

S. H. HODGES.

Improvement in Machines for Trimming Boot and Shoe Soles.  
No. 129824.

Patented July 23, 1872.

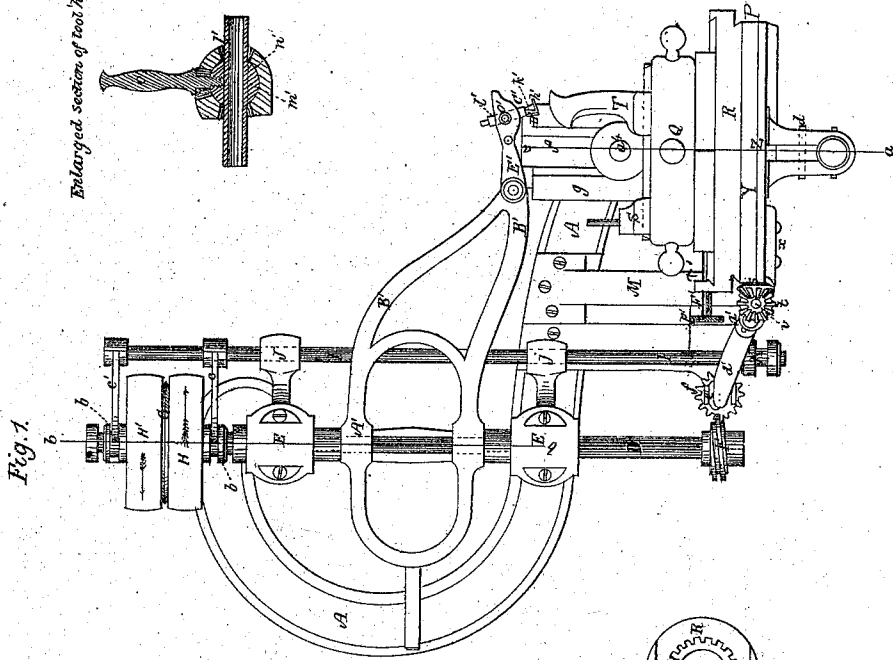
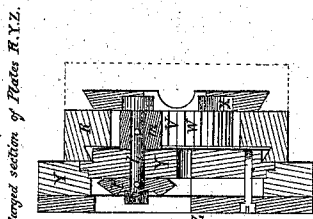


Fig. 1.

Enlarged section of tool holder.



Divers sections of Plates H, Y, Z.

Fig. 5.

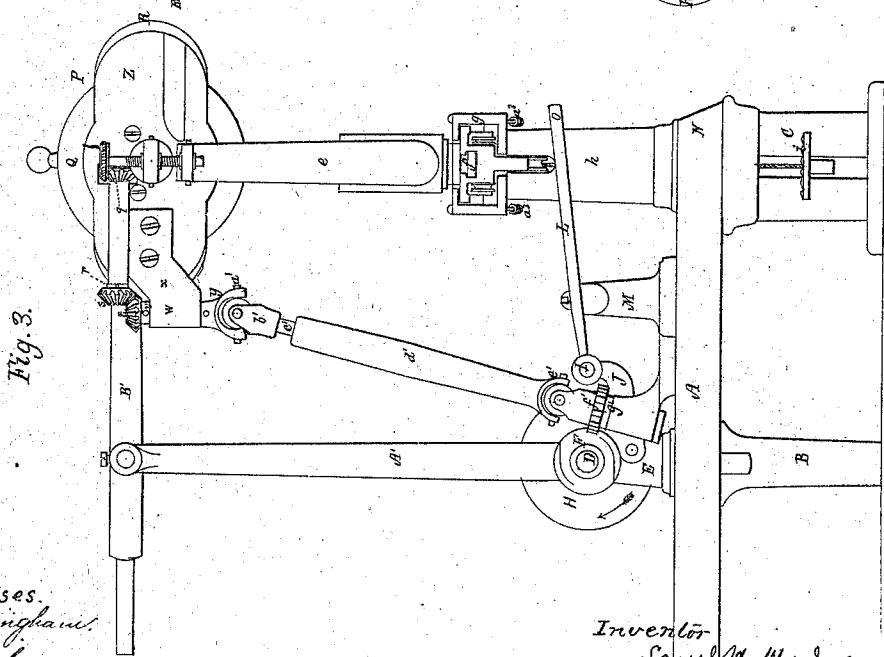
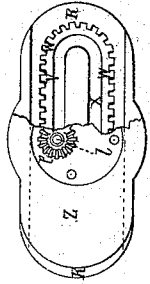


Fig. 3.

