F. W. MERRICK.

LASTING MACHINE.

APPLICATION FILED JAN. 6, 1912.

1,174,937.

Patented Mar. 7, 1916.

2 SHEETS—SHEET 1.

Fig. 1.

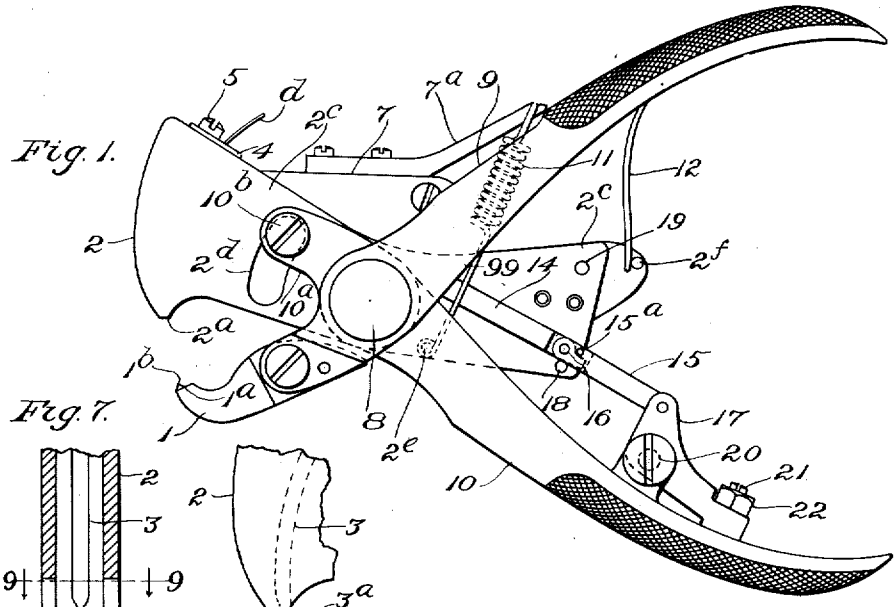


Fig. 7.

Fig. 8.

Fig. 9.

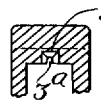


Fig. 2.

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2 SHEETS—SHEET 2.

Fig. 3.

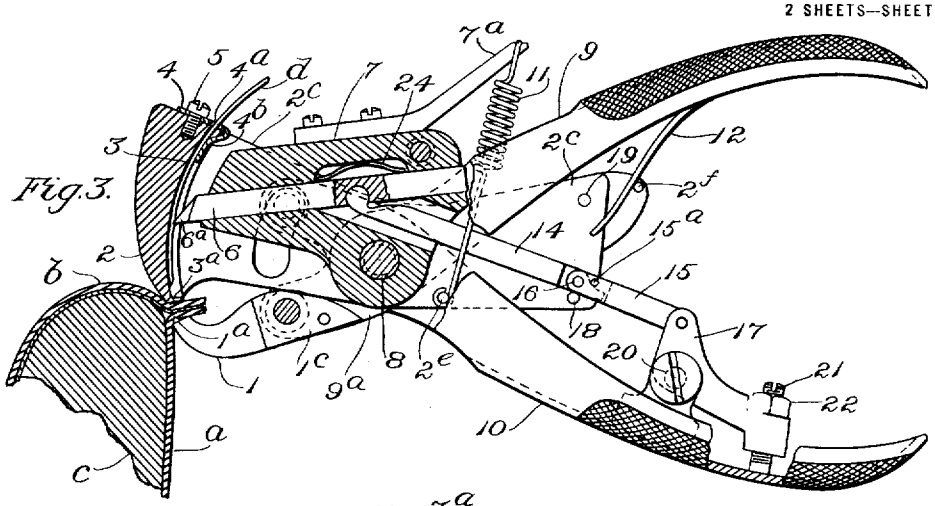


Fig. 4.

