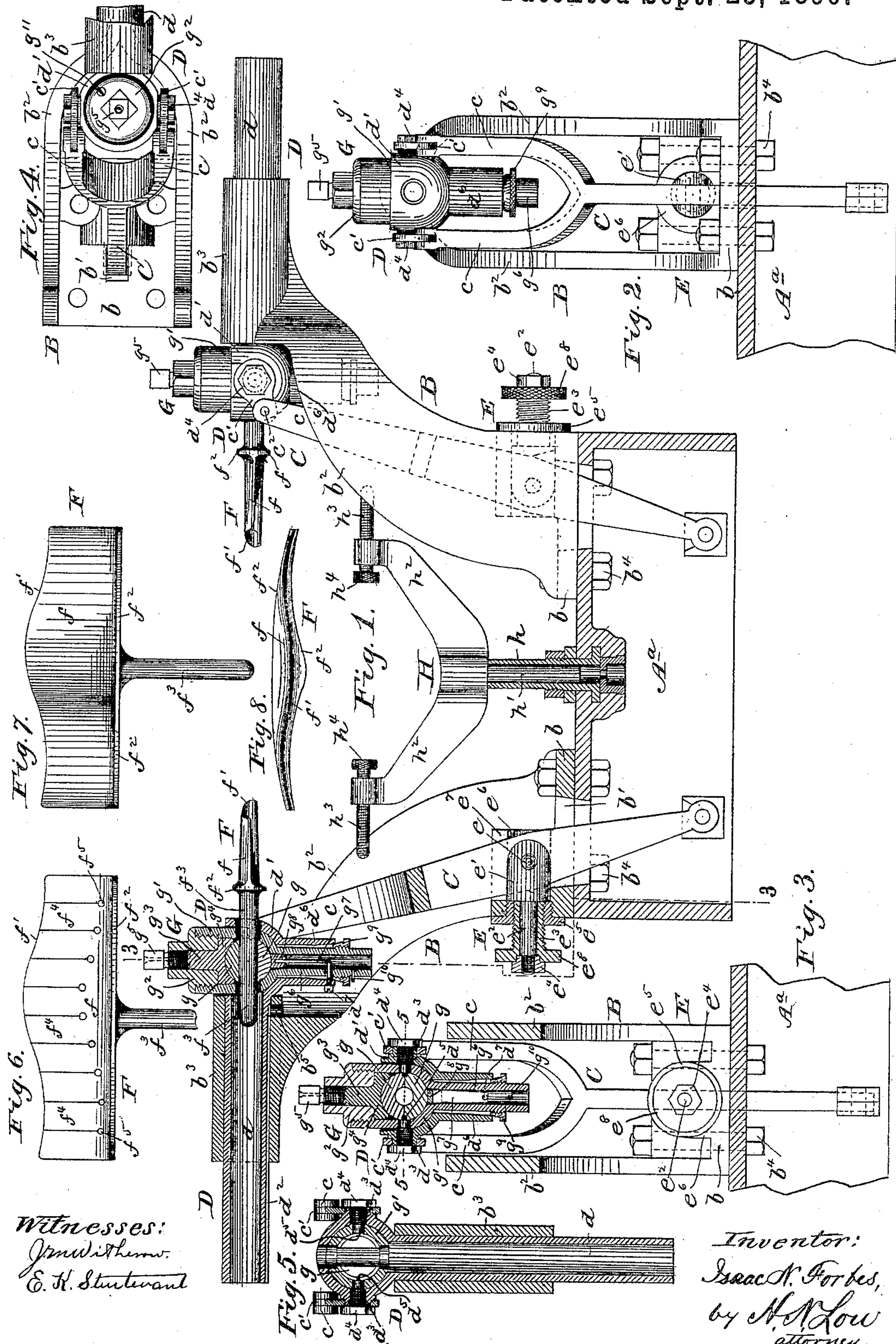


(No Model.)

I. N. FORBES.  
LASTING MACHINE.

No. 436,850.

