(No Model.)

7 Sheets—Sheet 1.

E. PATTEN.

LASTING MACHINE.

No. 467,877. Patented Jan. 26, 1892.

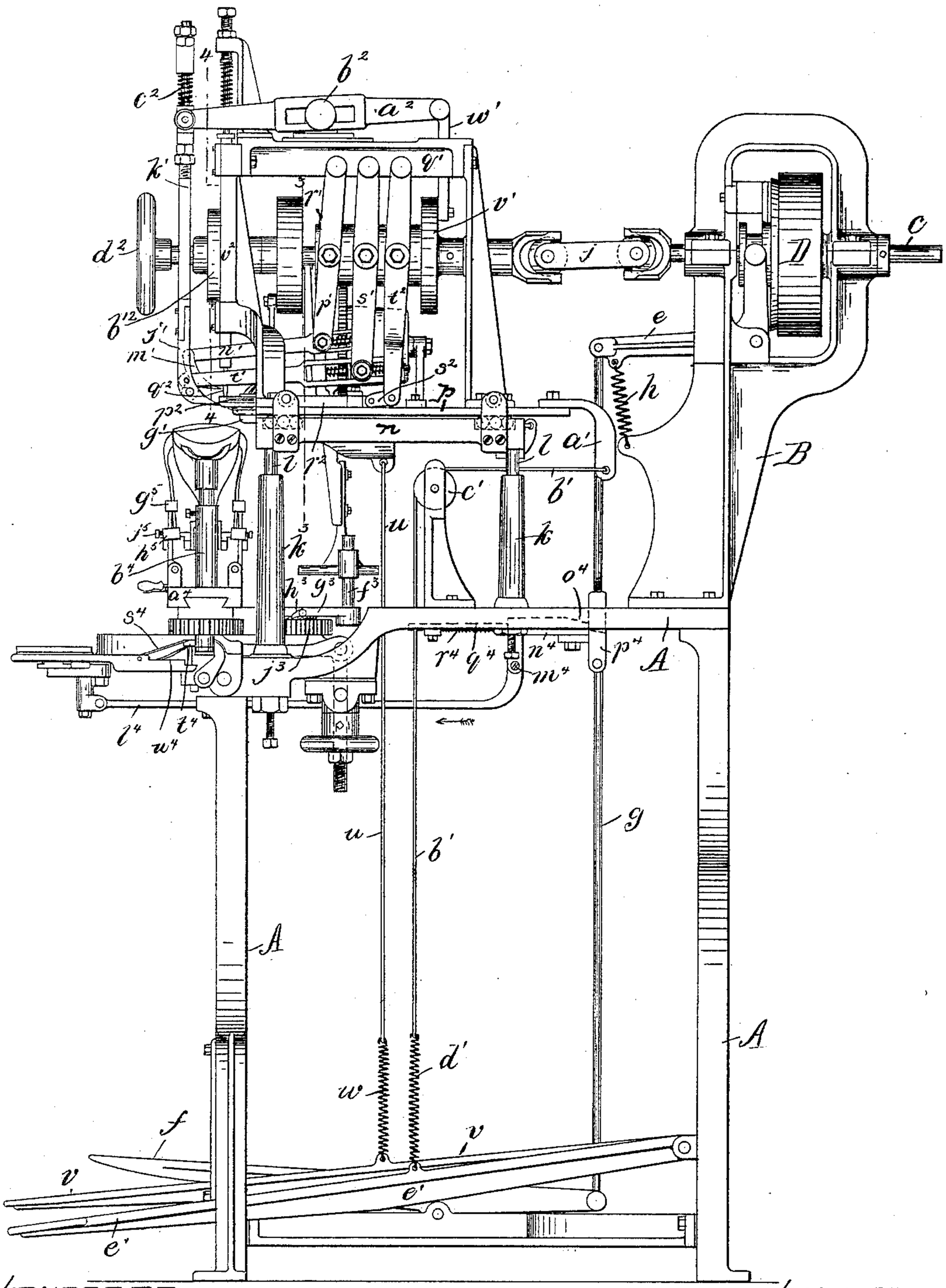

Fig. 1.

WITNESSES.

Robert Wallace;

Matthew Clark.

INVENTOR.

Enos Patten

by Wm. McCulloch.

his atty.

(No Model.)

7 Sheets—Sheet 2.

E. PATTEN.

LASTING MACHINE.

No. 467,877.

Patented Jan. 26, 1892.

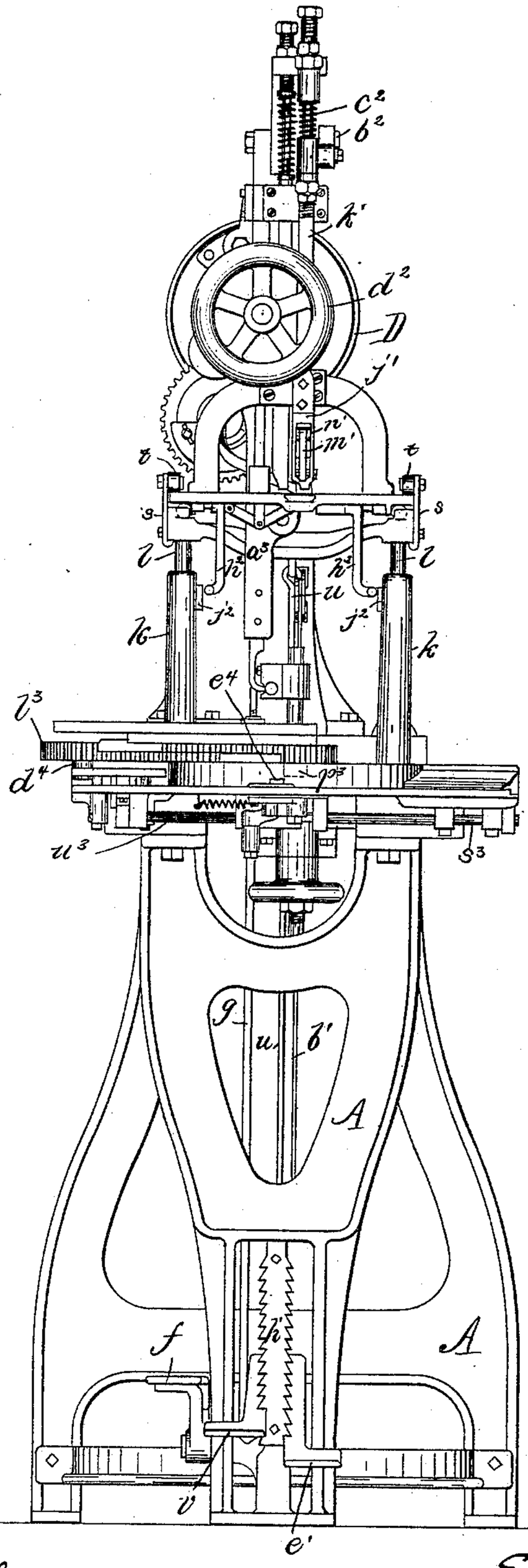

Fig. 2.

WITNESSES.

Robert Wallace.

Matthew Clark.

INVENTOR.

Enos Patten

by Wm. A. Macleod.

his atty

(No Model.) 7 Sheets—Sheet 3.

E. PATTEN.

LASTING MACHINE.

No. 467,877. Patented Jan. 26, 1892.