Witnesses.  
C. B. Nottingham  
J. R. Nottingham

Inventor  
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S. H. HODGES.

Improvement in Machines for Trimming Boot and Shoe Soles.  
No. 129,824. Patented July 23, 1872.

Fig. 2.

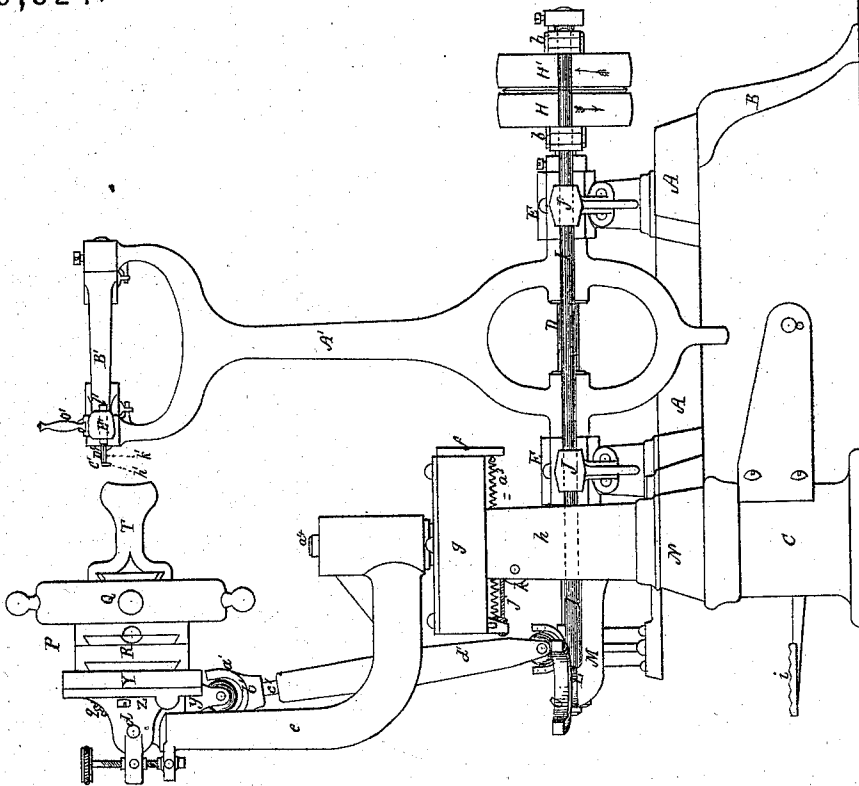
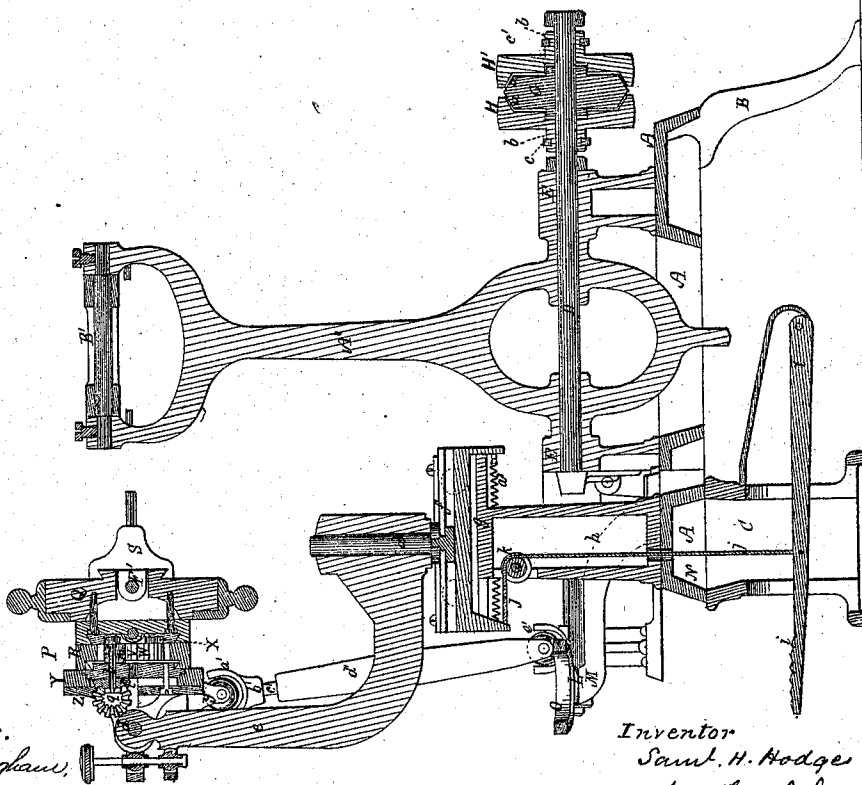


Fig. 4.  
on line of cut of Fig. 1.



