2 Sheets—Sheet 1.

G. W. COPELAND.

LASTING MACHINE.

No. 181,772. Patented Sept. 5, 1876.

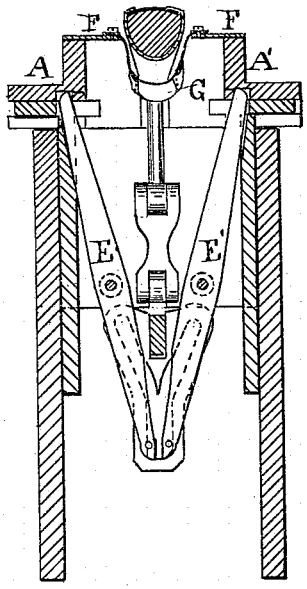

Fig. 1.

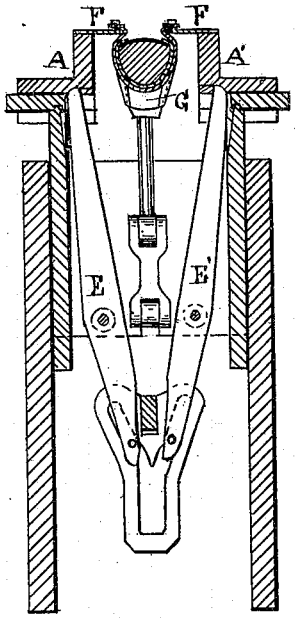

Fig. 2.

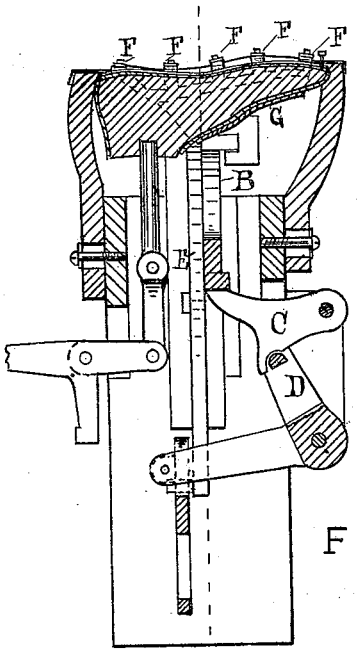

Fig. 3.

Fig. 5.

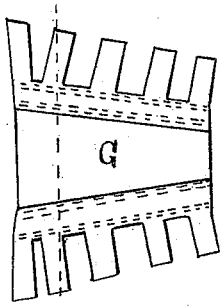

Fig. 4.

WITNESSES.

Hebron Libby

Fred. F. Raymond

INVENTOR

Geo. W. Copeland.

2 Sheets—Sheet 2.

G. W. COPELAND.

LASTING MACHINE.

No. 181,772. Patented Sept. 5, 1876.

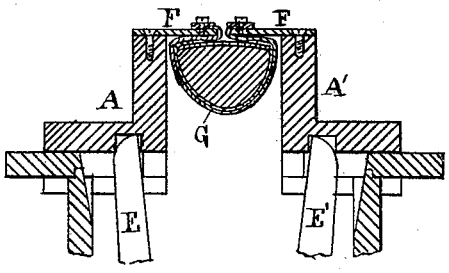

Fig. 6.

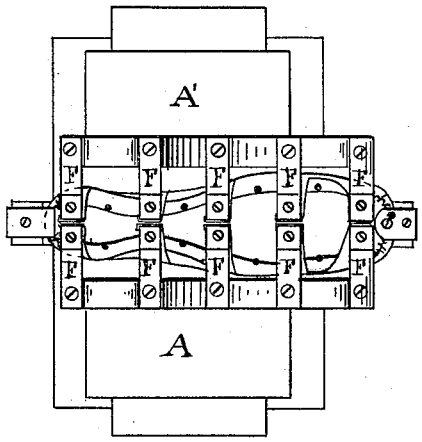

Fig. 7.

WITNESSES.
Hebron Libbey
Fred. F. Raymond

INVENTOR
Geo. W. Copeland.

UNITED STATES PATENT OFFICE.

