2 Sheets—Sheet 1.

G. W. COPELAND.

LASTING MACHINES FOR BOOTS AND SHOES.

No. 182,560. Patented Sept. 26, 1876.

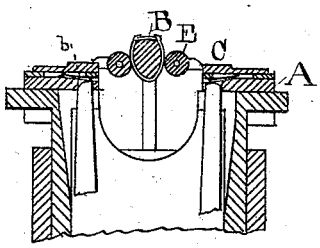

Fig. 3.

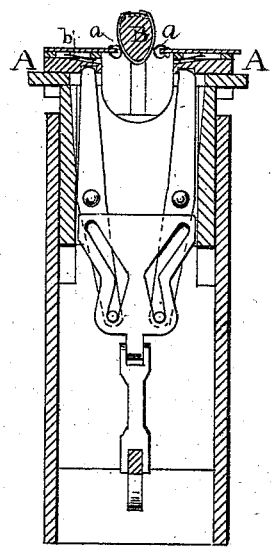

Fig. 1.

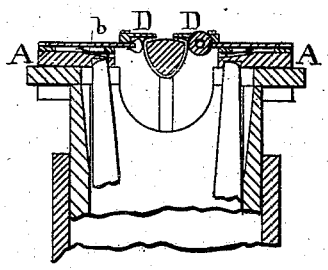

Fig. 2.

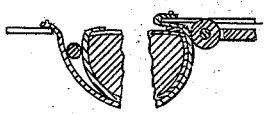

Fig. 13.

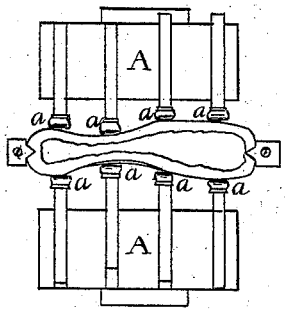

Fig. 5.

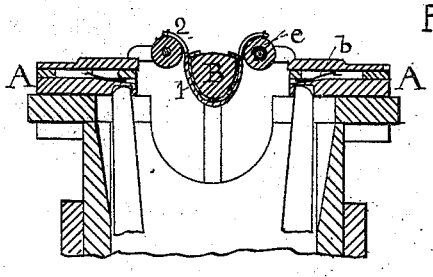

Fig. 6.

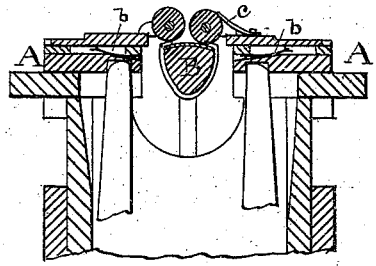

Fig. 4

WITNESSES

F. A. Raymond 2d

INVENTOR

Geo. W. Copeland

2 Sheets—Sheet 2.

G. W. COPELAND.

LASTING MACHINES FOR BOOTS AND SHOES.

No. 182,560. Patented Sept. 26, 1876.

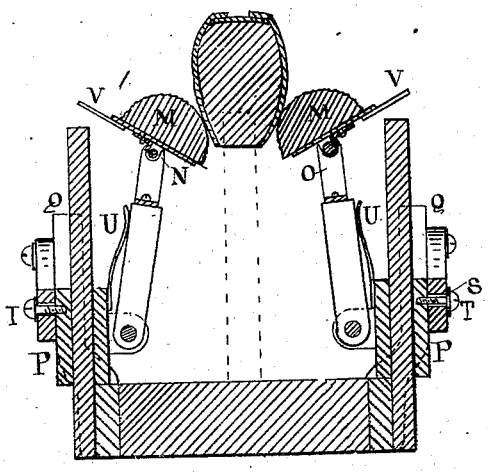

Fig. 7.

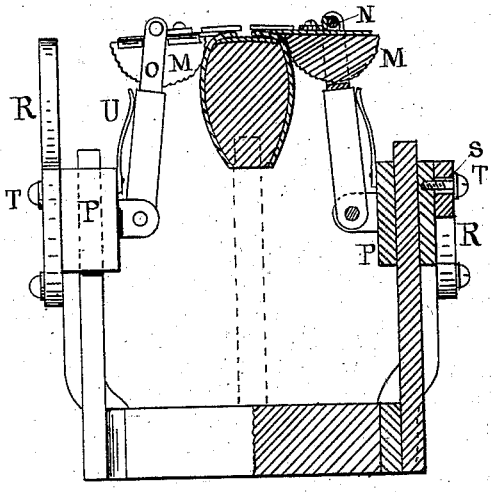

Fig. 8.

