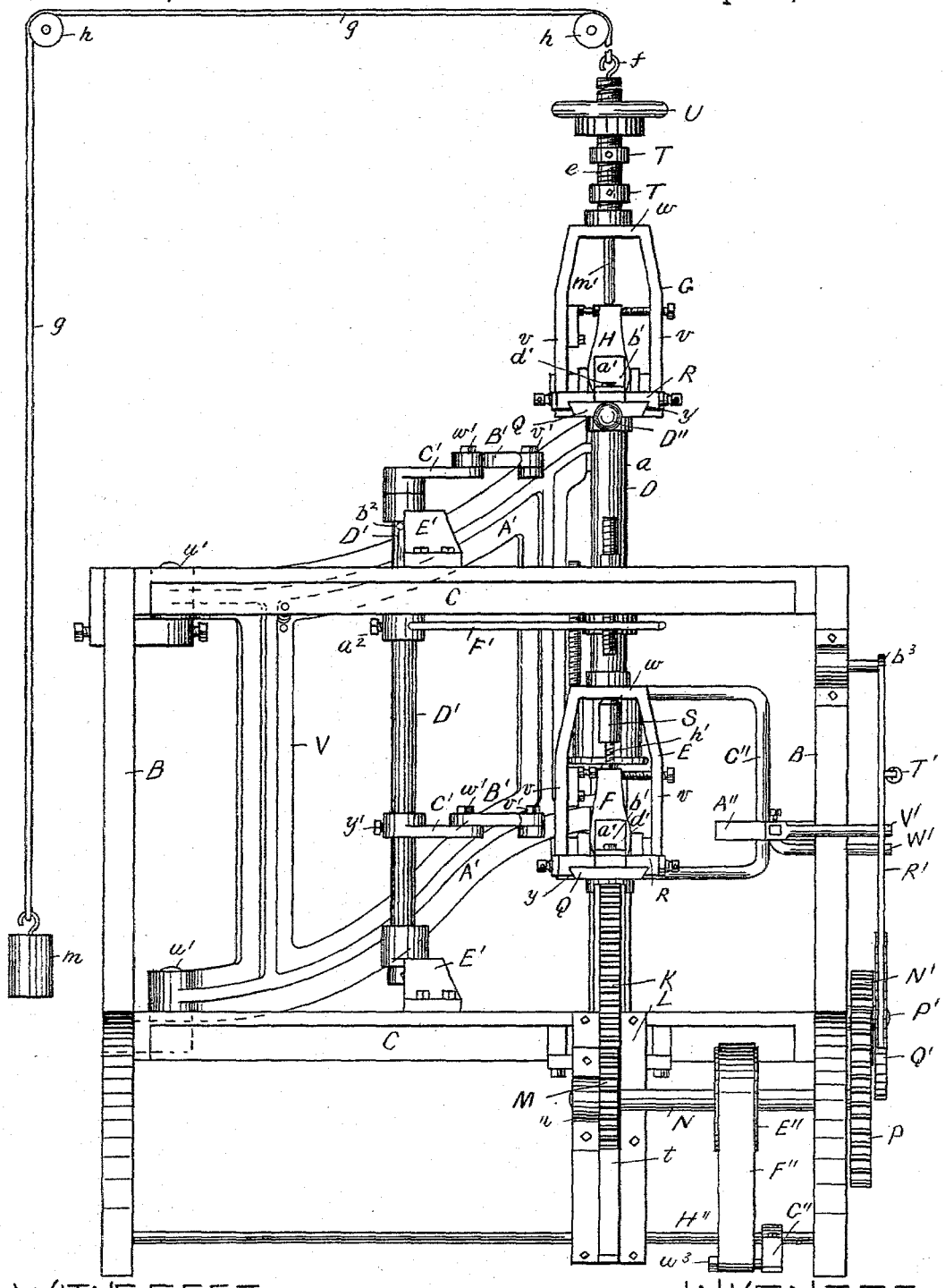
(No Model.) 4 Sheets—Sheet 1.

W. H. AUSTIN.

MACHINE FOR MANUFACTURING LASTS FOR BOOTS OR SHOES.

No. 494,771. Patented Apr. 4, 1893.



WITNESSES.
C. W. Tuttle
Carrie E. Nichols.

Fig. 1.

INVENTOR.
William H. Austin.
Per Edwin W. Brown.
Attorney

(No Model.) 4 Sheets—Sheet 2.

W. H. AUSTIN.

MACHINE FOR MANUFACTURING LASTS FOR BOOTS OR SHOES.

