6 Sheets—Sheet 1.

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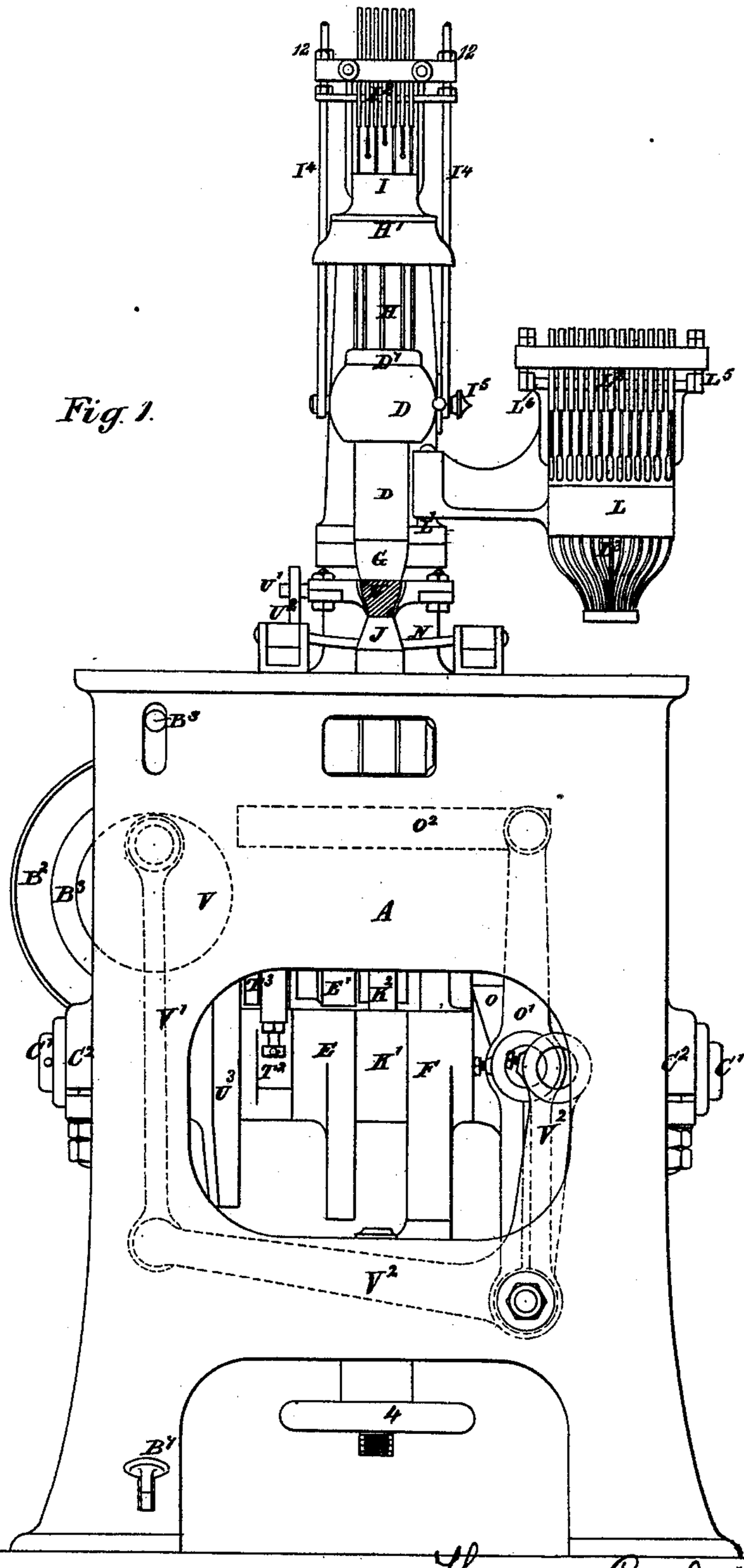
Boot and Shoe Heeling Machine.

No. 214,369. Patented April 15, 1879.

Fig. 1.



Witnesses
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Harry A. Crawford.

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Boot and Shoe Heeling Machine.

No. 214,369. Patented April 15, 1879.

Fig. 2.

