4. Sheets. Sheet. 1.

Hawkins. Mead & Spear.

Heel Burnishing Mach.

No. 113,658. Patented Apr. 11. 1871.

Fig. 1.

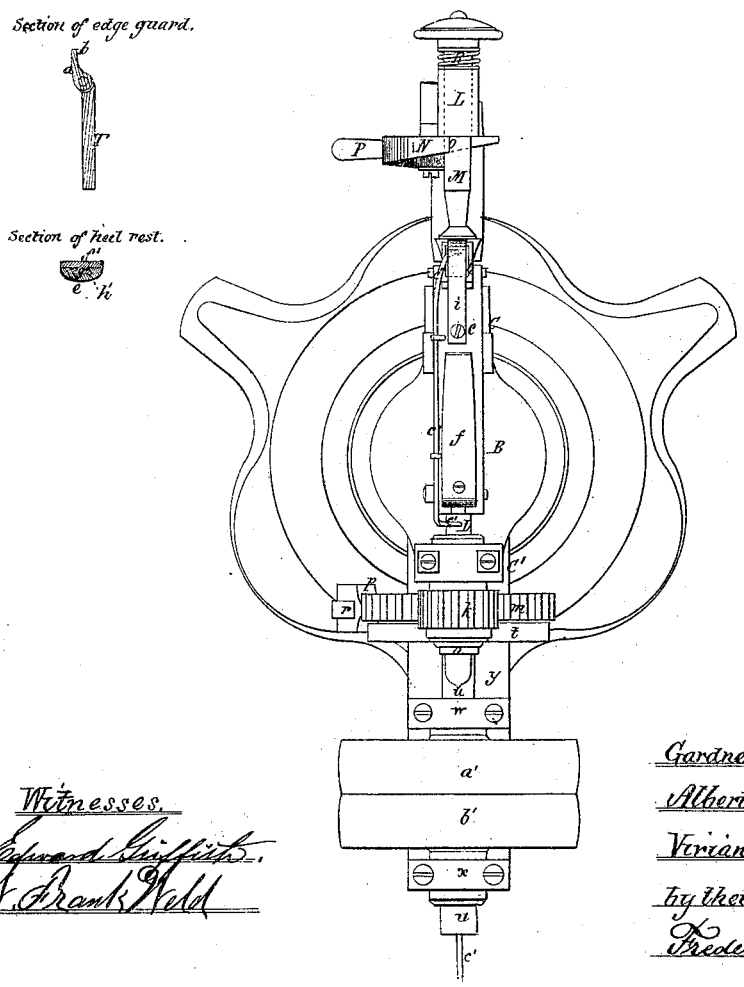
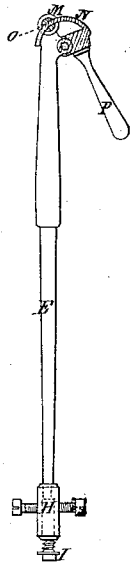


Fig. 5.



Witnesses.
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Frederick Eustis

4. Sheets. Sheet. 2.

Hawkins. Mead & Spear,

Heel Burnishing Mach.