Patented Sept. 23, 1890.



Witnesses:  
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# UNITED STATES PATENT OFFICE.

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## LASTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 436,850, dated September 23, 1890.

Application filed June 8, 1889. Serial No. 313,616. (No model.)

*To all whom it may concern:*

Be it known that I, ISAAC N. FORBES, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Lasting-Machines; and I do 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.

My invention consists in means whereby the lasting pieces or clamps which operate to force the edges of the upper over and press it down upon the last are automatically depressed at their inner and operating ends or edges, such depression taking place after said ends have passed the line of the boundary of the inner sole and before they have completed their inward movement. I am by such means enabled to obviate a difficulty met with in many lasting-machines, namely, the tendency of the fingers or side clamps to push the inner sole inward and force it upward away from its proper position upon the last and beneath the edges of the upper leather. I am also enabled to perform the lasting operation more perfectly and expeditiously.

It also consists in a lasting-piece, finger-plate, or clamp of novel and simple construction, by the use of which the lasting operation may be most readily and efficiently performed and the machine changed to adapt it to all sizes, classes, and variations of lasts, including those for right and left foot boots and shoes with the greatest ease and rapidity.

In order to make my invention more clearly understood, I have shown in the accompanying drawings means for carrying the same into practical effect.

In said drawings, Figure 1 is an end view, partly in cross-section, of so much of a lasting-machine embodying my invention as is necessary for an understanding of the same. Fig. 2 is an inner side view of one of the stands and a portion of the actuating mechanism for the side lasting devices. Fig. 3 is a vertical longitudinal section of the same on line 3 3, Fig. 1. Fig. 4 is a top view of the same. Fig. 5 is a horizontal sectional view on line 5 5, Fig. 3. Fig. 6 is a top view of a side-lasting clamp constructed according to my invention. Figs. 7 and 8 are respectively

a top and an inner edge view of a modified form of the same.

Referring to the drawings, A<sup>a</sup> indicates the table of suitable construction—such as those which are fully described in detail in my pending applications, Serial Nos. 303,927 and 312,484—at the sides of which are bolted, as shown at b<sup>4</sup>, or otherwise secured, the stands B B. Each of said stands consists of a base-plate b, slotted as shown at b', two upwardly and outwardly extending arms b<sup>2</sup>, and a horizontal bearing-sleeve b<sup>3</sup>, secured to or formed with the upper ends of arms b<sup>2</sup>. In these sleeves are supported the side-lasting devices in such manner as to be movable toward and from the last. The slide for this purpose is shown at D, and consists of a tubular portion d, which fits and is adapted to slide in the bearing b<sup>3</sup>, and provided at its inner end with a vertical bearing or socket d'. The tube d is longitudinally grooved, as seen at d<sup>2</sup>, and guided in its reciprocation by a pin b<sup>5</sup>, which is fixed in the bearing b<sup>3</sup> and engages said groove. Such reciprocation is effected by the side levers C. These levers are forked at their upper ends and provided with short connecting rods or links c', hinged to the lever-arms c at c<sup>2</sup>, and hinged at their other ends upon bosses d<sup>3</sup>, formed upon the opposite sides of the slide D. The rods are there secured by means of bolts d<sup>4</sup>, which are screwed into said bosses and the heads of which overlap upon the outer faces of the rods. If desired, the bolts may be shouldered and the bearings for links c' formed thereon. Intermediately between their upper and lower ends the side levers C are provided with adjustable fulcrums E. Said fulcrum is mainly constructed and operates as described in detail in my pending application, Serial No. 303,927. It is sufficient to say that it is composed of a fulcrum-pin e, which passes through the lever C, a slide-bearing piece e', which is recessed to receive the lever and horizontally perforated for said pin, a stem e<sup>2</sup>, forming a part of piece e', an externally-screw-threaded adjustable sleeve e<sup>3</sup>, which surrounds said stem, a nut e<sup>4</sup>, which screws tightly upon the reduced and threaded end of the stem and bears loosely against the outer face of sleeve e<sup>3</sup>, an internally-threaded bushing e<sup>5</sup>, which engages the sleeve e<sup>3</sup>, and a cylindrical slide-bearing



