

A. C. CAREY.

Machinery for Lasting Boots and Shoes.

No. 146,043.

Patented Dec. 30, 1873.

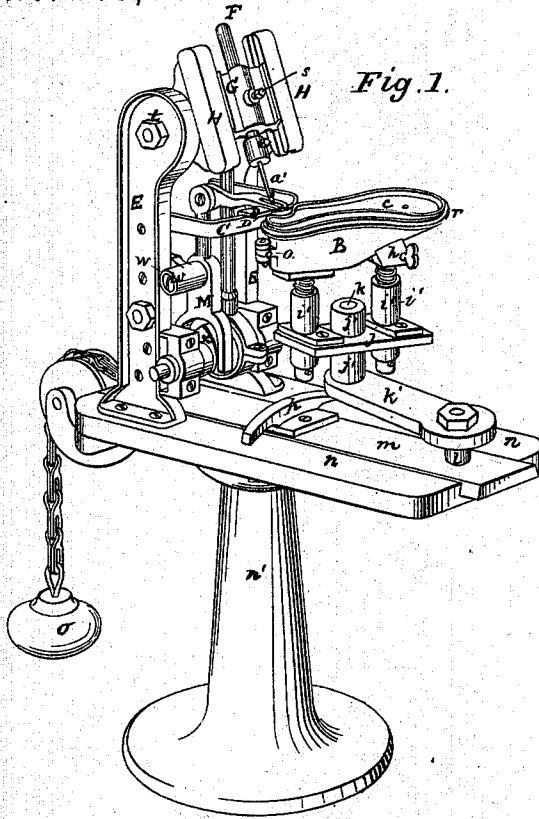


Fig. 1.

Fig. 2.

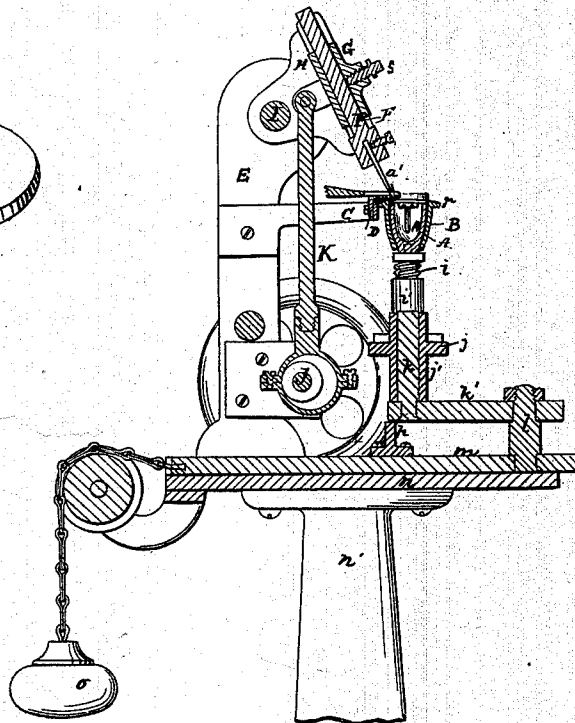
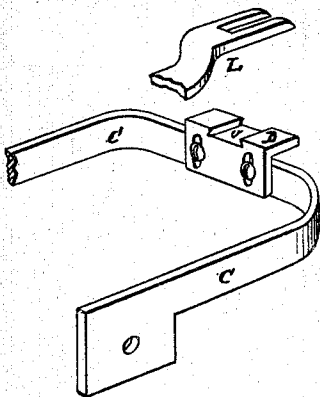


Fig. 3.



Witnesses.

Erill Dick

Inventor.

Augustus C. Carey
by atty. H. H. H.

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Fig. 4.

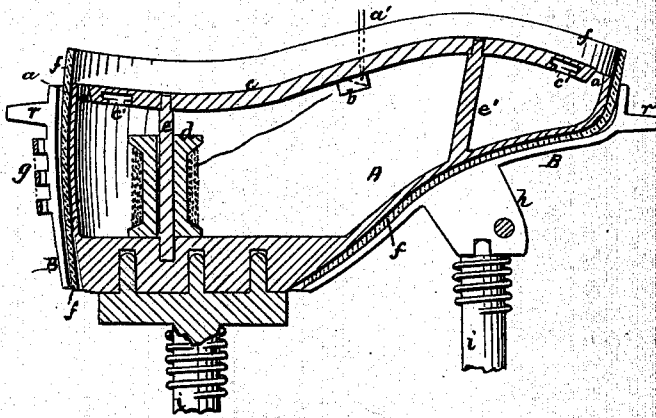


Fig. 5.