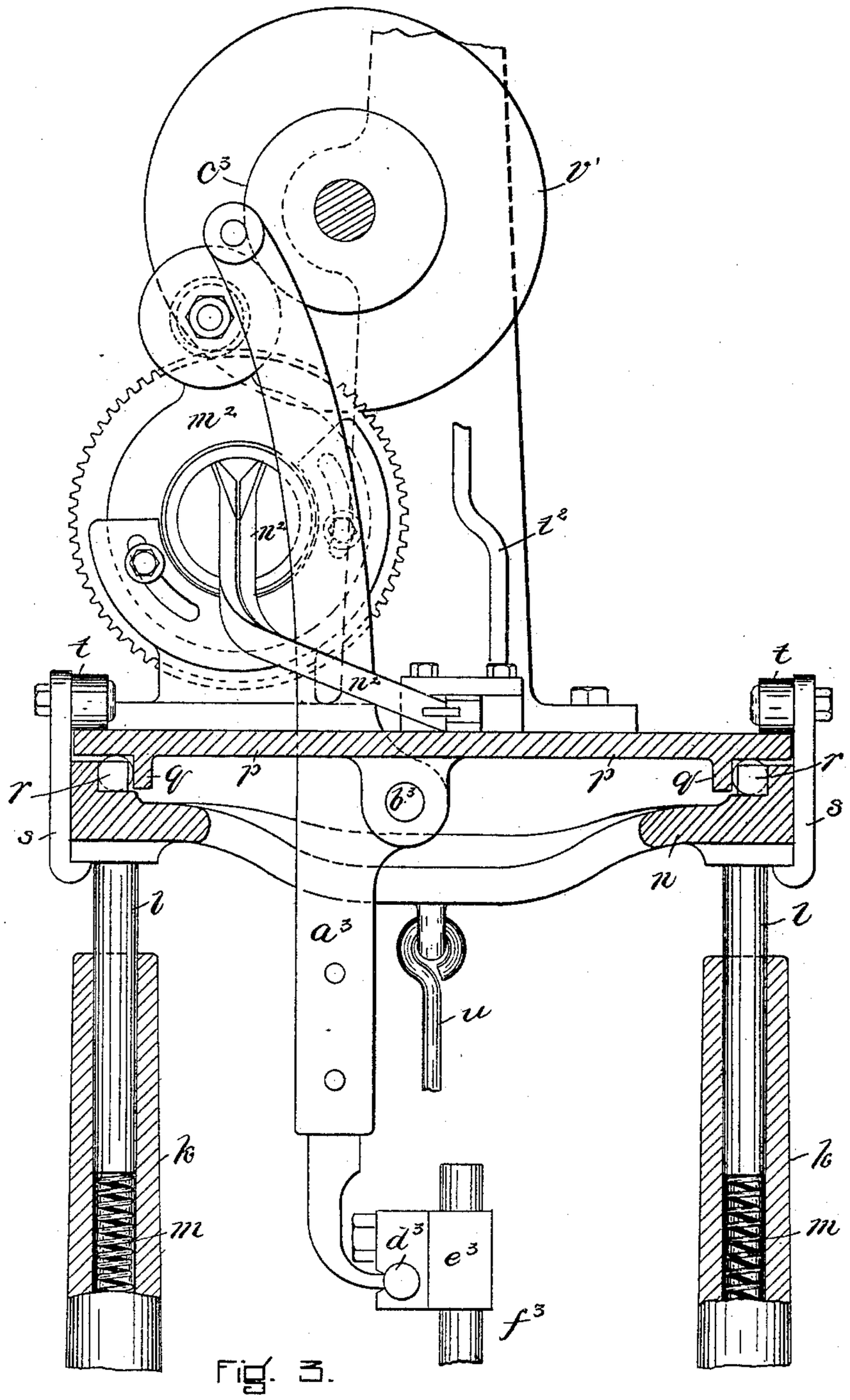

Fig. 3.

WITNESSES.

Robert Wallace,
Matthew Clark.

INVENTOR.

Enos Patten.
by Wm. A. Macleod
his atty

(No Model.) 7 Sheets—Sheet 4.

E. PATTEN.

LASTING MACHINE.

No. 467,877. Patented Jan. 26, 1892.

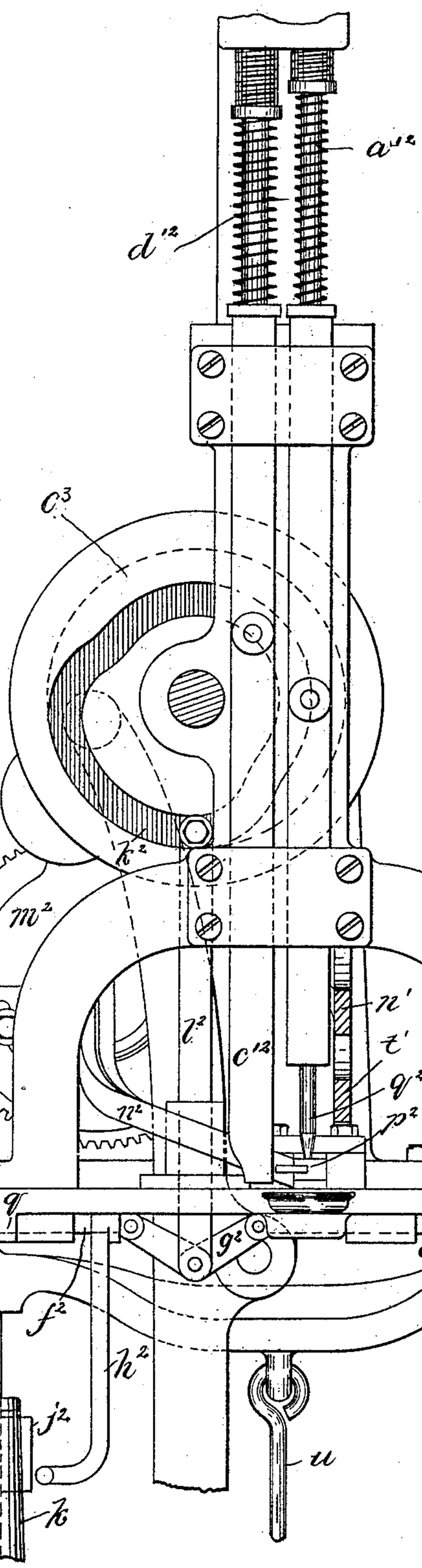

Fig. 4.

WITNESSES.

R. Wallace

Manton Clark

INVENTOR.

Enos Patten

by

Wm. A. Macleod

his atty

(No Model.) 7 Sheets—Sheet 5.

E. PATTEN.

LASTING MACHINE.

No. 467,877. Patented Jan. 26, 1892.

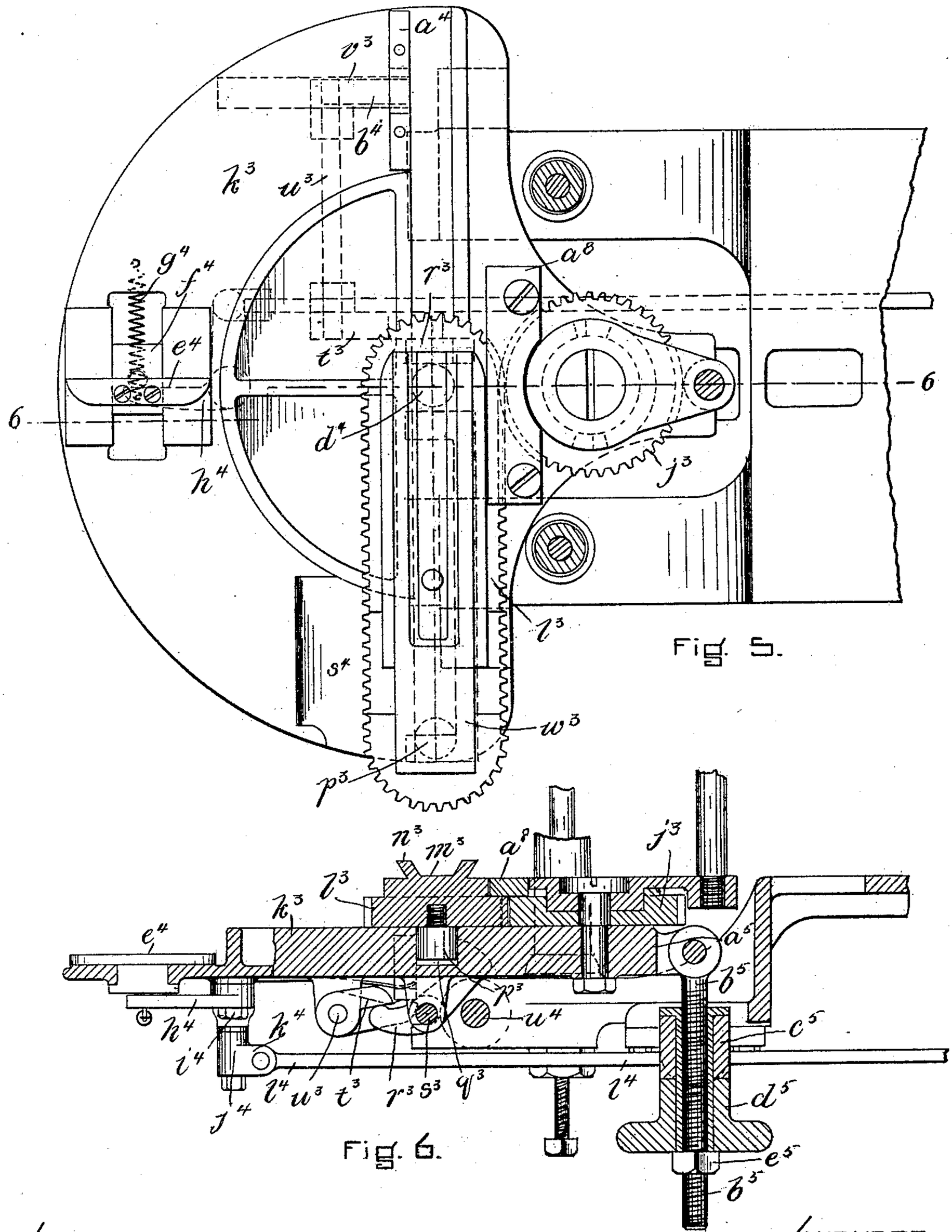

Fig. 5.