$e^6$ , which at its inner end receives and guides the piece  $e'$ , and at its outer end is internally screw-threaded to engage the bushing  $e^5$ . The bearing  $e^6$  preferably is formed in one piece with the standard B, and is longitudinally slotted at  $e^7$  in the vertical plane of slot  $b'$  to receive and permit the oscillation of the lever. The top of the table is similarly slotted in the same plane, and the lower ends of levers C extending down therethrough are engaged and actuated by suitable mechanism. (Not shown.) Such mechanism is preferably the same as that fully described in detail in my application, Serial No. 303,927, hereinbefore referred to.

It will be seen that the points to which slides D will be moved by the levers C may be varied by screwing sleeve  $e^3$ , by means of its flanged and milled head  $e^8$ , inward or outward, as may be desired.

The side-lasting pieces or clamps are shown at F. They are preferably formed of dropped spring-steel, and their inwardly-extending operative portions  $f$  are very thin and elastic. The portion  $f$  is curved vertically, as shown, to conform to the contour of the bottom of the last, and the inner edge  $f'$  is curved horizontally to correspond with the edge of the insole, over which it passes in the operation of lasting. Of these clamping-plates there will be provided two for each last, where the variations of the latter demand, and each clamp will be properly numbered to indicate the last and the side thereof to which it belongs. A vertical rib or flange  $f^2$  is formed with the outer edge of the elastic portion  $f$ , as shown in Figs. 1, 6, 7, and 8, for the purpose of strengthening said elastic portion and enabling the operating force to be applied to it uniformly, so that it will act with equal pressure at both ends and at the intermediate portions of the last. At the outer side of the rib  $f^2$  is formed the horizontal outwardly-extending shank  $f^3$ , which serves as the means for securing the clamp F in its holder.

The holder G is formed by two hemispherical vise clamping-pieces  $g$ , each of which is provided on its flat face with a half-round cylindrical bearing, and which fit and are held in an inner socket or hemispherical bearing  $g'$ , which in turn is carried in and by the holder  $d'$  of the slide D, already described. The socket  $g'$  is provided at its upper end with an internal screw-thread, engaged by a correspondingly-threaded plug  $g^2$ . A stop-screw  $g^{11}$  (see Fig. 4) engages said plug and socket to prevent the unscrewing of the former. In a central perforation of the latter fits the vertical stem  $g^3$  of a concave bearing-piece  $g^4$ , which is adapted to fit the upper of the two hemispheres  $g$ . A clamping-screw  $g^5$  engages a thread in the upper part of the perforation of screw-plug  $g^2$ , bears upon the end of stem  $g^3$ , and is adapted, when screwed down, to firmly clamp the shank  $f^3$  of the lasting device between the parts  $g$   $g$ . The

upper end of the stem is rounded, and the lower end of screw  $g^5$  slightly tapered or beveled in order that their pressure upon one another may not cause their ends to upset or bind in their bearing in plug  $g^2$ . The set-screw  $g^5$  is provided with an oil-hole, as shown, through which the parts constituting the holder may be properly lubricated. The sockets  $d'$  and  $g'$  are perforated, as shown in Figs. 1 and 5, to admit of the entrance of shank  $f^3$  and of its universal adjustment. It will thus be seen that the lasting-clamp F is provided with a universal ball-and-socket joint, which at the same time constitutes a vise-clamp holder of the most effective and easily-operated description. I will now describe the means by which such holder is automatically oscillated to depress the edge  $f'$  of the lasting-clamp at the proper time. The hemispherical portion of the inner socket  $g'$  fits that of the outer socket  $d'$ , but the upper part of the outer socket is turned or bored slightly tapering or flaring from the plane of the center of its hemispherical portion upward and outward, thus permitting of an oscillation within certain limits of the inner socket and a vertical movement of the edge of its lasting-clamp F. The inner socket is held down in place and its horizontal oscillation prevented by the inner ends of bolts  $d^4$ , which ends are turned off to form journals and engage corresponding bearings bored through the sides of the inner socket, as seen in Figs. 3 and 5. Each of said bolts is also provided on its inner end with a small pin or extension  $d^5$ , which engages a groove formed by two circular rabbets in the edges of the hemispherical vise-clamps  $g$ , by which engagement it is insured that the dividing plane of said clamps shall be kept approximately horizontal with one of the clamps above the other, which position is essential to the proper clamping action of the bearing-piece  $g^4$ . The shank  $f^3$  being round, free rotation and adjustment are permitted in the only direction in which the vise-clamps are by pins  $d^5$  prevented from revolving.