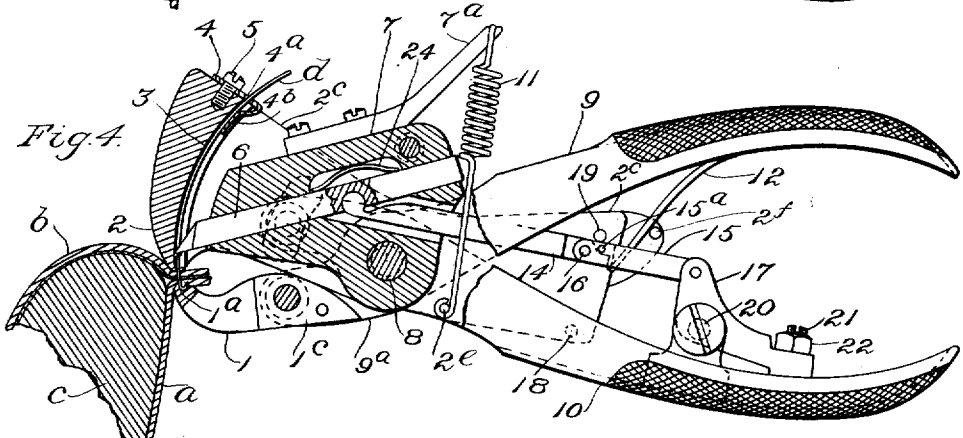
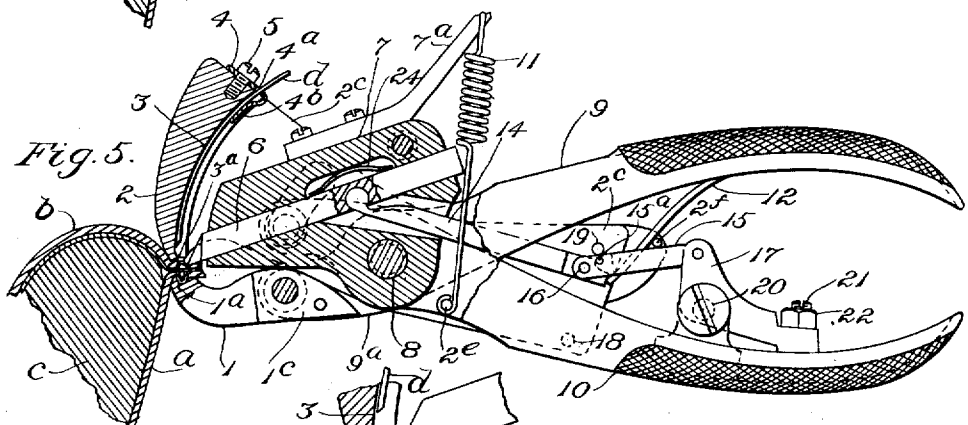


Fig. 5.



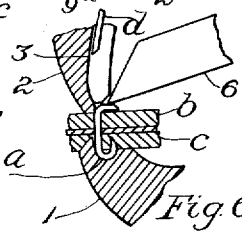


Fig. 6.

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UNITED STATES PATENT OFFICE.

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LASTING-MACHINE.

1,174,937. Specification of Letters Patent. Patented Mar. 7, 1916.

Application filed January 6, 1912. Serial No. 669,740.

To all whom it may concern:

Be it known that I, FRANK W. MERRICK, a citizen of the United States, residing at Boston, in the county of Suffolk, State of Massachusetts, have invented a certain new and useful Improvement in Lasting-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention resides in novel devices for feeding a continuous length of wire, driving the leading portion thereof to constitute a fastening, cutting off, completing, and setting such fastening. The said devices are useful, either as a whole or in part, for purposes in general, but I contemplate more especially the employment of the same in the manufacture of boots and shoes, and particularly in lasting.

The invention is shown herein embodied in a hand-operated machine or implement which has been contrived for the purpose of securing the upper of a shoe in place in the lasting operation by means of preliminary fastenings. A special aim in this connection has been to provide for the application of fastenings of a character such as not to interfere with the subsequent operation of sewing, and hence not requiring to be extracted or withdrawn to permit of such operation being performed. In other words, to provide for the application of preliminary fastenings of a character enabling them to be allowed to remain in place, without extraction or withdrawal as in the case of the tacks employed at present for lasting purposes. The idea is to employ a fine soft wire that will not occasion injury to either the awl or the needle of the sewing machine in case a fastening should be encountered thereby. However, it is to be understood that the features of my invention are not restricted in all cases to use in lasting, or with wire of the character mentioned.

The said machine or implement as herein illustrated comprises jaws which close upon the upper and the lip or flange of the insole, or upon the upper and the margin of the sole in certain kinds of shoes, and draw the upper snugly around the last and into proximity to the shoulder of the insole or the surface of the sole; a guide in connection with one of such jaws for the continuous wire of which the fastenings are formed; a tool which feeds such wire, drives the leading end thereof through the upper and the material of the insole or sole at the point where they are held in the pinch of the said jaws, clenches the said end against the other jaw, cuts the wire to sever the inserted fastening therefrom and leave a standing end on such fastening, bends over the said standing end in a predetermined path, and cooperates with the opposite jaw in finally setting the fastening.

The invention is not restricted to the particular form of embodiment herein shown and described. Nor are the features thereof restricted in all cases to use in hand-operated machines, implements, or tools, inasmuch as they may be embodied in automatic machines.

