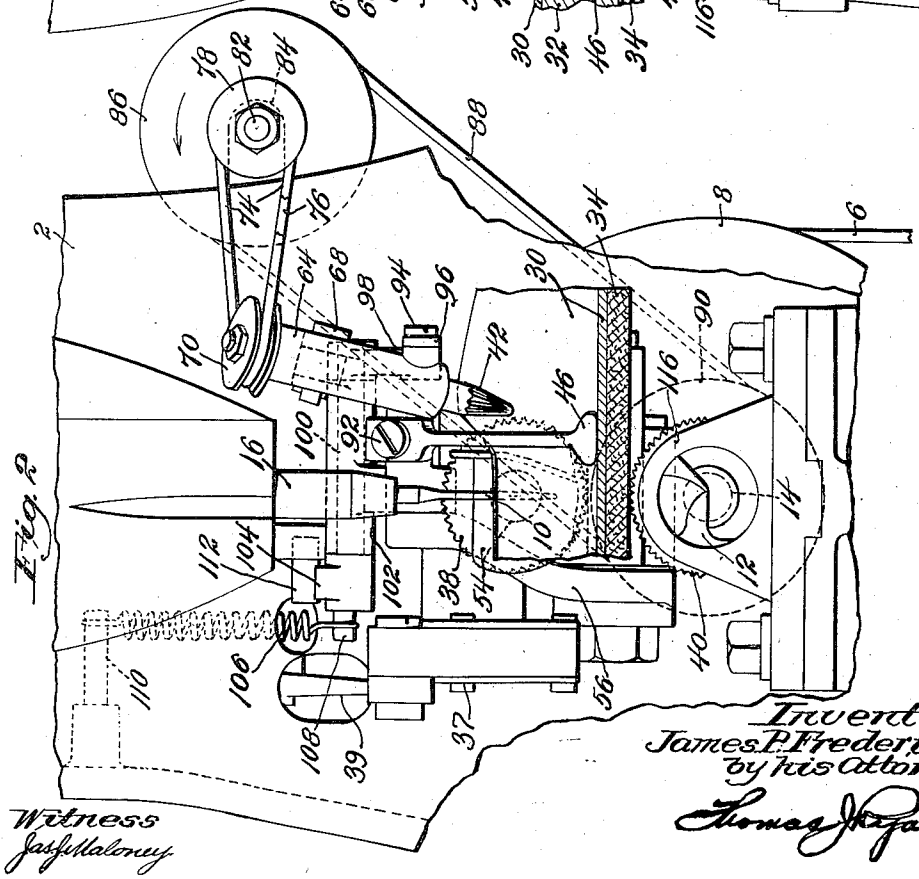


Fig. 2



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MACHINE FOR LASTING SHOES

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12 Claims. (Cl. 12—6)

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The present invention relates to machines for lasting stitchdown shoes and is herein shown and described as embodied in an improvement of a sewing lasting machine disclosed in United States Letters Patent No. 1,864,510, granted June 21, 1932, upon application of Bernard T. Leveque.

An object of the invention is to provide a progressive lasting machine which will not only act effectively to stretch the upper of a stitchdown shoe tightly over a last, but which will also improve the action of the machine in such a way that a more uniform tension will be imparted to the upper throughout the lasting margin of the upper without the exercise of particular attention or skill on the part of the operator for the machine. Other objects of the invention are to improve the construction and arrangement of parts in a machine for lasting stitchdown shoes.

For the accomplishment of these and other objects, the machine of the present invention is provided with an upper clamping and progressive lasting roll of known design and a member between which and the lasting roll the marginal portions of a shoe upper and sole are gripped, together with means acting along the line of progression in advance of the bite of the lasting roll in gripping the shoe to impart a preliminary tension to the upper. Preferably, the preliminary tensioning means consists of a pair of secondary upper feeding and tensioning rolls separate from the primary lasting roll, located to engage the upper only, so that by the time the upper reaches the grip of the lasting roll substantially all of the looseness in the upper will be taken out, leaving the parts being operated upon in the proper relation for a final upper tensioning and lasting action such as is required to bring the upper uniformly into close fitting conformity and accurate engagement with the last on which the upper is supported. The secondary rolls also assist in presenting the shoe to the machine as the operation progresses by guiding the marginal portion of the upper and holding it continuously out of engagement with other operating parts of the machine.