Fig. 6.

WITNESSES.

Robert Wallace.

Matthew Clark.

INVENTOR.

Enos Patten

by Wm. H. Macleod.

his atty.

(No Model.) 7 Sheets—Sheet 6.

E. PATTEN.

LASTING MACHINE.

No. 467,877. Patented Jan. 26, 1892.

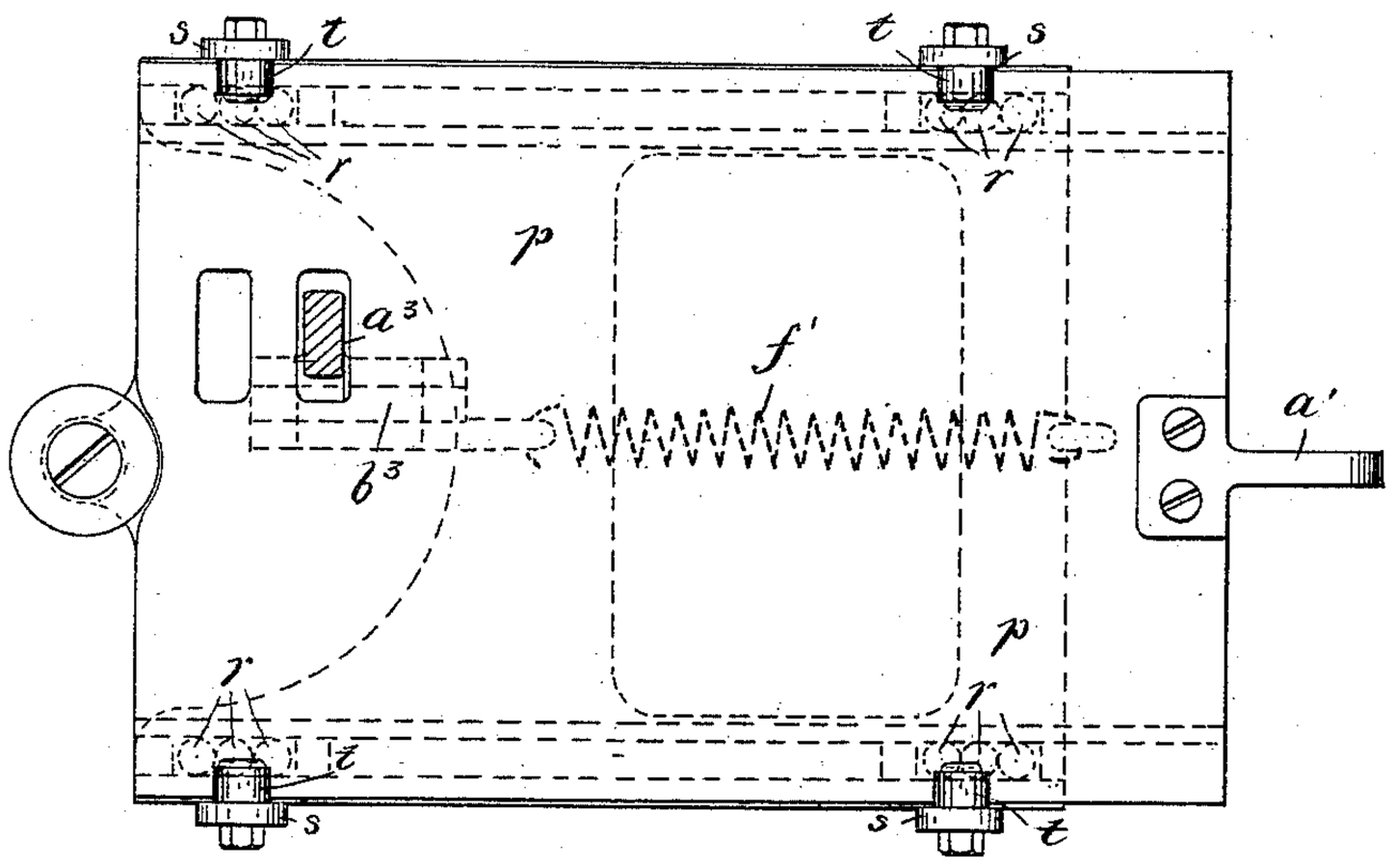

Fig. 7.

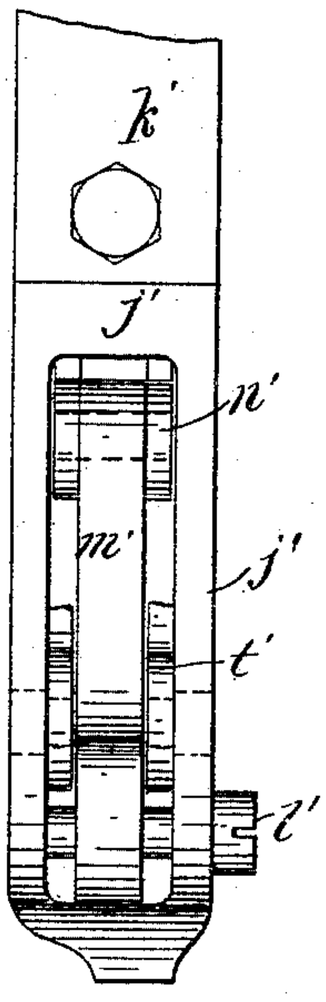

Fig. 8.

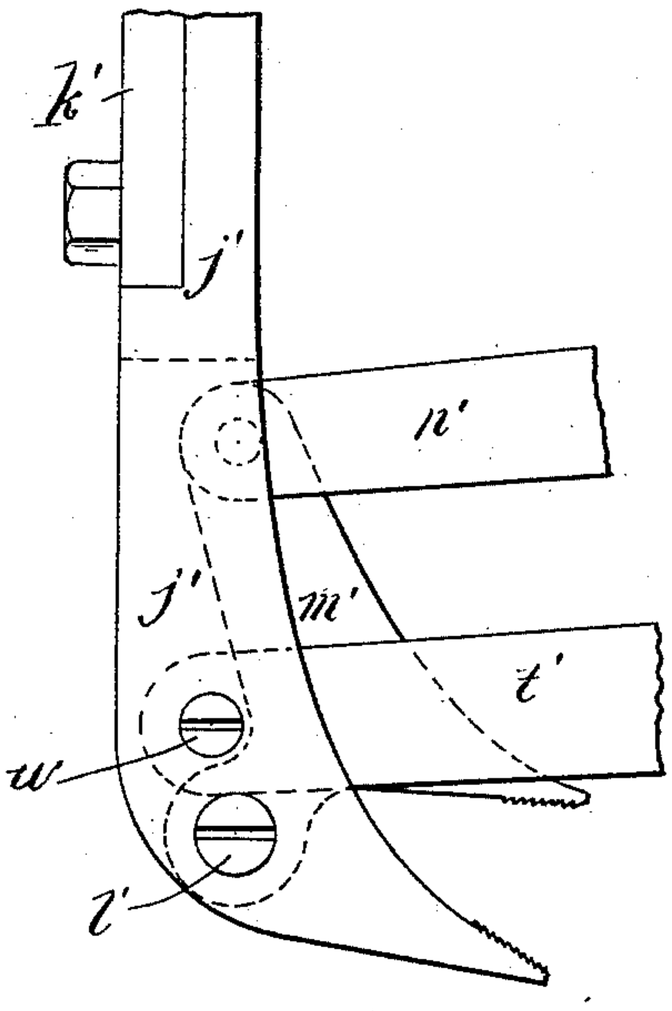

Fig. 9.