In the drawings, Figure 1 is a side elevation of the said machine with the jaws thereof open or separated. Fig. 2 is a view of the same in vertical section, with portions of a last and a shoe, the jaws being open. Fig. 3 is a sectional view showing the jaws closed upon the upper and the flange or lip of the insole of the said shoe, and the tool engaged with the wire as at the beginning of the feeding and driving operation. Fig. 4 is a sectional view showing the feeding and driving operation consummated, the leading end of the inserted fastening clenched, and the cutting completed. Fig. 5 is a sectional detail illustrating the operation of bending the standing end of the inserted fastening over in a predetermined path. Fig. 6 is a sectional view on a larger scale than the preceding views, illustrating the setting operation as completed. Figs. 7, 8 and 9 are detail views of the jaw 2, also on large scale.

Having reference to the drawings, the jaws are marked 1 and 2, respectively. The jaw 1 is shaped at its working end to enter fully home into the angle between the main portion of the insole *a*, Figs. 2, 3, etc., and its outstanding lip or flange *a'*. The said working end is provided with the anvil 1^a which is properly concaved, as shown in Figs. 4, 5 and 6, to deflect the leading end of the wire around and back toward the material through which it has been driven, in order to clench such end. The said working end is provided with the small projecting lip 1^b, located at one end of the concavity of the anvil. When the jaws are closed together upon the material clasped between them, this lip penetrates the material and ap-

proaches close to the jaw 2, as shown most clearly in Fig. 6. Its office is to guide the end of the wire with certainty into the concavity of the anvil, and by being carried into close proximity to jaw 2 before the wire is forced through the material it avoids all liability of the leading end of the wire not finding its way properly into the concavity of the anvil. The opposing jaw 2 has its nose 2^a shaped to bear upon the upper b opposite the anvil 1^a, close in under the bottom of the last as indicated in Fig. 3, etc. In practice, the upper and the lip of the insole (or the upper and the margin of a sole in the case of a stitch-down shoe) being between the jaws as in Fig. 2, with the jaw 1 pressed home into the angle between the insole and its lip or flange, (or against the under surface of the sole in the case of a stitch-down shoe), the operation of closing the jaws together causes the outer face of the jaw 2 to wipe against the upper at the edge of the last, pressing the upper smoothly into place around the said edge and into proximity to the shoulder of the insole, (or the upper surface of the sole.) The upper is held securely in place between the closed jaws while the wire is fed and driven through the portions of upper and lip (or sole) which are in the pinch of the jaws, and also while the wire is clenched and cut and the standing end of the inserted and severed fastening is bent over and the fastening finally set. By driving the fastening right at the pinch, it holds the upper where the latter is drawn by the jaw 2 in closing against the jaw 1.

The jaw 2 is formed at its back with a groove 3 which constitutes a passageway for the continuous wire d of which the fastenings are formed. The lower end of such groove opens through the nose of the said jaw, *i. e.*, the portion of the jaw 2 which coacts with the anvil jaw 1 in pinching the upper and the lip of the insole (or margin of the sole). At the upper end of the said groove a strip of metal 4 is made fast to the top of jaw 2 by means of a screw 5, such strip having an eye 4^a in line with the groove, and also having a tongue 4^b which extends downward, with the lower portion of its length within the groove. The wire passes through the said eye into the groove, and along the latter. The eye directs the wire into the groove, and the tongue holds the wire against the back wall of the groove below the eye. The said tongue acts, by its pressure against the wire, and through its frictional engagement with the latter, as a kind of tension-device. It holds the wire in place while the tool is not in engagement with the wire, and obviates accidental forward movement or accidental withdrawal of the wire at the time when the tool is out of contact with the wire. In the nose of jaw 2, the side-walls of the groove 3 converge as shown in Figs. 7, 8 and 9 at 3^a to provide a centering guide for the wire, by means of which the wire is positioned accurately in the work in being driven.

At 6 is the tool by which the feeding, driving, cutting, etc., operations are performed. Its working portion 6^a is reduced in width and enters into the groove 3. Such portion is beveled off above to form a cutting end at the lower corner thereof. The said tool has relative movements which cause its working end to move inward toward the back wall of the groove 3 and along the groove toward the nose of the jaw 2, then outwardly from the said back wall, and then in the reverse direction lengthwise of the groove to the starting point. The inward movement of the tool causes its working end to engage the wire, press it against the back wall of the groove, and cut part way into and through the wire. As long as the engagement of the tool with the wire continues the wire cannot become displaced or withdrawn accidentally, and must accompany the tool in movement of the latter toward the stock into which the wire is to be driven. The movement of the tool toward the nose of the jaw 2, operates, by reason of the engagement of its working end with the wire, (1) to feed the wire lengthwise toward the material which is pinched between the jaws 1 and 2, (2) to drive the leading portion of the wire through the said material, and (3) to clench the end of the wire by forcing it into the concavity of the anvil.