To enable the shoe to be presented to the machine and to be withdrawn readily after an operation thereon is completed, according to a further feature of the invention, the secondary tensioning rolls are arranged to be separated when the machine is brought to rest and to be brought into engagement with the shoe upper in starting a new operation. The separation of the secondary rolls is timed to occur at the same time or shortly after the primary lasting roll releases its grip on the shoe.

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While the invention is useful in connection with the illustrated sewing lasting machine, it may also be embodied to advantage with other types of lasting machines which act progressively. For example, the use of the secondary tensioning rolls may be useful in producing improved results wherever progressively acting upper pulling gripping means has been employed as a lasting device.

These and other features of the invention are embodied in certain combinations, constructions, and arrangements of parts hereinafter described and claimed, the advantages of which will be readily understood from the following description taken in connection with the accompanying drawings in which,

Fig. 1 is a view in right-side elevation of the upper portion of a lasting and sewing machine embodying the features of the present invention;

Fig. 2 is a view in front elevation on an enlarged scale of parts about the sewing point of the machine illustrated in Fig. 1 showing in section a portion of a shoe being operated upon;

Fig. 3 is a view in right-side elevation of the parts of the machine illustrated in Fig. 2;

Fig. 4 is a sectional view of a shoe prepared for a sewing and lasting operation in the machine of the invention; and

Fig. 5 is a sectional view on an enlarged scale taken across the toe of the shoe after the lasting and sewing operation.

The machine illustrated in the drawings is a thread lasting machine of the same construction and mode of operation, except as hereinafter described, as that disclosed in the patent to Leveque above identified and comprises a sewing head or frame 2 supported upon a base 4 upon which is mounted suitable driving means connected with the sewing head of the machine by a belt 6 passing over a clutch pulley 8 controlled by a starting and stopping treadle (not shown) mounted at the bottom of the base.

The stitch forming devices comprise an eye-pointed needle 10, a rotating looper 12 (Fig. 2) fixed upon one end of a main operating shaft 14. The needle is secured to the lower end of a needle bar 16 actuated by a crank 18 on the main shaft 14 through a connecting rod 20, a pair of concentrically mounted bell cranks 22 and 24, and a short link 26 between the bell crank and a clamp block 28 on the needle bar.

The machine is intended to operate upon a shoe upper 30, illustrated in Fig. 4, drawn loosely over a last 32 and held in properly centered relation thereupon by the operator and a midsole or insole 34 is tacked to the last. The upper is ar-

ranged with its marginal extension flaring against the edge of the sole in loose engagement therewith. The shoe parts thus referred to are similar to those of the conventional stitchdown shoe except that the marginal portion of the upper in the present shoe projects substantially beyond the extension of the sole edge as in the shoe disclosed in United States Letters Patent No. 2,339,726, granted January 18, 1944 in the name of Karl A. Stritter. The projecting portion of the upper margin, after being lasted and fastened by the stitch forming devices of the illustrated machine, is folded back upon itself and carried about the edge of the insole and a platform member **36** of the same outline as the insole to cover the edges of both. The projecting portion of the upper is then carried beneath the platform **36** and secured in a convenient manner as by cement. To last the upper to the insole of the shoe described above the illustrated machine is equipped with a primary upper clamping and lasting roll **38** similar to that disclosed in the Leveque patent and with a lower insole-clamping roll **40** cooperating with the roll **38** to grip the upper and insole in close proximity to the point at which they are attached together in the manner set forth in the patent.

In the embodiment of the invention, only the flaring edge of the upper which projects beyond the edge of the insole **34** is acted upon by secondary upper tensioning rolls **42** and **44** arranged in a particularly advantageous manner to take out the looseness of the upper about the last and to distribute the fullness of the upper uniformly along the insole edge before the upper reaches the bite of the lasting rolls as the lasting operation progresses. To assist in guiding a shoe and to bring the upper firmly into contact with the extension of the insole edge, the upper is drawn beneath a guiding abutment or foot **46** which also engages the last supported bulge of the upper directly in advance of the sewing point. The upper tensioning rolls **42**, **44** and abutment **46** act continuously not only to take out the looseness in the upper in advance of the sewing point in the machine, but also to keep the edge of the upper from coming into contact with the needle and the other operating parts of the machine.