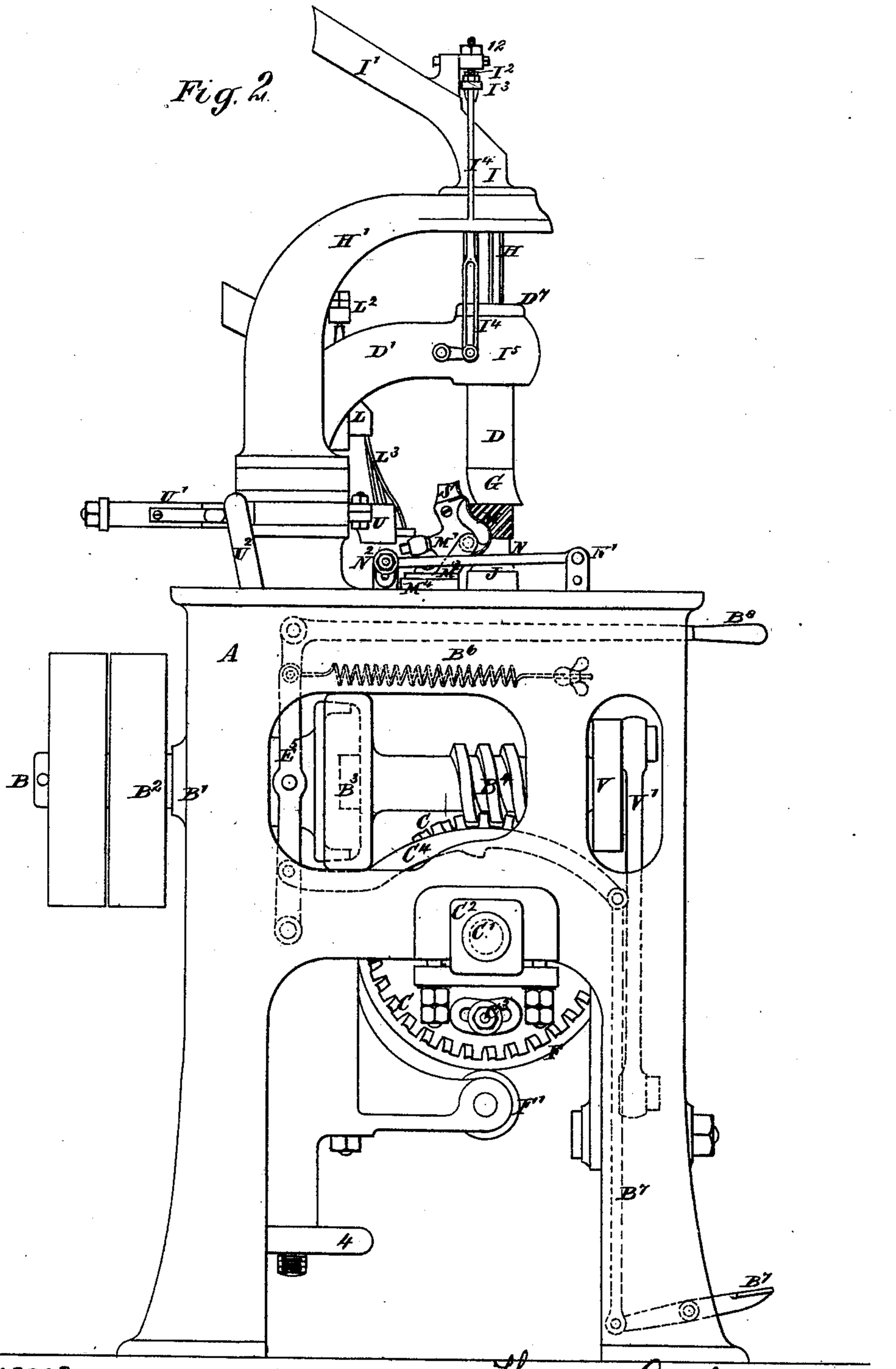

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Fig. 4.