Witnesses.  
C. D. Nottingham,  
J. R. Nottingham

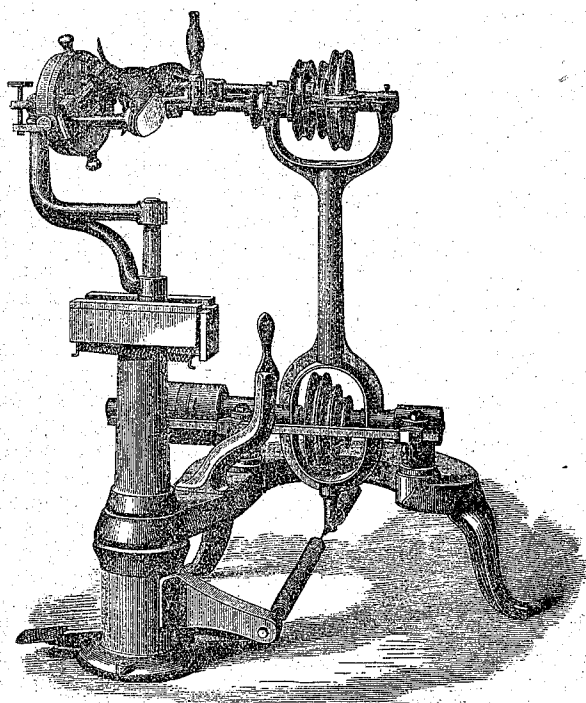
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Improvement in Machines for Trimming Boot and Shoe Soles.

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# UNITED STATES PATENT OFFICE.

SAMUEL H. HODGES, OF LYNN, MASSACHUSETTS, ASSIGNOR TO THE HODGES  
EDGE TRIMMING AND SETTING MACHINE ASSOCIATION, OF SAME PLACE.

## IMPROVEMENT IN MACHINES FOR TRIMMING BOOT AND SHOE SOLES.

Specification forming part of Letters Patent No. 129,824, dated July 23, 1872.

Specification describing certain Improvements in Machinery for Trimming the Edges of the Soles, and in some instances the Heels, of Boots and Shoes, invented by SAMUEL H. HODGES, of Lynn, in the county of Essex and Commonwealth of Massachusetts.

These improvements have reference, more or less closely, to the fundamental principles of a machine for a like purpose shown and explained in Letters Patent of the United States numbered 117,287, and issued to me on the 25th day of July, 1871, the novel characteristics of which consist mainly in the combination, with a jack or holder for supporting the boot or shoe, of a trimming or burnishing tool, actuated by suitable mechanism, and mounted upon a flexible or jointed frame or arms in such a manner that the trimming or burnishing tool may, by means of such frame or arms, be brought to bear at any desired point or angle upon the edge or bottom of a boot or shoe, held in or by the jack, such machine being shown in perspective in Sheet A of the accompanying drawing. While, however, my present improvements are, as stated, allied more or less closely to my patented machine, above referred to, they possess inherent novelty, which may render their individual application valuable to other machines of a like character, while they depart radically from such patented machine in one particular—that is, in the employment of a stationary or “straight” trimming-knife in lieu of a rotary cutter-head armed with a series of peripheral cutters. Heretofore, in sole or “fore-part” trimming machinery in which a stationary knife is employed, the jack or device which supports and carries the boot in the necessary path, while the knife performs its functions, is driven in an undeviating path in an arbitrary vertical plane, and in one direction only, with no freedom of motion out of this path, and no power of retracing its steps if the knife execute imperfect or unfinished work, the variable yielding motions which are requisite between the cutter and sole in order to conform to the irregular outline of the latter being executed by the cutter. Furthermore, in “fore-part”-trimming machinery heretofore in use, in which a stationary or “straight” knife is employed, a form or pattern-plate has been

adopted to impart the desired size and outline to the sole by causing the cutter to reduce to such pattern-plate any portion of the sole protruding beyond it.

