(No Model.)

3 Sheets—Sheet 1.

# E. B. ALLEN

## HEEL TRIMMING MACHINE.

No. 377,284. Patented Jan. 31, 1888.

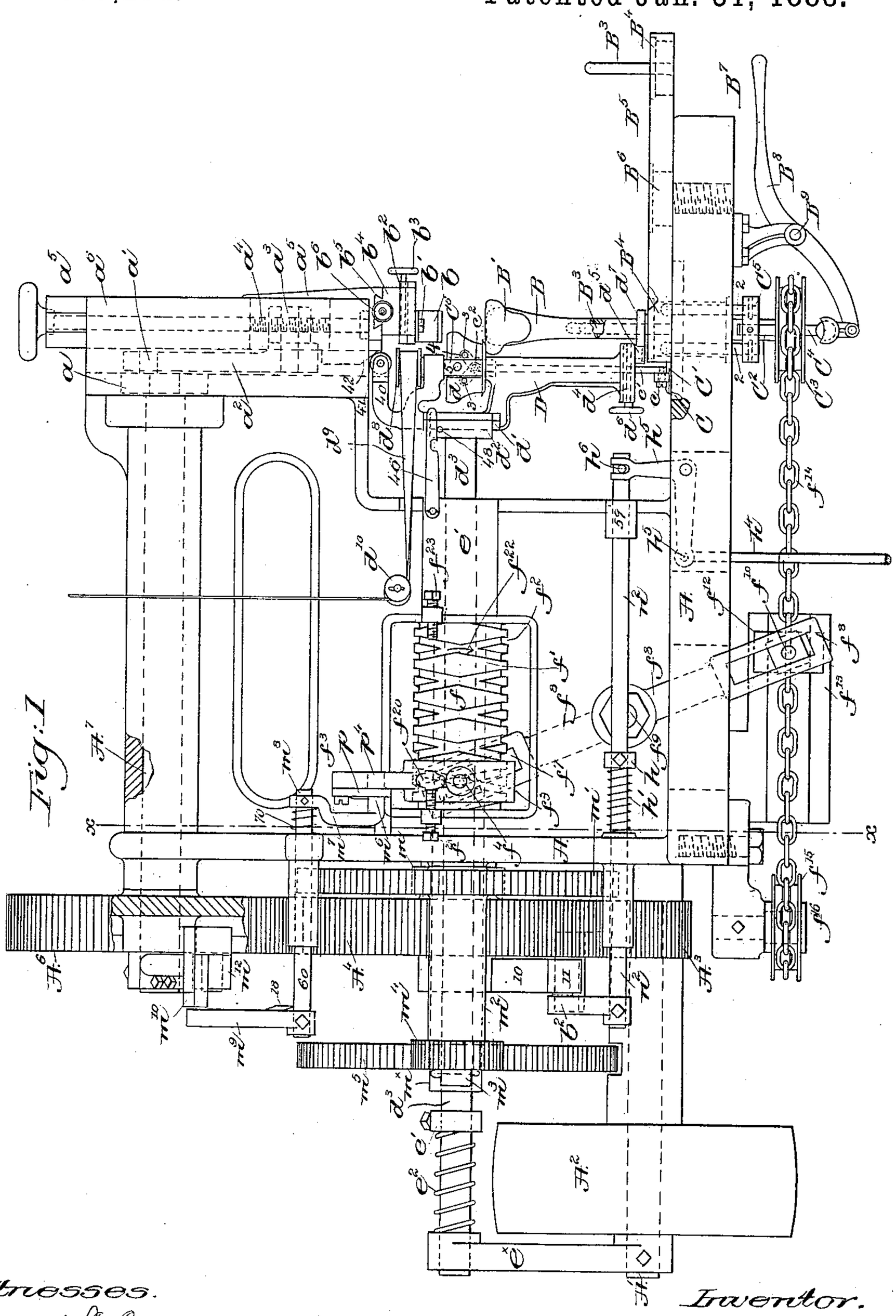

Fig. 1.

Witnesses.
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Inventor.
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Attys

(No Model.) 3 Sheets—Sheet 2.

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## HEEL TRIMMING MACHINE.

No. 377,284. Patented Jan. 31, 1888.