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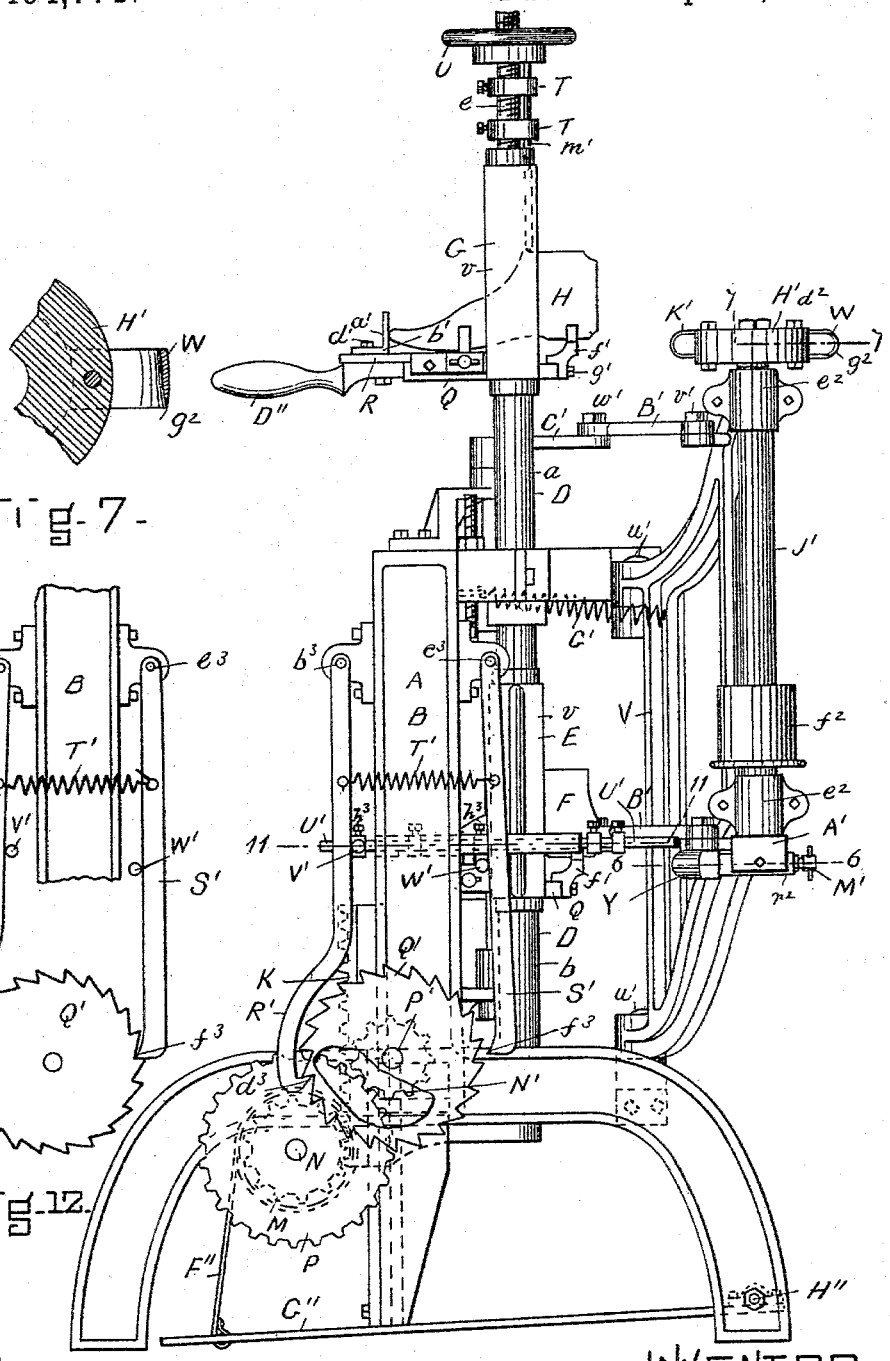

Fig. 7.

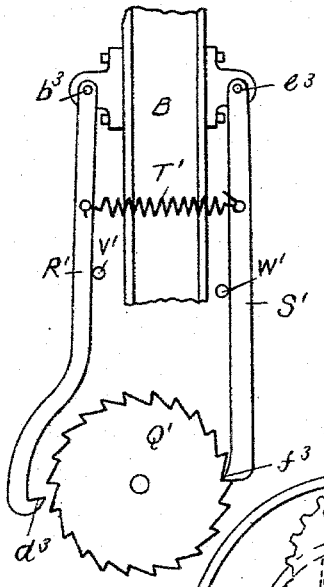

Fig. 12.

Fig. 2.

WITNESSES.

C. M. Tuttle

Laura E. Nichols

INVENTOR.

William H. Austin.

Per Edwin W. Brown

Attorney.

(No Model.) 4 Sheets—Sheet 3.

W. H. AUSTIN.

MACHINE FOR MANUFACTURING LASTS FOR BOOTS OR SHOES.