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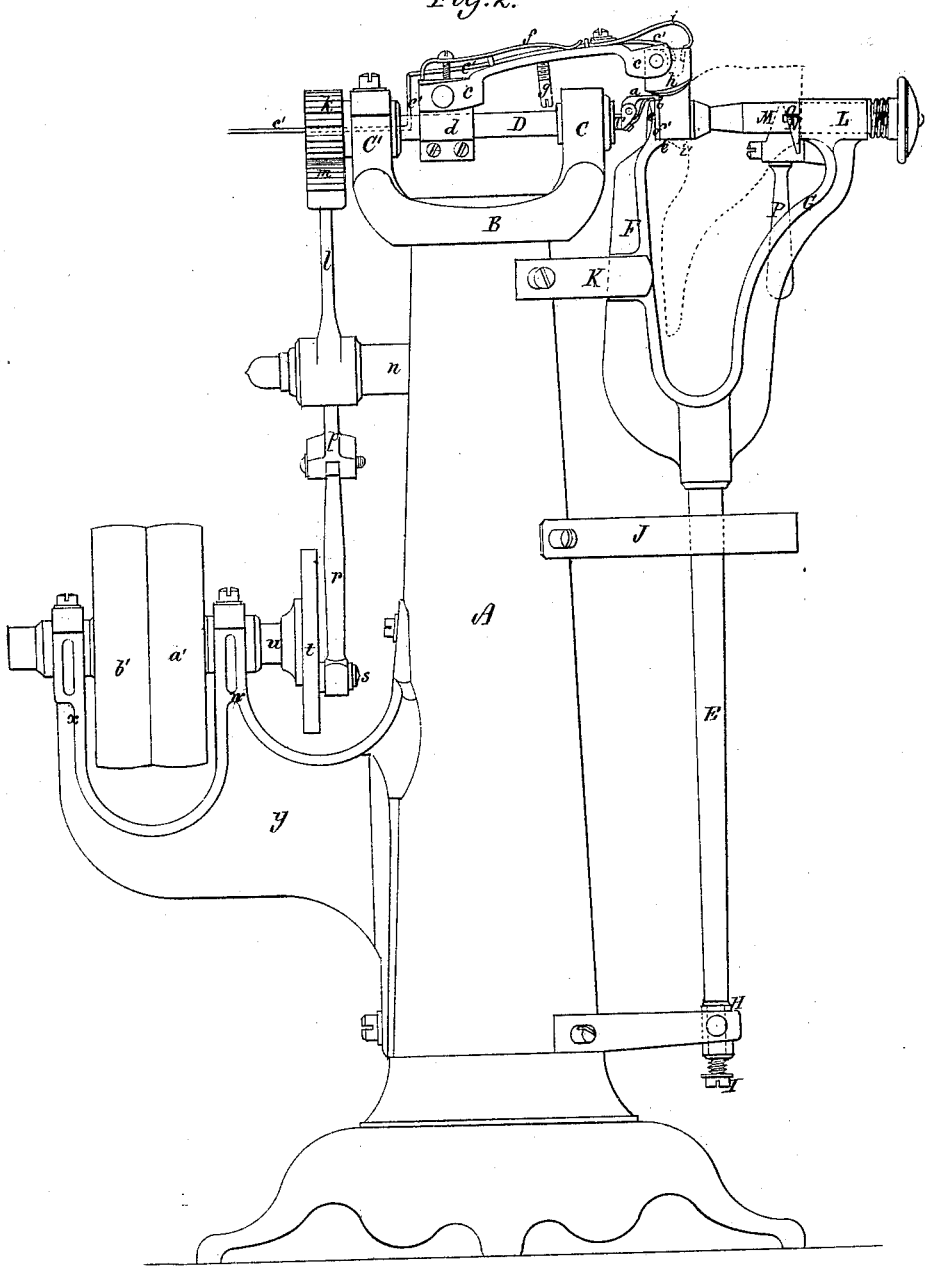
Fig. 2.



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4. Sheets. Sheet. 3.