WITNESSES.

Robert Wallace,

Matthew Clark.

INVENTOR.

Enos Patten

by Wm. Macleod

his Atty

(No Model.) 7 Sheets—Sheet 7.

E. PATTEN.

LASTING MACHINE.

No. 467,877. Patented Jan. 26, 1892.

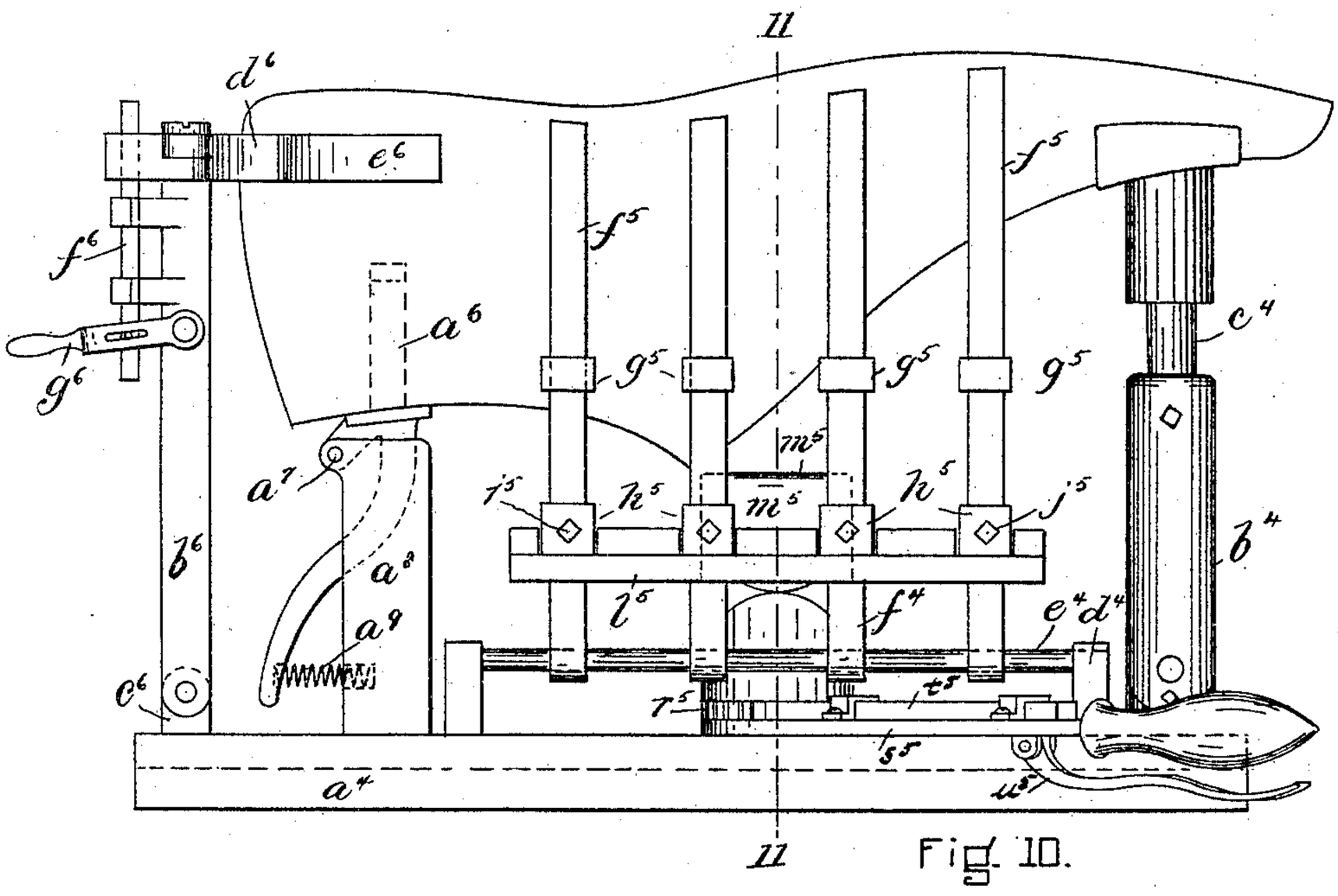

Fig. 10.

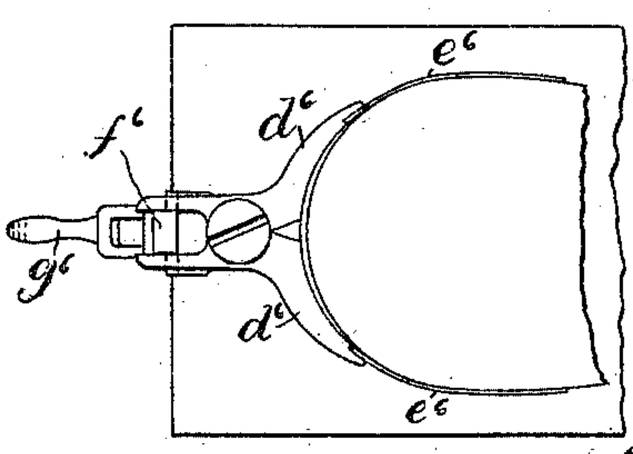

Fig. 12.

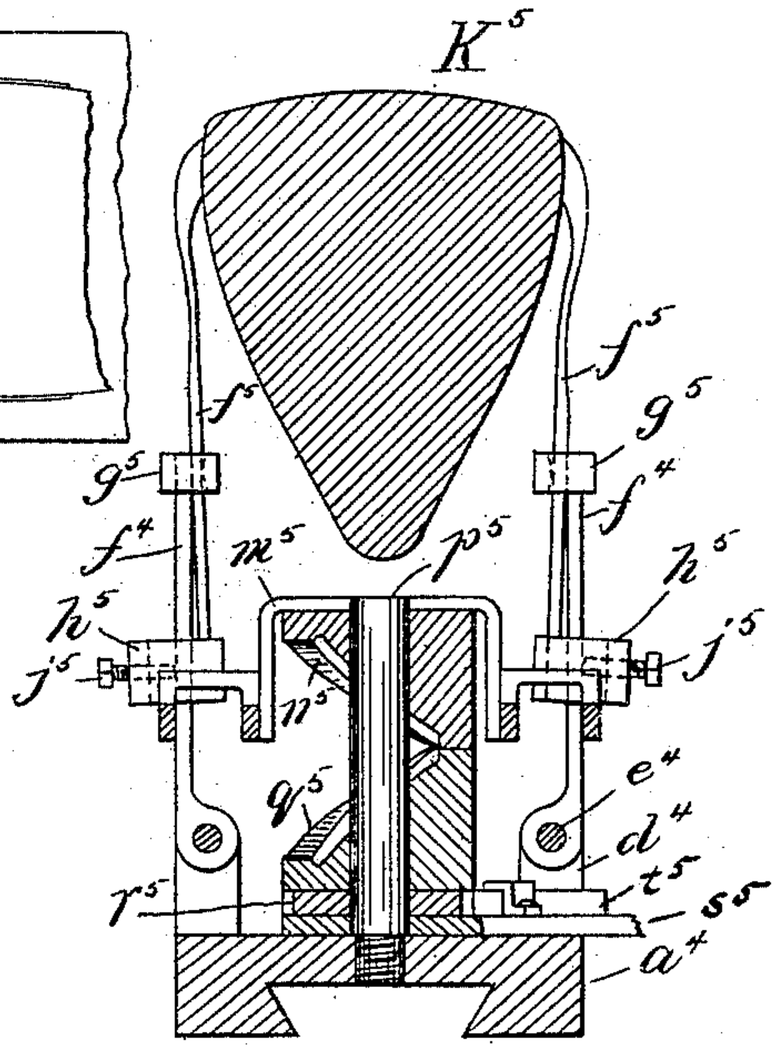

Fig. 11.

WITNESSES.

Robert Wallace,
Matthew Clark.

INVENTOR.

Enos Patten.
by Wm. McCulloch
his atty

UNITED STATES PATENT OFFICE.

ENOS PATTEN, OF LYNN, MASSACHUSETTS, ASSIGNOR TO THE LYNN LASTING MACHINE COMPANY, OF SAME PLACE.

LASTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 467,877, dated January 26, 1892.

Application filed December 4, 1890. Serial No. 373,538. (No model.)