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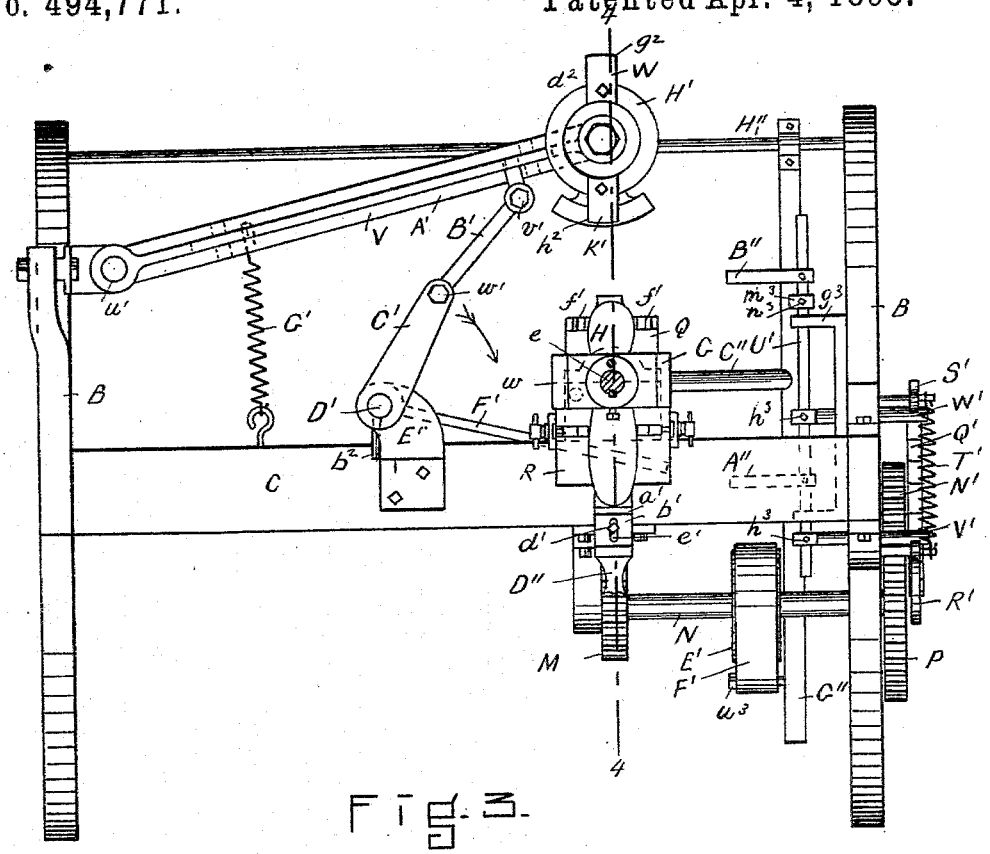

Fig. 3.

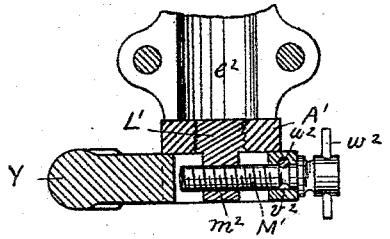

Fig. 5.

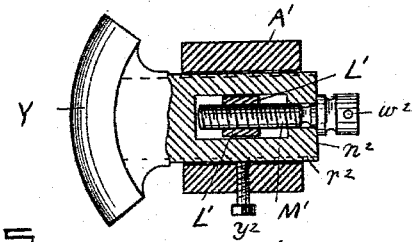

Fig. 6.

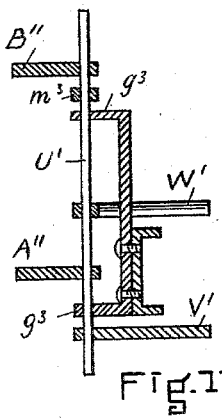

Fig. 11.

WITNESSES.
E. M. Tuttle
Carrie E. Nichols

INVENTOR.
William H. Austin.
Per Edwin W. Brown
Attorney.

(No Model.) 4 Sheets—Sheet 4.

W. H. AUSTIN.

MACHINE FOR MANUFACTURING LASTS FOR BOOTS OR SHOES.

No. 494,771. Patented Apr. 4, 1893.

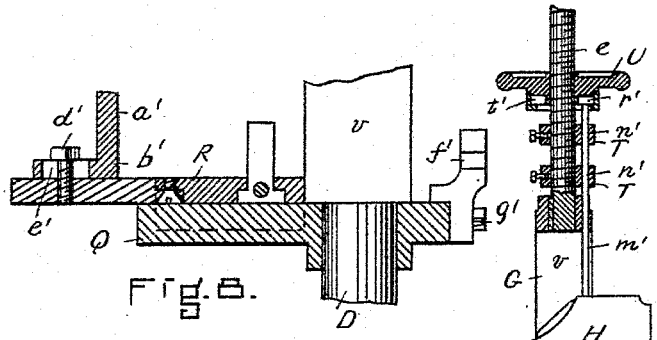

Fig. 8.