Fig. 3

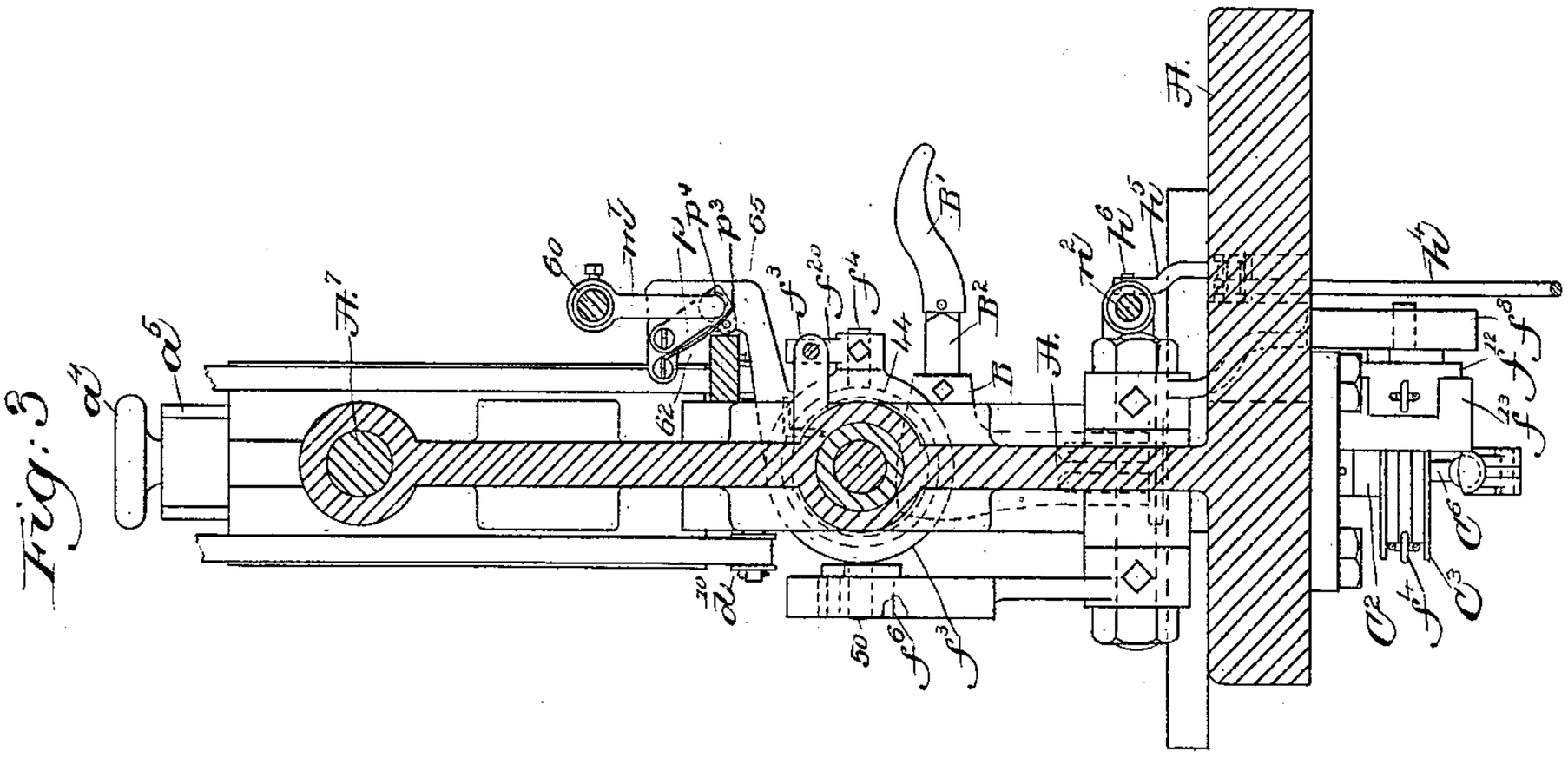