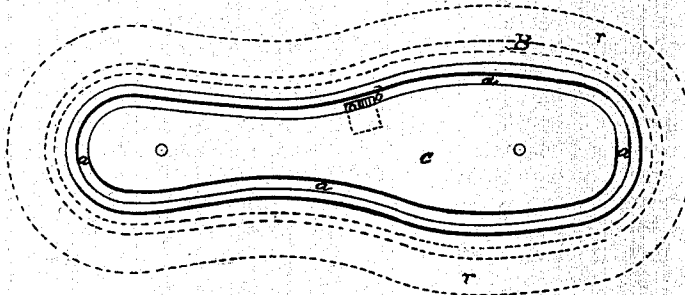


Fig. 6.

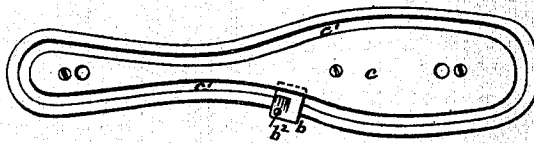
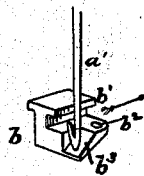


Fig. 7.



Witnesses

Emell Dick

Inventor

Augustin C. Carey

by atty. Abbott

UNITED STATES PATENT OFFICE

AUGUSTUS C. CAREY, OF MALDEN, ASSIGNOR OF TWO-THIRDS HIS RIGHT TO
GEORGE F. BREED AND DEAN PEABODY, OF LYNN, MASSACHUSETTS.

IMPROVEMENT IN MACHINERY FOR LASTING BOOTS AND SHOES.

Specification forming part of Letters Patent No. **146,043**, dated December 30, 1873; application filed
December 17, 1873.

To all whom it may concern:

Be it known that I, AUGUSTUS C. CAREY, of Malden, Middlesex county, Massachusetts, have invented certain new and useful Improvements in Machinery for Lasting Boots and Shoes, of which the following is a specification:

This invention relates principally to a new mode of lasting boots and shoes, *i. e.*, fastening together the insole and upper on the last by machinery. The main feature that characterizes my invention is effecting the union of these parts by machine-sewing, the stitch being made through the upper and the insole, and the line of the stitches following the contour of the sole or the bottom of the last upon which the sole and upper are lasted.

I am aware of no instance before my invention in which the lasting operation has been effected by machine-sewing, the upper and insole hitherto, after having been mounted on the last, being held together by tacks, and then sewed or basted by hand with a zigzag stitch running crosswise over the sole, or being pegged or nailed together.

In carrying out my invention, I employ a hollow last, having on its sole a continuous thread or needle slot or passage, extending around the sole or tread in a course which is to be the line of stitching, and communicating with the interior of the last. In connection with this hollow last, I employ a sewing mechanism, one part of which is exterior to and has no direct connection with the last, while the other part is contained within and carried by the last, the two parts being brought into communication and acting together, through the thread or needle slot in the last, to stitch together the upper and the insole when the machine is in operation.

The parts just specified are the main elements which enable me to perform the operation of lasting by machine sewing or basting. Without attempting any preliminary statement of the details of their arrangement and construction, and of the other devices which I prefer to employ in connection with them in an organized machine, I shall proceed at once to a description of the machine illustrated in the accompanying drawings, in which I have

indicated one way in which my invention can be carried into practical effect.

Figure 1 is a perspective view of the machine. Fig. 2 is a vertical central section of the same. Fig. 3 is a view of the edge and top gages and crimper or folder, detached. Fig. 4 is a longitudinal vertical section of the last. Fig. 5 is a top view of the same, the sole or tread being the uppermost portion. The last-holder, or form that incloses the body of the last, is indicated in dotted lines. Fig. 6 is a plan of the under side of the removable sole or tread of the last. Fig. 7 is a view of the two parts of the stitch-forming mechanism.

I shall first describe the last and manner of mounting the upper and insole on the same, the sewing mechanism, and the manner in which it is arranged and operated, in connection with the last, to sew through and through the insole and upper; and I shall afterward describe the devices which I now prefer to employ to co-operate with the parts above named in order to facilitate the operation of the machine.

