(No Model.) 5 Sheets—Sheet 1.

N. LOMBARD.

LASTING MACHINE.

No. 524,446. Patented Aug. 14, 1894.

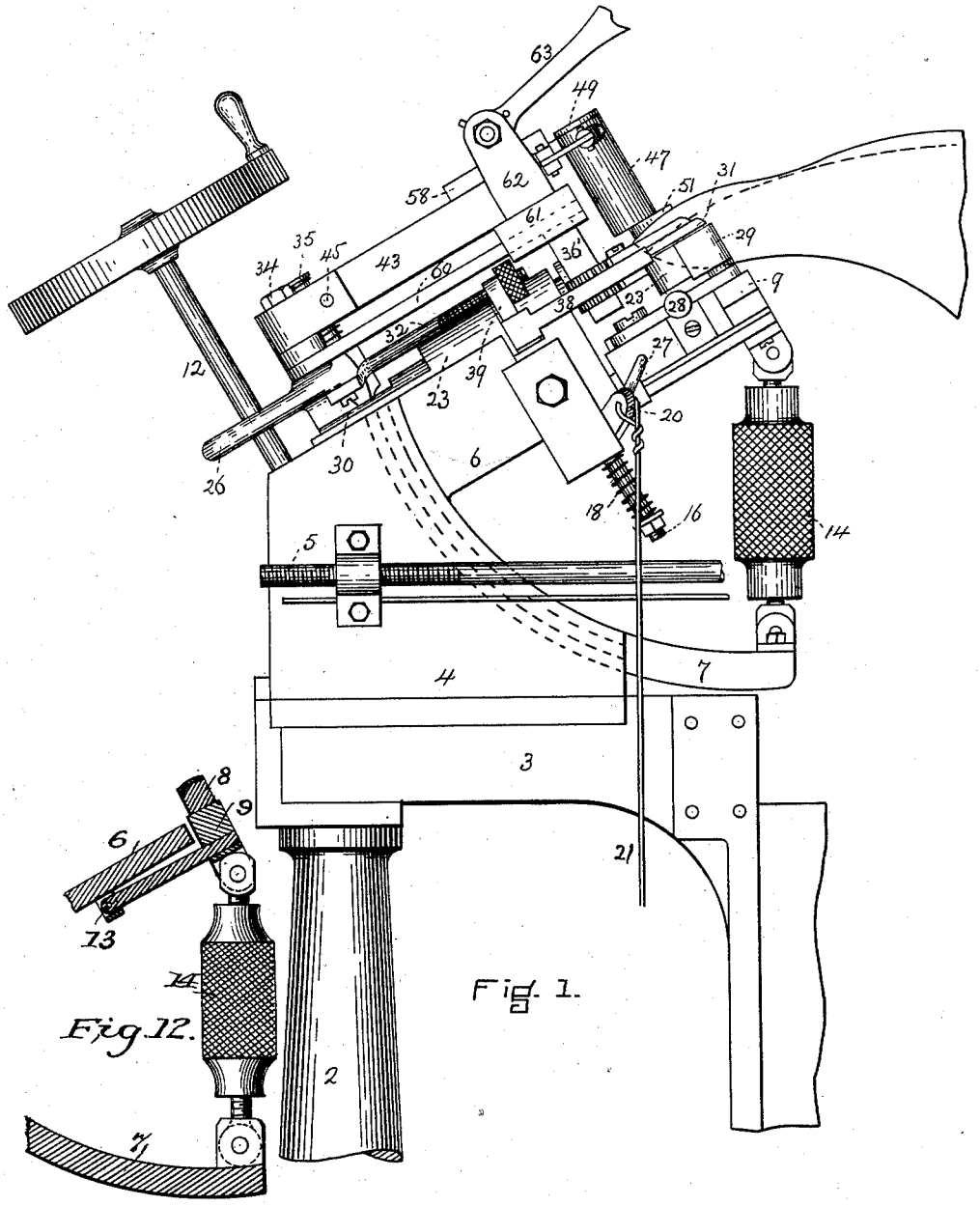

Fig. 1.

Fig. 12.

WITNESSES.

A. D. Gibbons

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INVENTOR.

Nathaniel Lombard.

by H. C. Lodge Atty

(No Model.)

5 Sheets—Sheet 2.

N. LOMBARD.

LASTING MACHINE.

No. 524,446.

Patented Aug. 14, 1894.