Grave objections are found to exist in this construction, for the reason, among others, that, first, with a pattern-plate, all soles of one number are reduced to a given outline, without permitting the workman to exercise his discretion in varying from this pattern, as is often desirable, owing to variations of the uppers; secondly, the knife, owing to the nature of its attachment, oftentimes inclines inward toward the pattern-plate and abuts against the latter, with injury to both, and at another time will diverge from such plate and leave the leather, or will impart an irregular and unsightly edge to the sole, which remains, as the sole cannot retrace its movement, or is remedied only by effecting an entire circuit of such sole and going a second time over the imperfect place.

I have endeavored, in this machine, to conform the action as nearly as possible to that of human labor, and to obviate objections above named, as well as others, and in proceeding to do so I have incorporated in it elements as follows: First, I have applied the jack to its supporting frame or column in such manner that while being driven in an oblong path by mechanical means it possesses all necessary freedom of motion in any direction with respect to the trimming-knife, whether back and forth, or in a vertical, or horizontal, or vertical circular arcs, or curved paths, by which I am enabled to provide for any emergency that may arise; and, secondly, I have so applied the jack and the carriage which carries it in an oblong path, and combined them with the driving-shaft of the machine, as to be enabled, by the simple reversal of a pulley, operated by the knee of the workman or otherwise, to reverse the movement of the jack, or the same and a boot or shoe applied to it, and compel the knife to retrace its steps and go again over any portion of the sole-edge once traversed by it and left in an imperfect state; and, thirdly, I have dispensed entirely with a form or pattern-plate, and have mounted the knife or shank in its swinging arm or frame which supports it by means of a ball-and-socket or other universal joint, and provided

it with an upright handle in order that the workman, by the aid of such handle, may vary the horizontal slope of the knife transversely of its length and gage the depth and direction of its cut, or longitudinally of its length, and thus vary the angle of the sole-edge, and also to adjust by such handle the proper height of the knife and present it to the sole-edge; and, fourthly, I have so constructed the "jack" that its heel-post or jaw remains stationary, in order to obtain a positive general starting-point for the work to begin, and in connection therewith have so applied the knife-stock to its supporting-arm that its position with respect to the heel-post, or to the same and the heel or sole of the boot or shoe, as to be enabled to begin work at the least conspicuous part of such sole, for the reason that it sometimes occurs that a slight imperfection in the surface is left by the initial cut of the knife; fifthly, I have provided a means of varying the distance traveled by the jack in its oblong path, in order to adapt the functions of the machine to soles of various lengths or sizes, and I effect this purpose by mounting the jack upon a traveling-carriage and providing it with a regulating-screw to govern its position upon the latter with respect to one end, turning-point, or center of the same, a suitable scale of divisions being engrossed upon some conspicuous and convenient part of the said carriage which shall correspond to the various sizes of boots or shoes, in order that the workman may readily set the "jack" to the desired point.

The drawing accompanying this specification represents in Figure 1 a plan, in Fig. 2 a front side elevation, in Fig. 3 an end elevation, and in Fig. 4 a vertical section, of an edge-setting machine embodying my improvements.

In the drawing, A represents the bed-plate or base of the machine, which is a curved block, somewhat in the form of a hook, and provided with two feet, B B, and a hollow standard, C, upon which it is supported. The driving-shaft of the machine is shown at D as mounted horizontally in suitable boxes E E, erected upon the rear end of the base A, and as provided at one end with a spiral worm, F, and at the other with a fixed circular disk or truck, G, whose periphery is reduced to two inclined or beveled faces, *a a*, of equal angles, while disposed loosely upon the shaft D; and upon each side of the friction-disk G, and revolving in opposite directions, as shown by arrows on them, I employ a pulley, H or H', so arranged as to slide endwise, in contact with or away from the truck or disk. Each pulley H or H' is formed with a concentric peripheral grooved hub, *b*, and into the groove of each hub the end of a shipping-bar, *c* or *c'*, extends, the opposite ends of the two bars being fixed to a long horizontal rod, I, which is common to the two, and which is mounted and slides within suitable boxes J J applied to the base of the machine, or making part of the