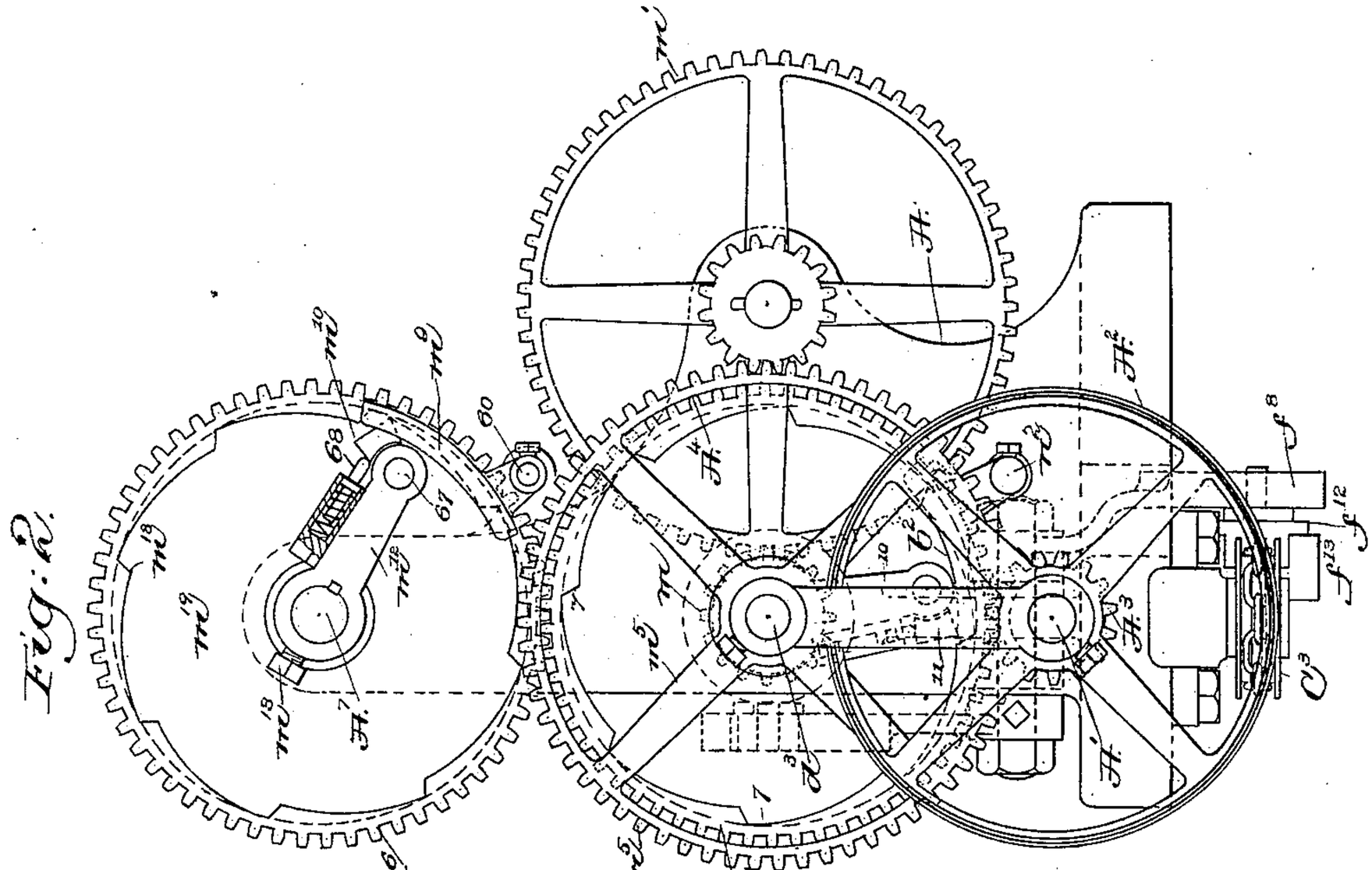