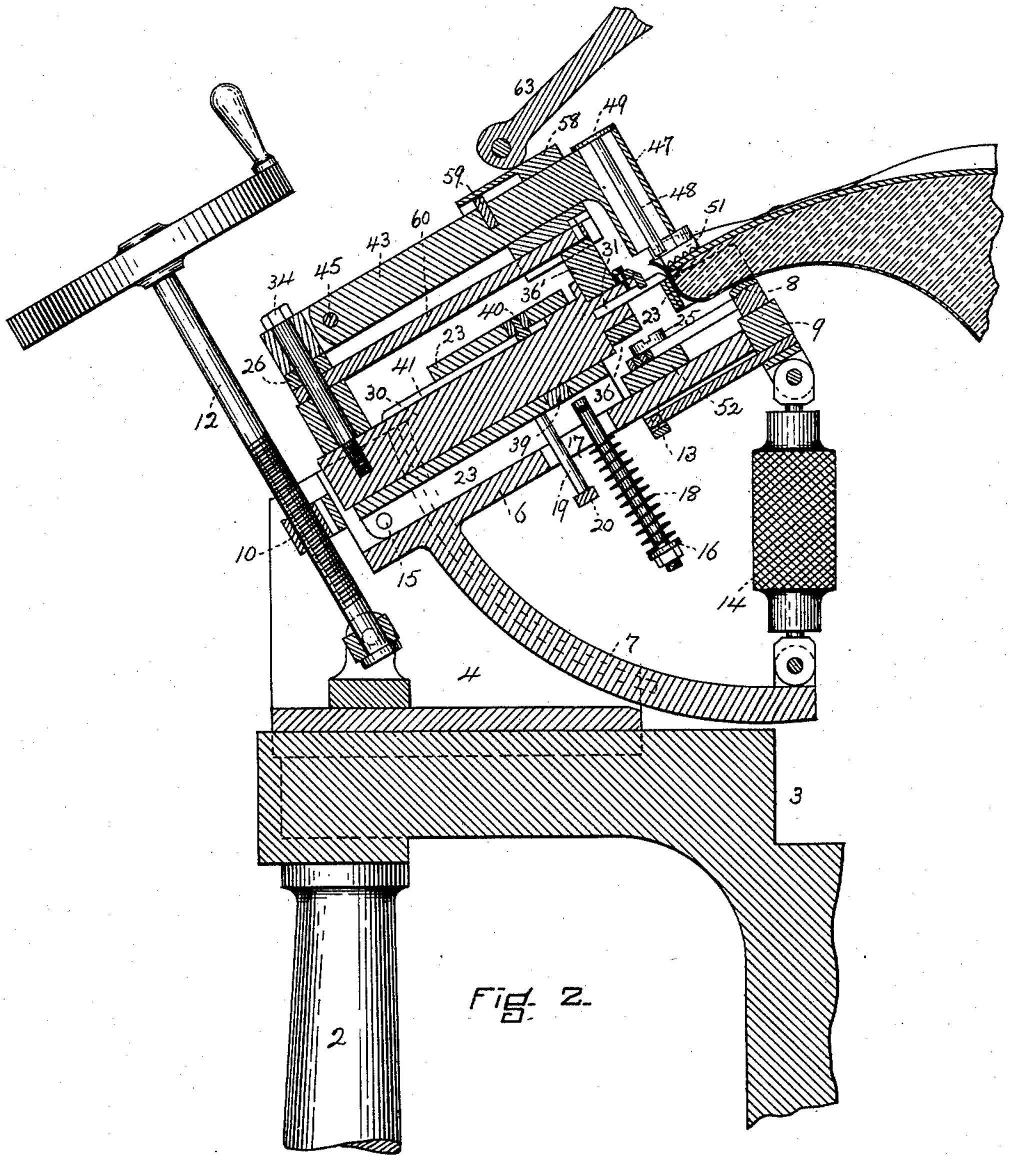

Fig. 2.

WITNESSES.

A. D. Green.

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by H. E. Lodge Atty.

(No Model.) 5 Sheets—Sheet 3.

N. LOMBARD.

LASTING MACHINE.

No. 524,446. Patented Aug. 14, 1894.