The cutting by which the portion of wire that has been inserted into the material or work is severed to constitute a fastening takes place as soon as the driving and clenching have been effected, but before the termination of the movement of the tool toward the material or work. The cutting is effected at a sufficient distance from the upper surface of the material or work to leave a projecting standing end of the partially formed fastening. The withdrawing or retracting movement of the tool relative to the wall against which it cuts takes place during the final portion of the approach of the tool toward the anvil, it beginning as soon as the cutting has been accomplished. The tool, by reason of its combined onward and withdrawing movement keeps hold of the top of the standing end, which is relatively long and if not controlled is liable to bend in any direction, and pulls the said standing end forward, at the same time that it crowds it toward the material or work. Thereby it bends the said standing end in the direction of the withdrawal of the tool, and in doing so it directs and controls the bending. As it completes the bending the pressure of the tool effects the final setting of the fastening. The return movement of

the tool lengthwise of the groove replaces it at the starting point. The tool 6 is combined with a movable carrier 7.

In the present instance the jaws 1 and 2, and the tool-carrier 7, are mounted or hung upon the same pivotal pin 8. The stock 1^c of the jaw 1 is fixed between the forward ends of the side-arms 9^a, 9^a, of a lever 9, which in this instance is extended rearward in the form of a handle. The said pivotal pin 8 is fitted to holes in the said side-arms. The jaw 2 is provided with side-arms 2^c, 2^c, which fit between the side-arms 9^a, 9^a, of lever 9, and are pivotally mounted upon the pin 8. Normally the jaws 1 and 2 are caused by means of a spring to stand apart from each other as is explained hereinafter. In being closed together, the jaw 2 is actuated by yielding force, one convenient means of applying such force being explained hereinafter. The tool-carrier 7 is pivotally mounted upon the pin 8 between the side-arms 2^c, 2^c, of the jaw 2. To provide for the actuation of the tool-carrier 7, a lever 10 is provided, it having side-arms 10^a which are pivotally mounted upon the pin 8 intermediate the side-arms 2^c, 2^c, of the jaw 2 and the side-arms 9^a, 9^a, of lever 9, the said lever 10 being extended rearward in the form of a handle, and the said side-arms 10^a thereof being engaged with the tool-carrier 7 by means of screws 10^b, the stems of which latter work in curved slots 2^d, 2^d, made in the side-arms 2^c, 2^c, of jaw 2.

Normally, the parts being open or separated as in Figs. 1 and 2, the upper jaw 2 is held in the depressed position relative to tool-carrier 7 and tool 6 which it occupies in such figures by the action of a suitable spring, here constituted for convenience by a contracting spiral spring 11, one end of which is engaged with a post 7^a projecting rearward from the top of tool-carrier 7, the other end of the said spring being engaged with a pin 2^e projecting from one of the side-arms 2^c of jaw 2, such side-arm being extended rearwardly. In contracting, the said spring swings the jaw downward around pin 8 until the upper end walls of slots 2^d bring up against the stems of the screws 10^b as in Figs. 1, 2 and 3. This is the normal relation. A spring-arm 12, made fast to lever 9 and bearing against a pin 2^f projecting from the rearwardly-extending side-arm 2^c of the jaw 2, acts with a tendency to turn the lever 9 so as to separate the jaw 1 from the jaw 2 to the fullest extent permitted by post 7^a, which acts as a stop for the said lever 9. The two springs 11 and 12 therefore tend to keep the parts normally in the open position shown in Figs. 1 and 2.

When power is applied tending to close the levers together, the spring-arm 12 yields first, being weaker than spring 11, and relative approach occurs of jaw 1 with respect to the jaw 2 and the tool-carrier, as in Fig. 3, without change in the relative position of the jaw 2 and tool 6 with respect to each other, until the two jaws bring up firmly upon the material between them, as in Fig. 3, or until the stock 1^c of the jaw 1 brings up against the under edges of the side-arms 2^c, 2^c, of the jaw 2. Meanwhile the comparatively strong spring 11 acts to hold the jaw 2 in its relatively depressed position with respect to the tool-carrier and tool, with the upper end walls of the slots 2^d, 2^d, of the side-arms 2^c, 2^c, of said jaw 2 pressed against the stems of the screws 10^b. Hence the jaw 2 is thereby caused to swing in unison with the tool-carrier 7 around the axis of pin 8, and to the same extent as the tool-carrier, until the closing of the jaws together is checked. When the said closing is checked and jaw 2 is prevented thereby from moving further in unison with the tool-carrier 7, the latter in completing its movement toward the jaw 1 moves independently of the jaw 2, as illustrated in Figs. 4, 5, 6. This independent movement of tool-carrier 7 causes the tool to feed the wire *d* along toward the nose of jaw 2, and to drive the leading end of the wire through the material. It also causes the tool to effect the clenching, bending, and setting.