Fig. 2.



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(No Model.)

3 Sheets—Sheet 3.

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## HEEL TRIMMING MACHINE.

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Fig. 4.

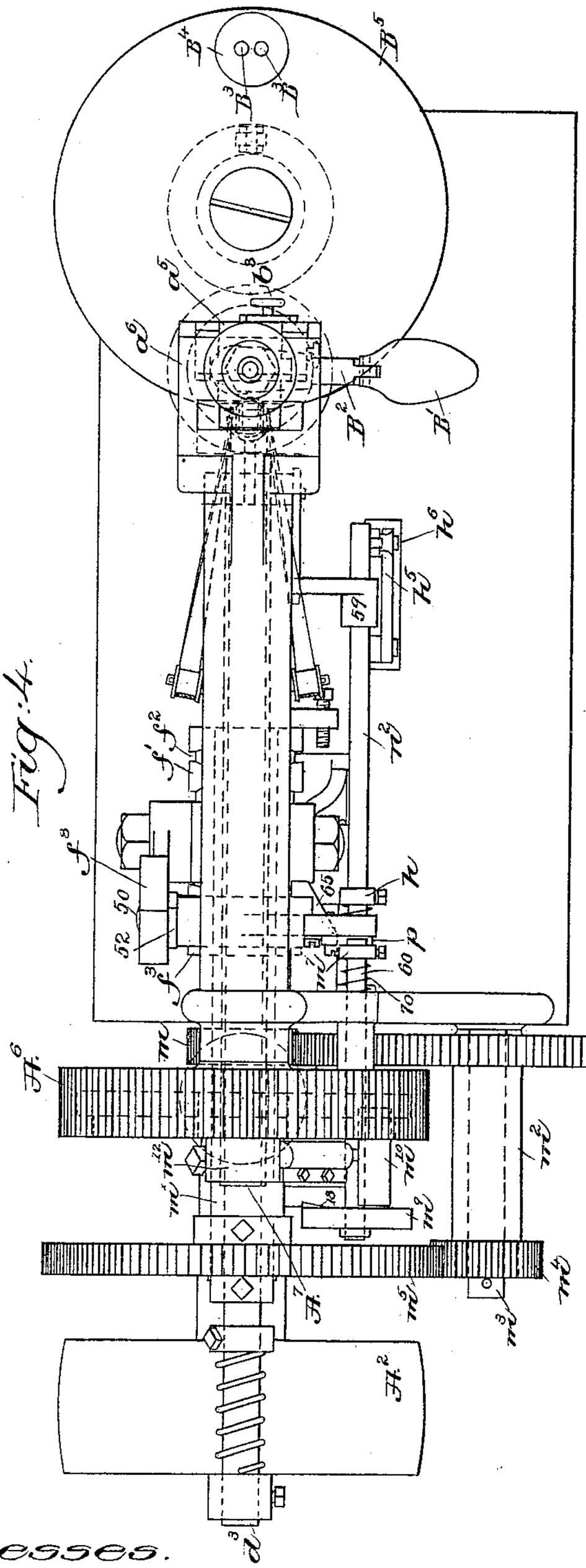
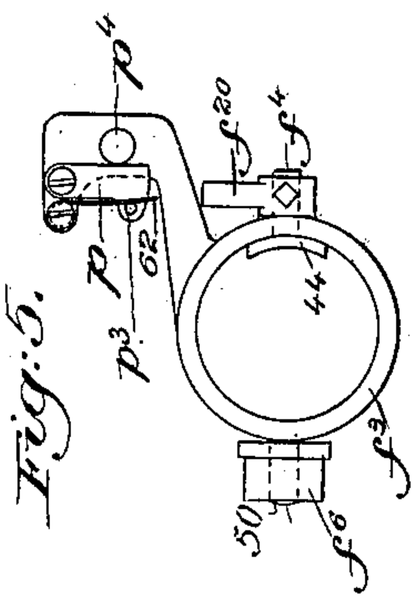


Fig. 5.



Witnesses.
Howard F. Eaton
Fred L. Emery.

Inventor.
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# UNITED STATES PATENT OFFICE.

EDWARD B. ALLEN, OF PORTLAND, MAINE, ASSIGNOR TO JAMES W. BROOKS, TRUSTEE, OF CAMBRIDGE, MASSACHUSETTS.

## HEEL-TRIMMING MACHINE.

SPECIFICATION forming part of Letters Patent No. 377,284, dated January 31, 1888.

Application filed September 27, 1887. Serial No. 250,800. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD B. ALLEN, of Portland, county of Cumberland, and State of Maine, have invented an Improvement in Heel-Trimming Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention has for its object to provide a novel mechanism for trimming heels of boots or shoes. I have also shown my improved machines as adapted to breast the trimmed heel while yet in the trimming-machine.

In accordance with my invention the shoe the heel of which is to be trimmed is mounted upon a jack which is rotated automatically in one and then in the opposite direction, the jack having a pattern-plate against which bears a roll connected to a frame carrying the spindle upon which is mounted the heel-trimming cutter-blades, a cam controlling the position of the blades with relation to the shaft carrying them so as to properly shape the exterior of the heel or give to the same more or less ogee shape. The heel having been trimmed and the jack rotated back into its normal position, means have been provided to automatically set in motion a heel-breasting knife-carrier, which breasts the heel.

My invention consists, essentially, in a heel-trimming machine, a rotating shaft having two or more cutting-blades pivoted thereon, combined with a rod and connections between it and the said blades, and a cam to actuate the rod to change the position of the blades to alter or modify the curvature of the heel; also, a movable bed, a turn-table mounted thereon, a last carried by the turn-table, and a rotating cam-plate, combined with a locking device or mechanism to clutch the cam-plate and turn-table together; also, in a heel-trimming machine, a rotating table, a series of turn-tables carried by it to receive two or more lasts, and a rotating cutter to trim the heel, combined with means to rotate the said lasts one at a time in the said rotating table and while the heel of the shoe is being acted upon by the rotating cutter; also, in a heel-trimming machine, the combination, with a partially-rotating last and a rotating heel-trimmer, of heel-breasting mechanism, substantially as will be described, to breast the heel after the same has been trimmed; also, in a heel-trimming mechanism, a heel-breasting mechanism and an intermediate clutch, combined with means to automatically set into operation the heel-breasting mechanism at the completion of the heel-trimming operation, all substantially as will be described.