The last A is of any ordinary or suitable external configuration. It is made hollow to such an extent as to permit of the free movement of the last with respect to the needle, without interfering with the proper delivery of the thread, or with the operation of the two parts of the sewing mechanism. The last is to be held on a support, which will allow it to be freely moved along under the needle, in order that the stitches may be made to follow the proper line or course. A mechanism for so supporting the last will be hereinafter described. Through the tread of the last is formed a continuous slot or channel, *a*, communicating with the interior of the last, and following the contour of the sole, as seen in Figs. 4 and 5. Above the last is supported, in suitable bearings, the barbed needle *a'*, to which a reciprocating movement is imparted by suitable mechanism, hereinafter described. The last and needle are so placed, with relation to each other, that the needle, in descending, will enter and pass down through the channel or passage *a* far enough to engage the thread carried by the other part of the stitch-forming mechanism, which latter, as hereinbefore stated, is carried by or contained

within the last. The stitch-forming mechanism, in the present instance, is designed to make the chain or loop stitch with a single thread; and for this purpose the other part that co-operates with the needle consists of what may be called the "thread-carrier" b , which hangs from the under side of the sole c of the last, as indicated in Fig. 4, it being provided with a flanged head, b^1 , fitting accurately, but so as to move with ease, in a flanged groove, c' , formed on the under side of the sole of the last, and extending around the same in a line parallel with the needle slot or passage a . The thread-carrier is formed with an eye, b^2 , for the thread, and an inclined or beveled face, b^3 , upon which the needle strikes in its descent, the impact of the needle against this beveled face causing the thread-carrier to be moved in its guide-groove c' in the direction indicated by the arrow in Fig. 7.

By this arrangement of the thread-carrier, not only can the thread be laid in the path of the needle, so as to be taken up by the needle-barb when the latter ascends, but the last can be moved progressively or fed along under the needle without carrying the thread-carrier out of position with respect to the needle.

Thread may be supplied to the thread-carrier through the hollow last from any convenient source located either within or outside of the last. In the present instance the supply is derived from a spool, d , mounted on a spindle or post inside the last, as shown in Fig. 4—an arrangement which I prefer, as being convenient, and as rendering the mechanism more compact. The delivery of the thread from the spool, if desired, can be regulated by a suitable tension or friction brake applied to the spool in any of the ways usually employed in sewing-machines for a like purpose.

To facilitate access to the interior of the last, I make the sole c removable. It is for this purpose supported on posts e c' , as seen in Fig. 4, from which it can be lifted whenever desired.

I shall now proceed to describe the general operation of the last and sewing mechanism in lasting a boot or shoe.

The upper (indicated at f in Fig. 4) is stretched on the last, and held thereon by suitable means, with its edges projecting above the tread or sole c . The insole is then laid upon the sole or tread c , and the edges of the upper folded down onto the insole, either during the progress of the sewing, or before said operation. Preliminary to putting on the insole, the thread from spool d is passed up through eye b^2 of the thread-carrier, and the end of the thread is drawn up through slot a , and held outside the last. The last is then placed on the machine below the needle, and so that the portion of the passage a under the needle will be in the plane of movement of the same. The last is so placed as to bring the incline b^3 of the thread-carrier directly under the needle. The needle is then put in motion. In its de-

scend, after penetrating the upper and insole, it will strike the bevel b^3 , and will move the carrier back in the direction indicated in Fig. 7. As the outer end of the thread is confined, this movement of the carrier will have the effect of laying the thread along in the line of the slot a . The needle, however, will not generally take up a loop on its first stroke. When it rises so as to clear the work, the last is moved forward a distance equal to that which the carrier was moved backward by the needle. This will have the effect of bringing the bevel b^3 directly under the needle, so that the latter, when it again descends, will again strike the bevel and force the carrier backward. By this time the thread will have been stretched quite across the path of the needle, so that when the latter ascends its barb will catch the thread and draw up a loop through the work. The last is again moved forward a distance equal to the backward movement of the carrier, and the needle, in descending, again operates the carrier, and in ascending takes up a loop, which is drawn through the first loop, thus making the chain or loop stitch. In this manner the sewing progresses, the intermittent feed movement of the last, which has the effect of bringing back the thread-carrier to its proper position under the needle, being in a direction opposite to that in which the carrier is moved by the needle, and independently of the last.

The stitching or lasting is done through and through the insole and overlapping edge of the upper, and the line of stitching follows the course of the channel or passage a , the last being properly guided and directed for the purpose. The barb of the needle is turned to the front, and the needle is placed not vertically, but at an inclination, with relation to the last, as shown in Figs. 1 and 2, so that, in its descent, it may move obliquely toward the center or the opposite side of the last, for the purpose of enabling its barb, with more certainty, to engage the thread stretched across its path by the movement of the carrier, which takes place when the needle descends.

