

No. 628,200.

J. KEATS & W. S. CLARK.

Patented July 4, 1899.

LASTING MACHINE.

(Application filed Dec. 14, 1897.)

(No Model.)

11 Sheets—Sheet 1.

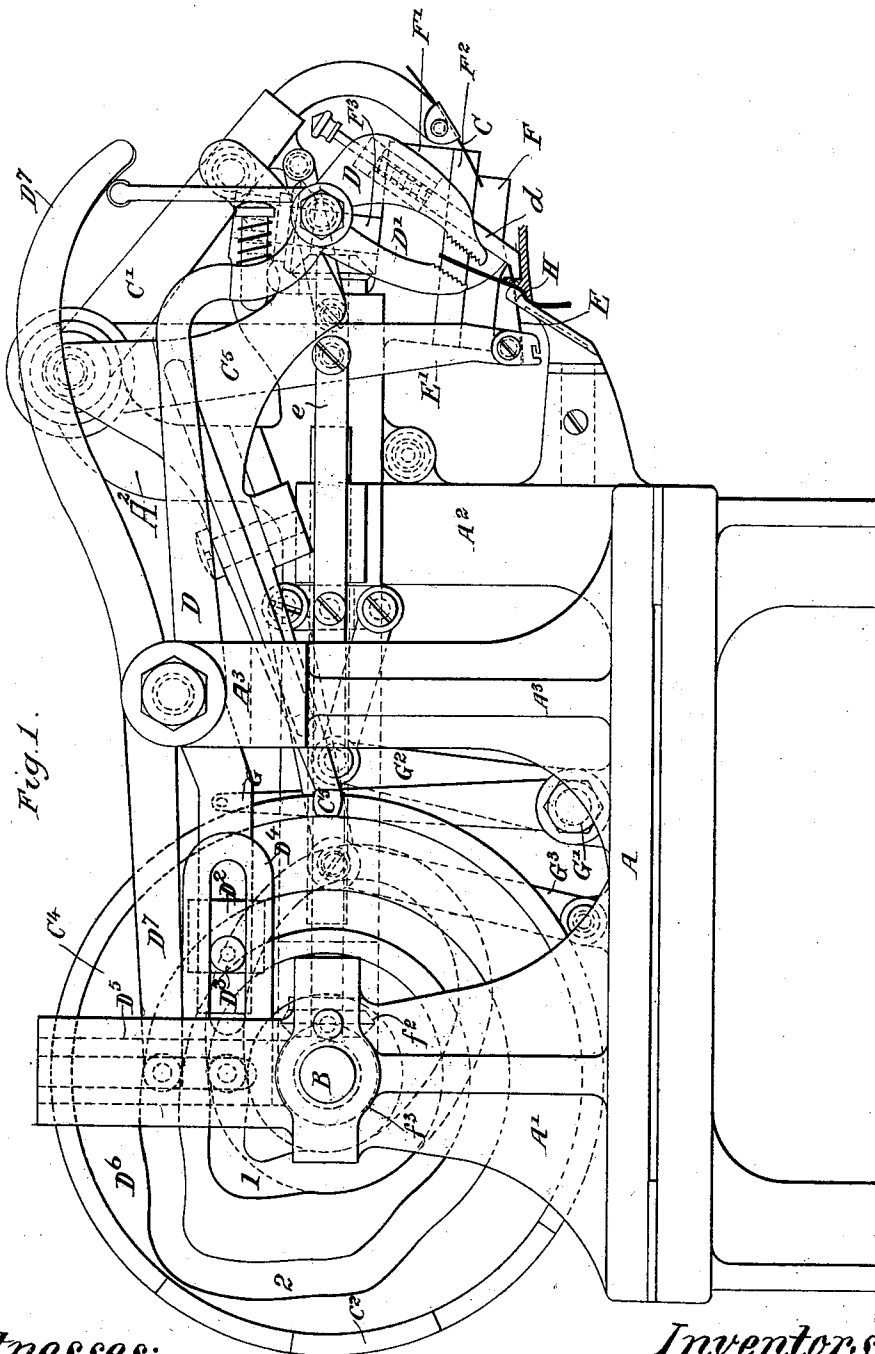


Fig. 1.

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George Bany Jr.

Inventors

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By attorneys  
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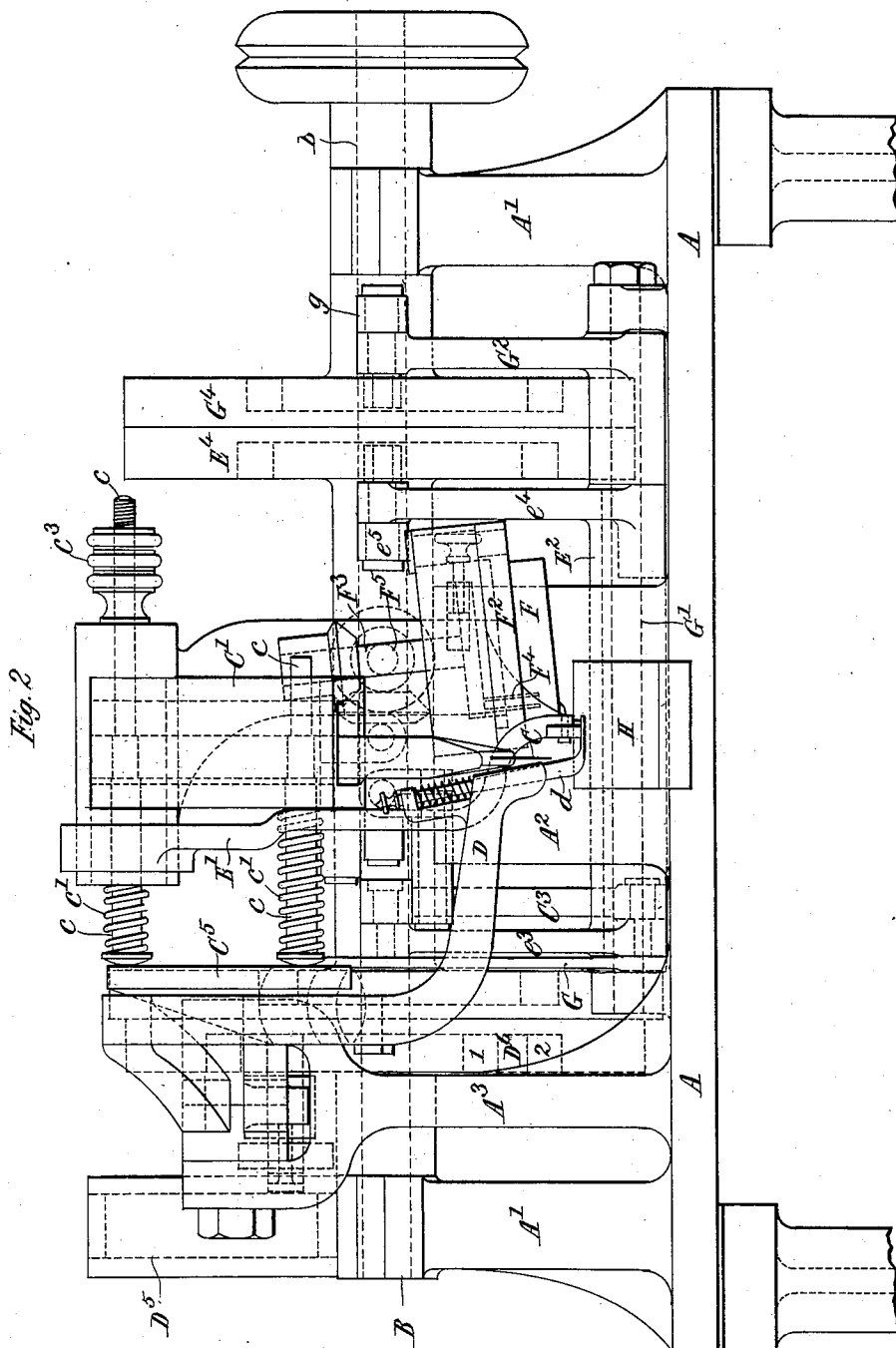
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11 Sheets—Sheet 2.