$d^6$  is a downward tubular extension of the socket  $d'$ , and is bored out slightly tapering, as seen in Figs. 1 and 3, to permit of the oscillation within it of a similar smaller extension  $g^6$  of the inner socket  $g'$ . The outer extension  $d^6$  is shorter than the inner, in order that it may not encounter the adjustable set-screw in the stop-arm hereinafter described, and the inner extension is provided with a spring  $g^7$ , which tends constantly to throw the lower end of the holder G inward and the edge  $f'$  of the lasting-clamp F upward. Said spring is preferably constructed and secured as shown in Figs. 1 and 3, in which it consists of a small flat tapered piece of proper elasticity and shape situated within the inner extension  $g^6$  and held at its upper end in the slot of a tapered plug  $g^8$ , which is driven downward into the upper end of said extension, the bore of the latter being tapered to fit, and



thereby compressed upon the spring. The lower and free end of this spring bears against the inner end of a pin or screw  $d^7$ , which passes loosely through an aperture in the inner extension  $g^6$ . This part  $d^7$  may be simply a loose pin adapted to slide in its bearing in the inner extension  $g^6$  and resting at its outer end against the inner surface of the outer extension, or it may be secured in and rigid with the outer extension, as shown.

The stop for automatically oscillating the holders G is shown at H. It comprises a tubular standard or post  $h$ , secured in the longitudinal T-groove or in an enlargement thereof of the table, where it is suitably clamped, as fully described in my application, Serial No. 312,484, a vertical shaft  $h'$ , mounted in said standard, Y-arms  $h^2$   $h^2$ , formed with said shaft, and adjustable set-screws  $h^3$ , mounted in screw-threaded holes in the upper ends of said arms. Said screws  $h^3$  are situated in the same vertical transverse plane with the lower ends of the extensions  $g^6$   $g^6$  of holders G G and at such height that said extensions will as the levers C C move the lasting devices inward come in contact with them and be arrested, whereby the farther inward movement of said devices results in the depression of the side-lasting clamps F. The adjustment of screws  $h^3$  inward or outward by means of their milled heads  $h^4$  determines the time relative to the advance of the lasting-clamps at which such depression shall take place. The depression should occur at the moment when the lasting-clamps have passed for a sufficient distance above and beyond the edge of the insole, thereby avoiding any displacement of the latter and forcing the upper and insole down firmly upon the last, as more fully described and illustrated in my said application, Serial No. 312,484.

In first adjusting the lasting-clamps F to the last it is necessary that their holders G should be firmly held in position. I have therefore provided for temporarily securing said holders against oscillation in their sockets.  $g^9$  is a conical milled nut or screw-sleeve engaging a corresponding thread upon the extension  $g^6$ , below the end of the outer extension  $d^6$ . The upper and smaller portion of said nut is adapted to enter the end of the outer extension, and it will be readily understood that by screwing it up all oscillation of the inner extension and of the holder G will be prevented while the side clamp is being properly adjusted to the last.  $g^{10}$  is a pin secured in the inner extension  $g^6$ , and adapted to act as a stop to limit the unscrewing of the conical nut  $g^9$ .