Fig. 3

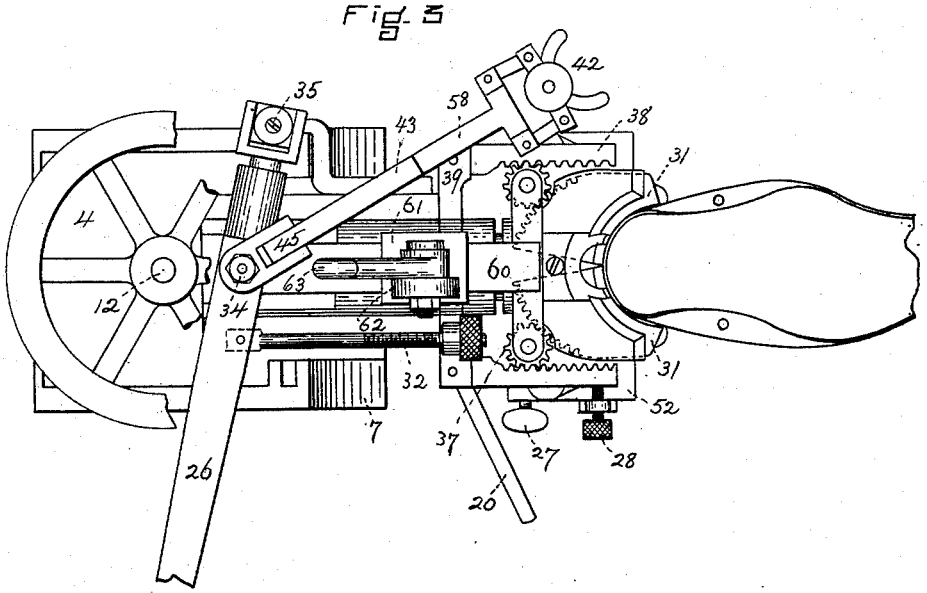
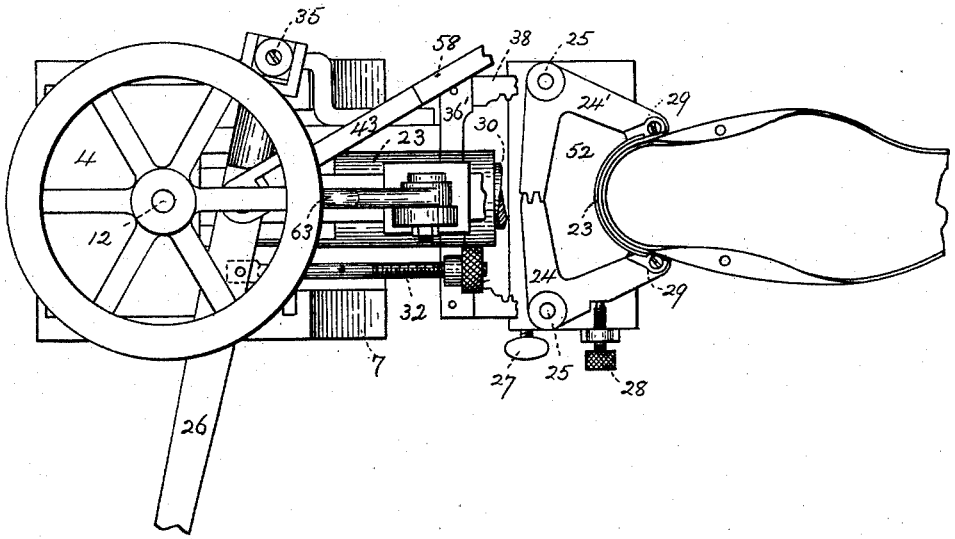


Fig. 4.



WITNESSES.

A. D. Sprague.

Francis E. Stanwood

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(No Model.) 5 Sheets—Sheet 4.

N. LOMBARD.

LASTING MACHINE.

No. 524,446. Patented Aug. 14, 1894.

Fig. 5.