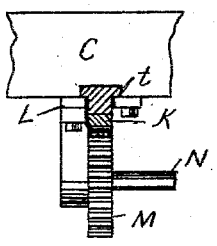

Fig. 9.

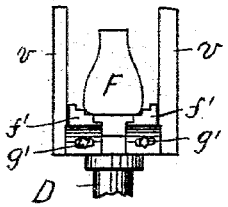

Fig. 10.

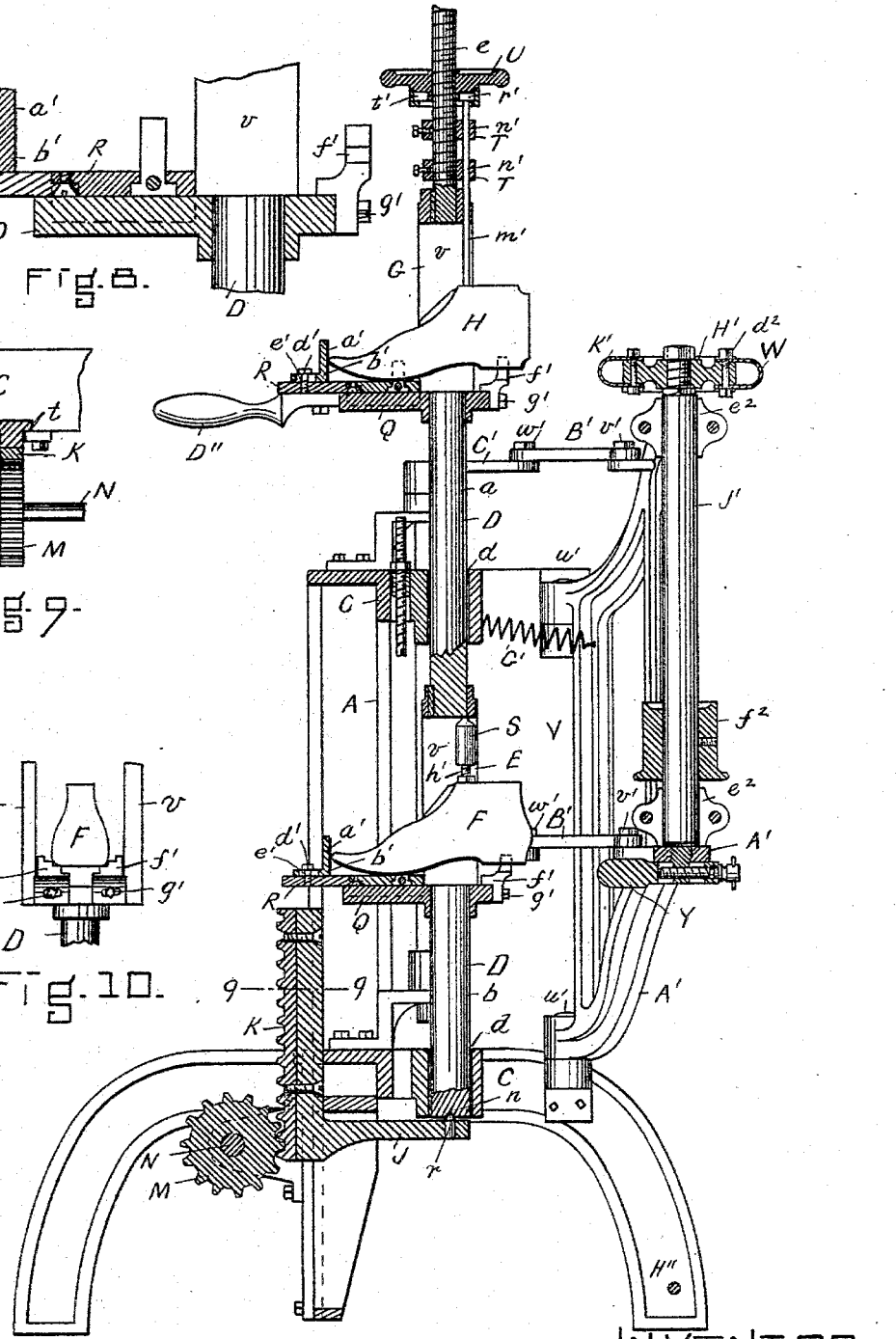

Fig. 4.

WITNESSES.
C. M. Tuttle
Louis E. Nichols

INVENTOR.
William H. Austin
Per Edwin W. Brown
Attorney

UNITED STATES PATENT OFFICE.

WILLIAM H. AUSTIN, OF BROCKTON, MASSACHUSETTS, ASSIGNOR TO HIMSELF, WILLIAM H. CARY, WILLIAM THOMPSON, AND AUGUSTUS A. DELANO, OF SAME PLACE.