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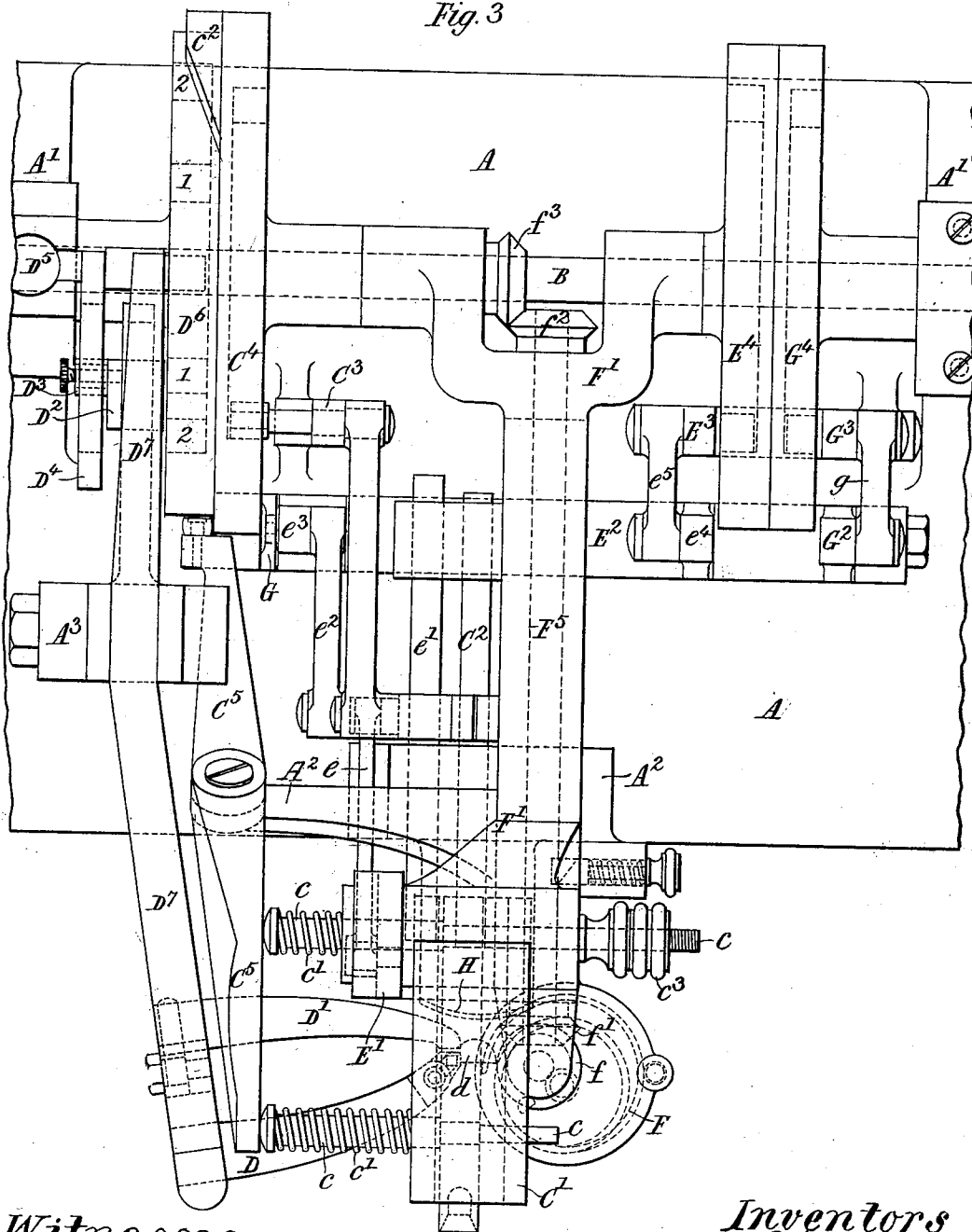
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Fig. 3