To all whom it may concern:

Be it known that I, ENOS PATTEN, of Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Lasting-Machines, of which the following is a specification, reference being had to the drawings accompanying and forming a part hereof, in which—

Figure 1 is a side elevation of my improved machine. Fig. 2 is a front elevation with the jack removed. Fig. 3 is a section on line 3 3, Fig. 1. Fig. 4 is a section on line 4 4, Fig. 1. Fig. 5 is a plan view of the table of the machine, showing the gears for moving the jack so as to present successive portions of the edge of the upper to the pinchers. Fig. 6 is a section on line 6 6, Fig. 5. Fig. 7 is a plan of the sliding table on which the upper part of the machine rests, and showing in dotted lines the upper part of the stationary frame on which the table rests, as also the ball-bearings and the spring which throws the table back after a shoe has been lasted. Fig. 8 is a front view, and Fig. 9 a side view, of the pinchers. Fig. 10 is a side elevation of the jack with the last in position. Fig. 11 is a section on line 11 11, Fig. 10. Fig. 12 is a plan view showing the heel-clamp for the last.

My invention has for its object to produce a speedy and effective machine for lasting boots and shoes which shall follow as closely as may be the operation and method of a laster in lasting a shoe by hand; and it consists in the organization into a single machine of mechanism for holding the shoe after it has been properly assembled and presenting the edges of the upper or successive portions thereof to the lasting mechanism, mechanism for seizing the edge of the upper, drawing it tightly and smoothly over the last and holding it securely near to or against the sole of the last while it is being secured thereto, and mechanism for securing it to the last after it has been drawn tightly and smoothly thereon; also in the construction and arrangement of the mechanism of the various devices referred to for performing each of these operations, all as hereinafter more particularly described, and as is pointed out in the claims, which are appended hereto and made a part hereof.

I have embodied my invention in the best form now known to me in the machine which is shown in the accompanying drawings, and I will refer to said drawings in the following description, using like letters of reference for like parts.

A is the stationary frame of the machine, on the rear of which is bolted an upright B, in which is journaled the shaft *c*, on which is secured the belt-pulley D, and which also supports the shipper mechanism of common construction. The bell-crank lever *e* is a part of said mechanism, and is connected with the treadle *f* by means of the connecting-rod *g*.

To start the machine, the operator depresses the treadle *f* with his foot, as will be clear. The reverse movement of the shipper mechanism when the operator raises his foot from the treadle *f* is obtained by means of the spring *h*, (see Fig. 1,) one end of said spring being secured to the bell-crank *e* and the other to the stationary upright B. The main shaft *c* has inserted therein a link *j* of common construction, which permits of the forward part of the shaft being raised or lowered relatively to the rear portion thereof, while at the same time the entire shaft may be driven from the pulley D.

On the standard A, which supports the machine, are set four uprights or posts *k*, each of which is provided with a central socket or aperture, (see Fig. 3,) which receives a rod *l*, underneath which within the aperture is placed a spring *m*, so that these rods may be pressed back into their sockets, the springs allowing them to recede under pressure. On top of these rods *l* is secured a frame *n*, and on top of this frame is a bed or table *p*. (Shown in plan, Fig. 7.) The table *p* is arranged to slide forward and backward on the frame *n*, and for this purpose it is provided on its under side with guide-flanges *q*, and outside the flanges the edges of the table rest on balls *r*, so that it may slide easily. Clamps *s* are hooked at their lower ends underneath the frame *n*, as shown in Fig. 3, and at their upper ends are provided with studs, on which are set rolls *t*, which project over and bear on top of the table *p* at the edges and serve to hold the table securely down on the frame *n*. By this arrangement the table *p*, which carries the lasting mechanism proper,

as hereinafter described, may slide horizontally forward and backward relatively to the frame n, but cannot move vertically relatively thereto.

Centrally underneath the table n is secured the upper end of a connecting-rod u, the lower end of which is connected by means of a spring w with a treadle v. The spring w is stronger than the springs m, which are underneath the rods l, so that when the foot of the operator is placed on the treadle v the downward movement of the treadle causes the rods l to recede in their sockets, thus allowing the frame n and all that it supports to move downwardly a considerable distance before the spring w is extended. The object of this arrangement is to permit the operator to lower the lasting mechanism proper into position near the sole of the last and where the pinchers may seize the edge of the upper, said mechanism being normally some distance above the sole of the last, in order that the shoe when jacked may be placed in the machine without interference from the lasting mechanism. This arrangement further permits the lasting mechanism, as the edge of the last passes along under it, to drop down into the shank portions of the last, which are lower than either the ball or heel portions, (see Fig. 10,) and thus follow the curve of the sole of the last and be in position to seize the upper throughout the shank, as well as throughout the ball and heel portions.

It is necessary that the lasting mechanism, which is normally rearward of the last, should be so mounted as to be capable of being drawn forward so that it will be in position directly over the edge of the upper or slightly in front of it, and also, inasmuch as the sole is broader at some parts than at others, and as shoes vary in width, the lasting mechanism must move forward and backward as the last travels under it to bring the edge of the shoe successively in position for the lasting-pinchers. This horizontal or forward and backward movement is permitted by mounting the table p, (see Fig. 3,) as hereinbefore described, on the ball-bearings r in such manner as to permit the table and the lasting mechanism proper which is supported by it to be moved forward and backward. For the purpose of moving it forward the table p is provided with a rearwardly and downwardly projecting arm a', (see Fig. 1,) to which is secured a cord or flexible connection b', which passes over a sheave c', journaled in a support secured on top of the standard A. The lower end of the cord b' is connected by means of a spring d' with a treadle e', and it will be clear that if the operator puts his foot upon the treadle e' and presses the treadle downwardly he will draw the table p and the lasting mechanism forward toward the last. When the treadle e' is released, a spring f', (see Fig. 7,) located underneath the table p and fast at one end to a projection on the table and at the other to the frame n, operates to draw the table backward. The spring d' is stronger than the spring f', and therefore so long as the treadle e' is depressed the table p is kept in its forward position.

In order to determine the forward and backward movement of the table p to accommodate the curvature of the last as it moves past the table, a projection or gage g' (see Fig. 1) is provided, which butts against the side of the last and serves to stop the table and the lasting mechanism at the proper point, when they are drawn forward by the spring d'. Provision is of course made for the forward and backward movement of the lasting mechanism relative to the power devices, and this is conveniently and preferably effected by making the shaft c of sufficient length to permit a longitudinal play in its bearings and giving it a sliding connection (as by an ordinary spline and groove) with that part of the shipper mechanism which is adapted to clutch the pulley D. It will be clear that as the lasting mechanism must move slightly both vertically and horizontally in operating upon the upper around the edge of the sole of the last, the treadles v and e' must be held down while the machine is in operation—that is, the lasting mechanism is held yieldingly, both as regards a vertical and horizontal movement, in contact with or in proximity to, the edge of the sole of the last, and this yielding contact is obtained by means of the springs w and d'. For the purpose, therefore, of holding the treadles down a vertical strip h' (see Fig. 2) is secured to the standard A, and on either side of said strip is a ratchet, so that as either treadle is depressed it may be caught and held at its lowest position by the ratchet-teeth, as will be clear from Fig. 2. When a shoe is jacked and ready for lasting, the operator therefore depresses the treadles v and e', bringing the parts into position, and secures the treadles when depressed by means of the ratchets on the strip h', as heretofore described.