Other features of my invention will be pointed out in the claims at the end of this specification.

Figure 1 in side elevation represents a sufficient portion of a machine for trimming and breasting heels to enable my invention to be understood; Fig. 2, a left-hand end view of Fig. 1; Fig. 3, a section of Fig. 1 in the dotted line *x*, looking to the right; Fig. 4, a top view of the machine shown in Fig. 1; Fig. 5, a detail of the collar which moves the trimming-lever and the slide-rod 60, co-operating with the heel-breasting devices.

The frame-work A, of suitable shape to support the working parts, has a stud, A′, upon which is loosely mounted a belt-wheel, $A^2$, the hub of the said belt-wheel having a spur-gear, $A^3$, which engages a clutch-gear, $A^4$, of the same general construction as the clutch-gear shown as mounted loosely upon the shaft 8 in Patent No. 332,032. The clutch-gear $A^4$ runs loose on a slide-rod, $d^3$, or it may be on a sleeve loose thereon, and its teeth engage the teeth of and rotate a clutch-gear, $A^6$, loose on the shaft $A^7$ of the heel-breasting mechanism, to be described.

The shaft $A^7$, extended through suitable bearings of the frame-work, has at its front end a disk, *a*, provided with a crank-pin, *a*′, which by a link, $a^2$, is connected to a stud, $a^3$, applied to a screw-threaded rod, $a^4$, inserted through a slide, $a^5$, adapted to move up and down in suitable guides, $a^6$, made in the front end of the frame-work, the lower end of the said slide having attached to it in an adjustable manner a breasting-knife, *b*.

The shaft $A^7$ at its rear end (see Fig. 2) has keyed to it an arm, $m^{12}$, provided with a dog, $m^{10}$, pivoted at 67 and acted upon by a spring-pressed pin, 68, which normally acts to keep a portion of the said dog in position to be engaged by the teeth $m^{18}$ at the interior of

the flange of the said clutch gear $A^6$, the said dog engaging the said teeth, except when in contact with a stop-shoe, $m^9$, fast on a slide-rod, 60. As herein shown, the breasting-knife $b$ is clamped by suitable bolts, $b'$, to a block, $b^2$, made horizontally adjustable by a screw, $b^3$, in a block, $b^4$, the said block $b^4$ having preferably a dovetailed gland, $b^5$, fitted into the lower end of the slide $a^5$ and made adjustable horizontally therein in a direction at right angles to that of the slide $b^2$ by a screw, $b^6$. These screws and blocks permit the breasting-knife to be moved laterally and longitudinally in a horizontal direction, so that its edge may be put into proper position to correctly meet and breast the heel. The rotation of the screw $a^4$ changes the position of the stud $a^3$ with relation to the length of the slide $a^5$, and consequently alters the vertical stroke of the slide $a^5$ and its attached heel-breasting cutter $b$.

The last upon which is mounted the shoe the heel of which is to be trimmed is composed, as herein shown, of a heel part, B, and a toe part, B′, adjustably connected by a rod, $B^2$, the said last being of usual construction. The heel part of the last is provided with two holes to receive parallel pins $B^3$, rising from a small turn-table, as $B^4$, it having a collar to rest upon a shouldered opening made in and through a rotating last-carrying table, as $B^5$, the center of rotation of the said table being a stud or bolt, $B^6$. This table, which may be rotated by hand, has a series of holes to receive similar turn-tables, so that while one turn-table is being rotated during the trimming operation, as will be described, the operator or attendant may be applying or removing a shoe from a second last not then in operative position to be trimmed. The bed of the frame-work upon which the rotating table $B^5$ rests is provided with a rotating plate, C, having a cam-ledge, C′, along its edge for a part of its circumference. This cam-plate has a shank, $C^2$, which is extended below the bottom of the bed of the frame-work, and has secured to it a sprocket-wheel, $C^3$. The shank $C^2$ is bored and slotted to receive within it a sliding pin, $C^4$, attached at its lower end by a bolt or other usual universal joint to a lever, $B^8$, pivoted at $B^9$, the said sliding pin having a cross-head, $C^5$, provided with two studs, 2 2, which, when the outer end of the lever $B^7$ is extended up through holes in the said cam-plate, enters holes in and rotates the turn-table $B^4$ and the last thereon in one and then in an opposite direction with the cam-plate C.