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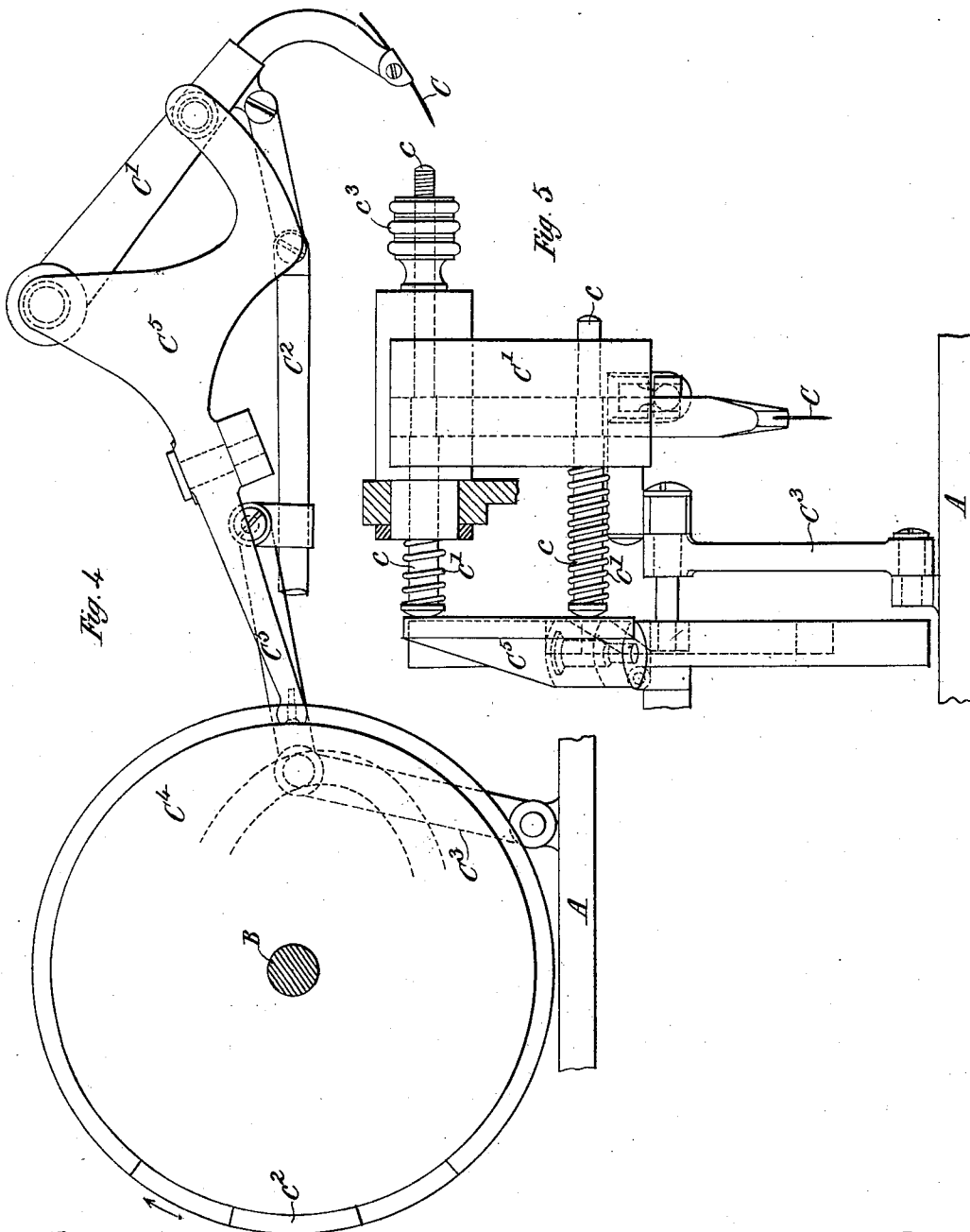
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11 Sheets—Sheet 4.



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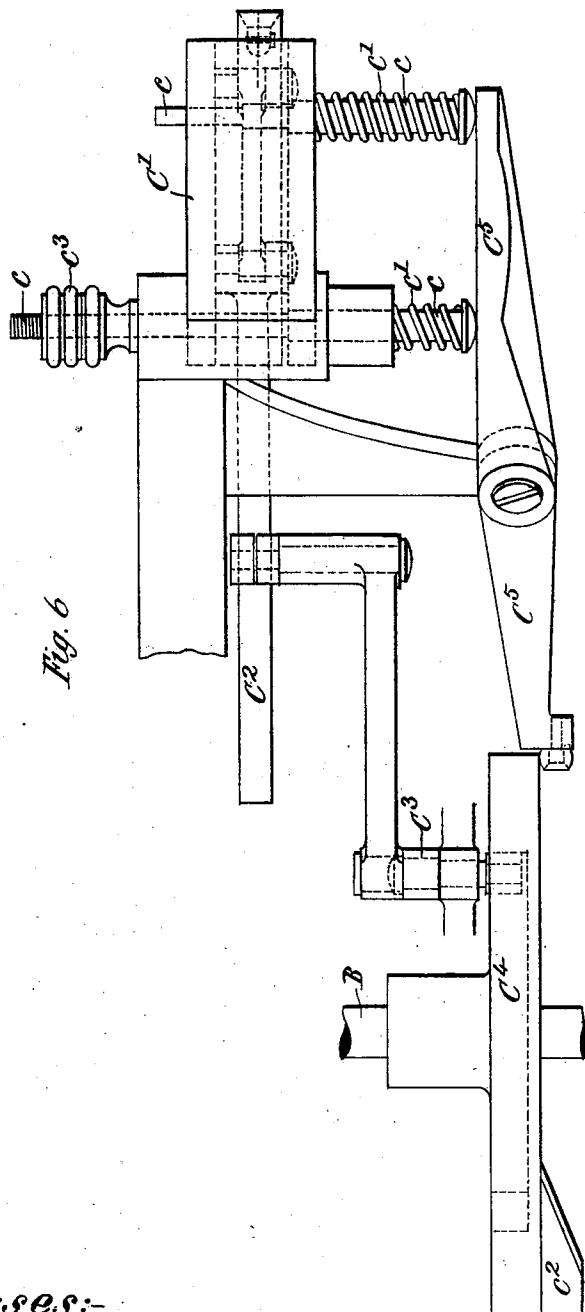