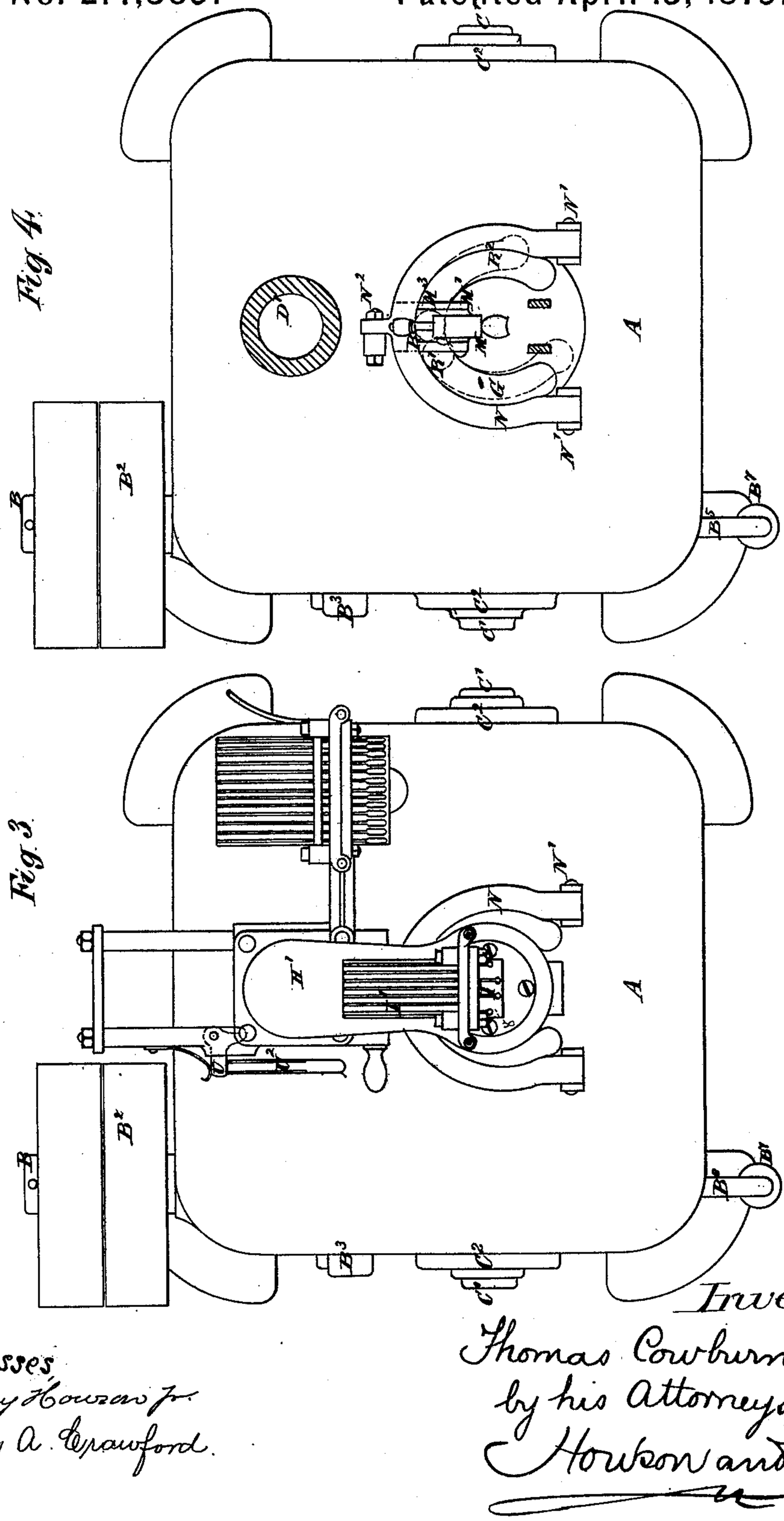

Fig. 3.

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Boot and Shoe Heeling Machine.

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FIG. 7a

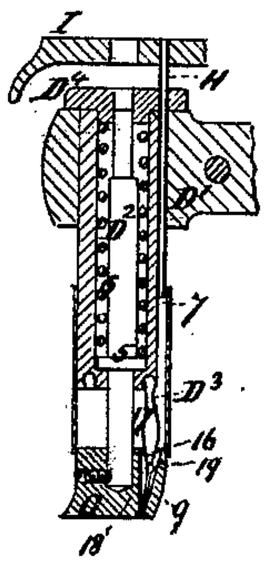

FIG. 5

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Boot and Shoe Heeling Machine.