In the rotation of the cam-plate C the cam-ledge C′ acts upon a roller-stud, $c$, connected to the lower end of a rod, $c'$, extended up through the shaft $C^6$, upon which, by a pin or stud, 5, are pivoted the blades $d$ of the rotary heel-trimmer, the said rod $c'$ at its upper end having a stud, $c^2$, which is connected by links 3 to studs 4, extending from the said blades $d$ at one side their pivotal point 5, the said shaft $C^6$ being forked or slotted at its upper end to receive the inner ends of the cutting-blades $d$, the latter being permitted to turn out and in upon the said stud 5. The vertical movement of the rod $c'$ by the cam C′ causes the blades $d$ to be turned, so that their cutting-edges are so changed as to adapt them to give more or less curvature to the outer side of the heel, the said blades being most retracted into the shaft C when the cutter is trimming the sides of the heel from the breast toward its rear part, and being turned out farthest from the center of the said shaft just as the rear side of the heel is being acted upon by the cutters $d$.

The yoke-like sleeve D, in which rotates the shaft $C^6$, has V-shaped projections $d'$, which enter correspondingly-shaped guides, $d^2$, attached to or forming part of the rod $d^3$, referred to, the said yoke-like sleeve being thus free to be adjusted vertically. The lower end of the sleeve D is grooved to receive a carriage, $d^4$, (shown by dotted lines, Fig. 1,) having a roller or other stud, $d^5$, made adjustable in the foot of the said sleeve by means of a screw, $d^6$. The roll $d^5$ in practice rests against the heel-shaped pattern-plate $d^7$, attached to the lower end of the last, the adjustment of the stud compensating for plates of different sizes. The upper end of the shaft $C^6$ has a belt-pulley, $d^8$, over which is extended a belt, $d^9$, which, passed about sheaves $d^{10}$, is extended upward, the said belt in practice being passed about a pulley on a rotating shaft, thus rotating the shaft $C^6$ independently of the other parts of the machine, in order that any desired rate of speed may be gained for the shaft $C^6$ and blades $d$. The rod $d^3$ is extended backward through a bearing, $e'$, and a bearing, $e^\times$, fixed to the stud A′, and near its rear end the said rod has fast on it a collar, $e'$, between which and the bearing $e^\times$ is placed a spiral spring, $e^2$, which normally keeps the rod $d^3$ pressed forward, so that the roll $d^5$ will rest against the pattern-plate $d^7$. The rod $d^3$ receives loosely upon it a hollow shaft or sleeve having a hub, $f'$, the periphery of which is provided with crossing screw-threads $f^2$. The hub $f'$ is surrounded by a collar, $f^3$, having a stud, $f^4$, provided at its inner end with a lozenge-shaped shoe, 44, of usual construction, concaved at its inner face and shown only by dotted lines at the right of Fig. 3, the said shoe entering and riding in the said screw-threads $f^2$, the rotation of the hub moving the collar $f^3$ horizontally, the crossing grooves enabling the hub rotated in but one direction to carry the yoke forward and then backward to its starting-point; but to effect the reversal of the collar $f^3$ the shoe on the arrival of the collar at the end of the hub must, it will be obvious, be partially turned, so as to enable the point of the shoe to change from one into the reverse screw-thread, or to enable the shoe to swing from one into another groove in the direction of the arrows marked on the hub in Fig. 1. To do this the stud $f^4$ has firmly bolted to it a short arm, $f^{20}$, which, as the collar approaches the end of its stroke, in every direction meets

a stop, as $f^{23}$, and oscillates the stud $f^4$ and shoe for a short distance.

The collar $f^3$ at its side opposite the shoe and pin $f^4$ has a pin, 50, having loosely mounted upon it a square block, $f^6$, (shown best in Fig. 3,) which enters a slot, $f^7$, in the upper end of the trimming-lever $f^8$, pivoted at $f^9$ upon the frame-work, the lower slotted end of the said lever embracing a square swivel-block, $f^{10}$, mounted on a stud of a carriage, $f^{12}$, made to slide in guideways $f^{13}$, attached to the frame-work.

The stud or carriage $f^{12}$ has connected to it the opposite ends of a chain, $f^{14}$, which is extended over the sprocket-wheel $C^3$, and also over a sprocket-wheel, $f^{15}$, loose on a stud, $f^{16}$, connected with the frame-work, the vibration of the trimming-lever, as will be obvious, effecting the rotation of the spindle $C^2$ in one and then in the opposite direction, thus rotating the last to present the heel of the shoe to the action of the rotating cutters or blades $d$, the trimming of the heel being done, however, when the last is being rotated in one direction and not in its backward direction.