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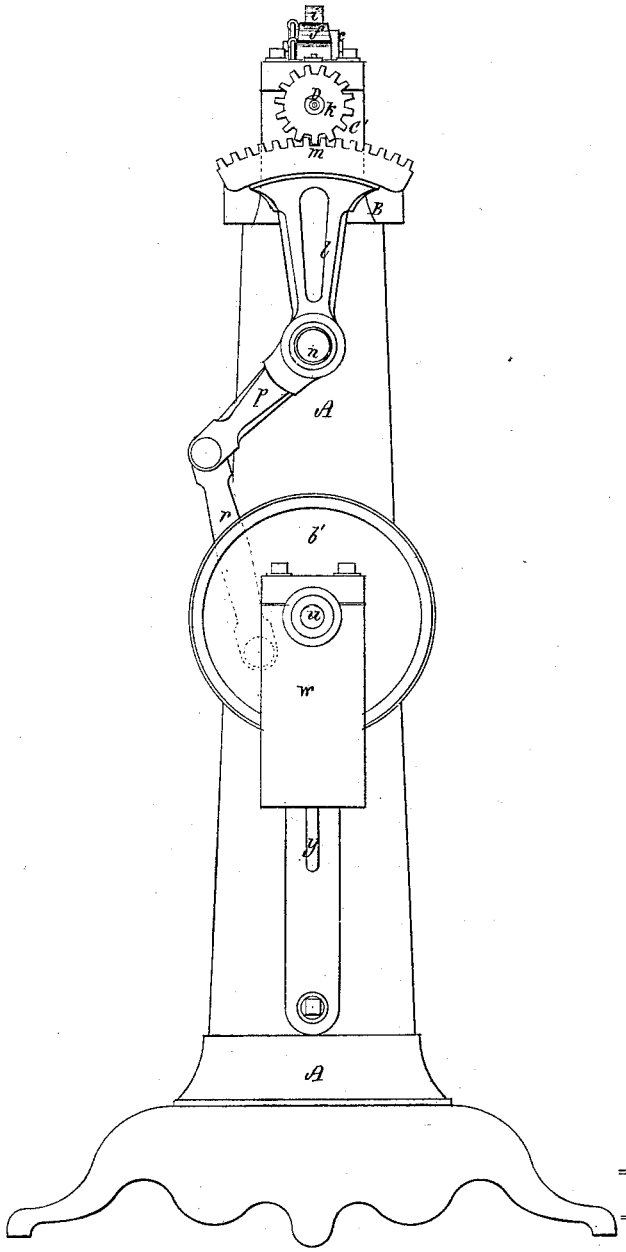
Heel Burnishing Mach.

No. 113,658. Patented Apr. 11. 1871.

Fig. 3.



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4. Sheets. Sheet. 4.

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Heel Burnishing Mach.

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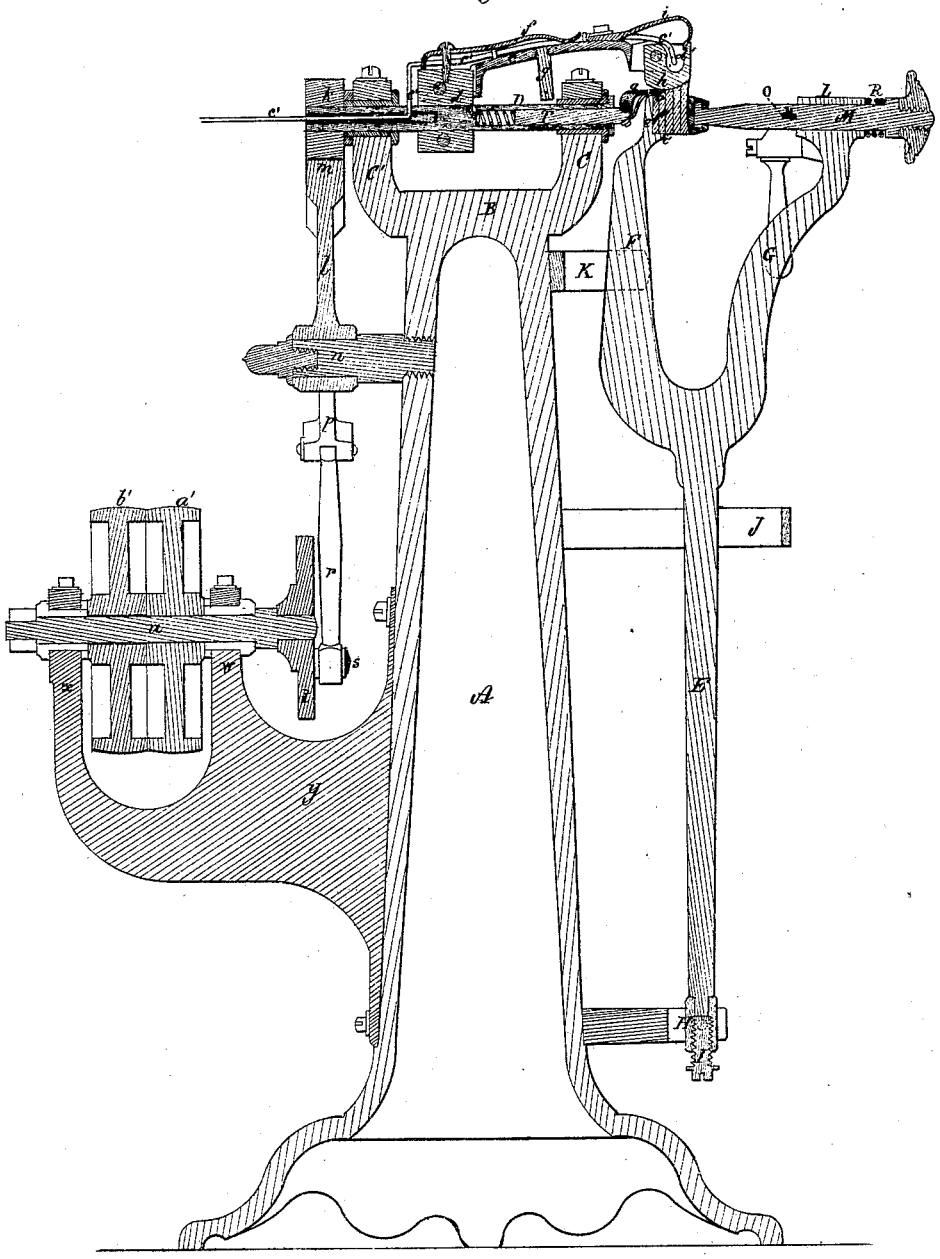
Fig. 4.