boxes E E, before named, the said shipping or reversing rod I being parallel with the driving-shaft and of about equal length therewith. The end of the reversing-rod I, immediately adjacent to the worm F, is formed with a concentric channel, K, into which extends one end of a horizontal shipping-lever, L, such lever being fulcrumed to a post or stud, M, erected upon the base A, and extending to the front end N of the said base, where it terminates in a fork, *o*, in which the workman places his knee, and by it reverses the motion of the jack, at pleasure. The worm F, attached securely to the shaft D, drives, by means hereinafter stated, the pinion which actuates the jack-supporting carriage or slide; and as this carriage is applied in such manner as to be driven in either direction by the pinion and the worm, a reversal of the motion of the latter will sever the direction traveled by the said carriage. The oppositely-revolving pulleys H H' and the intermediate truck G constitute the means of reversing the motion of such worm, and to effect such result the workman has merely, by an effort of his knee, to push the lever in one or the other direction, which drives one pulley, as the case may be, in contact with the truck G, and rotates the worm in a corresponding direction. A reverse pressure of the knee upon the lever L forces the opposite pulley in contact with the truck G, and produces a rotation of the worm in an opposite direction. The reversing mechanism thus organized constitutes the second portion of these improvements.

The jack which receives and supports the boot and presents its sole to the action of the shaving or trimming knife is shown at P in the drawing as a circular disk, Q, mounted vertically upon a plate, R, and provided with two jaws or posts—one, viz., S, being the heel-post and stationary upon the disk, and the opposite one, T, to be movable toward and away from it. As the jack, imperfectly shown by the disk Q and jaws S and T, is to the same as that pulley shown and described in Letters Patent of the United States numbered 124,744, and issued to me on the 19th day of March, 1872, and as an addition of any portion of it to this machine is merely to define its position with respect to the other members of such machine, I have not shown or described its detailed constitution, and merely wish to remark that the heel-post is to be stationary upon the disk, in order, as before premised, to obtain a uniform and positive starting-point for the beginning of the work, and in so doing carry out in part the object of the fourth portion of these improvements. The plate R, which upholds the jack, is an oblong rectangle with semicircular ends, the joint between the two being an ordinary dovetailed or shelf groove, one which permits the jack to slide longitudinally upon the plate. The plate R is formed or provided at its outer face with an oblong chamber, V, whose sides are parallel and whose ends are semicircular, the

boundary of this chamber being formed into a toothed rack, *W*, which extends its entire circuit, while in the inner face of such chamber I cut an endless channel, *X*, of a contour exactly corresponding to that of the toothed rack *W*, but of a size somewhat less, as shown in Fig. 5 of the drawing, which is an outer side view of the plate *R*, rack *W*, and channel *X*. The plate *R*, with its accompanying rack *W*, is mounted and slides upon a second plate, *Y*, of substantially like form and size, this latter plate, in turn, being pivoted at its center to a tilting-block or cross-head, *Z*, which is pivoted by a horizontal pin, *d*, to the upper end of an L-shaped standard, *e*, the lower end of which standard or post is pivoted to a stud, *a*<sup>4</sup>, which stud is adjustably connected to a sliding carriage, *f*, playing in horizontal reciprocations within a grooved head, *g*, which, in turn, is affixed to the upper part of an upright post, *h*, erected upon the front end of the base *A*. Suitable springs, *a*<sup>3</sup>, are to be combined with the carriage *f* and head *g* in such manner as to force the former outward or away from the trimming-knife; and in order to advance such carriage and present a boot carried by the jack to the action of such knife, I employ a treadle, *i*, disposed within the hollow standard *C*, and connect this treadle with the outer end of the carriage *f* by a cord, *j*, which passes over a pulley, *k*, pivoted within the post *h*, as shown in Fig. 4 of the accompanying drawing. Within the rotating plate *Y*, upon which the jack-plate *R* plays, I mount a short horizontal shaft or stud, *l*, which extends across the chamber *V* and enters the channel *X*, while upon the portion of this shaft which crosses the chamber I affix a pinion, *m*, which meshes into the toothed rack *W*, before named, the pinion serving to drive the plate *R* and chuck in an oblong path upon the inner face of the plate *Y*, while the channel serves to properly support and guide such plate *R* in its movements and relieves the pinion of the thrusts and wear which would otherwise devolve upon it. Upon the outer end of the shaft *l* I affix a beveled gear, *p*, while meshing into this gear and driving it is a second beveled gear, *q*, which, in its turn, is affixed to the inner end of a horizontal shaft, *r*, which rotates in suitable bearings applied to the block or cross-head *Z*, before named, the outer end of such shaft being provided with a beveled gear, *s*, which meshes into a twin gear, *t*, affixed to the upper extremity of an upright rod, *v*, which rotates within a bearing, *w*, forming part of a bracket, *x*, which projects from the rear end of the cross-head *Z*. The lower part of the rod *v* terminates in a forked block, *y*, which constitutes one portion or gimbal of a universal joint, *a*<sup>1</sup>, the lower gimbal or fork *b*<sup>1</sup> of which is attached to or makes part of the upper end of a rod, *c*<sup>1</sup>, which enters and slides within a tubular bar, *d*<sup>1</sup>, the lower end of which bar is connected by a universal joint, *e*<sup>1</sup>, with a worm-gear, *f*<sup>1</sup>, mounted upon an upright post,