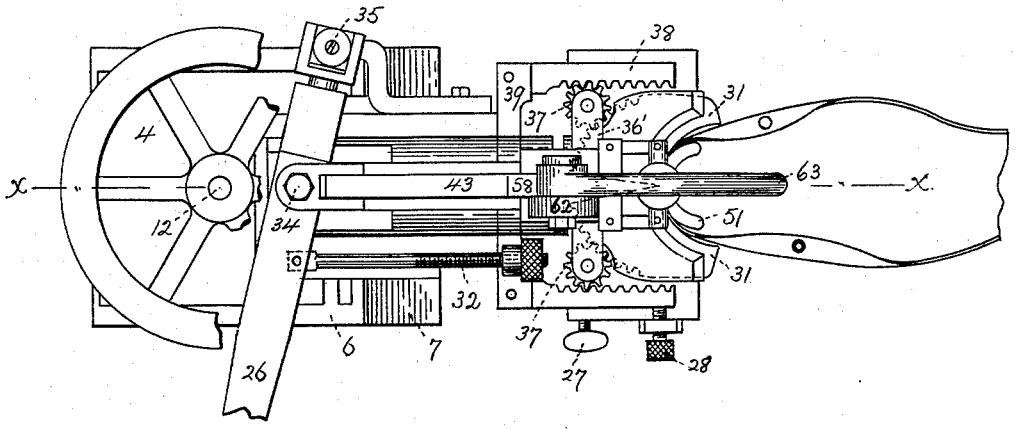
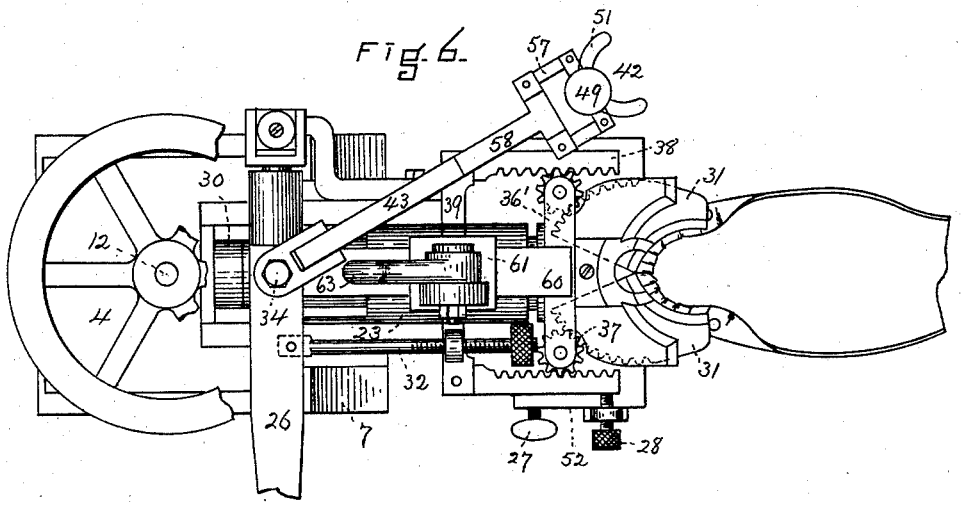


Fig. 6.



WITNESSES.

A. D. Spencer

Francis C. Stanwood

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(No Model.) 5 Sheets—Sheet 5.

N. LOMBARD.

LASTING MACHINE.

No. 524,446. Patented Aug. 14, 1894.

Fig. 7.

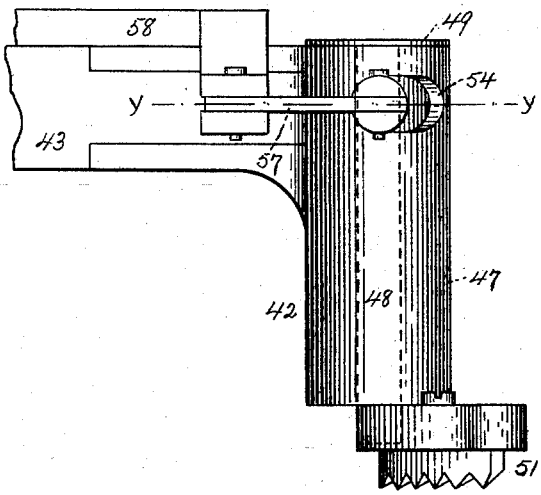


Fig. 8.

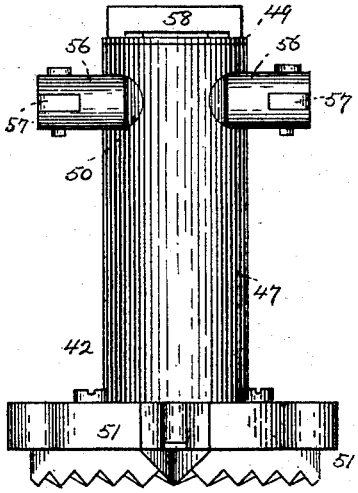
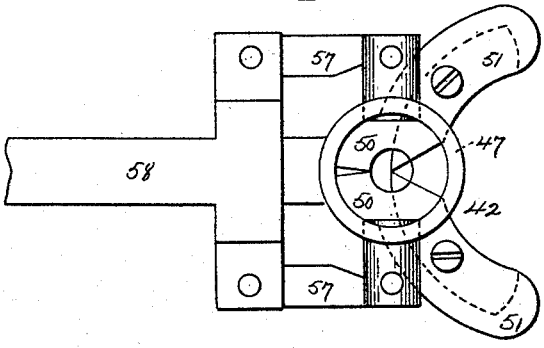


Fig. 10.



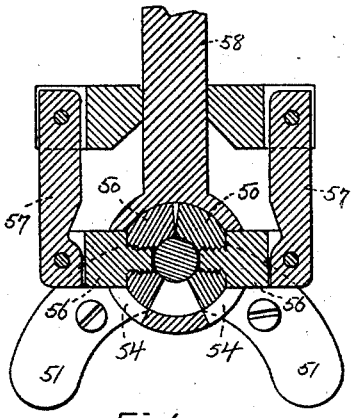


Fig. 9.