The rear end of the hollow shaft or sleeve having the hub $f^2$ is extended backward through an upright of the frame far enough to receive upon it a pinion, $m$, which is engaged and rotated by a toothed gear, $m'$, having a diameter eight times larger than that of the said pinion, to thus give to the said hollow shaft or sleeve eight rotations to one of the clutch-gear $A^4$. The hub $m^2$ of the gear $m'$ is mounted loosely upon a stud, $m^3$, and has at its opposite end a pinion, $m^4$, which is engaged by a toothed gear, $m^5$, of the same diameter as the gear $m'$. The gear $m^5$, fast on the hub or sleeve $m^\times$, loose on the rod $d^3$, is provided with an arm, 10, having a dog, 11, provided at its inner side (see dotted lines, Fig. 1) with a tooth which enters the space bounded by the clutch-gear $B^4$, which tooth is at times permitted to engage one of the series of teeth 7 at the inner side of the rim of the continuously-rotating clutch-gear $A^4$, the arm 10 and gear $m^5$ at such times rotating in unison with the said clutch-gear. The dog 11 is held out of engagement with the teeth 7 at all times, except when the trimming-lever is to be moved, by means of a stop-shoe, $b^2$, attached to a rod, $n^2$, provided with a bearing, 59, the said rod having a collar, $h$, acted upon by a spiral spring, $h'$, to normally keep the stop-shoe in such position as to act upon and hold the dog 11 out of engagement with the said teeth 7 as the clutch-gear $A^4$ rotates; but when it is desired to start the trimming-lever $f^8$ to rotate the last, as described, the operator will place his foot upon a suitable treadle, which, by a link, $h^4$, turns an elbow-lever, $h^5$, so that one end thereof in engagement with a pin, $h^6$, on the rod $n^2$ will push the rod to the left in Fig. 1 and remove the stop-shoe $b^2$ from the dog 11, thus permitting the continuously-rotating clutch-gear $A^4$ to engage the said dog and rotate the arm 10 and the gear $m^5$. The jack having been rotated so that the cutter has acted from one corner of the heel-breast along one side, about the rear part, and then about the other side of the heel to the opposite corner of the breast, the last is rotated in the opposite direction back to its starting-point, leaving the heel in position to be breasted by the knife $b$. This stopping the jack is effected by the stop-shoe $b^2$, which, immediately after the dog 11 engages the teeth 7, is moved back again into its original position by the spring $h'$, the foot of the operator having been removed from the treadle referred to, so that when the dog 11 again arrives at the said stop-shoe its end meets the stop-shoe and effects the disengagement of the dog from the rotating teeth 7 of the gear $B^4$ and stops the rotation of the arm 10 and gear $m^5$. Just before the gear $m^5$ in its rotation arrives in position to be stopped the pivoted block $p$, mounted on an upwardly-extended ear of the collar $f^3$, (see Figs. 1 and 3,) meets a cam, 65, attached to the frame-work, (see Fig. 4,) the said cam acting to turn the pivoted block $p$ aside against its spring 62 far enough to cover the hole $p^4$ (see dotted lines, Fig. 1) in the said ear just before the block $p$ in the movement of the collar $f^3$ to the left arrives at the end $m^6$ of the arm $m^7$, bolted to the rod 60, and thereafter, in the further movement of the collar $f^3$ toward the left in Fig. 1, the block $p$, acting against the arm $m^7$, pushes the rod 60 with it to the left, removing the stop-shoe $m^9$ from the dog $m^{10}$, permitting the latter to be engaged by the teeth $m^{18}$ of the continuously-rotating clutch-gear $A^6$, the gear thereafter carrying with it the arm $m^{12}$ and shaft $A^7$ for one full rotation, at which time one end of the dog $m^{10}$ again arrives in contact with the stop-shoe $m^9$, which releases the said dog from the teeth of the clutch-wheel $A^6$, leaving the shaft $A^7$ at rest.

The rod 60 between the frame-work A of the machine and the arm $m^7$ is surrounded by a spiral spring, 70, which normally acts to move the rod 60 in a direction opposite that given to it by the pivoted block $p$.

The stop-shoe $m^9$ (see Fig. 1) is provided at its inner side with a cam projection, 18, which as the dog $m^{10}$ arrives nearly to the lower end of the stop-shoe strikes the said projection and causes the said stop-shoe, and with it the rod 60 and arm $m^7$, to be moved to the left (see Figs. 1 and 4) far enough to remove the projection $m^6$ from contact with the block $p$, thus enabling the spring $p^3$ to again assume control of the block and push it aside to uncover the hole $p^4$, and as soon as the said dog passes the projection 18 the spring 70 acts to throw the stop-shoe $m^9$ fully to the right, to be in the path of movement of the said dog $m^{12}$, to disengage it from the teeth $m^{18}$ when the shaft $A^7$ has completed one rotation, the finger $m^6$ as the rod 60 is so moved entering the hole $p^4$.