The lasting rolls **38** and **40** are constructed and arranged the same as in the machine of the Leveque patent. The lower insole-engaging roll **40** is mounted directly upon the reduced forward end of the operating shaft **14** and is rotated by a helical gear **48** loose on the shaft **14** driven by a corresponding gear **50** actuated intermittently during each stitch forming cycle. The lasting roll **38** is driven by a corresponding helical gear **52** rotatable on a stud **54** which also supports the roll **38**. The stud **54** has an enlarged head forming a guard at the outer end thereof and an inner end secured upon a supporting member **56** pivoted at **58** on the head or frame of the machine. The lasting roll **38** also is enabled to move bodily toward and from clamping relationship with the roll **40**. For driving the upper lasting roll **38**, the helical gear **52** is rotated by a similar gear **60** also driven intermittently and simultaneously with the movement of the roll **40** to feed the shoe. To drive the gears **50** and **60**, they have connected to them similar oppositely arranged driving mechanisms including Horton clutch driving members **37** and links **39** (see Fig. 3). The arrangement and operation of the lasting rolls **38** and **40** is such that while the operations progress a continuously applied tension is imparted to the upper. At the end of each rotary movement of the lasting rolls the needle penetrates the upper and insole to insert stitches which produce further tightening of the upper into firm lasted relation with the last **32**. As thus far described the construction is the same as in the Leveque patent.

During operation of the machine described in the patent, it is the practice for the operator frequently to manipulate the flaring edge of the upper with his fingers in advance of the point of sewing operations to take out the looseness in the upper before it is gripped by the roll **38**. In some cases, however, preliminary manipulation of the upper in this way during sewing is difficult, the presentation of the shoe to the machine requiring full attention of the operator and all the forces capable of being exerted conveniently by both his hands.

To avoid the necessity of manipulating the flaring edge of the shoe upper in advance of the sewing point and to apply a preliminary tension to the upper in the machine of the present invention, the secondary upper tensioning rolls **42** and **44** are driven positively and continuously throughout each cycle of machine operation with a greater peripheral movement than that of the lasting rolls. The secondary tensioning rolls are driven at such speed that movement of the flaring upper edge will not, however, require greater movement to be imparted to the shoe by the lasting rolls **38** and **40**, the flaring edge of the upper being of greater length than the portion of the upper engaging the extension insole. Any excess of rotation imparted to the lasting rolls beyond that required by the secondary rolls causes slippage between the rolls and the upper. The secondary rolls **42** and **44** are inclined at an acute angle to the direction of shoe movement between the lasting rolls and at a small angle to each other as illustrated in Figs. 2 and 3. The rolls, when rotated, provide a component of up-draft in the edge of the upper and act on the upper a sufficient distance in advance of the sewing point at which the needle **10** operates that they clear the other moving parts of the machine. The work-engaging portions of the secondary rolls are fluted and are of small diameter with a tapering shape. The axis of the roll **44** is fixed but that of the roll **42** is movable to enable separation from the roll **44** when desired for introduction of the upper between them.

The mountings and driving connections for the secondary rolls are similar to those described in United States Letters Patent No. 2,140,532, granted December 20, 1938, on an application of Axel A. Lawson. The bearing structure for these rolls consists of a pair of sleeves **62** and **64** within which they rotate. The sleeve **62** is secured to the supporting member **56** by a screw **66** passing through a lateral projection from the sleeve and into threaded engagement with the supporting member. The sleeve **64** is hingedly connected by a pin **68** to the sleeve **62** enabling relative movement between the work-engaging ends of the secondary rolls.

For driving the secondary rolls **42** and **44**, their upper ends carry pulleys **70** and **72** surrounded by belts **74** and **76**. The belts **74** and **76** also engage similar pulleys **78** and **80** fixed to a horizontal shaft **82** rotating in bearings **84** on the frame of the machine. The pulleys **78** and **80** are arranged in a ninety degree relationship to the pulleys **70** and **72** on the upper ends of the secondary rolls and located to enable their separation without stretching the belt **74** excessively. To drive

the shaft 82, its rearward end has mounted upon it a pulley 86 engaged by a belt 88 passing over a pulley 90 secured to the main operating shaft 14. When the main operating shaft begins to rotate the secondary tensioning rolls thus are operated to draw the flaring edge of the upper toward the sewing point with a continuous movement throughout the lasting and sewing operations.