The stock of the tool 6, in the present instance, is fitted to a guideway in the tool-carrier 7 with capacity to move inward and outward relative to the rear wire-guiding wall of the groove 3. It is controlled and actuated by means of a toggle comprising links 14, 15. The link 14 has one end thereof connected pivotally at 16 to one end of the link 15, the other end of the latter being pivoted to an abutment-arm 17 which is carried by lever 10. When the two links are substantially in line, as in Figs. 1, 2, 3, 4, the working end of the tool 6 stands projected from the tool-carrier close to the back wall of the groove 3, and in engagement with the wire *d*. When the toggle-joint is bent, broken, or flexed, the tool is retracted from said wall as in Fig. 6. The alternate straightening and bending of the toggle are brought about through the action of pins 18 and 19, carried by the extended side-arm 2^e of jaw 2, upon the links 14 and 15. The said side-arm 2^e with its pins 18, 19, constitutes a toggle-controller. In Figs. 1 and 2, in which the jaws are opened apart, and in Fig. 3, in which the jaws have been approached to each other but the feeding movement of the wire has not been commenced, the pin 18 is in contact with the under side of the links, and the toggle-joint is thereby held substantially straight, but with the pivot 16 just a little above the straight line joining the points of pivotal connection with the tool and the abutment-

arm 17, and with the working end of the tool projected into engagement with the wire as aforesaid. The toggle-joint is arranged to pass thus slightly beyond the said straight line so as to prevent accidental breaking or flexing of the joint by the backthrust of the tool as it cuts the wire *d* near the completion of the feeding movement of the tool. A stop-pin 15^a carried by link 15 and engaged by a prolongation of link 14 determines the extent to which the pivot 16 passes beyond the said straight line. In Fig. 4, in which the parts are closer together than in Fig. 3, and in which the feeding has terminated and the wire has been cut, leaving a projecting standing end, the pin 19 is in engagement with the top side of the links and is beginning to depress the pivot 16 so as to draw the tool rearward. At this stage the tool is continuing to approach the jaw 1. The effect of the said approach, and of the retraction of the tool by reason of the bending of the toggle, occurring at one and the same time, is to draw the upstanding end of the severed fastening in the direction in which the tool is retracting, thereby bending the said end over in the predetermined path until it is pressed fully down, and consummating the final setting of the fastening. In Fig. 6, in which the approach of the tool of the anvil has been completed and the fastening has been set, the toggle joint is bent or broken and the tool is fully retracted. As the parts open again from their closed position in Fig. 6, the pull of the spring 11 upon the rearwardly-projecting arm 2^c of jaw 2 holds the jaw 2 down upon the material between the two jaws until, by the action of the said spring in contracting, the tool-carrier 7 and lever 10 have been moved reversely relative to the said jaw the distance permitted by the slots 2^d. This relative movement of the tool-carrier and the lever 10 causes the tool to rise relative to the said jaw 2 in a retracted position until the engagement between the links and the pin 18 restores the toggle to its straightened position as in Figs. 1 and 2. To prevent the tool from shaking or jarring forward prematurely, a friction-spring 24 is placed within a cavity of the tool-carrier and arranged so as to bear against the tool. The friction between the tool and the said spring, and between the tool and the lower side of the guideway therefor, restrains the tool from too free endwise movement. The operation of straightening the toggle moves the tool inward toward the back wall of the groove 3 again so as to bite against the wire.

The back wall of the groove 3 is slightly eccentric with relation to pivotal pin 8, so that the said wall and the path of the working end of the tool converge as the tool descends. The eccentricity of the said back wall is such as to leave about three-fourths of the diameter of the wire between the wall and the cutting end of the tool when the tool occupies the position in which it is shown in Figs. 2 and 3. In the descent of the tool the convergence of the said back wall toward the path of the said cutting end crowds the wire gradually against the working end of the tool until the wire is completely severed. In order to enable the path of the tool to be adjusted to a nicety with respect to the said back wall, the abutment-arm 17 is pivoted at 20 to the lever 10, and provided with an adjusting screw 21 which makes contact by one end thereof with the back of the lever. Said adjusting screw is furnished with a lock-nut 22 to prevent accidental loss of adjustment thereof. Adjustment of abutment-arm 17 in one direction by means of the adjusting screw will cause the tool to work closer to the said wall, and adjustment thereof in the other direction will correspondingly vary the closeness of approach of the tool to the wall.