GEORGE W. COPELAND, OF MALDEN, MASSACHUSETTS.

IMPROVEMENT IN LASTING-MACHINES.

Specification forming part of Letters Patent No. **181,772**, dated September 5, 1876; application filed July 10, 1876.

To all whom it may concern:

Be it known that I, GEORGE W. COPELAND, of Malden, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Mechanism for Lasting Boots and Shoes, of which the following is a specification:

This invention relates particularly to that method of "lasting" or fitting the upper of a boot or shoe to a last, which employs the principle of constantly-succeeding compression exerted from the median line, from instep to toe, to force and strain the upper upon the last in gradually-succeeding areas, until the surplus upper is carried to the edge of the insole and folded thereon in position to be secured to the same; and consists of various modifications and improvements upon the patents relative to girth-lasting already granted, which will permit the lasting of "rights" and "lefts" and varying sizes and widths of lasts, and compensate for varying thicknesses of insole and slope or curvature of the last-bottom, as will be hereinafter explained.

Reference is made to the accompanying drawings, forming a part of this specification, in which Figure 1 is a cross-section of my lasting-machine, showing the position of the last on the spindle before the lifting of the jaws and the relation of the girth to the upper. Fig. 2 is also a cross-section of the lasting-machine, showing the position of the jaws, fingers, and girth relative to the last, upper, and insole when the jaws are raised above the plane of the insole. Fig. 3 shows a longitudinal section, representing the method of operation. Fig. 4 is a plan, and Fig. 5 a cross-section, of the girth. Fig. 6 shows the position of the jaws, fingers, and girth relative to the last, upper, and insole at the completion of the lasting; and Fig. 7 shows a plan of the machine and the fingers closed upon the insole.

The method of bringing a pressure to bear upon the upper and last, along the median line from instep to toe, and from that line to strain and fit the upper to the last, and to carry the surplus to the edge of the insole by raising the jaws, to which were attached elastic girths that passed under the upper on the last, and by the vertical rising of the jaws were brought to bear upon the said median line, and the principle of continuing the strain upon the upper and of laying the folds upon the insole, by causing the jaws carrying the girths, when they had reached the plane of the surface of the insole, to move horizontally over and upon the insole, have, as above stated, been covered in former patents, but it has been found by experimenting that the operation of the jaws in closing horizontally upon the plane of the upper surface of the insole, requires that the jaws and the lasting-plates, which are fastened to the jaws and are arranged to lap upon the insole in laying the surplus margin of the upper upon the same, must open a distance nearly equal to the distance from one edge of the last-bottom over the top of the last to the opposite bottom edge at the point where the last is flattest and widest, that the last may be adjusted on the spindle, and that, consequently, when the jaws were lifted to stretch the girth and cause it to develop a strain on the upper, that part of the upper which was to be fitted to the flattest and widest part of the last (corresponding to the ball of the foot) was not fitted to the last as tightly as upon the parts subject to a greater strain, as the stretch at that point in the girth was considerably less. Besides this objection to the unequal tension on the girth, when the line of compression ended at or near the edge of the insole, and was coincident with it, there was frequently difficulty arising from varying thicknesses of insole and from the inner and outer edges of a last not always being of uniform height.

The remedy of these defects is one of the objects of my invention, and I accomplish it by causing the jaws A A′, which heretofore lifted only to the plane of the insole-surface, to lift above said level any desirable distance sufficient to develop a stiff strain on all parts of the upper on the last.

In the drawings is shown one method of operating the jaws. The vertical movement is communicated by levers C D to a supporting-plate, B, which rises and falls in the ways or guides on the interior of the framework of the machine. This plate B carries the jaws A A′, which rise and fall with the plate, and have a horizontal movement thereon when

actuated by the straight levers E E′, the cam, and the continued descent of lever D. The movement of the jaws toward the center line of the last from heel to toe, from their greatest lift above the last-bottom, may be straight in on that level, or they may advance and then drop to the surface of the insole and again advance, or they may move diagonally toward the center-line.