No. 214,369. Patented April 15, 1879.

FIG. 12.a

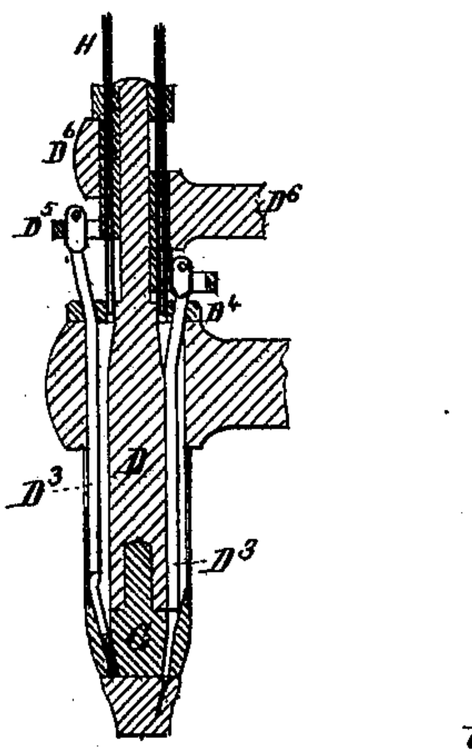

FIG. 6.

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Boot and Shoe Heeling Machine.