In many instances, in the use of wire of medium and large gage the width of the groove 3 may be so proportioned to the diameter of the wire that the side walls of the groove serve as lateral guides for the wire. However, the wire *d* preferably used by me in practice for lasting purposes, and which is so small in diameter and so soft that it is impracticable to drive the same by means of devices heretofore known without confining the same by closely-fitting inclosing guide-walls, is in fact so small that any driver small enough to follow the wire within such guiding side walls is too frail to be practical. The problem is to guide the wire properly and at the same time provide for driving it by means of a tool sufficiently strong and stable to be practicable. My experimenting has shown me that if the wire be given an initial bend into a curved path corresponding to a segment of a circle, as in Figs. 2, 3, 4 and 6, conforming to a concave inner guide-wall curved to constitute such segment, as in the said figures, it can be driven without being further guided. It will seek the concave surface of the said wall or supporting surface, and pressure on the end of the wire sufficient to drive it compels the wire to seek escape in the direction already indicated by the curve of the sustaining wall, and it will not tend to cripple laterally. That is to say, being given an initial bend it seeks no other during the driving. It will be confined in the plane of the driver, between and by means of the driver and the said concave wall. The said concave wall constitutes a concave curvilinear wire-guide which is tangential to the line in which the wire is driven into the work. As closely-fitting side-guides are not required, I am enabled to secure satisfactory results with a

groove 3 considerably wider than the diameter of the wire. This obviates all necessity for employment of a driving tool having an excessively thin and frail acting portion to work in the groove 3, and enables me to employ a tool having a working end of substantial thickness and corresponding strength.

From the foregoing description it will be apparent that in the illustrated embodiment of the invention the tool, jaw 2, and wire, have a common movement toward the stock into which a fastening is to be driven, until the said jaw reaches the stock, and thereafter the tool and wire have a further movement which effects the driving, etc. It also will be apparent that in such further movement the initial portion thereof effects the feeding, driving, and clenching, and the latter portion thereof effects the cutting, bending of the standing end, and setting.

The construction may be varied in many respects without involving departure from the principles of the invention.

What is claimed as the invention is—

1. In combination, relatively movable jaws, one thereof adapted to wipe against the upper of a shoe at the edge of a last, and to press the upper smoothly into place around said edge and into proximity to the shoulder of the insole or surface of the sole, and the other having an anvil, the said jaws arranged to clasp the margins of the upper and a sole together and a combined wire cutting and driving tool engaging the wire and operatively combined to feed and drive the wire right at the pinch, sever the wire, clench the leading end of the wire against said anvil jaw, and bend the other end of the driven and severed portion to set such end.

2. In combination, a jaw and anvil, a jaw relatively movable toward and from the first-mentioned jaw, having a guide for a continuous wire, and adapted to pinch portions of an upper and insole or sole between itself and the first-mentioned jaw, and a combined cutting and driving tool constructed and combined to feed and drive the wire while such portions are held thus pinched, clench it against the anvil, and sever the driven fastening.

3. In combination, a jaw and anvil, a jaw relatively movable toward and from the first-mentioned jaw, having a guide for a continuous wire, and adapted to pinch portions of an upper and insole or sole between itself and said first-mentioned jaw, and a combined cutting and driving tool constructed and combined to feed the wire and drive it at the pinch of the said jaws, clench it against the anvil, and sever the driven fastening.

4. In combination, a jaw and anvil, a jaw having a groove constituting a passageway for a continuous wire, a tool entering transversely into said passageway and means to actuate said tool to engage and feed the wire, drive its leading portion through material between the jaws, sever the wire, and clench the inserted portion against the anvil.

5. In combination, a wire-guide, a combined feeding, driving and cutting tool adapted to drive the wire to thereby insert the latter for a fastening, produce a standing end upon the inserted fastening and bend such end down and means for actuating the said tool.

6. In combination, opposing relatively-movable jaws, one thereof having a wire-guide in connection therewith, and a combined feeding, driving and cutting tool constructed and combined to drive a continuous wire and sever the inserted fastening, leaving a standing end upon the said fastening, and coöperating with the opposite jaw to bend such end down and set the fastening.

7. In combination, a jaw and anvil, a jaw having a wire-guide in connection therewith, and a combined feeding, driving and cutting tool constructed and combined to drive a continuous wire and sever the inserted fastening, leaving a standing end upon the said fastening, and coöperating with the anvil to bend such end down and set the fastening.

8. In combination, a wire-guide, and a tool, and means for operating the same to engage and feed a continuous wire, drive its leading portion, and cut the wire adjacent the thus driven portion to leave a standing end upon the inserted fastening, and by a transverse movement while still engaged with the said standing end bend over the latter.

9. In combination, a jaw and anvil, a jaw having a wire-guide in connection therewith, a tool, and means for operating the same to engage and feed a continuous wire, drive its leading portion, cut the wire to leave a standing end upon the inserted fastening, and by a transverse movement while engaged and pressing down the said standing end bend over the latter and set the fastening.

10. In a machine for forming and driving wire-fastenings, in combination, a tool constructed and combined to feed, drive, cut, clench one end of the inserted fastening, and bend over, and set the other end of said inserted fastening, and means for actuating said tool.