The feeding movements imparted to the upper and sole by the lasting rolls 38 and 40 are intermittent, alternating with the reciprocation of the needle. The peripheral speed of the lasting rolls is arranged to cause somewhat less feeding movement in the shoe than the secondary rolls. For this purpose the sizes of the pulleys 78, 80, 86 and 90 are so chosen that a greater peripheral speed will be attained in the secondary rolls. The distance between the point of engagement of the secondary rolls 42 and 44 to the point of engagement of the lasting rolls 38 and 40 perpendicular to the seam line is sufficient to permit continuous movement of the upper edge while intermittent motion only takes place along the line of the seam inserted. Furthermore, combined intermittent and continuous movement at spaced points on the upper is advantageous in taking out and distributing evenly the excessive fullness in the upper along the last, the secondary rolls drawing the upper from beneath the abutment 46 to force the last supported surface of the upper firmly against the outer edge of the abutment. The greater peripheral speed of the secondary rolls compensates for the extra length of the upper margin about the curved edges of the shoe. This action insures a uniform relationship between the parts being operated upon before the upper and sole are gripped by the lasting rolls 38 and 40. Also less effort is required of the operator in presenting the shoe to the machine than with the usual arrangement, the parts being guided more or less automatically as the operation progresses.

After leaving the secondary tensioning rolls 42 and 44, the flaring edge of the upper passes between the shank of the abutment 46 and is bent forwardly against the outer surface of the head of the stud 54, which serves as a needle guide in a manner more fully described in the Leveque patent. The abutment 46 is secured to the supporting member 56 by a screw 92 so that the abutment acts close to the sewing point between the needle and the tensioning rolls 42, 44.

When the lasting roll 38 is raised to free the shoe from its grip, the abutment 46 also is raised and the secondary tensioning rolls 42, 44 separate. To separate the tensioning rolls 42, 44 before a sewn shoe is removed from a machine, the sleeve 64 forming a bearing for the roll 42 has pivotally connected to it at 94 the forward end of a link 96, pivotally connected in turn to an arm 98 secured to one end of a shaft 100 carried by a bearing sleeve 102. The bearing sleeve 102 is formed integrally with an upwardly projecting portion of the supporting member 56 so that it moves with the supporting member when the lasting roll 38 is raised to disengage the shoe upper. At the end of the shaft 100, opposite to that which carries the arm 98, is a second arm 104 acted upon by a tension spring 106 stretched between a pin 108 carried by the arm 104 and the pin 110 within the machine frame. The spring 106 acts through the arms 104, 98 and link 96 to force the roll 42 against the roll 44 during lasting and sewing operations. After the operations are completed and the supporting member 56 together

with the lasting roll 38 raised, a cam surface along the upper edge of the arm 104 engages a pin 112 to rotate the arm 104 and shaft 100 in a clockwise direction, as viewed in Fig. 3. This movement of the shaft 100 swings the arm 98 to the left against the action of the spring 106 and separates the roll 42 from the roll 44. When the supporting member 56 and lasting roll 38 again are moved downwardly in starting operations on a new shoe, reverse action takes place and the tensioning roll 42 is brought into yielding engagement with the flaring edge of the shoe upper which is positioned between the rolls 42, 44.

The upper lasting roll 38 not only grips the upper to hold it while a seam is being inserted but it also acts to fold over the upper upon itself, the line of the fold being guided by the inner edge of the abutment 46 beneath which the upper is drawn by secondary tensioning rolls. Each stitch is then inserted with the threads passing through a folded-over portion of the upper and the insole 34, as indicated at 114 in Fig. 5. After the lasting and sewing operations are completed on a shoe, the marginal portions of an upper have been brought into close proximity to the bulging last supported surfaces of the upper and the excessive fullness of the marginal upper portions has been evenly distributed throughout the length of the seam connecting the upper to the insole.

To complete the shoe, the platform 36 is temporarily affixed to the sole 34 with their respective edges registering and the marginal portions of the upper outside the line of stitches 114 is folded about the registering edges of the insole and platform in the manner illustrated in Fig. 5. The shoe thus constructed furnishes a heavy reinforcement along the line of stitches 114 which are concealed and shielded against entry of moisture or other deteriorating agents. After the platform 36 has its edges covered over by the upper, a suitable outsole may be attached by conventional methods, either cement or sewing, or both.

In other respects, the machine embodying the invention operates in the same manner as that in the Leveque patent, above identified, and is equipped with a thread cutter (not shown), a work support 116 of the usual construction serving as a shoe supporting and steadying member supplementing the grip of the lasting rolls 38, 40 and other devices more fully described in the Leveque patent. The action of the upper engaging abutment 46 and the secondary tensioning rolls 42, 44 assists in directing the shoe properly as the operations progress not only by drawing the upper beneath the abutment and holding the last supported surface of the upper against the forward edge of the abutment but also by means of the secondary rolls the horizontal position of the shoe is maintained accurately at all times. The tension of the upper beneath the abutment causes the entire shoe to be drawn upwardly somewhat and the position of the abutment enables the operator to raise the shoe being sewn about the work support and lower lasting roll 40 as a fulcrum until further upward movement is stopped by the abutment. When this position of the shoe is reached the abutment serves as a gage to insure accurate presentation of the parts to the lasting rolls and stitch forming devices with unvarying uniformity throughout the length of the seam inserted.