No. 214,369. **Patented April 15, 1879.**

FIG. 7

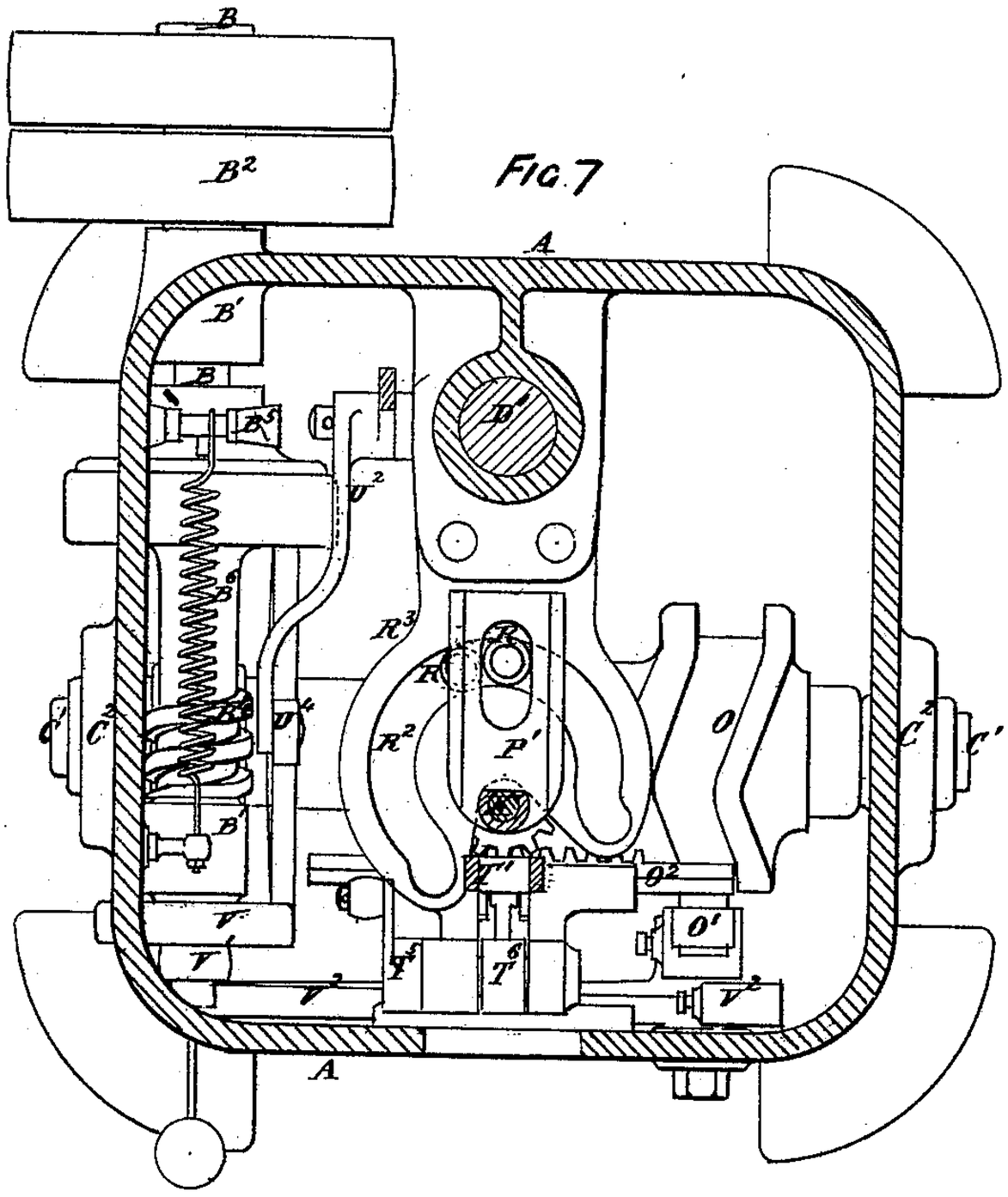


FIG. 8

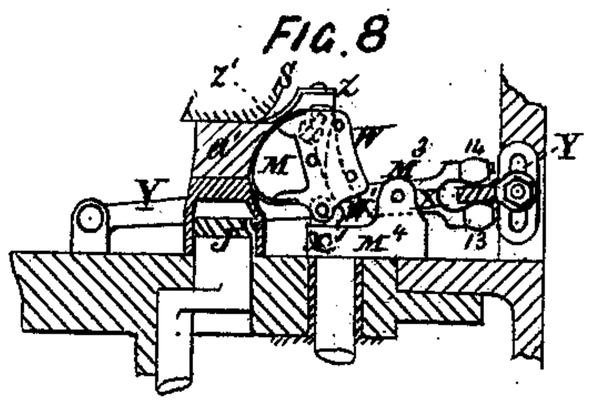


FIG. 9

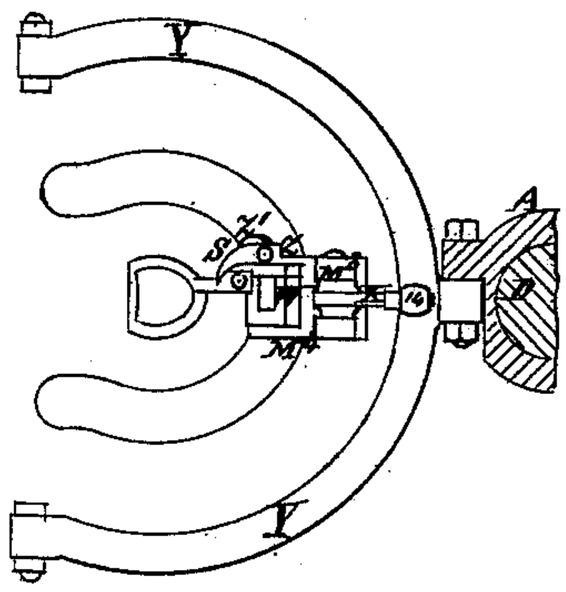


FIG. 10.

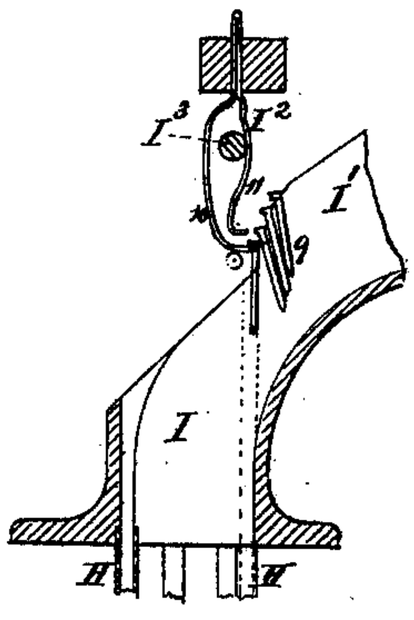


FIG. 11.