11. In a machine for driving wire-fastenings, in combination, a driver having a driving-movement in one path and a bending-over movement in a path at an angle to said driving-path, and means for actuating the said driver.

12. In combination, an anvil, a coöperating jaw which pinches the upper of a shoe and the lip or flange of an insole or a portion of a sole against the anvil, and a

tool constructed and combined to feed and drive a continuous wire, cut the same, and clench it against the anvil.

13. In combination, an anvil, a coöperating jaw which pinches the upper of a shoe and the lip or flange of an insole or a portion of the sole against the anvil, and a driver which feeds and drives a continuous wire, cuts, leaving a standing end, clenches the leading end of the wire against the anvil, bends over the standing end, and sets the inserted fastening.

14. In combination, an anvil provided with a projecting lip located at one end of the anvil to penetrate the stock and approach close to the opposing jaw, so as to guide the end of the driven wire with certainty to the anvil, an opposing jaw, and a tool which feeds and drives a continuous wire, cuts, and clenches it against said anvil.

15. In combination, a wire-guide, a cutting and driving tool, and means for moving the tool toward the wire-guiding surface and into engagement with the wire, then lengthwise of the wire to feed and drive the latter, finally cutting by continued movement toward the said surface, and withdrawing the tool during the final portion of the movement lengthwise while still engaged with the standing end of the inserted fastening thereby bending over the said standing end.

16. In combination, an anvil, a wire-guide, a cutting and driving tool, and means for moving the tool toward the wire-guiding surface and into engagement with the wire, then lengthwise of the wire to feed and drive the wire and clench the same against said anvil, finally cutting it by the continued inward movement, leaving a standing end, and withdrawing the tool during the final portion of the movement lengthwise while still engaged with the standing end of the inserted fastening and thereby bending over the standing end.

17. In combination, an anvil, a coöperating jaw having a wire-guide, a cutting and driving tool, and means for moving the tool toward the wire-guiding surface and into engagement with the wire, then lengthwise of the wire to feed, drive and clench, finally cutting it by the continued inward movement, leaving a standing end, and withdrawing the tool during the final portion of the movement lengthwise and thereby bending over the standing end.

18. In combination, a presser having a wire-guide, a tool-carrier, a feeding, driving, and cutting tool carried by said tool-carrier, and means for moving said presser with yielding force against the stock operated upon.

19. In combination, a jaw and anvil, a cooperating jaw having a wire-guide, a tool-carrier, a tool carried by said tool-carrier, constructed and combined to feed, drive, clench against said anvil, and cut, and a tool means for moving said coöperating jaw with yielding force toward the other jaw.

20. In combination, a presser having a wire-guide, a tool-carrier, a tool carried by said tool-carrier constructed and combined to feed, drive, and cut, and means for actuating said presser through the means of the tool-carrier.

21. In combination, a jaw and anvil, a cooperating jaw having a wire-guide, a tool-carrier, a feeding, driving, cutting and setting tool carried by said tool-carrier, means for operating said tool-carrier and tool, and means for actuating said coöperating jaw through the means of the tool-carrier.

22. In combination, a jaw and anvil, a coöperating jaw having a wire-guide, a tool, a tool-carrier, means for actuating said tool-carrier and tool to feed, drive, and cut the wire, leaving a standing end, and bend down said standing end, and means for actuating said coöperating jaw through the means of said tool-carrier.

23. In combination, a jaw and anvil, a coöperating jaw having a wire-guide, a tool, a tool-carrier, means for actuating said tool-carrier and tool to feed, drive, cut the wire, leaving a standing end, bend down said standing end and coöperate with said anvil in clenching the leading end of the wire, and means for actuating said coöperating jaw through the means of said tool-carrier.

24. In combination, a presser having a wire-guide, a tool-carrier, a feeding, driving and cutting tool carried by said tool-carrier, and means for yieldingly actuating said presser through the means of said tool-carrier.

25. In combination, a jaw and anvil, a cooperating jaw having a wire-guide, a tool-carrier, a feeding, driving, cutting and upsetting tool carried by said tool-carrier, and means for yieldingly actuating said coöperating jaw through the means of said tool-carrier.

26. In combination, a moving tool-carrier, a tool carried by said tool-carrier, actuating means for actuating the tool relative to the tool-carrier, and a movable jaw operated by the tool-carrier and itself operatively controlling the tool-actuating means.

27. In combination, a moving tool-carrier, a tool carried thereby, a toggle connected with said tool, and means for operating said toggle to project the tool at one extreme of the movement of the tool-carrier and to retract the tool at the other extreme of said movement.

28. In combination, a moving tool-carrier, a tool carried thereby, a toggle connected with said tool, means for operating said

toggle to project the tool at one extreme of the movement of the tool-carrier and to retract the tool at the other extreme of said movement, and adjusting means to vary at will the path of the tool.