*g*<sup>1</sup>, affixed to the base *A*, and in such close proximity to the worm *F*, hereinbefore named, as to mesh into and be driven by such worm. The rotation of the driving-shaft *D*, acting through the universal joints *a*<sup>1</sup> and *e*<sup>1</sup>, the beveled gears *p*, *q*, *s*, and *t*, with their adjuncts, and the pinion *m* and rack *W*, drives the plate *R* and jack through a path corresponding to the form of the inside rack *W*, such path being the proper one to carry the boot-sole about the trimming-knife and obtain one of the free or variable motions hereinbefore named as constituting the first portion of these improvements. The pivoting of the standard *e* and its superdisposed load to the adjustable stud *a*<sup>4</sup> allows a horizontal movement, in a circular path, to be imparted to the jack, and provides another of the free motions embraced in the first part of these improvements. The pivoting of the cross-head *Z* to the standard *e* and the horizontal sliding of the carriage *f* insure liberty of motion, which, in conjunction with those last named, gives all desired liberty to the motions of the jack, and completes the said first portion of these improvements. By the freedom of motion thus obtained I am enabled to do away with all necessity for a pattern-plate or form, and thus carry out in part the intent of the third portion of these improvements.

Having thus seen how the boot is supported and carried through the motions necessary to effect the trimming of its sole, I will explain the nature, application, and operation of the knife by which the trimming is executed.

*A*<sup>1</sup> in the accompanying drawing represents an upright frame or standard of any proper design, such standard being disposed preferably above the driving-shaft and bearing at top a horizontal arm or frame, *B*<sup>1</sup>, which is pivoted to it in such manner as to oscillate or rock thereupon in a vertical plane, a suitable catch or stop-action being applied to the two to uphold the knife-carrying end of the arm *B*<sup>1</sup> and relieve at certain times the operator from this labor, assuming such end of the arm to be the heaviest, as would ordinarily be the case. The front and free end of the knife-carrying arm *B*<sup>1</sup> projects forward to a point about opposite the center of the carriage *f* and the heel-rest of the jack when the latter is in the position which it should assume at the initiatory action of the knife upon the sole, and I prefer that this initial action of the knife should be, as before premised, at the shank immediately up to the heel, as this is the portion of the sole-edge where any imperfection would be less apparent than at any other. This, however, is by no means arbitrary, as no imperfection may result from the action of the knife at the starting and leaving-off points. Another advantage in starting the action of the knife at the inner face of the heel is, that in this case it will not be necessary to compel the jack and its plate *R* to describe a movement about but one end thereof. The trimming knife or tool is shown at *C*<sup>1</sup> as composed

of two portions, one,  $D'$ , being a bar, whose outer end terminates in a right-angular bend or lip,  $h'$ , to serve as a guide to the knife, by traveling in the rand-seam of the boot, and the other portion,  $k'$ , the paring or trimming blade for reducing the edge of the sole to an even surface, the two parts  $D'$  and  $k'$  of the knife being inclosed within a tubular holder,  $l'$ , formed with a ball,  $m'$ , which is received within a socket,  $n'$ , created in the front or free extremity of the arm  $B'$ , the ball-and-socket or universal joint thus obtained permitting the greatest freedom of motion to the knife by allowing it to tilt or slope in either a vertical direction longitudinally of the frame  $B'$ , or horizontally and transversely thereof, and in so doing govern, as before stated, the depth of the cut affected by it, and to a certain extent, when desired, vary the bevel or angle of the sole-edge. These motions of the knife are controlled by an upright handle,  $o'$ , which is screwed into the ball  $m'$ , and so as to abut against the two portions of such knife and clamp them tightly together. The vertical variations of the knife is an important matter, for the reason, among others, that with soles of varying widths or sizes the knife-carrying arm must be raised or lowered; consequently the slope of the knife must be varied in consonance therewith, for if rigidly attached to the arm it would, under certain conditions, take too rank a cut into the leather and oftentimes leave it altogether.