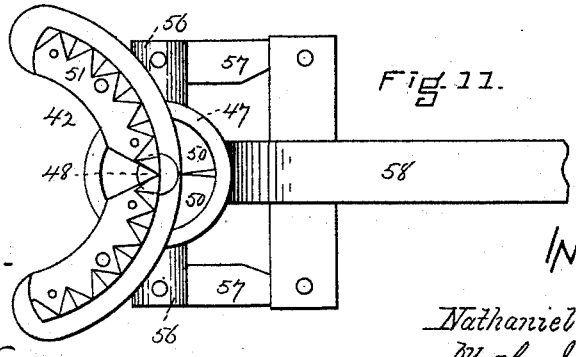


Fig. 11.

WITNESSES.

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INVENTOR.

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by H. E. Lodge Atty.

UNITED STATES PATENT OFFICE.

NATHANIEL LOMBARD, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE AUTOMATIC LASTING MACHINE AND MANUFACTURING COMPANY, OF PORTLAND, MAINE.

LASTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 524,446, dated August 14, 1894.

Application filed November 15, 1893. Serial No. 491,003. (No model.)

To all whom it may concern:

Be it known that I, NATHANIEL LOMBARD, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Toe-Lasting Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

This invention relates to lasting machines, particularly that class which comprises mechanism for operating upon the toe portion of the upper of a boot or shoe.

My improvements comprise various elements by which the several adjustments are secured in creating a proper rest for the toe of the shoe according to the size as likewise mechanism by which the toe portion of the upper is pulled tightly over the insole and then held until the act of tacking has occurred.

The essential elements comprise a rocking head which is obliquely positioned with respect to the toe according to the style of the latter, also a piston fitted with folding wipers at its extremity and adapted to reciprocate as well as to oscillate. This portion is intended by means of interconnecting mechanism to cause the wipers to open or close after the manner of scissors. Other operating parts and their respective functions will be more fully hereinafter set forth.

The prominent feature in my present invention is embodied more particularly in the adjustment, construction and mode of operating the instrumentality termed a retarder. This part is mounted in the end of a swinging arm and is composed of two curved plates attached to two rods which are contained within a short sleeve or tube pendent from the swinging arm. The lower surface of said plates are formed with radial V notches in order to direct the leather of the upper into proper folds when the act of crimping the leather is to take place or as said leather is folded over the insole.

My invention further consists in such mechanism as shall exercise a retarding effect or produce a friction upon the movement of the crimpers, these latter being free to fold or converge simultaneously with the wipers, which latter forcibly actuate said crimpers and cause them to overcome the effects of friction. In this manner the pull or lasting process with respect to the toe is produced and by increasing the friction of the crimpers, the upper can be drawn more tightly over the toe.

The drawings accompanying this specification represent in Figure 1 a side elevation of toe lasting mechanism embodying my invention. Fig. 2 is a vertical longitudinal section of the same on line *x. x.* Fig. 3 is a plan showing the parts in readiness for lasting, the retarder being swung to one side. Fig. 4 is a plan but with the wipers and their operating mechanism removed to show the flexible toe rest. Fig. 5 is likewise a plan showing the parts in position when lasting is being effected. Fig. 6 is a plan after lasting a shoe the retarder being swung to one side and the wipers withdrawn in part to expose the upper for tacking. Fig. 7 is a side elevation of the retarder and swinging arm in part. Fig. 8 is a front end view. Fig. 9 is a horizontal section on line Y Y. Fig. 10 is a top view with the axial joint pin removed. Fig. 11 is an inverted plan. Fig. 12 shows the head frame in part with toe-support and adjusting devices in section.

In said drawings 2 represents a post and 3 the frame, in part, of a lasting machine, upon which is mounted a sliding carriage 4 controlled by the screw-threaded shaft 5 (see Fig. 2). Adjustably affixed to this carriage is a tool head 6 curved at 7 to engage the carriage and this head is to swing from a central point 8 (see Fig. 2) located just beneath the toe where the latter rests upon the support 9. In other words the curvature of the frame describes an arc the center of which is at 8. Hence as the head slides or oscillates upon the curved part of the frame the point 8 is approximately motionless; and therefore the expression "swings from a central point," as the effect is an exact equivalent to a positive pivotal point at 8, and the toe-support, or that

portion contiguous to the toe of the shoe, remains practically stationary, even although the head may be swung through an arc of several degrees to adjust or vary the angle of the lasting appurtenances. The inclination of the entire assemblage of parts with respect to the toe, is controlled by means of the boss 10, which engages the screw-threaded shaft 12 pivotally mounted, see Fig. 2. Moreover the toe support is pivoted at 13 beneath the head and its position is regulated by the screw sleeve 14 which interconnects said support with the curved portion 7 of the head, the latter serving as a fixed point. Thus it will be understood, that while movement of the entire head can be made by means of the screw-shaft 12 without changing the positions of the individual elements with respect to each other, a movement of the screw-sleeve 14 will raise or lower the free-end of the toe-support. This latter, as before premised, swings in a vertical plane on the pivot 13 and may be adjusted higher or lower according to the form of toe. It will be noticed that this adjustment may be effected without altering the angle at which the head proper, 6, may stand.