The shaft $A^7$ is stopped with the crank-pin $a'$ in position to place the slide $a^5$, carrying the heel-breasting knife $b$ in its most elevated position.

As shown in Fig. 1, it is supposed that the heel has been trimmed, and that the shoe is yet on the last and the latter in position to have the heel breasted. As the slide $a^5$ employed to move the breasting-knife $b$ descends, a cam or incline, 42, thereon meets a roll, 41, on an arm, 40, extended forward from the upper end of the yoke D, (see Fig. 1,) and pushes the said yoke and rod $d^3$ back against the spring $e^2$ until a latch, 46, pivoted on the frame, engages a pin or projection, 48, on the said yoke, this backward movement of the yoke D removing the heel-trimming cutter out of the path of movement of the descending blade $b$. The heel having been breasted, the table $b^5$ is turned to bring another shoe in position to be trimmed and breasted, and the operator then lifts the latch 46 by hand, and through the rod $n^2$ releases the dog 11, to start the hub $f^2$, move the trimming-lever, and rotate the last.

I am aware that it is not new to provide a rotary cutter having fixed blades with an auxiliary blade attached to a segmental carriage, the said auxiliary blade being thrown into operation at certain stages of the rotation of the cutter to cut into the bottom of and deepen the groove in the heel only at the rear end of the heel, as in United States Patent to Glidden, No. 221,676, dated November 18, 1879.

I claim—

1. In a heel-trimming machine, a rotating shaft and two or more pivoted cutting-blades carried thereby, combined with a rod and links to connect the rod with each of the said blades and with a cam to actuate the rod to move all the said blades about their pivots during the rotation of the said shaft and while the said blades are acting upon and shaping the heel, all the said blades acting to cut entirely around the heel from breast to breast, substantially as described.

2. The movable bed $B^5$, a turn-table mounted thereon, a last carried by the turn-table, and a rotating cam-plate, combined with the locking device or mechanism to clutch the cam-plate and turn-table together, substantially as described.

3. The rotating shaft $C^6$, its attached cutter, the yoke-like bearing in which the said shaft rotates, and cam-roll $d^5$, combined with the partially-rotating last and pattern-plate $d^7$, substantially as described.

4. The rotating shaft $C^6$, its attached cutter, the yoke-like bearing in which the said shaft rotates, and cam-roll $d^5$, combined with the partially-rotating last and pattern-plate $d^7$, and with the cam-plate having a cam-ledge, C′, and a rod, $c'$, actuated thereby to change the position of the blades $d$, substantially as set forth.

5. In a heel-trimming machine, a rotating table, a series of turn-tables carried by it to receive two or more lasts, and a rotating cutter to trim the heel, combined with means to rotate the said lasts one at a time in the said rotating table and while the heel of the shoe is being acted upon by the rotating cutter, substantially as described.

6. In a heel-trimming-machine, a rotating cutter, a turn-table, a last mounted thereon, a rotating plate, C, having a shank, $C^2$, provided with a sprocket-wheel, combined with a chain and with a vibrating lever, $f^8$, substantially as described.

7. In a heel-trimming machine, the combination, with a partially-rotating last and a fixed rotating heel-trimmer, of heel-breasting mechanism, substantially as described, to breast the heel after the same has been trimmed, as set forth.

8. The shoe-holding last, the shaft $A^7$, slide $a^5$, and intermediate connections, combined with the heel-breasting blade $b$, to operate substantially as described.

9. The rotating shaft $A^7$, the link $a^2$, the slide $a^5$, and the screw $a^4$, combined with the stud $a^3$, made adjustable with relation to or upon the said screw, and the breasting-knife, substantially as and for the purpose set forth.

10. The reciprocating slide $a^5$, combined with the blocks $b^4$ and $b^2$, the heel-breasting blade $b'$, and with means to adjust them to place the blade in proper position, substantially as described.

11. The rotating clutch-gear $A^6$, the shaft $A^7$, the arm $m^{12}$, its dog, stop-shoe, and rod and arm $m^7$, combined with the collar $f^3$ and with the spring $p^3$ and pivoted block $p$, to operate substantially as described.

12. The heel-trimming mechanism and the heel-breasting mechanism, combined with an intermediate clutch automatically controlled as to its movements by the heel-trimming mechanism, whereby the main shaft of the heel-breasting mechanism is started at the completion of the heel-trimming operation, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWARD B. ALLEN.

Witnesses:

G. W. GREGORY,

C. M. CONE.