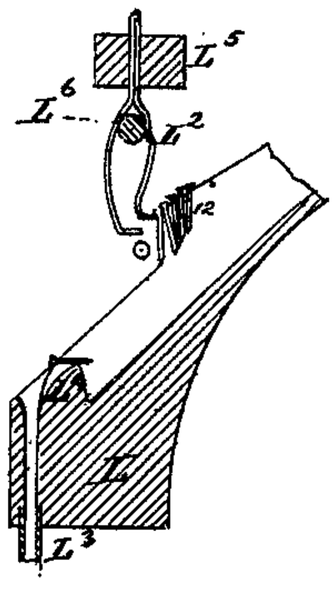
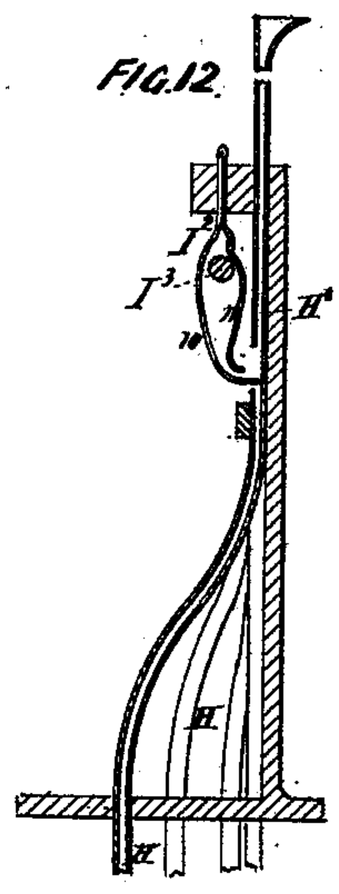


FIG. 12.



Witnesses,
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Inventor:
Thomas Cowburn
by his Attorneys,
Howson and Son

UNITED STATES PATENT OFFICE.

THOMAS COWBURN, OF GLOUCESTER, ENGLAND.

IMPROVEMENT IN BOOT AND SHOE HEELING MACHINES.

Specification forming part of Letters Patent No. **214,369,** dated April 15, 1879; application filed August 19, 1878; patented in England, May 8, 1878.

To all whom it may concern:

Be it known that I, THOMAS COWBURN, formerly of the city and county of Bristol, England, but now residing in the city of Gloucester, England, have invented Improvements in Boot and Shoe Heeling Machines, of which the following is a specification.

My said invention relates to machinery or apparatus for riveting and shaping or paring and finishing the heels of boots and shoes, for which invention I have obtained an English patent, No. 4,169 of 1877, complete specification filed May 8, 1878.

In carrying out my said invention, I proceed in the following manner: For riveting and shaping the heel I take the upper part of the boot or shoe (the sole having been previously attached by riveting, sewing, or otherwise) and place it upon a ram or holder, and maintain it in contact therewith. The materials for the heel, consisting of lifts and top piece, are placed on a block and are retained in position by a clip or cup. On setting the machine in motion the requisite number of rivets or nails are released and pass down tubes in the ram or holder, falling onto the insole, which is being held against it. The ram or holder then descends and presses the sole onto the material of the heel, and, continuing to descend, forces the rivets into the heel at the desired angle and holds the heel firmly on the block. The clip or cup is then withdrawn by a further movement of the machine out of the way of the paring-knife, next hereinafter described.

This knife is carried on a slide working in a lever or arm revolving on a vertical axis nearly concentric with the heel, and has a reciprocating partial rotary motion imparted to it round three sides of the heel.

The knife is caused to approach to or recede from the center by a curved guide, which directs the lower edge of the knife and gives the form to the bottom of the heel.