Surmounting the head and secured thereto by a transverse pin 15 is a cylinder 23 adapted for motion in a vertical plane longitudinal of the shoe. To the under side of this cylinder is a pendent pin 16 which extends through a slot 17 in the head, while coiled about said pin is a spring 18 the latter acting to draw the cylinder downwardly. A bolt 19 pendent from the cylinder through the same slot is connected with an arm 20 operated by a flexible cord 21, which serves to uplift the cylinder against the pressure of the spring 18 and thereby relieves the pressure of said medium on the wipers, when it is so desired.

To serve as a stop, and against which the end of the toe abuts during the process of lasting, a flexible band 23 is provided. This is attached to the end of bell crank levers 24 24′ which are pivoted at 25 upon an adjustable sliding plate 52. This latter is positioned on the upper side of the head and held in place by the set-screw 27. The adjacent ends of the bell-crank levers are formed with teeth and interlock in order that the movement of both ends of the band 23 shall be equal and simultaneous. An adjusting screw 28 serves to regulate the proper size of the band and prevents spread of the latter, when the toe is thrust against the said band. This latter is secured to the bell-cranks by pivotal blocks 29 (see Figs. 1 and 4).

Within the cylinder is the piston 30 which is equipped at its front extremity with folding wipers 31 after the style of those in general use. Said piston is moved to and fro by the lever 26 secured to its rear end by the bolt 34, while the extremity of the lever is attached to a fulcrum post 35 on the head, in such manner as shall permit of the piston being oscillated. As before premised this piston carries wipers for crimping and folding the upper of the toe about the last and said wipers are operated to open and close by the following instrumentalities. Transversely at the extremity of the piston, which is flattened at this point (see Fig. 2), are affixed parallel bars 36 36′, while within their slotted extremities and mounted on transverse pins are twin gears 37, these latter interconnecting with the rear toothed portion of the wipers, and a toothed rack 38 which forms part of a yoke 39. This latter is free to rock about the cylinder but is united to the piston by a pin 40, which slides in a groove 41 in said piston (see Fig. 2). Hence the latter is free to reciprocate, while the yoke is stationary, being held in the cylinder. On the other hand the gears move with the piston and thus are compelled to revolve and so swing the wipers, making them open or shut according to the direction in the movement of the piston. To adjust the throw of the piston in order to have the wipers approximate in shape that of the toe when they touch the latter I have supplied a rod 32 fitted with an adjustable nut the rod being free to slide through a fixed boss, which serves as a stop for the nut and limits the distance which the wipers can be removed from the extremity of the toe.

The above detailed mechanism provides for every adjustment and action necessary to last a toe with the exception of providing for the proper pull upon the upper in order to make the leather conform to and fit the last at this point. And hence for this purpose I provide a retarder. In this element is embodied one of the principal features of my invention and my improvements I consider consist in the peculiar construction of the retarder proper, as likewise in the shape and function of its several component parts, one distinctive characteristic being that the crimpers, to wit: the operative tool part of the retarder; are moved and contract inwardly consequent upon the action of the wipers as they fold the upper over the insole.

The retarder, shown as an entirety at 42, is hung at the extremity of a swinging arm 43. This latter is joined at 45 for vertical movement and is secured to the bolt 34 for horizontal movement.

The retarder comprises a short upright tube 47 rigid with the arm 43 and centrally therethrough is a removable rod 48 secured to a disk or cap 49, which surmounts and closes the tube. Within the annular space formed between the rod and tube are positioned two oscillating shafts 50, segmental in cross section to provide for their movement axially within the tube. Transversely attached to their lower ends are twin tools or crimpers 51 curved as shown in Figs. 9, 10, and 11, and formed upon their under surfaces, which are contiguous to the leather of the upper with radial V shaped notches. These latter serve to crimp and bend the leather into folds, which are produced by drawing the upper toward a central point; in this way the excess of the