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UNITED STATES PATENT OFFICE.

GARDNER C. HAWKINS AND ALBERT G. MEAD, OF BOSTON, AND VIVIAN KIMBALL SPEAR, OF LYNN, MASSACHUSETTS.

IMPROVEMENT IN BOOT AND SHOE HEEL BURNISHING MACHINES.

Specification forming part of Letters Patent No. **113,658**, dated April 11, 1871.

To all whom it may concern:

Be it known that we, GARDNER C. HAWKINS and ALBERT G. MEAD, of Boston, in the county of Suffolk and Commonwealth of Massachusetts, and VIVIAN KIMBALL SPEAR, of Lynn, in the county of Essex and Commonwealth aforesaid, have made an invention of a novel as well as highly useful Machine for Burnishing Boot and Shoe Heels; and do hereby declare the following to be a full, clear, and exact description thereof, due reference being had to the accompanying drawings, making part of this specification, and in which—

Figure 1 is a plan, Fig. 2 a side elevation, Fig. 3 a rear-end elevation, and Fig. 4 a vertical and longitudinal section, of a machine embodying our invention; Fig. 5, a front view of the jack, so called, which will be duly explained.

This invention relates not only to the introduction bodily with heel-burnishing machines of one or more devices for effecting therein purposes not heretofore accomplished in such mechanism, but to improvements in details already in existence.

We have, in the invention herein to be explained, combined as an organized combination, first, devices for clamping and firmly supporting a boot and shoe, and presenting the heel thereof to the burnishing-tool, this element of the combination being termed a jack, and consisting of an upright vibrating rod guided by suitable ways stepped at bottom upon a proper pivot, and carrying upon one arm of its forked top an adjustable clamp or sliding arbor for confining the heel of a boot between itself and the opposite arm of such fork, the traverse movements of the arbor within its bearing being effected by a circular wedge, in combination with a spring, as hereinafter explained, the whole being designed to economize the time and reduce the labor inevitable in the use of machines heretofore in use.