The lasting-clamp F preferably has its blade or operating portion  $f$  divided into separate fingers  $f^4$ , as seen in Fig. 6, to give greater flexibility to the whole device and greater independence of action to the different parts of the edge  $f'$ , according to the irregularities of the stock or last. At  $f^5$  are shown perfo-

rations through said blade  $f$  at the bases of the fingers  $f^4$ , which reduce the metal and add to their elasticity.

The mode of operation of my invention has been sufficiently set forth in the above description of its construction.

It will be understood that the illustrations and description in this application are not extended beyond those parts of the machine comprised in my present invention.

The last-supports, head and toe lasting devices, and the actuating mechanism are fully described in my pending applications, Serial Nos. 303,927 and 312,484, upon the machine described, in which this present invention is an improvement, taking the place of the respective side clamps of my former machines and their holding mechanism, including side levers.

I do not in this application claim, broadly, the adjustable fulcrums for the levers C, comprising the parts  $e$ ,  $e'$ ,  $e^2$ ,  $e^3$ , and  $e^5$ , the same being the subject in part of my application, Serial No. 303,927, filed March 19, 1889.

I do not in this application claim an oscillatory side-lasting-clamp holder and a stop for engaging said holder and causing a depression of the clamp as the holder moves inward, the same being the subject of my pending application, Serial No. 333,301, filed December 10, 1889.

While I have hereinafter claimed certain parts and combinations thereof as constituting my invention, it will be understood that I do not confine myself to the exact shapes or arrangements described, but that such claims extend as well to any parts or combinations thereof which are substantially the same, though differing somewhat in shape, appearance, or operation from those herein illustrated and described.

Having thus described my invention, what I claim is—

1. In a lasting-machine, the combination, with a lasting-piece, of a holder therefor comprising a universal joint and a clamp engaging and adapted to secure the parts of said joint, by means of which said lasting-piece is mounted, adapted to be adjusted in all directions to conform to the last, and rigidly held, substantially as set forth.

2. In a lasting-machine, the combination, with a lasting-piece, of a holder therefor comprising a universal joint by means of which said piece is mounted and adapted to be adjusted in all directions to conform to the last, and a single clamping device by which all members of said joint are secured at one operation, substantially as set forth.

3. In a lasting-machine, the combination, with a lasting-piece consisting of an elastic curved continuous blade adapted to extend along the side of the last, of a holder therefor comprising a universal joint, by means of which said lasting-blade is mounted and adapted to be adjusted in all directions to



comform to the last, and a clamp engaging and securing the parts of said joint, substantially as set forth.

4. In a lasting-machine, the herein-described lasting piece or clamp, provided with a flexible blade having a curved surface and curved along its edge, and a longitudinal strengthening-rib integral therewith, substantially as set forth.

5. In a lasting-machine, the herein-described lasting piece or clamp, provided with a flexible blade having a curved surface and curved along its edge, a longitudinal vertical strengthening-rib integral therewith, and a supporting-shank, substantially as set forth.

6. In a lasting-machine, the herein-described lasting piece or clamp, provided with a flexible blade having a curved surface and curved along its edge and partly divided to form independent elastic fingers, all formed in a single piece, and a supporting-shank, substantially as set forth.

7. In a lasting-machine, the herein-described lasting piece or clamp, provided with a thin flexible metallic blade adapted to extend from near the toe to near the heel of the last and to conform to the same, said blade having a curved surface and curved along its edge and having a supporting-shank, substantially as set forth.

8. In a lasting-machine, the combination, with a lasting-piece provided with a thin flexible metallic blade adapted to extend from near the toe to near the heel of the last and to conform to the same, said blade having a curved surface and curved along its edge, of a slide, an oscillatory holder for said blade mounted on the slide, and a depressing mechanism for forcing said flexible blade downward toward the bottom of the last, substantially as set forth.