material is more easily disposed of, and can be made to lie much more compactly upon the insole, while the act of crimping and folding is done with less effort. In the present instance the tool is made up of two plates the lower corrugated portion being separately attached to the upper plate. In the process of lasting, these crimpers act very similarly on the inside, to what the wipers do upon the outside of the upper, that is they approach and fold together, the center of motion with the crimpers being the center of the rod 48 and this is coincident with the center of movement with the wipers. To provide for this folding action I have apertured the tube at two points 54, see Figs. 7 and 10, and inserted therein small lugs 56, which are free to play in two openings and have screw-engagement with the upper ends of the shafts 50. From the outer ends of said lugs are pivoted connecting rods 57 which are united to a friction bar 58, this latter has sliding engagement upon the swinging arm but is retained in place thereupon by a pin 59. When the crimpers are inactive said bar is free to slide loosely on the arm and in this way the crimpers are adjusted over the insole against the inside of the upper, as shown in Fig. 2. Hence they can be manipulated quickly and easily to any form of toe.

Beneath the swinging arm, in parallelism therewith and secured to the bolt 34, is a guide 60 its forward end resting upon the transverse bar 36′ here extended upward to meet it in order to make a more rigid bearing. Said guide serves to support a block 61 with a vertical arm 62 to which is pivoted a cam lever 63, the latter when reversed, as in Figs. 3, 4, and 6, being idle or inactive; when active, it is thrown forward and then serves to press the friction bar against the swinging arm 43 with such pressure as will produce the necessary retarding action upon the crimpers. In other words, when the piston advances with the wipers it likewise carries the swinging arm and the retarder, the upper now being held between the wipers and the crimpers. But as the wipers contract they force with them the crimpers, while the leather gradually slips between these co-operating elements. Hence the degree of friction upon the bar 58, which must slide upon the swinging arm 43 as the crimpers contract inwardly, serves to regulate the resistance of said crimpers to the wipers and in this way the wipers are enabled to pull the leather more or less tightly about the last. The greater the resistance of the crimpers, the firmer the hold of the wipers upon the leather and the harder this is drawn over the toe.

It is to be understood that the crimpers do not have positive action of their own, but are operated by the movement of the wipers as the latter move over upon the insole.

The operation of this machine is as follows: It being understood that the various elements are in the relative positions shown in Figs. 3 and 4, the toe of the shoe having been thrust into the flexible band already previously adjusted to receive it. The carriage head 6 is given the proper inclination and the sleeve 14 operated to bring the toe-support 9 into such position as will suit the particular style of toe. These adjustments are necessary only when different styles of shoes are being lasted. The operator now grasps the arm 43 and lifts it vertically, at the same time swinging it toward the shoe until it is in alignment with the longitudinal axis of said shoe but above it. The arm is now dropped until the retarder strikes the insole, when the edge of the upper projecting above the insole is straightened up and the crimpers heretofore in a contracted position are now expanded by sliding the friction plate 58 backwardly on the arm 43. This movement continues until the upper stands about vertically or perhaps flared outwardly a little as shown in Fig. 2. After the crimpers 51 are properly positioned the block 61 is moved along upon the guide 60 until the cam lever 63 is about midway above the friction plate 58; the cam-lever 63 is now thrown forward and proper friction created between the arm 43 and the plate 58. It will be understood that the only way in which the crimpers can be opened or closed is by reciprocations of the connecting rods 57 and the plate 58. The operator now grasps the lever 26 and advances the piston 30, while as the racks 38 are held stationary by engagement of the yoke 39 with the cylinder, the gears 37 are rotated and the wipers are contracted. This folding action is accompanied by forward right line movement of the piston which carries said wipers over upon the last. The pressure of the wipers upon the insole is relieved somewhat if necessary by counteracting the action of the spring 18 which is effected by means of the arm 20 and band 21 to a lever (not shown) preferably one operated by the foot.

The act of stretching the leather and the requisite degree of force with which the upper is drawn over the toe of the last is, as before premised, accomplished by the resistance which the crimpers exert against the wipers. The crimpers are in fact a passive agent, since the wipers, as they advance and contract, compel the crimpers to do likewise, but this advance movement of the piston it will be understood in operating the wipers to contract compels the plate 58 to slide forward on the arm 43 and thus the crimpers are likewise forced to contract; at the same time any tendency on the part of the crimpers to contract freely is opposed by the friction which now exists between the said plate 58 and the arm 43. Hence the upper is held forcibly between the crimpers and the wipers, but is allowed to slip as the crimpers yield to the more powerful action of the wipers.

The notched under surface of the crimpers is to assist in creating regular folds in the leather and thus subdividing the excess of material which arises in folding the upper over the toe. After the upper has been properly stretched, crimped and flattened down upon the insole the piston is withdrawn slightly, to expose the edge of the upper, see Fig. 6, while the cam-lever 63 is reversed, when the block 61 is pushed back upon the guide 60 until said block is clear from the friction plate 58; the plate 58 is free to slide back on the arm 43, the crimpers are together and the arm and retarder swing to one side as shown.