Secondly, as a member of this combination, we have adopted a traveling edge-guard, so called, which follows the motion of the burnishing-tool as it travels about the circumference of a heel, the purpose of this guard being to protect the extreme edge of the tread of the heel against the action of the burnishing-tool, which heretofore, in machines of like character, has had the effect of turning over a lip or burr upon such tread, the result of which is to injure the appearance of the work, and increase the labor upon the same.

A third element which enters into this combination is the general arrangement and method of support of the burnishing-tool, and consists not only in pivoting the rear end of the carrier of such tool to the base or frame which upholds it, in such manner that this carrier may vibrate upon its pivot, and acquire by this means great freedom of motion to accommodate itself to the variable curve or outline of the circumference of the heel, but as well in swiveling the burnishing-tool in its turn to the carrier, in order that such tool may adapt itself with equal pressure to the entire width of the edge of the heel, with peculiarities and advantages hereinafter referred to.

The fourth element in the organization of this machine consists in the mechanical devices whereby we obtain such a variable or yielding motion of the burnishing-tool in the arc of a circle as not only to enable it to travel at one uninterrupted and even movement entirely about the curved portion of the circumference of the heel, but to adapt itself to any irregular or eccentric curve which the outline of the heel may describe, whereby we successfully accomplish much more beneficial results in a machine in which the heel is held fast and the tool travels about it than in any heretofore known to the art; and to this end this fourth portion of our invention consists in attaching to the extreme rear end of the spindle which carries the burnishing-tool a pinion, which meshes into a segmental rack, making part of an upright sectoral plate, this latter plate being pivoted at its bottom to the main standard or column of the machine, and operated by a crank and pitman, in manner as hereinafter stated, the vibrations of the segmental rack imparting semi-revolutions to the burnishing-tool about the heel, with results presently to be understood.

We have introduced, as a fifth component part of this combination, a means of imparting continuous heat to the burnishing-tool, in order to enhance the polish imparted by it to

the heel; this portion of the invention consisting in the employment of a gas-pipe, which is applied to the tool-carrier and terminates within the cavity of the tool, the pipe being conducted from a suitable quarter from whence the proper supply of gas is obtained to maintain the requisite heat.

Sixth and lastly, these improvements consist in applying, in a peculiar manner, to the heel-receiving arm of the furcated standard or jack of the machine, an adjustable form or pattern-plate, whereby the edge of the heel is preserved intact from the crushing or spreading action of the burnishing-tool, which, but for it or its equivalent, would result in great injury to said heel.

In the drawings, hereinbefore alluded to as illustrative of our invention, A represents the main support or standard of the machine, and which consists of a cylindrical tapering column, with a broad substantial foundation, and surmounted by a cap, consisting of a base or bed plate, B, and two end standards or uprights, C C′, the plate B and uprights C C′ being substantially after the form of the headstock of a lathe, the similitude being further carried out by the addition thereto of an arbor or spindle, as shown at D, and which carries the burnishing-tool carrier, to be hereinafter alluded to.

In carrying out the first portion of these improvements in the classified order above premised, we apply to the front side of the column A an upright vibratory rod or staff, E, the upper part of which is furcated and divided into diverging arms or branches F G, while its extreme lower end is stepped within a sleeve, H, into the lower end of which a feed-screw, I, is screwed, in order to vary the relative height of the jack, so called, which the standard, with its fork, produces, the sleeve H being pivoted to the lower part of the column A in such manner as to freely vibrate or oscillate upon its bearings, while the upper part of the rod E, as well as the inner arm, F, is guided within ways or guides J or K, extending laterally from the column, the termination of the former constituting a stop or boundary to the extreme outer vibration of the jack. The branch or arm G of the jack may be said to resemble the "tail-stock" of a lathe, inasmuch as it carries at top a horizontal tubular head, L, within which plays a cylindrical spindle or rod, M, such spindle being forced to and fro within its bearing by a curved or segmental wedge, N, which enters a slot, O, cut through the spindle immediately in rear of its bearing or head L, the base of such wedge being pivoted to the arm G at one side of and below the head L, and provided with a handle, P, for partially rotating it about its pivot. A coiled spring, R, encircles the spindle M, and is situated between its outer end or knob S and the bearing L, and serves, by its expansion, to force the spindle outward as fast as released by the withdrawal of the wedge N. The purpose of the spindle M is to clamp the heel of the boot or shoe firmly between it and the upper part of the arm F, as shown in Fig. 4 of the drawings, the wedge N serving, when advanced or turned in the right direction upon its pivot, to drive the spindle with great power toward the heel-supporting abutment or arm F, which is to be of a form to correspond to that of the tread of the heel, but slightly less in circumference. The jack thus constructed, and carrying a boot or shoe, as represented dotted in Fig. 2, is presented to the action of the burnishing-tool, as hereinafter explained, and constitutes the first part of these improvements.