9. In a lasting-machine, the combination, with a lasting piece or clamp, a sliding support therefor, an actuating-lever and its adjustable fulcrum, of the stand B, having formed with it the bearing  $b^3$  for said slide, and the bearing  $e^6$ , adapted to receive the slide of said fulcrum, substantially as set forth.

10. In a lasting-machine, the combination, with a lasting piece or clamp and a holder therefor, of a slide-bearing consisting of the cylindrical bearing  $d$ , having at its inner end the holding-socket  $d'$ , provided with the lateral bosses  $d^3$ , substantially as set forth.

11. In a lasting-machine, the combination, with a lasting piece or clamp, of a universally-adjustable holder for the same, consisting of a hemispherical socket, two separate hemispherical vise-clamp pieces provided between them with a bearing for a portion of the lasting-clamp, and a movable clamping-piece for forcing said vise-clamps together when in their adjusted position, substantially as set forth.

12. The combination of a lasting piece or

clamp and a holder therefor comprising a socket  $g'$ , two hemispherical vise-clamps  $g$ , having a bearing formed between them, the bearing-piece  $g^4$ , and a securing-screw for the latter, substantially as set forth.

13. The combination, with a lasting piece or clamp, of a holder therefor comprising the socket  $g'$ , the two hemispherical vise-clamps,  $g$ , having a bearing formed between them and a circumferential groove, means for pressing said vise-clamps together, and inward projections from said socket which engage said groove, substantially as set forth.

14. The combination, with a lasting piece or clamp and a holder therefor comprising the socket  $d'$  and the oscillating socket  $g'$  mounted therein, of holding devices for the lasting-clamp carried by said inner socket, and a spring acting to control the oscillation of the one socket relative to the other, substantially as set forth.

15. The combination, with a lasting piece or clamp and a holder therefor provided with the inner socket  $g'$ , of the slotted plug  $g^8$ , the spring  $g^7$ , held thereby, the outer socket  $d'$ , and the pin or screw  $d^7$ , substantially as set forth.

16. The combination, with a lasting piece or clamp and a holder therefor provided with the inner oscillating socket  $g'$ , having the screw-threaded extension  $g^6$ , of the outer socket-piece, and the conical nut or sleeve  $g^9$ , fitting said screw-thread and adapted to engage the outer socket-piece to prevent oscillation of the holder and lasting-clamp, substantially as set forth.

17. The combination, with a lasting piece or clamp, the slide D, and the stop H, of the oscillating holder G, having a hemispherical socket  $g'$  and the downward extension  $g^6$ , adapted to engage said stop, substantially as set forth.

18. The combination, with a lasting piece or clamp and a holder therefor comprising the outer socket-piece  $d'$ , having the hemispherical portion, and the inner socket  $g'$ , having devices for securing and adjusting the lasting-clamp, of the lateral bolts  $d^4$ , passing through the outer and engaging the inner socket, substantially as set forth.

19. The combination, with a lasting piece or clamp, the stand B, having the arms  $b^2$ , and the slide D, mounted in the upper end of said stand and having the lateral bosses  $d^3$ , of the oscillating holder for said clamp mounted in said slide, the stop H, having the outwardly-projecting adjusting-screw  $h^3$ , the forked lever C, having its arms between the stand-arms  $b^2$  and adapted to pass on each side of the screw  $h^3$ , and the links  $c'$ , connecting arms  $c$  with said bosses, substantially as set forth.

20. In a lasting-machine having side clamps changeable at will from right to left foot side clamps, or vice versa, the combination, with said clamps, of a universal clamp-holder for the speedy changing and adjusting of the



same, comprising a socket, two separate hemispherical clamping-pieces, and a movable clamping-piece for securing the latter, substantially as set forth.

- 5 21. In a lasting-machine, the combination, with a lasting-clamp, of a holder therefor comprising a socket-piece, two hemispherical clamping-pieces, means for securing the latter, and a part movable toward the last, in which

part the said socket-piece is hinged and is adapted to be oscillated, substantially as set forth.

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

ISAAC N. FORBES.

Witnesses:

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