Fig. 6

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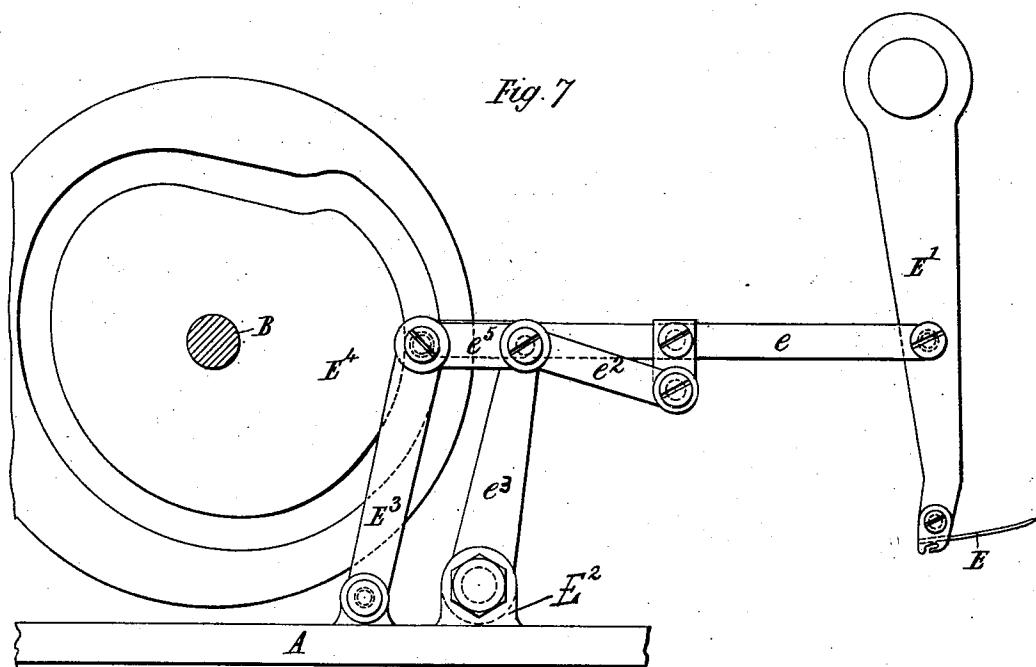
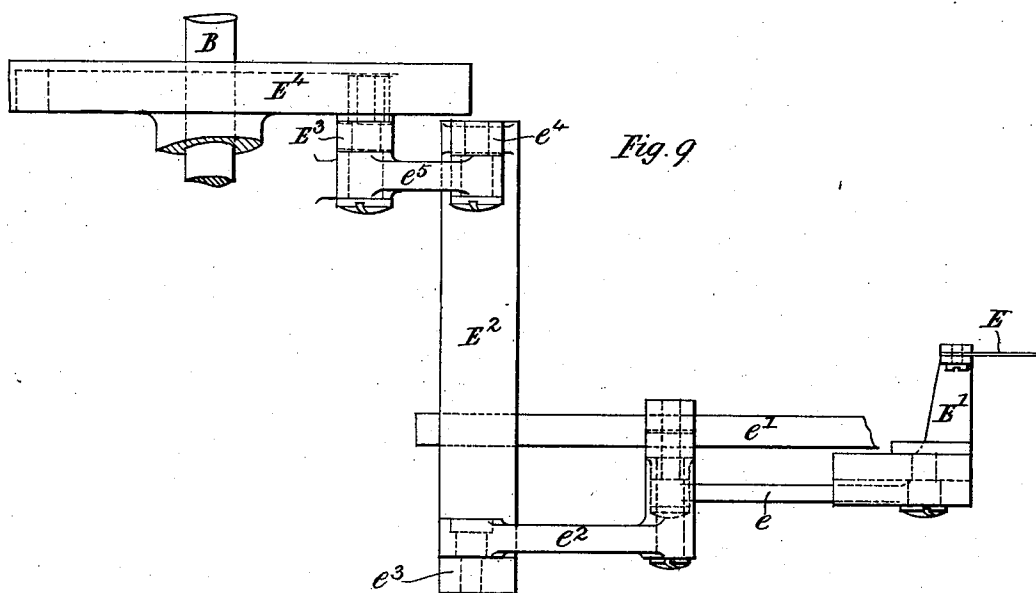
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11 Sheets—Sheet 6.



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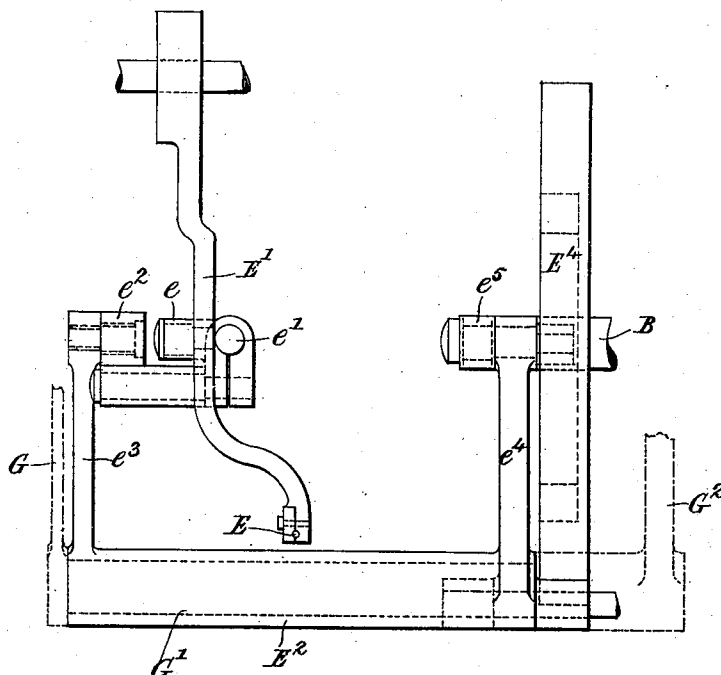
J. KEATS & W. S. CLARK.  
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(Application filed Dec. 14, 1897.)

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11 Sheets—Sheet 7.