MACHINE FOR MANUFACTURING LASTS FOR BOOTS OR SHOES.

SPECIFICATION forming part of Letters Patent No. 494,771, dated April 4, 1893.

Application filed January 29, 1892. Serial No. 419,666. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. AUSTIN, of Brockton, in the county of Plymouth and State of Massachusetts, have invented certain new and useful Improvements in Machines for Manufacturing Lasts for Boots or Shoes, of which the following is a full, clear, and exact description.

In the manufacture of lasts for boots or shoes in a last machine there is left on each last at the heel and toe of the last as it is finished by the last machine, a stub or portion, where the last is held in the lathe at each end, which portion or stub has had heretofore to be cut off, trimmed and finished into the proper shape by hand, and this invention consists of a machine constructed and arranged for operation substantially as hereinafter described, to cut and trim off the stub or portion left by the last machine at the heel of the last to make the heel of the proper shape and outline all substantially as hereinafter fully described reference being had to the accompanying sheets of drawings in which,

Figure 1, is a front view. Fig. 2, is a plan view and elevation. Fig. 3, is a plan view. Fig. 4, is a vertical cross section on line 4—4, Fig. 3. Fig. 5, is a detail vertical section at right angles to the section line 6—6, Fig. 2. Fig. 6, is a detail horizontal section on line 6—6, Fig. 2. Fig. 7, is a detail horizontal section on line 7—7, Fig. 2. Fig. 8, is a detail central vertical longitudinal section of the support for the pattern last or last to be operated upon. Fig. 9, is a detail cross section on line 9—9 Fig. 4. Fig. 10, is a detail end view of pattern last and its support. Fig. 11, is a detail horizontal section on line 11, Fig. 2. Fig. 12, is a detail side elevation of some of the parts shown in Fig. 2, Figs. 5, 6, 7, 8, 9, 10, 11 and 12 being enlarged.

In the drawings A represents a frame composed substantially of side uprights B, and cross bars C, on which is supported the various parts of the machine.

D is a vertical rod or spindle made in two parts *a*, *b*, arranged to freely move up and down in bearings *d*, *d*, in the frame bars C, the two parts being connected together by a frame E, in and on which is supported the last former or pattern F, the part *a*, also having another frame G, secured to it at its upper end in and on which frame G is supported the unfinished last H, which is to be operated upon by the machine.

To the upper end of the upper or last supporting frame G, is secured in any suitable manner a vertical endless screw rod *e*, and on its upper end an eye *f*, to which one end of a cord or rope *g*, is attached, which passes over pulleys *h*, and has a weight *m*, secured to its other end which acts to hold up or balance the vertical rod and parts carried by it.

The frame carrying rod D, rests by an under central socket *n*, in its lower part *b*, on a pivot or center *r*, of a horizontal arm *j*, of a vertical rack bar K, which is arranged to move up and down in side grooves *t*, in the portion L, secured to the frame, which engages with a gear M, on a horizontal shaft N, turning in bearings *u*, secured to the part L, of the frame, and the frame itself, which shaft extends to the outside of the frame work and has on its outer end a gear P, as shown more particularly in Figs. 1, 2 and 3.

The pattern last frame E, is composed of a horizontal plate Q, secured to the upper end of the part *b*, of the rod D, two side arms or bars *v*, extending upward therefrom in substantially a vertical line and connected together at their upper ends by a bar or plate *w*, which is secured to the lower end of the upper part *a*, of the rod as shown in front view in Fig. 1, more particularly.

Adapted to slide back and forth on the horizontal plate Q, is a plate R, it having a dovetail groove *y*, on its under side adapted to fit over dovetail edges of the horizontal plate on which plate R, rests the pattern or pattern last F, by its ball portion its toe end abutting against the upright portion *a'* of an angular piece *b'* secured by its other part to the plate by a set screw *d'* passing through an elongated slot *e'* therein, and the heel of the pattern last resting in between and on two lugs or blocks *f'* secured to the back edge of the plate Q, by screws *g'* which pass through slots, in the lugs and screw into the back edge of the plate Q, so they can move to and from each other across the plate, to adjust

them to the thickness of the pattern last and when so adjusted they are secured in position by their set screws g'. The angular piece b' is also arranged to be moved forward and backward on the plate by its slot e' to adjust its position thereon to correspond to the length of the pattern last and is secured by its screw when in such adjusted position. The upper frame G, is a duplicate of the lower frame E, and in and on it, is to be secured the unfinished last to be operated upon by the machine and which is secured in a like manner as the pattern last and all the parts are lettered the same as the lower frame, the description of the frame E, answering for this frame.