In this last-described construction and arrangement of the knife will be seen the means for carrying out, mainly, the third portion of these improvements.

I have previously stated that I prefer the heel-post of the jack should be stationary, to the end that a uniform and positive starting-point for the action of the knife may be insured.

Although the position of the jack and boot-heel relatively to the trimming-tool may be varied by sliding the former upon the plate  $Y$ , I prefer, for certain reasons, that the position of the knife itself should be susceptible of change bodily back and forth with respect to the jack and boot, and to accomplish this I insert such knife and its holder within a stock,  $E$ , and attach this stock to the arm  $B$  by a tenon-and-socket joint provided with a set-screw.

It might, under some circumstances, be found desirable to impart, as shown in my Letters Patent No. 117,287, before named, a vibratory motion to the standard or frame  $A'$  in combination with the herein-described free motions of the jack; but such motion of the standard  $A'$  would, in this connection, doubtless be found superfluous. As the plate  $R$  travels in a given path at all times, and the jack is caused to slide upon it for the purpose of adapting the machine to soles of varying lengths, I propose to control the extent of sliding of the jack to and fro of such plate by a screw,  $F'$ , which screws into the base of the

jack, and so that its head  $p'$  shall intercept and constitute a stop to such plate. By increasing the relative distance between the heel-post of the jack and the opposite end or turning-point of the plate  $R$ , I prolong the time during which the sole travels below the knife, and vice versa; and this relative distance is to be properly calculated and proportioned with respect to the length of the sole in order that, when the semicircular end of the rack  $W$  reaches the pinion  $m$  and the jack begins, by the aid of such pinion, to describe a semicircle with the pivot of the plate  $Y$  as a center, the toe of the sole shall reach the knife and begin to describe a like movement below it.

As an aid to the workman, and to enhance the utility of the machine, I shall, as before premised, engrave or engrass upon some conspicuous part of the carriage or plate  $R$  a suitable scale of divisions, which shall be graduated to correspond to the various sizes of soles, and constitute a means of enabling the workman to instantly adapt the jack to any given size.

In the employment of the screw  $F'$ , or its equivalent, and the functions performed by it, as well as in the scale of divisions employed as an auxiliary to such screw, will be seen the fifth and last portion of these improvements.

In describing the operations of this machine we will suppose, as a starting-point, that a boot is applied to the jack, and the latter stands in the position shown in Fig. 1 of the drawing, in which case the trimming knife or tool stands at the inner edge of the heel of the boot, (which is shown in dotted lines,) and with its guiding-lip entering the rand-seam of such boot, the two pulleys  $H H'$  revolving in the direction indicated by their respective arrows, and the plates  $R$  and  $Y$  in a horizontal position. The workman, by means of his right knee and the shipping-lever  $L$ , engages the pulley  $H'$  with the disk or truck  $G$ , and puts the driving-shaft  $D$  in rotation in the direction traveled by such pulley, which rotation, through the agencies hereinbefore described, starts the jack, in company with the plate  $R$ , in motion in a horizontal path in the direction of the arrow placed on such plate, it being understood that the horizontal variable movement of the arm  $B'$  enables the workman to adapt the knife to the longitudinal curvatures of the sole-edge, in connection with the rotary or oscillating motion of which the combined plates  $R$  and  $Y$  are susceptible about the pivot of the latter as a center. Simultaneously with the movement of the shipper  $L$  the workman elevates the knife above the level of the upper edge of the sole, depresses the treadle  $i$  to such an extent as to advance the sole-edge below the knife, and then lowers the latter until its lip or guide  $h'$  enters the rand-seam of the boot. The jack and plate  $R$  continue to travel rearward in the direction indicated, and carry the sole-edge in a like direction in contact with the knife, by which it is

trimmed, the slope or angle of such knife in either direction, or its height bodily, being varied and adjusted as the workman finds necessary in the progress of the work. The jack and carriage R, with the boot, continue the journey in the direction stated until the semicircular portion or end of the rack W reaches the pinion *m*, and the toe of the sole at the same time reaches the knife. The jack and the plates R and Y now turn in unison in the arc of a circle upon the pivot of the latter as a center, and as a consequence the toe portion of the sole is carried about in contact with the knife and trimmed by it, the rotation of the jack and plates continuing until the position of all are reversed upside down and a horizontal position again assumed. By the action of the pinion *m* upon the rack W, as before stated, the jack and the two plates begin a rearward movement in a horizontal plane until the front edge of the heel arrives at the knife, when the trimming of the sole is completed, the motion of the jack stopped, and the boot removed.