*Fig. 8*



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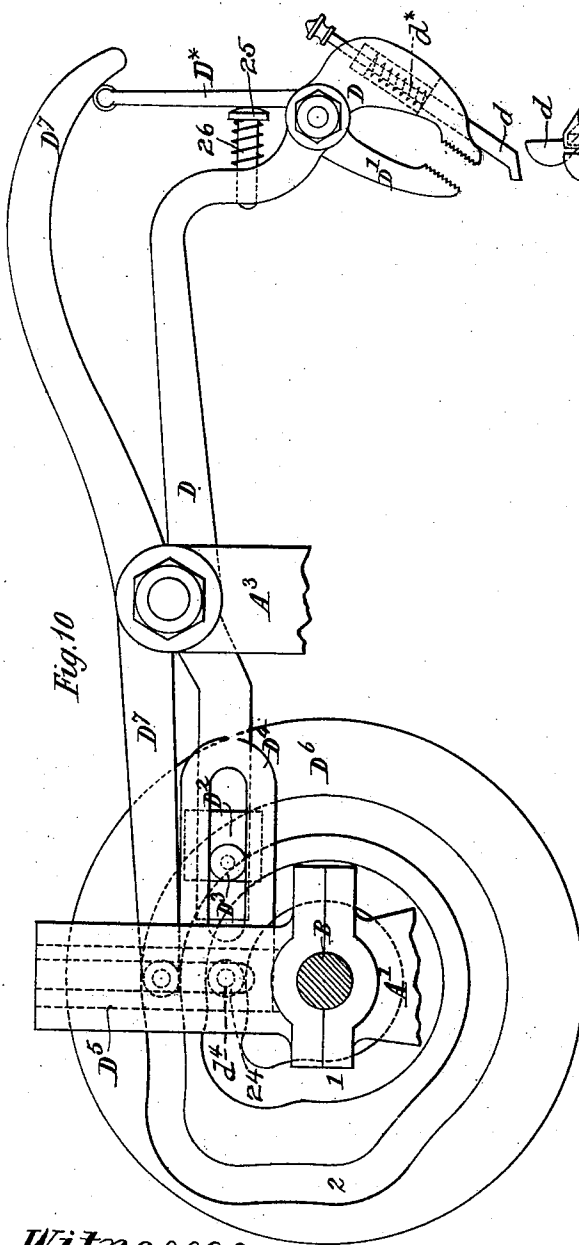


Fig. 10

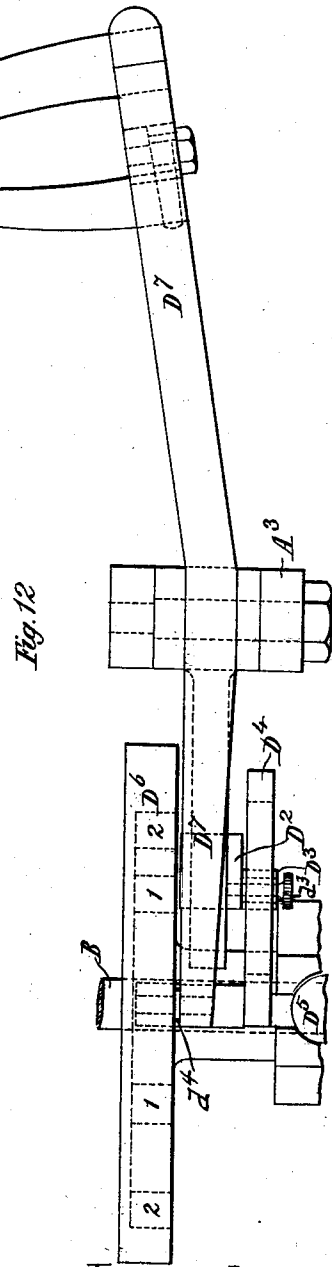


Fig. 12

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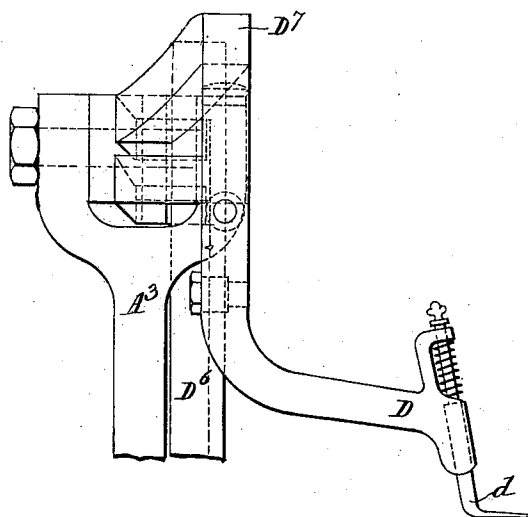
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*Fig. 11*



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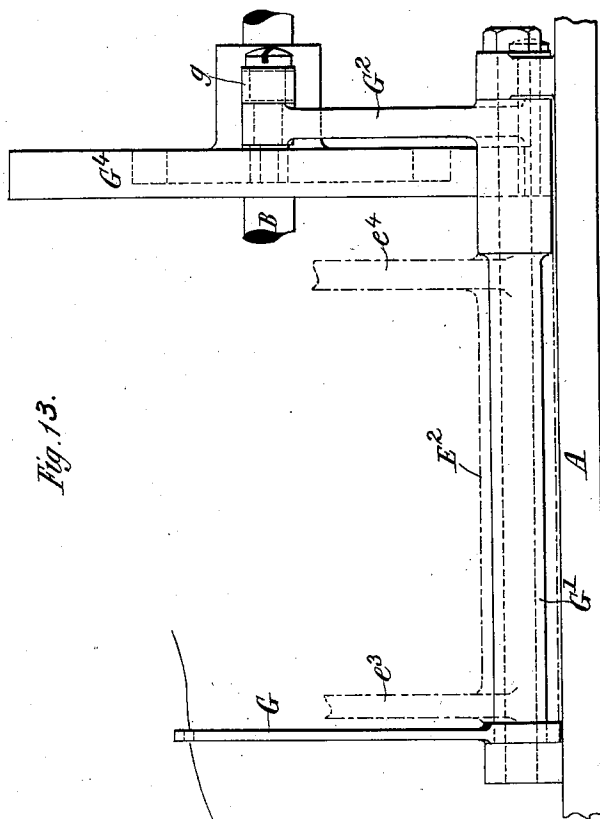


Fig. 13.