In order to prevent the bearing down or spreading action of the burnishing-tool upon the outer edge or boundary of the heel, and then carry into effect the second portion of these improvements, we adopt what we term an "edge-guard" or protector, which consists of a rod, T, inserted within the bore of the arbor D, hereinbefore mentioned, such rod being advanced by a spring of suitable nature placed within the bore of the spindle, and carrying at its front extremity a short arm, *a*, which is pivoted to it and extends longitudinally from it, the outer end of this arm being preferably bent into the form of a hanging lip, *b*, which bears against the extreme edge of the heel, and which, traveling immediately below and in company with the burnishing-tool, serves to keep the edge of the heel up to such tool, and entirely prevent the formation of a "burr" upon the tread of the heel, the removal of which otherwise is a matter of some trouble. In fact, this burr cannot be removed without defacing the edge of the heel, hence the edge-guard is an object of considerable value in machines of this character, and constitutes the second feature in these improvements.

To carry out the third portion in order of these improvements, we mount upon the upper part of the arbor D, before named, a horizontal bar or carrier, *c*, the rear end of which is pivoted to a dog, *d*, clamped to the rear end of the arbor, the said carrier extending forward over the heel rest or abutment *e*, and terminating thereat, a plate-spring, *f*, being applied to the upper surface of the carrier, for the purpose of depressing it toward the heel-rest, or a heel when applied thereto, the extent of this depression of the carrier being determined by an adjustable stop or pin, *g*, which is screwed into the under side thereof, and bears upon the arbor D at such times as the jack may be turned away from the heel-rest, or is not supplied with a heel.

In machines heretofore constructed, the carrier, or a substitute therefor, has been a rigid bar, to which a short and rapid intermittent movement has been imparted, and the heel of the boot moved about beneath it to receive the desired polish. In this our machine, however, the burnishing-tool, to be hereinafter explained, travels by the functions of the machine entirely about the curved portion of

the heel at one single movement in one direction, and at a comparatively slow rate of speed, although in machines of earlier date a rapid intermittent movement of the burnishing-tool was considered necessary. We have found, however, by long-continued experiments, that a slow motion with great pressure, and with a continuous sweep entirely about the curved edge of the heel, has decidedly the best effect thereupon.

By pivoting the carrier *c*, as described, it is enabled to describe a curve tangential to or eccentric with the arc of a circle, which its revolution with the arbor would otherwise compel it to do, and we are thus able to follow the convex form of the heel, no matter what curve it may possess.

The burnishing-tool is represented in the accompanying drawing at *h* as a metallic block, pivoted at its rear end to the front end of the carrier *c*, a plate-spring, *i*, being secured at the top of such carrier, and, by pressing upon the tool, serving to depress the latter toward or upon a heel when such is presented to it, as shown in Fig. 4.

As the purpose of pivoting the carrier *c* to the arbor is to accommodate it to the curved longitudinal outline or circumference of the heel as it travels about the latter, so the purpose of pivoting the burnishing-tool to its carrier is to enable it to adapt itself to the transverse curve or concavity of the heel, as well as for a more important purpose, which is, that its pressure upon the upper or inner edge of the heel may be lessened, as, were the rigidity of the carrier prolonged to its extremity, the force exerted by it upon the heel would tear away or separate the lifts of the latter.