Preparatory to "jacking" another boot and renewing the functions of the machine, the driving-shaft is put in rotation in the direction and by means first stated until the jack and two plates have described another semicircular movement by the action of the pinion upon the endless rack W, which brings the said jack and plates to the position first assumed, and in readiness for the application of a boot.

If the knife, in once going over and acting upon the sole-edge, fail for any reason to properly trim the latter, the motion of the sole may be reversed by reversing the position of the shipper L, and by it of the pulleys H H', and such sole compelled to retrace its journey sufficiently far to bring the knife in advance of the imperfect place, when the motion of the driving-shaft is again reversed, and the knife goes over said imperfect place.

A suitable catch or locking device should be combined with the screw F' and the plate R to prevent sliding of the jack upon said plate at the wrong time, and a suitable abutment or stop, *r'*, should be formed upon the end of said plate, adjacent to the head of the screw, against which the contiguous end of the base of the jack is to be placed when beginning operations upon a sole. Upon a new size of boot-sole being introduced to the machine the screw is set to the point indicated by the scale for such size, and the jack pushed up against the stop *r'*, as stated. The driving-shaft being put in rotation the sole, abutting against the knife, has the effect of sliding the jack upon the plate R until the head of the screw brings up against the stop *r'*, at which time the jack and boot have reached a point where they will turn, when the proper time arrives, on a common center with the plate Y and carry the toe of the sole about below the knife.

Although the foregoing description of this

machine relates to its application and use as a trimming-machine, it may be adapted to the purposes of burnishing by substituting for the knife a cylindrical disk of proper form and revolved by suitable means; and the transferring of the two may be effected by removing the arm B' and adding in its place one carrying a pulley, which may be driven by a second pulley fixed to the driving-shaft.

Having thus described the nature, purposes, and operation of my present machine, I claim the following:

1. In machinery of the kind specified, the combination of a "straight" or stationary knife (in contradistinction to a rotary one) and a jack actuated to travel in a path which will bring to or under the knife those portions of the boot or shoe to be acted on, and capable also of movements, substantially as set forth, independent of that above named, to allow it all necessary freedom of motion with respect to said knife, the said combination operating in the manner substantially as shown and described.

2. In combination with a jack, arranged and operating substantially as described, a "straight" or stationary knife (as distinguished from a rotary one) capable of being tilted and turned on its axis, substantially in the manner set forth, to regulate the depth of cut and vary the bevel of the sole-edge, as specified.

3. In combination with the jack and mechanism for moving the same forward to the knife, the means herein described, or their substantial equivalent, for reversing the movement of said jack, for the purposes stated.

4. In combination with a stationary knife, free to move bodily in a vertical plane, a jack, constructed and arranged substantially as set forth, so as to be set to correspond to the varying lengths of the soles, substantially as and for the purposes stated.

5. In machinery for trimming sole-edges, a knife or trimming-tool susceptible of a rocking motion upon its axis and a longitudinal tilting motion, or both a rocking and tilting motion, whereby a sole is sufficiently trimmed without the employment of a pattern guiding-plate, substantially as and for the purposes stated.

6. In machinery for trimming soles, a knife, mounted upon or supported by a ball-and-socket or other universal joint within a variable or swinging frame, and provided with an upright handle or its equivalent, essentially in manner and for purposes stated.

7. In machinery for trimming heels and soles, a jack provided with an immovable heel-post, and combined with means, substantially as described, for varying the position of said jack, and consequently its heel-post, with respect to the turning point of the jack-supporting carriage, whereby the jack may be adapted in its movements to soles of different sizes, substantially in the manner set forth.

8. In machinery, substantially such as specified, a jack arranged to move upon and with

a pivoted carriage, as described, and swiveled to its supporting column or post so as to allow its vertical angle, with respect to the trimming or burnishing tool, to be varied in order to vary the angle of the sole-edge, substantially as herein shown and set forth.

9. In machinery for trimming soles and in general combination, a jack of universal freedom of motion, as stated, advanced bodily with its supporting-standard to the immediate vicinity of the trimming-tool by one foot of the operator, and manipulated or guided upon

its standard by the left hand of said operator; a trimming-tool, susceptible of various motions, as specified, to be directed by the right hand of the operator, and, finally, of a reversing mechanism, to be brought into play or disuse by one knee of the operator, the whole being substantially in manner and for operation as explained.

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