To secure and hold the pattern last in position on its rest plate after it has been properly set, a short block or holder S, having a pointed end and a screw h' is placed between the pattern last and the upper part or bar w, of the frame and the screw being turned in the proper direction bearing against the plate w it presses firmly upon the pattern last and holds it firmly in position, as shown more particularly in Figs. 4, and 1. The unfinished last is held in its adjusted position by a vertical rod m', at the side of the screw rod e, which can freely slide up and down in sockets n' in two screw nuts T, screwing on the rod e, the rod m' having a circular flanged head r' which engages with an inner circular shouldered groove t' in the under side of a plate or handle nut U, screwing upon the rod m' so that by this engagement of the rod with the nut U, as the nut is screwed up and down on the rod e, the rod m' will move up and down, so that screwing the nut down, the rod m' will be pressed firmly upon the top of the last and hold it firmly in its adjusted position on the plate Q, as shown more particularly in Fig. 4.

V is a frame pivoted at u' to the framework so it can swing horizontally thereon, which frame carries the cutter or knife W, for operation on the last, and the guide or gage Y, which bears upon the pattern last F, and gages the action of the cutter on the last being operated upon, as usual in last machines except as to their connection with the present invention.

Near the cutter and guide end of the frame V, on its upper and lower arms A' of the frame are connected by pivots v' links B', in turn connected by pivots w', to other links C', which surround and are connected and secured by set screws y' to a vertical rod D' adapted to turn in bearings of brackets E', of the cross bars C, of the frame work.

Attached to the rod D' by a set screw a^2 is an arm or handle F' for operation thereof; pulling it forward swings the link connection forward which allows a spiral spring G' secured by one end to the cutter frame V, and to the cross bar C, to swing it forward on its pivots bringing its guide or gage Y, in position to bear upon the pattern last, the cutter frame being held by its spring G' for its cutter to act upon the last; pushing the handle backward the link connection is swung back which moves the cutter frame back into its normal position, shown in Fig. 3, in which position the link arms are swung back far enough for their central pivot w', to be horizontally back of a straight line between the two outer pivots of the links, at which point a pin b^2 secured to the center rod D' abuts against the bracket E' preventing any further backward movement of the frame, which is there held by its spring, so it can not accidentally move forward, but if the handle is pulled forward, as soon as the central pivot w' moves forward of such line the spring will then act to move the cutter frame into position and hold it for the action of its cutters upon the last.

The cutter W, is attached to an arm H' secured by a screw d^2 to the upper end of a vertical shaft J' adapted to turn in bearings e^2 in the cutter frame V and having a pulley f^2 for operation thereof, which shaft has secured to its lower end the guide or gage Y, which guide is semi circular in vertical outline and semi circular or round in cross section on its outer edge as shown in plan in Fig. 6, and in cross section in Fig. 5. The cutter is made of a strip or flat bar of steel and bent over in the arc of a circle having a cutting edge g^2 on one side it being bent so that its cutting edge will correspond with the circular outline of the cross section of the guide. Diametrically opposite to the cutter on its bar or holder H' is another cutter K' made of a strip or bar of steel and bent and secured thereto like the other cutter W, and having a cutting edge h^2, but which is a little less distance radially from the axial center, of the shaft and is also a little higher than the cutter W which balances the cutter W, and also cuts a little in advance of the cutter.

The guide or gage Y is secured to the under side of the end of the lower arm A' of the cutter frame V on which the cutter shaft J' rests, as follows:—A pin L' is screwed firmly into the under side of the arm A' its projecting end being square in cross section and having a transverse screw socket m^2 through which screws the screw M' passing freely freely through the end n^2 of an arm r^2, of the gage which in its arm r'' has a longitudinal slot t'' to freely fit over the square end of the pin L' preventing its turning horizontally, the arm end having a pin w'' which engages with a circumferential groove v'' in the screw to prevent its longitudinal movement, the screw having cross arms or handle w'' for operation of the same, so that turning in or out the screw M', the gage Y can be moved horizontally forward and backward so that it can be set in relation to the radial distance of the cutter from the central axial line of the shaft, for the desired operation of the cutter on the last, and when set it is secured by a set screw y^2. The gear P, on the outer end