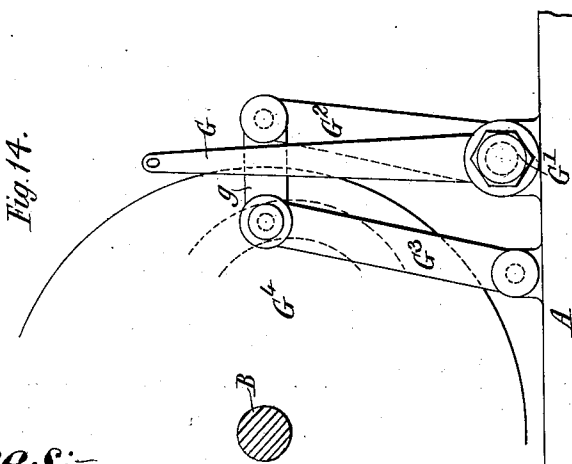


Fig. 14.

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Fig. 19.

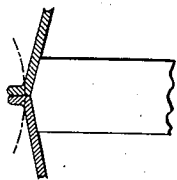


Fig. 15.

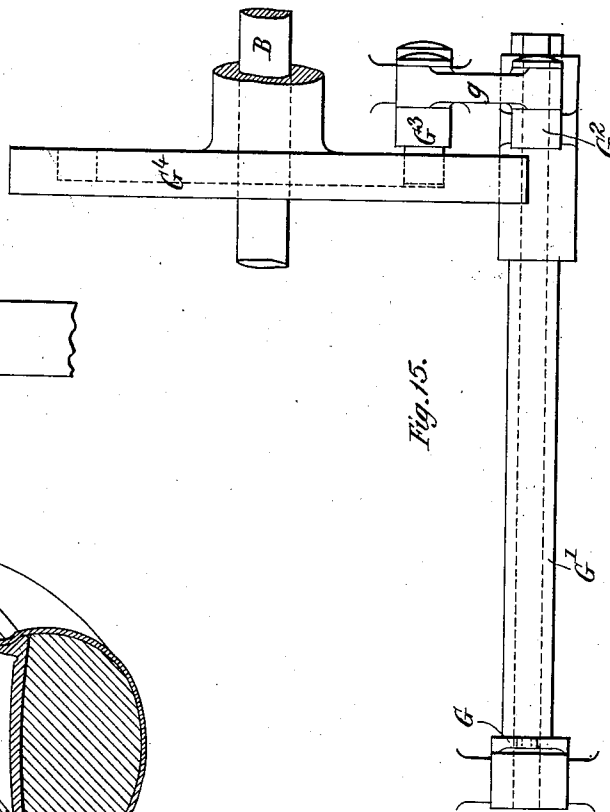


Fig. 17.

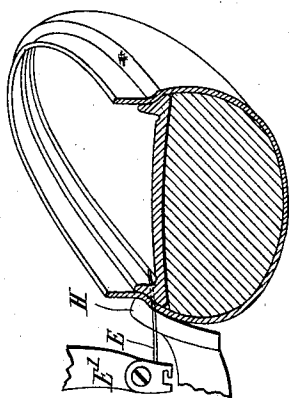


Fig. 16.

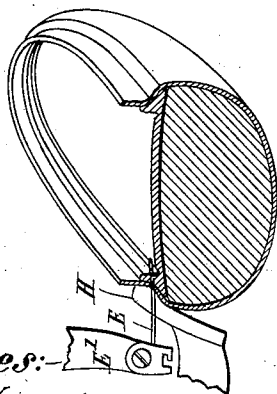
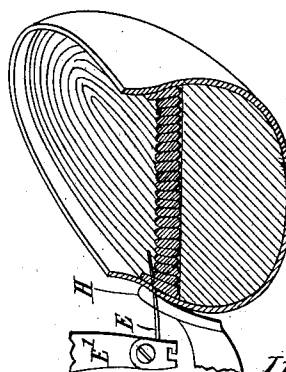


Fig. 18.



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# UNITED STATES PATENT OFFICE.

JOHN KEATS, OF BAGNALL, AND WILLIAM STEPHENS CLARK, OF STREET,  
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## LASTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 628,200, dated July 4, 1898.

Application filed December 14, 1897. Serial No. 861,794. (No model.)

*To all whom it may concern:*

Be it known that we, JOHN KEATS, of Bagnall, near Stoke-on-Trent, county of Stafford, and WILLIAM STEPHENS CLARK, of Street, county of Somerset, England, have invented certain Improved Machinery for Lasting Boots and Shoes, of which the following is a specification.

This invention relates to a novel arrangement of lasting-machines for securing the uppers to the soles or insoles of boots and shoes.

In an application for patent filed by us on the 10th day of September, 1897, Serial No. 651,162, we described a mode of preparing soles and insoles with a rib or raised portion at the edge or margin of the sole for receiving the line of stitches. Against this rib the edge of the upper was to be laid and the stitches were passed through the rib and the upper. It is claimed for this mode of manufacturing boots and shoes that it possesses advantages irrespective of the means used for uniting the parts together.

We have now designed a machine specially applicable for straining or, as termed in the boot-trade, "lasting" the uppers and sewing them to our ribbed soles by one combined operation, such machine having, besides the main characteristics of a boot-sewing machine, means whereby all the usual movements are made when lasting by hand. Thus we employ an eye-pointed curved needle and an awl to pierce the holes for the sewing-needle and also to feed forward the work. The work carried by a last is so presented to the machine for the lasting and sewing operations that the awl will strike the inner side of the rib of the sole, pass through the edge of the upper while held at tension by a pair of grippers, and, on the hold of the grippers relaxing, feed the work forward, bringing the pierced hole opposite the eye-pointed needle to receive the needle-thread. The locking or second thread is inserted in the loop of the needle-thread by a rotary shuttle, which is mounted with its axis in an oblique position. An interval of time during the rotation of the main shaft between the retreat of the needle and the next movement of the awl is provided for to allow the stretch to be taken out of the upper where the stitch is to be formed, by which means perfect lasted boots will be produced. The lasting instru-

ments or grippers work automatically, and after pulling up the edge of the upper to the adjustably determined amount they retain their hold on the said upper until the awl has pierced the rib and upper sufficiently to hold the upper (as lasted) in position during the feeding motion.