In our system the greatest pressure is exerted upon the outer portion of the heel, and is so directed as to bear inward toward the boot, which tends rather to solidify or condense the heel than to separate its lifts. In this manner we obtain very desirable results, and complete the third clause of our present improvements.

To carry into practice the fourth feature of these improvements, we mount upon the extreme outer end of the arbor D, or such portion thereof as protrudes rearward beyond the standard C′, a toothed pinion, *k*, while below this pinion we dispose a sectoral arm or plate, *l*, carrying at top a segmental rack, *m*, into which the pinion *k* meshes, and from which such pinion derives motion, the sector *l* being pivoted upon a horizontal stud, *n*, projecting from the rear side of the column A, and near the upper part thereof. The sector *l* is prolonged, below its pivot, into an obliquely-disposed arm, *p*, to the lower extremity of which the upper end of a pitman, *r*, is swiveled, the lower end of such pitman in turn being pivoted to the wrist-pin *s* of a crank or crank-wheel, *t*, which is mounted upon and revolves with a horizontal driving-shaft, *u*, duly supported in proper boxes or standards *w* and *x*, erected upon or making part of a bracket or extension, *y*, which springs from the rear side of the column A, and about midway its height, the arbor D, post *n*, driving-shaft *u*, and jack-spindle M being practically in the same vertical plane and alignment with each other and with the axis of the said column A, the shaft *u* being provided with fast and loose pulleys *a′ b′*, in the ordinary manner.

A continuous rotary motion of the driving-shaft of the machine in either direction imparts, through the agency of the crank-wheel *t*, pitman *r*, sectoral rack *m*, and pinion *k*, reciprocating sweeps of the burnishing-tool *h*, and its carrier *c*, in a semicircular or eccentric path about the heel-rest *e*, and it is the peculiar motion thus obtained, in combination with the mechanical devices we have just described for producing it, that constitute the fourth portion of our invention, and enables us to avoid the undulating or wavy surface which the short quick intermittent movement of the burnishing-tool in a limited space formerly impressed upon the heel.

In order that we may carry out the fifth portion of these improvements, and in so doing impart a certain and continuous degree of heat to the burnishing-tool *h*, we convey from a suitable locality, through the rear part of the bore of the arbor D, a gas-pipe, *c′*, such pipe rising behind the dog *d*, and being carried alongside or over the carrier *c*, and into the cavity *d′* of the burnishing-tool, where it terminates in a suitable jet. Gas being suffered to flow from a suitable source into the pipe *c′*, and inflamed at its jet, imparts such a degree of temperature to the burnishing-tool *h* as to greatly increase the polish and hard surface deposited upon the heel, the employment of gas for the purpose insuring an uninterrupted supply of heat.

Sixthly and lastly, we complete these improvements by applying, in a ready and peculiar manner, the movable form or pattern-guide, which supports the tread of the heel, it being understood that one such guide is required for each size of boot or shoe which may be subjected to the action of the machine. This pattern guide or plate is shown at *f′* in the drawings as a thin plate of a form corresponding to the tread of a heel, and as provided on its back with a dovetailed spline, *g′*, to enter a correspondingly-shaped groove, *h′*, cut in the front face of the abutment or heel-rest *e*, a shelf, *i′*, projecting outwardly from such abutment, which serves as a stop to insure the correct position of the plate *f′*, and to serve a like office for the heel of the boot.

The ease and certainty with which the various forms may be applied to or removed from the abutment *e* convert this apparently insignificant detail into a point of considerable value in the operation of the machine, and constitutes the sixth and last portion of these improvements.