I would here say that the movement of the last under the needle may be effected by hand, or automatically by mechanism similar, for instance, to that employed in pegging-machines to move, guide, and direct the last. I would also say that the thread-carrier may be operated by other means to move at the proper time and to the proper extent relatively to the movement of the last.

In the drawing I have represented an arrangement in which the last is designed to be moved and directed by hand. I have also there represented means which may advantageously be employed for the purpose of stretching or holding the upper on the last, and operating in connection with the work-supporting devices and gages.

The means for holding the upper closely on the last consists of a matrix or form, B , whose interior has the configuration of the exterior of the sides of the last, and this matrix is di-

vided longitudinally into two halves, hinged together at *g*, Figs. 1 and 4, and held together at *h* by a screw passing through ears on the contiguous edges of the two parts, or by other suitable means. After the upper is drawn on the last, the latter is placed between the opened halves of the matrix, which are then closed and drawn together, so as to clasp and press the upper firmly in place.

In the machine represented in the drawings, the form B remains on the last during the last-
ing operation.

In order to obtain the necessary freedom of motion for the last, I mount it on two posts, *i i'*, which support the last at the toe and heel, and are capable of vertical play in sockets *i' i'*, being upheld by springs, as shown. These posts and their sockets are supported at the ends of a plate, *j*, provided at its center with a vertical sleeve, *j'*, that fits and is capable of rotating on an upright post, *k*, fixed on the extremity of a horizontal arm, *k'*, turning on a vertical axis or pin, *l*, attached to the horizontal plate *m*. The latter slides in dovetailed ways in the base-plate or table *n*, which is supported on a suitable pedestal, *n'*. The sliding plate is preferably connected with a weight, *o*, or a spring, or equivalent means, whereby said plate, together with the mechanism that it carries, will have a tendency to move up toward the part of the machine where the needle and stationary gages are located. The outer end of the arm *k'* is upheld by a curved supporting-bar, *p*, on which it rests and over which it can move.

The mechanism thus described will allow the last all freedom of movement necessary to enable the workman to guide it or to cause it to follow the proper pattern. The last normally presses up toward the bar C, (shown separately in Fig. 3,) which is supported in the uprights or standards E. Its outer face, or face adjoining the last, constitutes the edge gage, against which the last or the pattern thereon is pressed during the movement of said last along under the needle.

The pattern, in this instance, is furnished by a flange, *r*, on the form or matrix B, said flange having an outline corresponding to the configuration or line of the needle slot or passage *a* in the last. It also is shaped so as to follow the undulations of the tread of the last. The edge of the flange *r* rests against the outer face of the edge gage *c*, and the upper face of the flange lies under the horizontal lip or flange D, carried by, and projecting outwardly beyond, the piece C, as shown in Fig. 3. This flange D constitutes what may be called the "top gage." By keeping the pattern-flange *r* up against these two gages, the proper position of the work, with respect to the needle, can be maintained at all times during the movement of the last, in the operation of sewing. The top gage D may be made vertically adjustable, as shown in Fig. 3, it being held to the edge gage by set-screws passing through slots, as seen in the figure referred to. The barbed needle is carried by a needle-stock, F,

held in a socket or sleeve formed in a slide, G, as shown in Fig. 2. The slide moves in dovetailed grooves formed in guide-frame H, fixed on an arbor, I, by which it is held to the standards E. The slide is actuated from driving-shaft J by a connecting-rod, K, jointed at one end to the slide, and encircling at the other end an eccentric on the driving-shaft, as shown in Fig. 2. The needle-stock is held in the slide by a set-screw, *s*, and can be adjusted to cause the barbed needle to make a larger or smaller loop, as desired, this being effected by loosening the set-screw and moving the stock up or down, according to the kind of loop required. By setting the stock down nearer to the last, a smaller loop will be made, and by setting the stock up, so as to increase the distance from the last of the point to which the needle recedes during its reciprocations, a large loop will be formed. It may be required at different times, owing to the varying character of the work, or to the different sizes and shapes of the lasts used, to vary the angle of inclination or obliquity of the needle with respect to the last. To this end, the arbor I of guide-frame H is arranged so that it can turn in its bearings in standards E, it being held in the desired position by tightening-nuts *t*, one of which is shown in Fig. 1. If found necessary, the connecting-rod K can be made in two parts, united in an adjustable manner, so that the working length of the rod can be varied to conform to the adjustment of the guide-frame H.