I will now describe the operation of the lasting mechanism proper. Assuming that the shoe is jacked and in position in the machine, the work of seizing the edge of the upper, drawing it smoothly over the last, and holding it in position to be secured by tacks is performed by a pair of jaws or pinchers, the last moving with its support or frame under the pincher to present successive portions of the edge of the upper thereto. When the lasting mechanism has been brought into position over the toe of the shoe, as heretofore described, by means of the treadles, the jaws of the pincher are open and the operator inserts the upwardly-projecting edge of the upper into the jaws. The jaws must then be closed and the pincher moved up to draw the upper tightly over the last and then back slightly from the edge of the last to stretch and lay the edge of the upper over the edge of the last. All the mechanism of the machine is

actuated from a single driving-shaft. The pincher which seizes the edge of the upper is shown in detail in Figs. 8 and 9, and consists of a downwardly and rearwardly curved portion j', which is secured by bolts to the pincher-bar k', so that it may be readily removed. The part j' is slotted vertically, as shown in Fig. 8, and in the lower part of the slot is pivoted at l' the upper jaw m', which is of the shape shown in Fig. 9. These jaws are preferably slightly serrated, as shown, so that when they are closed they will seize and hold the leather firmly. To the upper end of the jaw m' is pivoted a connecting-rod n', which (see Fig. 1) is pivoted at its rear end to the vertical lever p', which in turn is pivoted at its upper end to a cross-piece on the upper frame q', which frame is mounted on and secured to the table p. About midway of the lever p' is a stud carrying a cam-roll which co-operates with a cam r' on the shaft c. The rear end of the connecting-rod n' is slotted to receive a sliding block, at the rear of which is a spring, as shown in Fig. 1. The lever p' is pivoted to said sliding block. By this arrangement the jaws are closed with a yielding pressure, so that in case they should seize thick stock or any obstruction should get between the jaws the mechanism would not be broken or injured. Similar mechanism is provided for moving the jaws forward and backward—viz., a lever s, which is pivoted to the frame q' and which is actuated by a cam on the shaft c, and a connecting-rod t', which is pivoted at one end to the jaw j' at u' and at the other end is slotted and provided with a sliding-block, on either side of which is placed a spiral spring, as shown in Fig. 1, which block is pivoted to the lower end of the lever s', so that as the lever is moved the jaws will be given a forward and backward horizontal movement, the springs on either side of the block in the slotted end of the connecting-rod t' serving to prevent breakage of the parts in case the jaws in their movement should meet an obstruction. The vertical movement of the jaws is obtained by means of the cam v' on the shaft c through the rod w', which is pivoted at its upper end to the walking-beam a^2, the other end of said beam being pivoted to the pincher-bar k', as shown, Fig. 1. As the cam revolves, the pincher is raised, drawing the upper over the last, and is then lowered while the upper is tacked in position. The walking-beam lever a^2 has a sliding pivot at b^2, by means of which it may be adjusted, and the connection of said beam with the pincher-bar k' is obtained by means of a vertically-movable collar on said bar k', above which is a spring c^2, whereby, if the pincher is prevented from moving up by reason of there being very little slack in the upper or from any other cause, the upper will not be torn or injured or the machine damaged, the extra throw of the lever a^2 being taken care of by compression of the spring c^2. The hand-wheel d^2 on the main shaft and in front of the machine, where it may be readily grasped by the operator, is for the purpose of enabling the operator to turn the shaft and change the position of the parts of the mechanism, as he may desire, without starting the machine.

The lasting mechanism is mounted, as already described, in such manner that it will follow closely the curvature of the last while the support or frame which carries the last is moving. When the last stops, however, and the pinchers are about to seize the upper, the table p, which carries the essential mechanism of the machine, must be held rigidly, as will be clear, in order that the pinchers may draw the upper into place. To accomplish this, I have provided a locking device, which will be clear from Fig. 4 and which consists of horizontal sliding bars or bolts e^2 f^2, which are connected by means of the toggle g^2 and which when projecting outwardly impinge the frame n and by frictional contact therewith prevent the table or bed p from moving relatively to the said frame n. This prevents any forward or backward movement of the table p. On the sliding bars e^2 f^2 are downwardly-projecting arms h^2, the lower ends of which project outwardly, and as the bars e^2 f^2 are spread the ends of the arms h^2 are forced into contact with blocks j^2 on the forward uprights k, thus preventing by frictional contact therewith the vertical movement of the frame n. The frictional contact-surfaces of both the sliding bars e^2 f^2 and the arms h^2 may be covered with leather or other suitable material, if desired, to increase the friction. The toggle g^2 is forced upwardly to lock the table p by means of a cam k^2, with which the toggles are connected by a connecting-rod l^2, and the operation of the cam is so timed as to lock the table p at the proper time.

For the purpose of securing the upper in place I use tacks, which are placed in a hopper m^2, (see Fig. 3,) of usual construction and such as is employed for delivering tacks in a raceway, and from said hopper a raceway n^2, also of usual construction, conducts the tacks to a carrier p^2, (see Fig. 1,) which picks the tacks off one by one from the lower end of the raceway n^2 in the well-known manner and carries them forward under the driver q^2. The driver descending, forces the tack downwardly between the jaws of the carrier, which expand to allow it to pass and drive it through the upper and into the last. The carrier is of common construction, being simply two jaws arranged to spread when the tack is forced down between them and normally held together by spring-pressure. The carrier is moved forward to deliver a tack to the driver and backward to receive another tack by means of a sliding carrier-bar r^2, arranged to slide in suitable ways on the table p, and connected at its rear end by means of a link s^2 with the lower end of the lever t^2, the upper end of which is pivoted to the cross-piece of the frame q', and which is actuated by means of a cam u^2 on the main shaft in a manner

similar to the levers s' and p', which close the pinchers and move them laterally, as will be clear from Fig. 1. The driver is mounted in a vertical driver-bar v^2, adapted to slide in the front portion of the frame q', and is forced downwardly by means of a spring a^{12}, and is raised by a cam in the cam-wheel b^{12} in the well-known manner. The cam-wheel b^{12} also raises the presser foot or hammer c^{12}, which is driven downwardly by the spring b^{12}. (See Fig. 4.) The presser-foot is down on the work at all times except when the work is being fed, said presser-foot being located behind the pinchers and serving to prevent the pinchers from pulling out the tack just driven, as also to smooth and beat down the wrinkles around the toe and heel. As will be clear, the jack which carries the shoe must have an intermittent movement—that is, after the pinchers have operated at one point on the upper and that portion of the upper has been drawn tightly and tacked, the jack must move to bring another portion of the upper into place, and this movement is accomplished by means of a lever a^3, (shown more clearly in Fig. 3,) and which is pivoted at b^3 to a lug underneath the table p. The upper end of this lever is provided with a cam-roll in contact with a cam c^3, Fig. 4, and the lower end thereof is connected by a rod-and-socket connection, as shown at d^3, with the block or arm e^3 on the vertical rock-shaft f^3. By this arrangement the throw of the cam will rock the shaft f^3.

On the lower end of the shaft f^3 and rigidly secured thereto is an arm g^3, (see Fig. 1,) to which is pivoted a pawl h^3, which co-operates with a rack on the face of the pinion j^3. At each reciprocation of the shaft f^3 the pinion j^3 is moved forward a distance corresponding to one tooth on the rack.

The pinion j^3, which is shown more clearly at Fig. 5, is mounted on a short stud set in the tilting table k^3, on which table is also mounted the mechanism which carries the jack and which consists of an oblong gear l^3, which is in mesh with the pinion j^3. On top of the oblong gear l^3 is secured a plate or block m^3, which is provided with a dovetail n^3 (see Fig. 6) to receive the jack mechanism, the bed or plate of the jack mechanism being correspondingly dovetailed, (see Fig. 11,) so that the jack may be slid onto the block m^3 when the shoe is jacked and ready to be placed in the machine. The oblong gear l^3 revolves on two centers, one corresponding to the toe of the shoe and the other to the heel, and since the distance between these centers must be the same as that between the toe and heel of the shoe it is necessary that this gear should be adjustable as to length, because it must be adjusted to suit shoes of different lengths. To accomplish this, the gear is constructed in two parts, as shown more clearly, Fig. 2, each part being cut away as shown, so that one part shall be the complement of the other and so that the two parts may be slid on each other and secured at any point to lengthen or shorten the gear. At each end of the gear and projecting from the under face thereof are studs d^4 p^3, which travel in a path or groove q^3, cut transversely in the tilting table k^3. The oblong gear must be free to travel across the table k^3, while the lasting-pinchers are at work along the side of the shoe, and when the pinchers reach the heel or toe it must turn. In order to present the upper around the heel or toe to the pinchers, it turns on the studs d^4 p^3 and whenever one of said studs arrives at a point underneath or substantially underneath the pinchers. To accomplish this, the stud at that end of the oblong gear which is underneath the pinchers must be arrested in its movement and prevented from further travel in the groove q^3 until the toe or heel has been turned and the pinchers have begun work on the other side of the shoe. To accomplish this, I provide a stop-lever r^3, which is rigidly secured to a rocker-shaft s^3, which is journaled in downwardly-projecting lugs on the under side of the tilting table k^3. (See Fig. 6.) The stop-lever r^3 works in a recess formed in the under side of the table k^3, and is thrown upwardly into the groove q^3 and into the path of the stud p^3 by means of a pawl t^3, set on a short shaft u^3, which is also journaled in lugs on the under side of the table k^3. On the shaft s^3 is also rigidly secured a latch or dog w^3, which is pivoted at either end on the shaft and extends parallel with the shaft and nearly from one end thereof to the other. This latch is shown in plan view in dotted lines, Fig. 5. While the stud p^3 is passing this latch—that is, while the oblong gear is moving from one of its centers to the other—the stud p^3 keeps the latch pressed back against the tension of spring v^3; but as soon as the stud p^3 has reached the point where the heel or toe is to be turned it has passed the latch w^3, allowing the latch w^3 to fly up into the path q^3, and at the same time allowing the latch or stop r^3 to fly up into the path q^3, so that the stud p^3 is stopped by a latch or stop-lever on either side of it. (See Fig. 5.) The continued movement of the gear j^3 throws the oblong gear around and causes that portion of it which projects outwardly toward the edge of the tilting-table k^3 to pass over the spring v^3 and cross-piece a^4. The cross-piece a^4 is secured to the end of an arm or projection b^4, which is rigidly secured to the rock-shaft u^3, on the other end of which is secured the pawl t^3, which bears, as heretofore described, on the stop-lever r^3. The oblong gear continues in its movement. The stud d^4 comes in contact with the plate e^4, which is secured to a sliding plate f^4, arranged to slide in a slot in the front of the tilting table. The plate e^4 is normally drawn toward the left of the machine, as viewed in Fig. 2, by means of a spring g^4, which is secured at one end to a projection from the under side of the block f^4 and at the other to a similar projection on the under side of the table k^3. (See Figs. 2 and 5.)