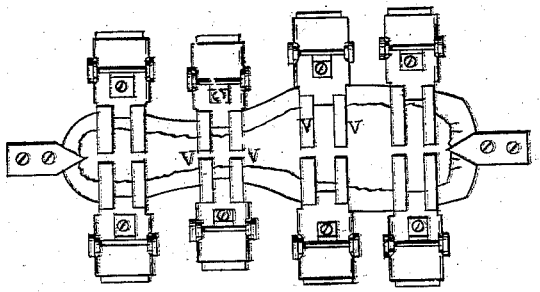

Fig. 9

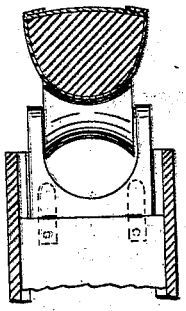

Fig. 10.

Fig. 11.

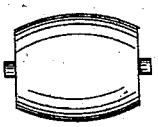

Fig. 12.

WITNESSES

Thos. Clarke

C. F. Raymond 2d

INVENTOR

Geo. W. Copeland.

UNITED STATES PATENT OFFICE.

GEORGE W. COPELAND, OF MALDEN, MASSACHUSETTS.

IMPROVEMENT IN LASTING-MACHINES FOR BOOTS AND SHOES.

Specification forming part of Letters Patent No. **182,560**, dated September 26, 1876; application filed August 28, 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 Lasting-Machines, of which the following is a specification:

This invention relates to that method of fitting an upper to a last which employs a straining or smoothing, or a combined straining and smoothing, action, commenced somewhere along the sides of a last, and continued to or upon the surface of the insole, or employed in fitting the upper to the last upon any desired area.

In previous applications I have shown and illustrated an effective principle upon which the upper may be strained onto and over the last by the use of a girth. Out of a study of this principle a method of successfully smoothing the upper upon the last by the operation of rolling surfaces—rolling, and, to a certain extent, gradually lifting the upper onto the last, or lifting it by pads or other contacting substances, either separately or in combination with a girth, as hereinafter explained—has grown.

Reference is had to the accompanying drawing, forming a part of this specification, in explaining the same, in which—

Figure 1 is a cross-section of my lasting-machine, showing the position of the lifting-pads relatively to the upper and last before the beginning of the lasting. Fig. 2 shows the position of the lifting pads or rolls when used in connection with independent lasting-plates. Fig. 3 represents the position of the rolls and last before the rolls are lifted. Fig. 4 shows the rolls closed upon the surface of the insole in laying the folds. Fig. 5 is a plan of the lifting-pad device. Fig. 6 shows the rolls with a girth attached to their circumference. Plate 2—Fig. 7 represents a semi-cylindrical roll or rocking pad, and its relation to the last at the commencement of lasting. Fig. 8 shows their position at the completion of the lasting. Fig. 9 is a plan of the same. Fig. 10 represents a roll operating in the hollow of a last between the instep and toe. Fig. 11 is a cross-section of a roll with a flexible circumference. Fig. 12 represents a roll with a conformed surface.

The jaws A are provided with similar movements to those shown in my prior inventions, and should approximate a path parallel to the sides of the last B from the line where the smoothing and straining action commences to or above the bottom of the last, which is inverted, and from that point may be provided with a closing movement. Arranged upon these jaws, to bear constantly against the sides of the last, are the series of fingers C, armed upon their outer ends with a roughened frictional surface, *a*, which may be elastic. These fingers operate the frictional pads vertically along the sides of the last to the edge of the insole, and the surplus upper and margin is folded upon the surface of the same, preferably by the advance of independent fingers or plates D, as shown in Fig. 2. The fingers C are automatic in their adjustment to the varying conformation of the sides of a last, being provided with a transverse movement upon the jaws and the springs *b*, which act to force the fingers from the jaws against the last.

The jaws A are adjusted to and from the last to accommodate extreme variations in the widths of lasts, and supplemental fingers may be added to effect an adjustment for increase in length.

I also show the features of smoothing, or smoothing in combination with a straining action, the upper upon the last in another form, as represented in Figs. 3 and 4. The jaws A have substantially the same movements as those of the jaws already described, and the fingers C are provided with a like automatic adjustment for variations in the sides of the last's surface. They are arranged at intervals upon the jaws, and carry on their ends projecting toward the last the rolls E, which contact with the upper at any desirable distance below the edge of the last, and advance over the sides of the same to or upon the surface of the insole, rolling out and smoothing the upper to the last as they move upward, and folding the edge upon the insole by the closing movement of the jaws upon the same, as represented in Fig. 4. These rolls may be provided with a roughened frictional surface, preferably of an elastic or semi-elastic nature, such as rubber, rawhide, felt,

leather, or canvas, substantially as shown in Fig. 11.

When it is desirable to obtain a straining action upon the upper, combined with a smoothing and rolling movement, I cause the rolls to revolve with limited freedom by restraining them sufficiently to cause a strain upon the upper. In Fig. 4 is seen a brake, *c*, operating as above described.

In Figs. 3, 7, and 8 I show an adaptation of the rolling principle to shank-lasting, and Figs. 9 and 10 show this modification employed as well upon the other portions of the sides of a last.