As I have before stated, the folding over or lapping of the edges of the upper upon the insole can be effected in any suitable way, and by various means, and either before, or during the progress of, the sewing or basting operation. In the machine shown in the drawings I have represented a device for the purpose which acts during the progress of the sewing operation. This device consists of a reciprocating crimper or folder, L, (represented partially in Fig. 3 on an enlarged scale,) which is arranged to move in a dovetailed groove, *v*, on the top gage D. This crimper is so located that its front end, which is directly under the needle, will, when moving forward, fold over the upper on the insole, and hold it there until the needle enters the work. The front end of the crimper is slotted for the passage of the needle, as shown. The movement of the crimper is derived from a vibrating arm, M, to which it is jointed. This arm is hung on a horizontal pin or axis, *w*, and is vibrated by a cam, *x*, on the driving-shaft, which cam is straddled by the forked lower end of the arm. The cam is so shaped and located, with respect to the eccentric that drives the needle, that the crimper will move forward in advance of the needle, and lap the edge of the upper onto the insole before the needle reaches the work. It continues in this position until the needle enters the work, and then withdraws, and, after the needle leaves the work and the last is moved along, it again advances to push a

fresh portion of the edge of the upper down onto the insole.

The mechanism herein described is adapted to last boots and shoes, and it is to this operation that my invention is mainly directed. It will be manifest, however, that, with a few changes, it may be used for sewing outsoles to uppers. In this case, the crimper or folder would not be needed, and it would, of course, be requisite to provide a waxed thread. The principle of operation of the machine would, however, remain unchanged.

I do not confine myself to the specific mechanism herein described, and shown in illustration of my invention, as the construction and arrangement of the same may be varied to some extent without departure from the principle of my invention.

What I claim, and desire to secure by Letters Patent, is—

1. An organized machine for lasting boots and shoes, or uniting the upper and soles, by sewing, comprising the combination of a hollow last or work-support, provided in or around its tread or sole with a continuous needle passage or channel, and movable under the needle for the purpose of feeding the work along during the operation of sewing, and a sewing mechanism, consisting of a reciprocating needle exterior to the last and a thread-carrier or its equivalent within the last, for presenting the thread to the needle, said parts of the sewing mechanism being adapted to operate together, through the needle slot or passage around the sole or tread of the last, to sew through the insole and upper, or the insole, upper, and outsole, as the last is fed along under the needle, substantially as set forth.

2. The movable hollow last, provided in or around its tread or sole with a needle passage or channel, and carrying within it a thread-carrier, held and adapted to move in a groove on the under side of the sole parallel with the needle-passage, in combination with a reciprocating barbed needle, entering the needle-channel in the last, and operating, in connection with the said thread-carrier, as herein shown and set forth.

3. In a machine substantially such as described, a hollow last, containing within it the thread-carrier or equivalent device, to operate,

in connection with the needle, to form the stitch, and the spool or bobbin from which the supply of thread to form the stitch is drawn, substantially as shown and set forth.

4. The hollow last, provided with a removable tread or sole proportioned in size and shape to the opening in the bottom of the last, so that, when in place, it will leave between its outer edge and the surrounding edges of the body of the last a continuous channel or passage, through which the needle may penetrate to the interior of the last, substantially as shown and set forth.

5. In combination with the last, the mechanism, constructed and arranged as herein shown and described, for supporting said last, and allowing the necessary freedom of movement to permit it to be fed along, and to present properly the successive portions of the work to the needle during sewing operation.

6. The combination, with the hollow last and the sewing mechanism, operating together as described, of the last-supporting mechanism and the top and edge gages and pattern, whereby the last may be accurately guided and maintained in proper position as it is fed along, substantially as shown and set forth.

7. The combination, in a machine substantially such as described, with the hollow channeled last or work-support, of the reciprocating needle, needle-slide, and slide-supporting frame, adjustable to vary the angle of obliquity or inclination of the needle with respect to the last, substantially as shown and set forth.

8. The reciprocating crimper, supported by and moving on the top gage, in combination with the last and sewing mechanism, substantially as shown and set forth.

9. The last-holder or matrix, divided longitudinally into two parts, hinged together as described, and provided with a pattern-flange, adapted to operate, in connection with the top and edge gages on the machine, substantially as shown and described.

In testimony whereof I have hereunto signed my name this 10th day of December, A. D. 1873.

AUGUSTUS C. CAREY.

Witnesses:

EWELL DICK,
M. BAILEY.