Underneath the block f^4 and in contact with a downwardly-projecting stud thereon is a bell-crank lever h^4, (see Fig. 6,) which is pivoted on a stud i^4 underneath the table k^3. To a stud on the other end of the bell-crank lever h^4 is pivoted a collar j^4, which is provided with lugs k^4, between which is pivoted a connecting-rod l^4, which extends rearwardly, (see Fig. 1,) its rear end being curved upwardly, as shown, and pivoted at m^4 to a downward projection from the sliding block n^4. The block n^4 is arranged to slide forward and backward on the under side of the top of the standard A and its rear end is beveled, as shown by the dotted lines, at o^4. This beveled end projects into a correspondingly-beveled slot in the link p^4, which forms a part of the connecting-rod g of the shipper mechanism. The block n^4 has a rearwardly-projecting rod q^4, on which is placed a spiral spring r^4, (see Fig. 1,) which tends to force the block n^4 rearwardly into a slot in the link p^4. As soon, therefore, as the shipper-treadle f is depressed to start the machine, the sliding block n^4 is forced into the slot in the link p^4 and locks the shipper mechanism in its operative position—that is, locks it in such position as to keep the machine in operation. As soon as the oblong gear has made its revolution, exposing all parts of the edge of the upper to the operation of the pinchers, the stud d^4, projecting from the under side of said oblong gear at the heel end of the shoe, strikes the plate e^4, as heretofore described, moving that plate to the right against the tension of the spring g^4, swinging the bell-crank lever h^4 on its pivot and withdrawing the block n^4 from the link p^4 of the shipper-connecting rod, thus allowing the spring l to reverse the movement of the shipper and stop the machine. By this arrangement the machine when set in motion will last the shoe, and when it has finished the operation will be automatically stopped. As there are two studs projecting downwardly from the under side of the oblong gear l^3, which form centers around each of which the gear makes a half-revolution, one of said centers being at the toe of the shoe and one at the heel, and as the stud at the toe—viz., the stud p^3—must not strike the plate e^4 to stop the machine, since when it passes the plate e^4 the shoe is only half lasted, it is made shorter than the stud d^4 in order that it may clear the plate e^4. This will be clear from Fig. 2, where the stud p^3 is shown in dotted lines, the lower end of the stud being slightly above the top of the plate e^4. When a shoe has been lasted and the machine stopped, the jack, with the lasted shoe thereon, is withdrawn from the machine, and the other jack, on which a shoe has been placed ready for lasting, is inserted in the machine. After the lasting mechanism has been brought to proper position the operator takes hold of that end of the oblong gear l^3 which projects toward him at the front of the table k^3 and lifts it slightly to the right to lift the stud d^4 over the plate e^4. When the machine is started, the oblong gear swings around until the stud d^4 comes in contact with the slanting plate s^4. (See Figs. 1 and 5.) The plate s^4 is pivoted in the table k^3, and the upper or rearward edge of the plate rests on a bar t^4, which is arranged to move vertically and is held in its raised position by means of the spring u^4, which is secured to the table k^3 and tends to keep the piece t^4 pressed upwardly. The continued movement of the oblong gear and the stud d^4 presses down the plate s^4 as the stud rides over it until the stud has got into line with the groove q^3 in the table, when it has cleared the piece t^4, allowing said piece to snap back into its raised position, in which it forms a guide in front of the stud d^4. As the stud d^4 passes over the piece t^4 it comes in contact with the face or upper edge of the stop-lever w^3 and forces said stop back, thus rocking the shaft s^3 and carrying back the stop-lever r^3, so that the groove q^3 is clear of obstructions and the oblong gear is free to travel across the table k^3. The stud d^4 holds the stop-lever w^3 back until said stud has passed the stop-lever w^3 and is clear thereof and the stops w^3 and r^3 are free to be thrown upwardly by the pressure of the spring v^3, as heretofore described. When they are thrown up, they form stops at either side of the stud d^4, and the oblong gear is then compelled to revolve around that stud as a center while the pinchers are working around the heel of the last. A plate a^8 is screwed to the table k^3 and serves to hold the gears j^3 l^3 in position. (See Fig. 5.)

As I have heretofore stated, the table k^3 is a tilting table—that is, it is pivoted on a cross-bar m^4, which is set underneath the said table in the standard A. At the rear of said table is a lug a^5, in which is pivoted a downwardly-projecting rod b^5, is threaded, and which projects through an aperture in the plate or block c^5, which is secured to the standard A. A hand-nut d^5 is screwed on the rod b^5 below the top of the standard A, and by turning the hand-nut d^5 the table k^3 may be tilted to incline its surface, as desired. A check-nut e^5 underneath the hand-nut d^5 on the rod b^5 serves to lock the hand-nut d^5 in a given position. The purpose of tilting the table k^3 is to vary the slant of the sole of the last relatively to the tack-driver, so that the tack may be driven into the sole on any slant desired—that is, if instead of driving the tack vertically when the sole of the last is horizontal, it is desired to drive the tack so that its point will project inwardly toward the center of the last, as is sometimes done in lasting by hand, this result may be obtained in my machine by tilting the table k^3, so that its rear edge will project upwardly slightly above its front edge—and, as will be obvious, the tack may be given an opposite direction by tilting the rear of the table downwardly.

The jack upon which the shoe is mounted after the upper has been centered on the last is shown more in detail in Figs. 10, 11, and 12. There should be two jacks at least with each machine, so that while the machine is lasting one shoe the operator may be assembling the next one and arranging it on the jack ready to be placed in the machine as soon as the previous shoe is finished. The jack consists of a dovetailed bed-piece a^4, adapted to slide on the dovetail n^3, as heretofore described. At one end of this bed-piece is secured a post b^4, of common construction, provided with a socket to receive the shank c^4 of the toe-support. At either side of the bed-piece a^4 are two lugs d^4, in which are secured rods e^4, one on each side of said bed-piece and lengthwise thereof. On each of the rods e^4 are mounted arms f^4, preferably four on each side of the last. On these arms are secured vertically-sliding clamps f^5, the upper ends of which are broadened, and their inner faces curved somewhat to correspond with the curve of the side of the last. The clamps f^5 pass through slotted blocks g^5, which are secured to the top of the arms f^4, and the lower ends of said clamps f^5 are provided with a slotted box h^5, through which the arms f^4 pass. A set-screw j^5 in the box h^5 allows the clamp f^5 to be adjusted relatively to the arm f^4 and toward or from the last K^5. The clamps f^5 are preferably of comparatively light metal and have some spring in themselves, so that their upper ends will bear with a yielding pressure against the sides of the last. A vertically-movable cross-bar l^5, (see Fig. 10,) which extends across all the arms f^4 on one side of the last, is connected with a similar bar on the other side of the last by means of a cross-piece or yoke m^5. (See Fig. 11.) A cam n^5 is placed on a vertical pivot p^5, which projects upwardly from the bed a^4, and below the cam n^5 on the same pivot p^5 is another cam q^5, which co-operates with the cam n^5. The cam q^5 is provided underneath with a ratchet r^5, and the cam q^5 and ratchet r^5 are free to turn on the pivot p^5. Underneath the ratchet r^5 is a hand-lever s^5, which swings on the pivot p^5, and on the hand-lever is a sliding pawl t^5, operated by a pivoted handle u^5, so that by raising the handle u^5 the pawl is made to engage with the teeth of the ratchet r^5, as will be clear from Fig. 10. By swinging the lever s^5 the pawl-handle u^5 being raised, the operator may turn the ratchet and thus move the cam q^5 relatively to the cam n^5, raising or lowering the yoke m^5 and the clamps f^6, and thus smoothing down and holding the sides of the upper on the last K^5.