It has also been customary to use lasting-plates which conform to the curvature or contour of the sides of the last. These were attached to the jaws, and held the girth, and as they merely lapped over upon the insole, and, as above explained, could not develop a sufficient strain on certain portions of the girth consequent upon the jaws rising only to the level of the insole-surface, it was impossible to secure a uniformly-good result. Added to the difficulty attendent upon their not extending to the center-line was that involved from the necessity of changing the plates and girth for "rights" and "lefts," and for every size of last. The defects are obviated by attaching to the jaws, in lieu of lasting-plates, the fingers F, at intervals sufficiently distant from each other to leave spaces for inserting the lasting-tacks. These fingers project at right angles from the jaws over and upon the insole, and are designed to nearly meet, as shown in Fig. 7, at the completion of the inward movement of the jaws, and support upon their outer ends the girth G, which is adjusted thereon to conform to the curvature of the last by any suitable devices.

Of course I do not limit myself to the number or location of the fingers, as two fingers, one at each end of the jaw, could support a rod, to which a girth could be fastened, for the principle of my invention is the development of a greater strain upon the girth than can be obtained by merely carrying it to the last edge, or causing it to lap thereon, by lifting the jaws a desirable distance above the edge, and continuing the strain upon the upper by carrying the edges of the girth to the center-line, as before explained.

The girth G is not elastic throughout, but is constructed with an elastic central band, preferably of rubber, with edges of rawhide, leather, canvas, or any tough and comparatively inelastic material, united to the central band by sewing, or in any convenient way, and which is secured to the ends of fingers F, the shape of the girth in plan being that shown in Fig. 4.

The operation of the machine is as follows: The last, with the upper and insole properly adjusted thereon, is inverted and hung upon the last-spindle with the toe and heel secured by their respective plates. The jaws A A′ are then raised, parallel with the sides of the last, to a distance somewhat above the edge of the insole, causing the girth to first act along the median line from instep to toe, and from that line to compress and strain the upper to the last in continuously-succeeding areas to the edge of the insole, when, by the continued advance of the jaws A A′ and fingers F toward the center-line, (increasing the strain upon the girth at the same time,) over and upon the insole, the surplus margin of the upper is folded upon the surface of the same in position to be tacked.

It will be observed that in this machine the last and upper are slung by a girth tightly compressed upon them, and drawing, by its own elasticity, the upper tightly upon the last by a dragging direct pressure, direct from the central horizontal line of the sides to the edge of the insole by a compressive elastic pressure along the upper surface of the shoe, between the said horizontal side line, and by a direct folding pressure on the insole from the edge toward its center, that this pressure is exerted evenly and indiscriminately upon all shapes of lasts, and that the combination belt, part of non-extensible and part of extensible material, gives an automatic compensation when desirable, while the arrangement of the long side fingers, closing the girth over upon the last and compressing the upper to it by the action of their ends only, renders the process of girth lasting, of a simplicity and efficiency in every part impractical when the girth was attached to plates conforming to the contour of the last, and only slightly lapping the edges of the insole, while the excessive rise and subsequent drop of the straining fingers completely avoid the danger of "rucking" the insole, and dispense with much of the care previously necessary in molding the same.

Having thus fully described my invention, I claim and desire to secure by Letters Patent—

1. In a lasting-machine, the combination of a girth extensible under strain, with jaws having, in the operation of lasting, a rising motion, succeeded by a closing motion, and a descending motion toward the median line of the last-bottom, substantially as described.

2. In a lasting-machine for girth-lasting, the combination of jaws, separate fingers, and an extensible girth, provided at its edges with non-extensible thongs, substantially as described.

3. In a lasting-machine for girth-lasting, the combination of the fingers having a rising and closing motion, and extended when closed to near the median line of the sole, with an extensible girth lapped and drawing upon the shoe by the inwardly-projecting ends of the fingers, substantially as described.

4. In a lasting-machine for girth-lasting, a girth containing the combination of an elastic extensible central band, with non-extensible lateral portions, substantially as described.

GEO. W. COPELAND.

Witnesses:
FRED. F. RAYMOND,
FRANK G. PARKER.