In the accompanying drawings the sewing devices illustrated are only incidental to the invention herein claimed, it being within the scope of the invention to employ any means suitable for the purpose to secure the upper to the sole by the lasting process.

Figure 1 is a side elevation of the machine complete. Fig. 2 is a front view, and Fig. 3 a plan view, of the same. Fig. 4 shows in side elevation the mechanism for operating the awl detached from the machine. Fig. 5 is an elevation taken at right angles to Fig. 4, and Fig. 6 is a plan view of the same. Figs. 7, 8, and 9 are similar views of the mechanism for operating the needle. Figs. 10, 11, and 12 are like views of the gripper mechanism. Fig. 13 is a front view, Fig. 14 a side view, and Fig. 15 a plan view, of the take-up and pull-off mechanism. Fig. 16 is a diagram illustrating the sewing of the upper to a leather-ribbed sole. Figs. 17 and 18 illustrate the sewing of the upper to ribbed felt and jute soles. Fig. 19 illustrates the mode of producing what is known as "flat" sewing by the improved machine.

A, Figs. 1, 2, and 3, is the base-plate, carrying standards A' for supporting the bearings of the main or cam shaft B. Projecting upward from the bed-plate is a standard A<sup>2</sup>, to the upper part of which is pivoted a rocking guide C', which incloses the arm of an awl C. This rocking guide is connected below its fulcrum through a short link to a rod C<sup>2</sup>, which at its other end connects through a second link with a rocking arm C<sup>3</sup>, fulcrumed on the base-plate and carrying a bowl which enters the groove of a face-cam C<sup>4</sup> on the cam-shaft B. The rod C<sup>2</sup> is supported by and is free to slide in guides standing up from the bed-plate. It is to provide for the compound movements of the awl that the arm to which it is attached is inclosed in and carried by the rocking guide C', which is drilled at one side to receive two guide-pins c'c', projecting laterally from the arm. These pins are, by means of springs c'c' coiled around them, held against

the prongs of a forked rock-lever  $C^3$ , fulcrumed on the side of the standard  $A^2$ . The rear end of this forked lever carries a bowl which bears upon the back of the cam  $C^4$  and is caused to rock by means of a tappet  $c^2$  coming into contact with the bowl, by which means the awl is caused to feed forward the work. The length of the stitch is regulated by means of an adjusting-nut  $c^3$  on the upper guide-pin  $c$ , which is threaded to receive it.

$D$   $D'$  are the lasting-grippers, the arm of the gripper  $D$  being fulcrumed on the standard  $A^3$  and the gripper  $D'$  being fulcrumed on the arm of the gripper  $D$ . This arm  $D$  is operated through a bowl  $d^4$ , which runs in a groove 1, cut in the face-cam  $D^6$  on the cam-shaft  $B$ . To regulate the action of this cam on the lever  $D$  so as to provide for the imparting of a greater or lesser strain in the lasting of the upper, the following contrivance is employed: Upon the free end of the gripper-lever  $D$  is mounted a block  $D^2$ , capable of sliding along the arm and being fixed in position by a set-screw  $d^3$ . This block  $D^2$  carries a bowl  $D^3$ , which enters a groove formed in a horizontal arm  $D^4$ , made fast to a vertically-sliding bar  $D^5$ , working in a slotted guide formed on the top of the standard  $A'$ . A projection from the side of the arm  $D^4$  carries the bowl  $d^4$ , which, working in the cam  $D^6$ , imparts the requisite rocking motion to the lever  $D$ , the amount of which motion is determined by the position of the adjusted block  $D^2$  upon its lever. The groove 1 of the cam  $D^6$  is so formed as (in the rotation of the cam-shaft) to depress the grippers to the proper position for taking hold of the work and to lift them while closed, so as to put the requisite lasting strain upon the upper immediately before it is pierced by the awl. It will now be understood that by adjusting the position of the block  $D^2$  on the lever  $D$  nearer to or farther from its fulcrum a simple means is provided for giving to the lasting-grippers a longer or shorter stroke, as may be desired, so that materials more or less elastic can be equally well lasted. The arm of the gripper  $D$  is fitted with a presser-foot  $d$ , to which a yielding pressure is applied by a spring  $d^*$ . This presser-foot, besides holding the sole to the last, serves to stop the operator from pushing up the work too high. The gripping-jaw  $D'$  has an upward extension which is of spring-steel and thin enough to be slightly resilient, and the extremity of which is acted upon to produce an elastic or yielding gripping action by a rock-lever  $D^7$ , mounted on the fulcrum-pin, which carries the arm of the gripper  $D$ . This rock-lever carries a bowl which runs in a second groove 2 of the face-cam  $D^6$ , such groove being so shaped in relation to the groove 1 that when the grippers are raised the jaw  $D'$  will continue to bite until the awl has pierced the upper and take up the strain of the grippers. The jaw  $D'$  will then be released from its grip to permit of the feed of the work taking place. When this is done,

the action of the cam-grooves 1 2 on their respective bowls will cause a repetition of the descent of the grippers to their acting position, when they will take hold of the upper, as before. That part of the lever  $D^7$  which bears on the yielding extension of the gripper is curved to insure its pressing fairly on the yielding end of the gripping-jaw  $D'$  and putting a yielding pressure on the upper. The timing of the action of the cam-grooves 1 2, it will be seen, is such that the grip and release of the jaws are quickly effected, and it is to provide for the varying thicknesses of the upper that the gripper is made yielding. To produce the quick opening of the gripper when the jaw  $D'$  is released, a push-pin 25 and a coiled spring 26 are applied between the lever  $D$  and the extension  $D^*$  of said jaw.

The eye-pointed needle  $E$  (see Figs. 7, 8, and 9) is carried by an arm  $E'$ , fulcrumed on the boss of the awl-guide  $C'$ . This arm  $E'$  is connected by a short link  $e$  to a slide  $e'$ , which carries two link-pins, the one being connected to the link  $e$  and the other to the link  $e^2$ . This latter link connects with an arm  $e^3$ , projecting from a sleeve-shaft  $E^2$ , which is carried by and is free to rock on a rock-shaft  $G'$ , hereinafter more particularly referred to.