The semi-cylindrical rolls or rocking pads M are hung upon horizontal axes N, substantially parallel to the sides of the last, and are provided with a vertical movement upon the same. In the drawing, the axes N have a bearing on arms O, and the said arms are pivoted to fall toward the last on block P, which is operated vertically on standards Q by levers R. The levers are slotted at S, as shown, and engage with the pins T that project from the block P. The springs U bear against the arms O, and serve to keep the rolls constantly pressing against the sides of the last. Arranged to project from one edge of the rolls are the folding plates V, which operate in laying the margin of the upper upon the insole, in combination with the rolls, substantially as shown in Fig. 8.

In practical operation these rolls commence to act upon the last at any desired distance below the edge of the insole, and as they are lifted they turn upon the sides of the last, and their peripheries being somewhat elastic or flexible, they conform to the surface of the last, to fit the upper to it, smoothing out the creases and wrinkles as they advance, and carrying the stretch and surplus upper to the surface of the insole.

In Figures 6 and 13 I show the combination of the rolls with the girth, by which a very good result can be obtained. The straps 2, instead of being fastened to the ends of lasting-fingers, are secured to the periphery of the rolls in such a way that the rising of the rolls releases the girth, while at the same time the rolls assist in the smoothing action, being adjusted to bear against the upper as they lift. These rolls advance to, or nearly to, the center-line of the insole and act against the springs *e*, which cause the rolls to wind the finger-strap upon their circumferences as they descend after the lasting of the upper.

A modification of this combination of girth and rolls is represented in Figs. 10 and 13, where the rolls are shown assisting the action of the girth, in the one case by the rolls operating transversely under the girth between toe and instep independently of the girth. They also may be operated between instep and toe, longitudinally, as well, and one large roll, as represented in Fig. 10, with its surface fitted to the surface of the last, will answer the purpose. Their action on this part of the last secures the perfect fitting of the upper to the hollow in the last generally existing at that point.

The other view represents the rolls acting independently of the girth between the finger-straps 2, vertically upon the sides of the last. This last arrangement is particularly adapted for lasting the shank.

Still another arrangement is shown in Fig. 13, where rolls are inserted between the girth and the sides of the last, in order that the girth may not bind upon the edges of the last and insole while operating upon areas more remote, the rolls here acting to prevent friction until they reach the edge of the insole, when the girth contacts with the sides of the last.

The operation of lasting is as follows: The upper is adjusted to the last, which is mounted on the spindle. The jaws are caused to move upward, and a smoothing and rolling action, or a smoothing, rolling, and straining action, as the case may be, is exerted upon the upper from a surface sufficiently distant from the edge of the insole to remove all stretch in the upper, and fit the same tightly and smoothly to the last by the upward movement of the force employed, and by the continued advance of a folding device upon the surface of the insole.

The rolls, when employed, operate substantially as described, in rolling out and compressing the upper to the last upon any desired portion of its surface, and in any direction.

Of course I do not confine myself to the use of rolls having cylindrical circumference or sections thereof, but propose to use a surface of any desired shape when the same is rocked upon any portion of the surface of a last in smoothing an upper thereto.

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

1. In a lasting-machine, the combination of the jaws A, having an upward movement, substantially parallel with the sides of a last, with the yielding elastic or flexible pads *a*, all arranged and operating substantially as described.

2. In a lasting-machine, the combination of jaws A and yielding elastic or flexible pads *a*, with an independent folding device arranged to close upon the insole, substantially as and for the purpose described.

3. In a lasting-machine, the combination of the jaws A with the rolls E, substantially as and for the purpose described.

4. In a lasting-machine, the rolls E or rocking pads, in combination with a brake, *c*, or other suitable restraining device, whereby the rolling movement is partly converted into and combined with a straining action, substantially as and for the purpose described.

5. In a lasting-machine, the rolls E adapted

to operate upon the sides of the last in smoothing the upper upon the same, substantially as and for the purpose described.

6. The combination, in a lasting-machine, of the rolls E and a lasting-girth, 1, having its straps 2 attached to the periphery of said rolls, substantially as shown and described.

7. In a lasting-machine, the combination of a lasting girth or pads with one or more rolls, arranged to act conjointly in fitting an upper to a last, substantially as shown and described.

8. The rocking pad described, provided with a rolling surface and a folding projection, V, substantially as shown and described.

9. The combination, in a lasting-machine, of an arm, O, having an upward movement substantially parallel to the last with the rocking pad M, substantially as and for the purpose described.

10. In a lasting-machine, a smoothing-roll, operated transversely or longitudinally upon the under surface of the last, substantially as shown and described.

11. The combination, in a lasting-machine, of the rolls or rocking pads described, with independent lasting plates or fingers, substantially as and for the purpose set forth.

12. The following-described method of lasting, consisting in fitting the upper to the last by a rolling or rocking movement of independent surfaces on the surface of the last, by which the upper is fitted thereto and smoothed thereon, substantially as and for the purpose described.

GEO. W. COPELAND.

Witnesses:

THOS. WM. CLARKE,

F. F. RAYMOND.