What I claim is—

1. In a lasting machine, the combination with a sliding carriage, a swinging carriage head, and means for shifting the inclination of said head with respect to the last of a boot or shoe, of a rocking cylinder upon said head, a piston adapted to reciprocate, lasting appurtenances carried by the piston, and means for oscillating the piston within said cylinder, substantially as set forth.

2. In a lasting machine, a sliding carriage, a swinging head secured to said carriage, lasting appurtenances affixed on said head a toe-support pivotally attached to said head, and means for adjusting said support to cause it to rock in a plane at right angles to the lasting appurtenances, substantially as described.

3. In a toe-lasting machine, a rocking carriage head, means for adjusting the same, a pivotal toe-rest secured to said head, combined with a sliding plate, a flexible toe band, and means for adjusting the curvature of said band, substantially as stated.

4. In a toe-lasting machine, the combination with a sliding carriage, a swinging head, and a toe support upon said head, of a sliding plate, a pair of rocking levers pivoted on said plate and having their adjacent ends interlocked, and a flexible band interconnecting the free extremities of said levers, substantially as specified.

5. In combination with a rocking cylinder, a piston therein, and folding wipers mounted upon said piston, a swinging arm, a retarder located in the same plane with the wipers and inclosed by said wipers, means to operate the wipers, and mechanism to cause the retarder to oppose the folding action of the wipers, said wipers and retarder grasping the vertical edges of the upper between them, substantially as explained.

6. In a lasting machine two folding wipers, combined with a retarder comprising two folding plates, said plates to be grasped by the wipers, and mechanism adapted to close both wipers and plates simultaneously, substantially as specified.

7. A retarder composed of a hollow tube, two shafts segmental in cross section within said tube, combined with two plates transversely at the extremities of said shafts and radially corrugated on the under side, means to cause the plates to open and close, and a frictional device to oppose the closing of said plates, substantially as specified.

8. In combination with a swinging arm, and a hollow tube mounted on said arm, two shafts within said tube, a crimper plate at the end of each shaft, and a central rod about which said shafts oscillate, substantially as stated.

9. In a lasting machine, the combination with a pair of folding wipers, and means for operating the same, of a retarder composed of two folding plates, the wipers to bear exteriorly against the material composing the upper, the retarder against the upper interiorly, and the plates of said retarder adapted to be closed by the pressure of the wipers against them, substantially as described.

10. The combination with a pair of folding wipers, and mechanism for operating the same, of a pair of folding crimpers, adapted to be closed by the folding of the wipers, and means to prevent free closing of the crimpers against the folding action of the wipers in order to grip the upper, substantially as explained.

11. In combination with a pair of folding wipers a retarder composed of a pair of folding crimpers, adapted to swing in the same plane as the wipers and a swinging arm which supports the same, of a sliding plate adapted to have variable friction with the swinging arm, and mechanism which unites said plate with the crimpers, whereby folding together of the wipers is retarded, substantially as described.

12. In a lasting machine, a movable piston, folding wipers actuated thereby, and means for elevating said wipers above the last, combined with a swinging arm, a retarder carried thereby, a friction plate, and a sliding block furnished with a cam lever, said lever serving to create resistance between the arm and the friction plate, substantially as set forth.

13. In a lasting machine, the combination with a rocking cylinder, a reciprocating piston therein, toothed racks attached to the cylinder, a pair of folding wipers, and gears which interconnect said wipers and racks, of a swinging arm jointed for vertical movement, a retarder thereupon having folding crimpers, and a friction plate which opposes the movement of the crimpers, substantially as stated.

14. In combination with a piston carrying folding wipers, and a swinging arm fitted with a retarder, consisting of twin folding crimpers, mechanism for uniting the piston with the arm, and a lever for imparting simultaneous movement to both, substantially as described.

15. The combination with a piston, folding wipers mounted thereupon, a swinging arm, movable crimpers on said arm, and a lever common to the piston and the arm, of mechanism for actuating the wipers, means for

opening and closing the crimpers, and a frictional device for opposing the closing of the crimpers, substantially as stated.

16. In lasting machines a retarder composed of a hollow tube, two shafts segmental in cross section therein, a central rod as an axis for said shafts, and twin plates transversely of the shafts and adapted to open and close, their center of movement being the longitudinal central axis of the rod, substantially as explained.

In testimony whereof I affix my signature in presence of two witnesses.

NATHANIEL LOMBARD.

Witnesses:
H. E. LODGE,
FRANCIS C. STANWOOD.