29. In combination, a wire-guiding surface, a moving tool-carrier, a driving and cutting tool carried thereby, a toggle connected with said tool, and means for operating said toggle to actuate the tool to engage the wire against the said surface drive and cut the wire against said surface during movement of the tool-carrier in one direction and to retract the tool from said surface at the extreme of such movement to release the wire during movement in the other direction.

30. In combination, a tool-carrier, a tool carried thereby, a toggle connected with said tool for moving it with relation to the tool-carrier, and a movable presser actuated by the tool-carrier and itself actuating the toggle.

31. In combination, a tool-carrier, a tool carried thereby, a toggle connected with said tool for moving it with relation to the tool-carrier, a movable presser actuated by the tool-carrier, and a toggle-controller operatively combined with said movable presser.

32. In combination, a presser, a tool-carrier, a cutting and driving tool carried by said tool-carrier, and means for causing the tool-carrier, tool, and presser to move in unison until the presser engages with the material and then moving the tool-carrier and tool independently to drive and cut a wire.

33. In combination, opposite jaws, a tool-carrier, a tool carried by the said tool-carrier, and means for causing the tool-carrier, tool, and one of said jaws to move in unison until the said jaws close upon the material, and then moving tool-carrier and tool independently to drive a wire lengthwise and cut the leading portion therefrom.

34. In combination, a driver, and a member having a longitudinally concave guide-surface between which and the driver a single continuous wire to be driven extends, and against which the said wire is pressed by the driver, whereby lateral buckling of the wire is obviated.

35. In combination, wire-guiding means having a longitudinally concave guide-surface against which the continuous wire to be driven rests while being driven, giving to the wire a corresponding longitudinal curvature, and a driver working along the concavity of said guide-surface and holding the wire against such surface in effecting the driving.

36. In combination, wire-guiding means having a longitudinally concave guide-surface against which the driven wire is flexed by resistance acting endwise at the leading end while being driven, causing the wire to assume a corresponding longitudinal curvature, thereby obviating transverse buckling or flexing, with a wire-centering guide by which the wire is positioned in the stock into which it is driven, and a driver.

37. In combination, wire-guiding means having a longitudinally concave guide-surface against which the driven wire rests while being driven, with a wire-centering guide at the delivery-end of said guide-surface, and a driver.

38. In combination, a driver, and a guide for the wire in being driven, the said guide having a longitudinally concave wall and the wire being confined in the plane of the driver between and by means of the driver and the said concave wall.

39. In combination, a driver, and a wire guide having a longitudinally concave curvilinear wire-supporting face which is tangential to the line in which the wire is driven into the work.

40. In combination, wire-guiding means having a wire-guiding surface, a tool constructed and combined to move in a path regularly converging with respect to said surface and by its movement in such path to feed and drive the wire to form an inserted fastening, the gradual approach of the cutting edge to the said surface causing the cutting of the wire during the continuance of the feeding and driving.

41. In combination, a moving tool formed to cut and drive, and wire-guiding means having a wire-guiding surface regularly converging toward the path of the tool to effect the cutting.

42. In combination, wire-guiding means having a wire-guiding surface, a moving tool formed to cut and drive, said surface and the path of the tool converging and thereby causing the cutting to occur, and means for adjusting the relation between said surface and path.

43. In combination, wire-guiding means having a wire-guiding surface, a moving tool formed to cut and drive, said surface and the path of the tool converging and thereby causing the cutting to occur, and means for adjusting the path of movement of the tool and the approach of its cutting end to the said surface.

44. In combination, a movable presser, a wire-cutting and driving tool, and means to move said presser, tool, and the wire engaged by said tool, in unison toward the stock until the presser reaches the stock, and thereafter giving continued movement to the tool and thereby by such continued movement effecting the driving and cutting.

45. In combination, an anvil-jaw, a movable jaw, a tool, and means for moving the

latter jaw, the tool, and a wire engaged by said tool, in unison toward the stock until such jaw reaches the stock, and thereafter giving continued movement to the tool and thereby effecting feeding, driving, clenching, cutting, the bending of the standing end, and setting.

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

FRANK W. MERRICK.

Witnesses:
CHAS. F. RANDALL,
EDITH A. WISEMAN.

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Correction in Letters Patent No. 1,174,937.

It is hereby certified that in Letters Patent No. 1,174,937, granted March 7, 1916, upon the application of Frank W. Merrick, of Boston, Massachusetts, for an improvement in "Lasting-Machines," an error appears in the printed specification requiring correction as follows: Page 6, line 67, claim 19, strike out the words "a tool"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 28th day of March, A. D., 1916.

[SEAL.]

J. T. NEWTON,
Acting Commissioner of Patents.

Cl. 12–110.

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