of the shaft N, meshes with a smaller gear N′ on a shaft P′ turning in bearings in the framework, and which carries at the side of the gear N′ a ratchet wheel Q′. In front of this ratchet wheel is a pawl R′ pivoted at b^3 to a block of the frame and having a hook end d^3 to engage with the teeth of the ratchet wheel Q′ at its front side, and at the rear of the ratchet wheel is another pawl S′ pivoted at e^3 to a block of the framework and having its end f^3 adapted to engage with the teeth of the ratchet wheel at its side. These two pawls are connected together by a spiral spring T′ which acts to hold them to their engagement with or in position to engage with a ratchet tooth of the ratchet wheel as hereinafter described. The weight *m*, connected to the carrying frame rod D and all its parts and the rack bar K, is not quite sufficient to overcome the weight of all these parts, so that if otherwise not supported the rod and its parts carried by it will drop its full movement, and to regulate such movement from its highest position to its lowest position and make it by a step by step or intermittent motion, the spring pawls R′ and S′ are arranged for operation in connection with the ratchet wheel and gears and as there is a constant downward pressure of the rod and its parts, the ratchet wheel is held from movement and consequently the rod and its parts by its engagement with one or the other of the spring pawls, which will then hold the rod and its parts in suspension, and if the engaging pawl is moved away from its connection with the ratchet wheel, the rod and its parts are free to drop, turning the ratchet wheel until it engages with the other spring pawl, and so on, the engaging point of one spring pawl being slightly higher or lower than the other according to the distance of the desired movement of the ratchet wheel and its rack bar with the rod and its parts. To operate these pawls so that the ratchet wheel will alternately engage with one and the other, to let the rod and its parts drop step by step, for the purposes hereinafter described, the following mechanism is constructed and arranged.

U′ is a horizontal bar adapted to slide forward and backward in a guide and support g^3 of the frame which bar has two horizontal arms V′ and W′ secured thereto and in such manner that they can be moved back and forth on said bar for adjustment thereon, as to their distance apart, being secured thereto by set screws h^3 when so adjusted, which arms project outward through the frame and between the two spring pawls, so that each pawl will bear or rest against its respective arm of the bar as shown in Figs. 2 and 12, the bars being adjusted as to their distance apart in such manner that when one pawl is engaged with the ratchet wheel the other will be disengaged and vice versa, as shown in said figures. The horizontal bar is limited in its movement in one direction by a block m^3 adapted to move on said bar and secured by a set screw n^3 which abuts against a fixed arm g^3 of the frame and in the opposite direction by the abutment of the arm V′ against another fixed arm g^3 of the frame. The bar also has oppositely horizontally projecting arms A″, B″, secured by set screws which are adapted to be adjusted thereon, and which are the operating arms of the bar to move it forward and backward as the case may be, to correspondingly move one or the other of the spring pawls to and from the ratchet wheel.

Secured to the side of the pattern last frame is a vertical U shape bar C″ projecting therefrom for its middle or vertical portion to be between the two operating arms A″ B″ of the bar U′. The upper or last frame has a handle D″ which projects forward into position for operation thereof.

On the rack-bar-gear shaft N, is a roll E″ which has one end of a belt F″ secured thereto and wound thereon, once or twice, its other end being secured to a projecting pin or arm w^3 of a treadle G″ pivoted to a horizontal rod H″ connecting the two rear legs of the frame as shown in Figs. 1, 2 and 3. If the rod and its parts with rack bar have been lowered to its lowest position the belt F″ in such movement is wound upon its roll E″ which raises the treadle, and to then raise the rod &c., to its uppermost position, the treadle is pressed down which pulling by its belt upon the roll turns it and its shaft in the opposite direction, and thus through its gear M, raises the rack bar and the rod and its parts into their highest position.

The operation of the machine is as follows:—The normal position of the machine is as shown, more particularly in Figs. 1, 2 and 3. The pattern last having been first secured in place on its frame and the unfinished last to be operated upon secured in place on its frame all substantially as described, power is applied to the machine which operates the pulley on the vertical or cutter shaft J′ revolving it and its cutters quite rapidly. The rod D and its parts are then raised by the treadle or have previously been raised into its highest position, or so that the last to be operated upon will be above the horizontal plane of the cutters, as shown in Fig. 2, more particularly. The operator then swings the cutter frame forward by its handle F′ which brings its guide or gage forward in position to bear upon the pattern last F, when it is low enough for such purpose. The operator then taking hold of the handle D″ swings the rod and its frames to the left for instance and then to the right, back to the left and so on, back and forth. As the pattern frame is swung to the left it also swings or moves forward the arm C″ and just at the last part of its forward movement it strikes against the operating arm A″ of the bar U′ and moves it forward a sufficient distance for its other arm V′ to move the spring pawl R′ from its engagement with the tooth of the ratchet-wheel Q′, at the same time by the action of the spring