The operation of the machine is described, in brief, as follows: Supposing, as a starting-point, the jack to be at its extreme outward

position, and ready to receive a boot or shoe, the curved wedge N lowered, and the spindle M, by the action of the spring R, also retracted to its greatest extent, a boot or shoe, as the case may be, is presented to the jack in such manner that the tread of its heel abuts against, and is supported by, the rest *e*, or the pattern-plate *f'* thereof, and with its toe hanging directly downward, as shown in dotted lines in Fig. 2 of the drawings. The workman now elevates the handle of the wedge N, and, by advancing such wedge, drives the spindle forward and against the heel, thus clamping the latter firmly between such spindle and the rest *e*. Continuing the operation, the workman now advances the jack until the heel carried by it has reached its proper position beneath burnishing-tool *h*, the jack and heel being firmly held up to this position by the workman. The belt-shipper is now seized and moved in the right direction, and the driving-shaft put in rotation, which, by means and in manner heretofore stated, compels the burnishing-tool to travel or sweep around the entire curved portion of the edge of the heel, and impart thereto a brilliant polish, the edge-guard traveling with such tool about the edge or boundary of the tread of the heel, and serving, as before stated, to prevent the said tool from turning over a burr upon such edge.

The motion of the driving-shaft is continued until the sweep of the burnishing-tool has been described one or more times, according to the character of the work or other circumstances, when it is stopped, the jack is retracted, the spindle (by the lower handle of the curved wedge) also withdrawn, and the boot or shoe, with its finished heel, removed from the machine. The whole operation is effected very expeditiously, and the heel finished to perfection.

Having thus stated the nature, purposes, and advantages of our invention, and the manner in which the same is or may be carried into practical effect, we claim as our invention, and desire to secure by Letters Patent of the United States, the following:

1. In a machine for burnishing the heels of boots and shoes, the combination of the burnishing-tool and its carrier with mechanism, substantially as herein described, for imparting to said tool a reciprocating motion in a curved path entirely around the curved portion of the heel to be burnished, for the purposes set forth.

2. The construction and application of the jack, as seen in its staff or standard E, diverging arms F G, tubular head L, spindle M, curved wedge N, or its equivalent, with its staff pivoted at bottom in an adjustable manner, the whole being in manner and for operation as herein described.

3. The curved segmental wedge N, for driving forward the spindle M, in combination with the spring R, or its equivalent, for retracting such spindle, essentially as and for purposes herein described.

4. In combination with the burnishing-tool, operating substantially as herein shown and described, the edge-guard for preventing the formation of a burr upon the tread of the heel during the burnishing process, substantially as shown and set forth.

5. The herein-described device for preserving intact the tread of a heel while undergoing the burnishing process, the same consisting of the rod T and its head or arm *a*, applied and operating as set forth.

6. The burnishing-tool carrier, pivoted or hinged to its rotary or oscillating support, substantially in the manner described and shown, in combination with a pressure-spring, or equivalent device, so that said carrier may adapt itself to the irregular curve of the heel, as set forth.

7. The burnishing-tool pivoted to its carrier, substantially as shown and described, in combination with a spring, or the equivalent thereof, for holding down the said tool upon the heel with a yielding pressure, substantially in the manner set forth.

8. As a means of imparting a sweeping motion to the burnishing-tool in a segmental or eccentric path about the heel, as herein explained, the combination, with the burnishing-tool and its carrier, of the pinion *k* and sector *l*, with its curved rack *m* and oblique arm *p*, or its equivalent, and the crank-wheel *t*, or its substitute, properly mounted, the whole being substantially in manner and operating as herein explained.

9. In combination with the burnishing-tool *h*, when pivoted and supported as described, the means, substantially as herein shown and described, of imparting continuous heat to the same, for purposes stated.

10. In combination, the heel-rest or guide-plate *f'*, the spindle M, actuated as explained, and the burnishing-tool *h*, pivoted at its rear to the carrier, as herein shown, the combination thus acquired operating as before stated.

11. In general combination, and as an organized machine for burnishing the heels of boots and shoes, the jack adjustably supported, and provided with adjuncts, as stated, the burnishing-tool and its carrier, with its accessories, as shown, and the pinion *k* and sectoral rack *m*, or their mechanical substitutes for imparting the desired motion to the said burnishing-tool, the whole being constituted, arranged, and operating as explained in the foregoing context.

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