$e^4$  is a second arm projecting from the sleeve-shaft and connected by a link  $e^5$  to a rock-lever  $E^3$ , fulcrumed on the base-plate  $A$  and carrying a bowl which enters a groove of a face-cam  $E^4$  on the cam-shaft. The cut of this cam is such as to cause the needle to follow (immediately after the feed) the receding motion of the awl, form the loop of the needle-thread, cause the needle to "dwell" while the shuttle is passing through the loop to lay the locking-thread therein, and then to withdraw the needle from the work.

$F$ , Figs. 1, 2, and 3, is a rotary shuttle for laying the locking-thread into the loop of the needle-thread. This shuttle is carried by a supporting arm or bracket  $F'$ , hung on the cam-shaft  $B$  and resting at its forward end on the standard  $A^2$ . Pivoted to the under side of this bracket-arm is the disk-shaped shuttle-support  $F^2$ , Figs. 1 and 2, which is recessed in its face to receive the shuttle. The portion of the bracket-arm which covers the shuttle when in position for work forms a bearing for a short shaft  $F^3$ , Figs. 1 and 2, which carries at its lower end the shuttle-driver  $F^4$ , Fig. 2, and has fitted to it a miter-wheel  $f$ , Figs. 2 and 3. The bracket  $F'$  carries a horizontal shaft  $F^5$ , Figs. 2 and 3, which is fitted with miter-wheels  $f'$   $f^2$  at its opposite ends. The wheel  $f'$  gears, as shown in Fig. 3, with the miter-wheel  $f$  on the shuttle-driver shaft, and the wheel  $f^2$  gears with the miter-wheel  $f^3$  on the cam-shaft. Rotary motion is thus communicated from the cam-shaft to the eccentric shuttle-driver.

$G$  (see Figs. 13, 14, and 15) is a rocking arm formed at its upper end with an eye, through which the needle-thread passes from the bobbin to the eye-pointed needle, its ob-

ject being to give out thread for the passage of the shuttle through the loop and take up the slack as required. This arm G is keyed to one end of a horizontal rock-shaft G', having its bearings in lugs on the bed-plate and forming a support for the sleeve-shaft E<sup>2</sup> before mentioned. The other end of the rock-shaft carries an arm G<sup>2</sup>, which by a short link g connects with a rocking arm G<sup>3</sup>, fulcrumed on the bed-plate. This arm G<sup>3</sup> carries a bowl which enters a groove in the face-cam G<sup>4</sup> of the cam-shaft. As, therefore, this shaft rotates an alternate movement is effected, by which the needle-thread is tightened or slack given off, as required.

H is a removable guide designed as a rest, against which the workman holds up the work to bring it under the action of the lasting and sewing instruments. This guide is carried by a socketed bracket projecting from the side of the standard A<sup>2</sup>, and it is made adjustable vertically by a binding-screw to suit the work in hand. (See Fig. 1.) The guide is also capable of replacement by other guides of modified shape, which shapes are best illustrated by Figs. 16, 17, and 18, already referred to as employed in connection with different kinds of ribbed soles.

The last, carrying the upper and sole or inner sole, by the hand of the workman is held up to or against the guide H, which is placed or adjusted to suit the different thicknesses of materials to be sewed and in relation to the position of the lasting-grippers D D'.

From the foregoing description of the mechanism and the respective actions of the parts it will be clearly understood that two distinct operations result from the action of the machine and that the sewing mechanism is specially adapted for use with the ribbed sole above referred to.

It only now remains to explain the cycle of operations in lasting the upper and securing it by stitches to the ribbed sole.

The work having been properly fitted to the last and secured thereon by pins, it is presented by hand to the machine and held in place during the operation, its position being controlled by the guide H and the presser-foot d. Rotary motion being now imparted to the cam-shaft, the grippers are caused to take hold of the edge of the upper (at the part presented to them) and then to strain or last it. While the upper is thus held at tension, the awl advances from its normal position, strikes through the rib of the sole and the upper, (close to the grippers,) and at the same moment the strain of the grippers ceases, leaving the awl to sustain the strain put upon the upper. The awl then acting as a feeder moves laterally the length of the stitch and, coming into line with the needle, commences to retire from the work, followed up closely by the advancing needle, which enters the hole made by the awl and presents its loop of thread to the nose of the shuttle. The shuttle-driver now causes the shuttle to

pass through the loop of the needle-thread and to deposit a locking-thread therein. As this action occurs the thread-controlling apparatus gives off slack thread to enable the shuttle to pass freely through the loop, and when it has thus passed the slack is taken up and the stitches tightened as heretofore. The continued rotation of the cam-shaft causes the grippers to descend, seize on another portion of the upper, and subject it to the like straining or lasting operation ready for the repeated action of the piercing and feeding awl.

From the foregoing explanation it will be understood that little skill is required on the part of the operator to produce good work, his duty differing little from that attendant on ordinary boot-sewing operations, where no means of straining or lasting is provided.

We claim—

1. The combination with a lasting-machine fitted with a feeding awl, of a device for straining or lasting the upper, such device consisting of a pair of grippers one member of which is elastically yielding, a rock-lever to which one member of the grippers is fixed and the other of said members is pivoted, a shaft and a cam thereon for operating said lever, a second rock-lever for actuating said pivoted member and a cam on said shaft for operating said second rock-lever, the whole arranged and operating substantially as above set forth.

2. In combination with the lasting-grippers and their carrying-lever D and operating-cam D<sup>6</sup>, the means for regulating the action of said cam upon said grippers, such means consisting of a block D<sup>2</sup> adjustable on said lever, a bowl D<sup>3</sup> carried by said block, a horizontally-grooved arm in which said bowl works, a vertical guide for said arm, and a bowl d<sup>4</sup> carried by said arm and engaging with the cam, substantially as herein described.

3. In a boot and shoe lasting machine, the combination with lasting-grippers and means for operating the same, of a feeding mechanism consisting of an awl and an arm carrying the same, a rocking guide receiving the said arm, a fixed pivotal support for said guide, a forked rock-lever and a fixed pivotal support for the same, pins projecting from said arm to enter holes in said rocking guide, springs applied to said pins for holding them against the prongs of said forked rock-lever, a shaft and means for rotating the same, a cam on said shaft and connections with said rocking guide for rocking the latter, and a tappet carried by said shaft for operating the forked rock-lever, all substantially as herein described.

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