T′ the other spring pawl S′ is moved forward, into such a position, that as the spring pawl R′ releases the ratchet wheel it is caused to turn by the weight of the rod and its parts through the rack bar, the tooth of the ratchet wheel nearest the spring pawl S′ will strike against it, which will hold the wheel from further movement, stopping the rod and its parts from farther descent, when the operator swings the rod and its frames in the opposite direction which moves the arm C″ backward, and in the last part of its movement strikes the bar operating arm B″ and through the arm W′ strikes the spring pawl S′ releasing it from its engagement with the ratchet wheel, allowing it to turn, and the rod and frames to fall until the next tooth of the ratchet wheel engages with the other spring pawl R′, which arrests its motion and the downward movement of the rod frames, when the rod frame is swung in the opposite direction and so on until the pattern last has passed below the gage. As the rod and its frames move down, when the pattern last and the last to be operated upon at their lowermost part are in the horizontal planes respectively of the gage and cutter the gage will bear against the lowest portion of the end of the heel of the pattern last, so that the cutter will then cut and trim the lowest portion of the heel of the last, and at each swing or movement of the rod and frames another part of the heel of the last will be presented to the cutter and cut by it and so on until the heel of the last is trimmed from its lowest to its highest point in accordance with the outline of the pattern last. The cutter frame is then swung back for the cutters to be out of the way, the last is removed, another secured in place, the rod and its frames raised by pressing down the treadle, when all is ready for trimming the heel of the new last as before and so on until all the lasts are trimmed corresponding to the former pattern. The gage for the pattern last moving in a horizontal plane and being somewhat thin, and the step by step downward movement of the pattern and last frame being of small degree, the gage will present itself to a very small portion of the curved shape of the pattern last, closer and to a better degree so that the cutters will surely cut and trim the heel correspondingly, making a true and correct outline of the heel of the last and conforming more fully and much better to the shape of the pattern last, than in machines which have their gage and cutters move or revolve in a vertical plane, which as is obvious makes it very difficult for the gage to fit the vertical curvature of the heel of the pattern last at all points, especially if the last to be trimmed has a deep and sharp curvature of the heel or is a high one, but all this is obviated in the present invention by the movement of the gage and cutter in a horizontal plane.

Having thus described my invention, what I claim is—

1. In a last trimming machine, a framework, a vertical rod or shaft provided with means for carrying a last pattern and last and arranged to move up and down in suitable bearings and to swing back and forth in said framework, a frame pivoted to a suitable support and adapted to swing on said pivot in a horizontal plane to and from said last pattern and last, a gage or guide secured to said swinging frame arranged to bear upon said last pattern, a revolving shaft in said swinging frame and a cutter or cutters secured to said shaft and arranged to revolve in a horizontal plane or in a plane parallel or substantially parallel to the bottom of the last pattern.

2. In a last trimming machine, a framework, a vertical rod or shaft provided with means for carrying a last pattern and last and arranged to move up and down in suitable bearings in said framework, a rack bar on one side of said rod, a shaft arranged to turn in suitable bearings in said framework, a gear on said shaft engaging with said rack bar, another gear on said shaft, a gear on a revolving shaft engaging with said latter gear and engaging with mechanism to allow of an intermittent motion of said gears and rack bar, a frame pivoted to a suitable support and adapted to swing on said pivot in a horizontal plane to and from said last pattern and last a cutter or cutters secured to said frame, said vertical rod being provided with an arm or means as it is swung back and forth to release said gear mechanism to allow said vertical rod to intermittently fall for the purpose specified.

3. In a last trimming machine, a framework, a vertical rod or shaft provided with means for carrying a last pattern and last arranged to move up and down in suitable bearings in said framework, a rack bar on one side of said rod, a shaft arranged to turn in suitable bearings in said framework, a gear on said shaft engaging with said rack bar, another gear on said shaft, a gear on a revolving shaft engaging with said latter gear, a ratchet wheel on said latter shaft, two spring pivoted pawls adapted to engage with said ratchet wheel, a bar or arm adapted to move forward and backward in suitable bearings having projecting arms to engage or bear respectively on the inner adjacent sides of the spring pawls, and oppositely projecting arms, and an arm on said rack bar rod, arranged in the swing or rock of the rack bar rod to bear first against one and then the other of the oppositely projecting arms of said sliding bar for the purpose specified.

4. In a last trimming machine, a framework, a vertical rod or shaft provided with means for carrying a last pattern and last and arranged to move up and down in suitable bearings in said framework, a rack bar on one side of said rod, a shaft arranged to turn in suitable bearings in said framework, a gear on said shaft engaging with said rack bar, another gear on said shaft, a gear on a revolv-

ing shaft engaging with said latter gear, and engaging with mechanism to allow of an intermittent motion of said gears and rack bar, a frame pivoted to a suitable support and adapted to swing on said pivot in a horizontal plane to and from said last pattern and last a cutter or cutters secured to said frame, a spring connecting said swinging frame with the support, a link joint connected to said frame and a rock shaft provided with a handle, and said rod being provided with an arm or means for releasing said gear mechanism to allow said rod to intermittently fall for the purpose specified.

5. A guide or gage for bearing upon the heel of the last pattern having an arm and a slot in said arm, a support for said gage or guide provided with a square pin or arm having a screw threaded socket, said arm fitting over said square pin and having a screw adapted to turn freely therein and screw into said pin and prevented from longitudinal movements in said arm for the purpose specified.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM H. AUSTIN.

Witnesses:
WM. THOMPSON,
EDWIN W. BROWN.