To take the last out of the jack, the hand-lever s^5 is again operated, turning the cam q^5 still farther around and allowing the cam n^5 and yoke m^5 to fall. As soon as the yoke m^5 has dropped far enough to carry the cross-bars t^5 down to the lower end of the arms f^4, the arms f^4 can be swung outwardly away from the last K^5 and the last removed. The heel of the last is set on a pin a^6, which is pivoted at a^7 on the heel-support a^8, the lower end of the pin projecting downwardly and curving outwardly from the post a^8, in order that a spring a^9 may be inserted between it and the support a^8 to throw the upper portion of the pin a^6 forward—that is, toward the toe of the last. When the last is placed on the pin a^6, the pressure of the spring a^9 tends to hold its toe down on the toe-support, as will be clear. A vertical bar b^6 is pivoted to a lug c^6 at the end of the bed-piece a^4. At the upper end of the rod b^6 are pivoted two jaws d^6. At the forward end of these jaws are secured springs e^6, which embrace the heel of the last and hold the upper thereon with a yielding pressure. The rear ends of the jaws d^6 are separated to receive the upper end of the sliding piece f^6. (See Figs. 10 and 12.) The upper end of said piece f^6 is wedge-shaped, and at the lower end of said piece is a pivoted handle g^6, which is slotted, as shown, Fig. 10, to receive a pin, which is set in the piece f^6. By means of this handle the piece f^6 may be raised or lowered. When the handle is lowered, the wedge-shaped upper end is forced downwardly between the rearward projections of the jaws d^6, forcing the jaws and the springs g^6 against the sides of the last and holding them in that position. When the last is removed, the movement of the handle g^6 is reversed, freeing the jaws d^6 and spring g^6 from the last.

What I claim is—

1. In a lasting-machine, the combination of a lasting-jack and a support or frame therefor, mechanism for rotating the said support or frame, a table or support movable toward and from said frame to follow the outline of the last during the movement or rotation of the support or frame therefor, lasting mechanism mounted upon the table, and means for forcing the table toward the lasting-jack with a yielding pressure, substantially as set forth.

2. In a lasting-machine, the combination of a lasting-jack, mechanism for rotating the same, a table or support movable vertically and toward and from the jack, lasting mechanism upon the table, and a spring-treadle mechanism for causing said support to move toward the last with a yielding pressure to enable it to maintain the lasting devices in proper proximity to the edge of the upper during the movement of the jack, substantially as set forth.

3. In a lasting-machine, the combination of a lasting-jack, mechanism for rotating the same, a yielding support or table adapted to move toward and from the jack, lasting mechanism mounted upon said table, a locking device for said yielding support, and a power mechanism connected with the said locking device, whereby the support for the lasting mechanism is automatically locked at the

time of the lasting operation, substantially as set forth.

4. In a lasting-machine, the combination, with lasting mechanism adapted to stretch and secure the upper, of a rotary jack adapted to present the different parts of the edge of the upper to said mechanism, a pinion j^3, a gear engaged by said pinion and connected with the jack, a pawl h^3, and power devices connected with said lasting mechanism and with the pawl, substantially as set forth.

5. In a lasting-machine, the combination of a rotary jack, actuating mechanism therefor, pinchers adapted to grasp the edge of the upper, mechanism whereby said pinchers are moved to stretch the upper, means for closing the pinchers comprising a rod n' and a spring located at a point between the pincher-jaw and the source of the movement of the rod and adapted to yield to permit the stretching movement, and power devices connected with the actuating mechanism of the jack and of said pinchers, whereby the jack is automatically moved relative to the pinchers at the proper times to present successive portions of the edges of the upper thereto, substantially as set forth.

6. In a lasting-machine, the combination of a movable jack, a table upon which said jack slides and rotates, actuating mechanism sliding and rotating the jack, pinchers adapted to grasp the edge of the upper, cam-actuated mechanism for closing said pinchers and moving them to stretch the upper, nailing mechanism for securing the upper in place after it has been drawn into position by said pinchers, and a yielding table supporting said pinchers and nailing mechanism, substantially as set forth.

7. In a lasting-machine, the combination, with lasting mechanism, of a movable jack, a table upon which said jack slides and rotates, actuating mechanism for the jack, whereby it is caused to move in a path, substantially such as described, to present the different parts of the edge of the upper successively to the said lasting mechanism, and a stop mechanism whereby the jack causes the lasting mechanism to be thrown out of operation, substantially as set forth.

8. In a lasting-machine, the combination, with the lasting devices, of a jack mounted and revoluble upon a tilting table, means for adjusting the inclination of the table, mechanism connected with the jack for revolving it to present different parts of the upper successively to said lasting devices, and a yielding table supporting said lasting devices and adapted to move in a manner to follow the outline of the last, substantially as set forth.

9. The combination, in a lasting-machine, with the movable jack and its operating mechanism, of a vertically-yielding support for the lasting mechanism mounted on the spring-seated rods set in uprights on the stationary frame, substantially as shown and described.

10. The combination, in a lasting-machine, with the movable jack and actuating mechanism, of the lasting mechanism proper, the sliding table p, and the vertically-movable frame n, substantially as shown and described.

11. In a lasting-machine, the combination, with the lasting mechanism proper, of an oblong gear upon which the jack is mounted, studs or pivots for said gear, a table having a groove or bearing in which said studs or pivots are adapted to slide, movable stops adapted to enter said guides at both sides of the pivot or stud on which the jack is to turn at a given moment to form a bearing for each stud or pivot in turn, and actuating mechanism for said gear by which it is given an intermittent rotary movement, substantially as shown and described.

12. In a lasting-machine, the combination, with the lasting mechanism proper, of a jack and an oblong gear on which said jack is mounted, said gear being divided and arranged to be shortened or lengthened, as desired, whereby the jack-actuating mechanism may be adjusted to suit shoes of varying lengths, substantially as shown and described.

13. The combination, in a lasting-machine, with an oblong gear on which the jack is mounted and actuating mechanism therefor, of automatic stop mechanism comprising path q^3 and hinged stops r^3 w^3, co-operating with studs on said gear, whereby the gear is caused to rotate and move in a right line alternately at given times, substantially as shown and described.

14. The combination, in a lasting-machine, with an oblong gear carrying the jack mechanism and actuating mechanism for said gear, of two studs in said gear of different lengths and stop mechanism in the path of movement of said gear and connected with the shipper mechanism, whereby at each complete rotation of the gear it will actuate the stop mechanism and stop the machine, substantially as shown and described.

15. In a lasting-machine having an intermittently-actuated jack having a suitable gear, the combination therewith and with the lasting mechanism proper, of the gear j^3 and its ratchet, the pawl h^3 and its arm g^3, the shaft f^3, the block e^3 on said shaft, the connection d^3, and the lever a^3 and its actuating-cam, whereby at each revolution of the main shaft the jack is moved to present a new portion of the upper to the pinchers, substantially as shown and described.

16. The combination, in a lasting-machine, with the lasting mechanism and the jack-actuating mechanism, of a jack provided with pivoted arms carrying vertically-sliding clamps, and mechanism, such as cams, for raising said clamps on the said arms to hold the upper against the last, substantially as shown and described.

17. In a lasting-machine, the combination,

with the lasting mechanism, of a lasting-jack, a frame or table supporting said lasting mechanism and movable toward and from the jack, power devices for actuating said jack and the lasting mechanism, a gage carried by the table and adapted to determine the point of arrest of the table, a hopper and delivery-tube for tacks adapted to deliver the latter to the presser, and a driver for fixing the tacks, substantially as set forth.

ENOS PATTEN.

Witnesses:
WM. A. MACLEOD,
ROBERT WALLACE.