The nature and scope of the invention having been indicated and the construction embodying

the several features of the invention having been specifically described, what is claimed is:

1. A machine for lasting shoes having a clamping roll, and a member between which and the clamping roll the marginal portions of a shoe upper and sole are gripped, in combination with means acting in advance of the roll to impart a preliminary tension to the upper.

2. A machine for lasting shoes having a clamping roll, and a member between which and the clamping roll the marginal portions of a shoe upper and sole are gripped, in combination with a pair of secondary rolls acting on the marginal portion of the upper in advance of the upper clamping roll to impart a preliminary tension to the upper.

3. A machine for lasting shoes having a clamping roll, and a member between which and the clamping roll the marginal portions of a shoe upper and sole are gripped, in combination with a pair of secondary rolls acting on the marginal portion of the upper in advance of the upper clamping roll to impart a preliminary tension to the upper, and an upper engaging abutment for pressing the tensioned upper against the sole between the secondary rolls and the last supported surface of the upper.

4. A machine for lasting shoes having means for clamping the marginal portions of a shoe upper and sole in close proximity to the point at which they are to be attached, in combination with means acting in advance of the bite of the clamping means to impart a continuous preliminary tension to the upper about the last.

5. A machine for lasting shoes having an upper clamping and lasting roll and a member between which and the roll the marginal portions of a shoe upper and sole are gripped, in combination with a pair of secondary rolls acting in advance of the lasting roll to impart a preliminary tension to the upper, and means for driving the secondary rolls during each cycle of machine operation with a greater feeding movement than that of the lasting roll.

6. A machine for lasting shoes having upper clamping and lasting means acting progressively along the projecting marginal portions of a shoe upper and sole by which the shoe upper and sole are gripped, and means for inserting fastenings between the grip of the lasting means and a last on which the shoe is mounted, in combination with a pair of rolls acting on the marginal portion of the upper only in advance of the lasting means to impart a preliminary tension to the upper.

7. A machine for lasting shoes having upper clamping and lasting means acting progressively along the projecting marginal portions of a shoe upper and sole by which the shoe upper and sole are gripped, and means for inserting fastenings between the grip of the lasting means and a last on which the shoe is mounted, in combination with a pair of rolls acting on the marginal portion of the upper in advance of the lasting means, the axis of which rolls is inclined at an acute angle to the line of progressive movement of the lasting operation to impart a preliminary tension to the shoe upper.

8. A machine for lasting shoes having upper clamping and lasting means acting progressively along the projecting marginal portions of a shoe upper and sole by which the shoe upper and sole are gripped, means for inserting fastenings between the grip of the lasting means and a last on which the shoe is mounted, in combination with a pair of rolls acting on the marginal portion of the upper in advance of the lasting means, the axis of which rolls is inclined at an acute angle to the line of progressive movement of the lasting operation to impart a preliminary tension to the shoe upper, and means for driving the preliminary tensioning rolls with a greater peripheral movement than that of the lasting means.

9. A machine for lasting shoes having upper clamping, lasting and feeding means, in combination with a pair of preliminary tensioning rolls acting on the upper only along the line of feed in advance of the feeding means to take out the looseness and distribute uniformly the fullness in the upper.

10. A machine for lasting shoes having upper clamping and lasting means including members for feeding the shoe intermittently, in combination with a pair of rolls acting on the marginal portion of the upper in advance of the lasting means to impart a preliminary tension to the upper, and means for rotating said rolls continuously during lasting.

11. A machine for lasting shoes having upper clamping and lasting means including members for feeding the shoe intermittently, in combination with a pair of rolls acting on the marginal portions of the upper in advance of the clamping means to impart a preliminary tension to the upper, mechanism for releasing the upper from the grip of the clamping means at the end of a lasting operation and simultaneously for separating the preliminary tensioning rolls.

12. A machine for lasting shoes having upper clamping, lasting and feeding means, in combination with a pair of preliminary tensioning rolls arranged at an acute angle to the direction of shoe movement imparted by the lasting and feeding means to take out the looseness in the upper against the last.

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