The top or seat can be made of a different shape or form by the employment of another curved guide, which gives the necessary movement to the upper edge of the knife. This guide may be set to give a greater or less difference between the shape of the top and that of the bottom of the heel. The upper edge or seat of the heel is pared true by a separate adjustable knife fixed to the main knife or to an arm, and receiving the same lateral motion as the upper edge of the main knife. The paring round the heel being completed and the knife having returned, a further motion of the machine raises a knife fixed on a diagonal or curvilinear slide to cut the front of the heel. The knife-slide falls, and, the ram or holder being raised, the operation is complete.

For burnishing the heel the knife-slide is removed and a burnishing-tool, which may be heated by a gas-jet or other means, is inserted. The motion for working the knife is put out of gear, and a more rapid motion given to the crank-arm or other device which polishes the surface.

If the top piece of the heel is to be riveted on at the same time, the rivets or nails are carried in a suitable rack mounted on a center-pin or on a slide, and before the material for the heel is placed on the block the rack is swung or slid over it, and a lever being depressed the rivets or nails are run down tubes into holes in the block corresponding to the number and in the position required in the heel. The rack is then removed and the operation before described is performed, and while the upper ram or holder presses the heel firmly onto the block a driver or ram ascends and forces certain punches which are provided against the rivets in the block and drives them into the heel. The paring operation is then performed, and the upper ram or holder finally ascends and the boot is removed.

In order that my said invention may be fully understood, I shall now proceed more particularly to describe the same, and for that purpose shall refer to the several figures on the annexed sheets of drawings, the same letters of reference indicating corresponding parts in all the figures.

Figure 1 of the accompanying drawings represents a front elevation of a machine constructed according to my said invention for riveting, shaping or paring, and finishing the heels of boots and shoes. Fig. 2 is a side elevation, and Fig. 3 a plan, of the same. Fig. 4 is a sectional plan with the upper part removed. Fig. 5 is a sectional side elevation. Fig. 6 is a sectional front elevation, and Fig.

7 is a sectional plan with the top of the table removed. Fig. 7ª is a sectional detail of the ram or holder and its appurtenances. Figs. 8 and 9 illustrate another modification of cutting-knife. Figs. 10, 11, and 12 are enlarged views of the springs and rivet-feeders, hereinafter more fully described. Fig. 12ª illustrates a modification of the holder and the riveting motion.

The various parts of the machine, hereinafter described in detail, are carried on a stand or frame, A, made of a suitable shape for that purpose. The motion is derived from the shaft B, mounted in bearings B^1, and actuated by the belt-pulley B^2 and a belt and another pulley from any suitable prime mover. On the shaft B is a friction-clutch, B^3, one part sliding on feathers on the shaft and the other loose, with a worm, B^4, at one end. This worm gives motion to a worm-wheel, C, keyed on the main shaft C^1, which rotates in bearings C^2. The shaft C^1 makes one revolution for a complete operation of the machine, and is brought to rest by the pin C^3 coming in contact with rods C^4, which are connected to the lever B^5, mounted on centers or fulcra at 1 in the frame A. The lever B^5 puts the friction-clutch B^3 in or out of gear, the necessary pressure for holding the parts of the clutch in gear being given by the spring B^6.

When another operation of the machine is required the rods C^4 are lifted clear of the stop-pin C^3 by the foot-lever and rods B^7. B^8 is a lever connected to the lever B^5, and which is provided for the facility of stopping the machine by hand when required.

D is the ram or holder, on which the upper part, *a*, of the boot or shoe is placed, the sole having been previously attached by riveting, sewing, or otherwise. This ram or holder is carried by the arm D^1, working in suitable guides in the frame A. The arm D^1 is lifted by the cam E and roller E′, and pressed down by the cam F and roller F′, the said rollers being carried in a frame, 3, fitting on the arm D^1, and being adjustable for different thicknesses of work by the screw and wheel 4.

The cams E and F are so arranged that the falling side of the cam E nearly coincides with the rising side of the cam F, and vice versa.

The ram D is hollow and fitted with a spindle or bolt, D^2, having a collar, 5, to rest on the lower part, and a spiral spring, 6, to bear on the collar 5 and against the cap D^7 of the ram. On the lower end of the spindle D^2 is fixed a die or presser, G, for pressing upon the insole of the boot or shoe *a* placed thereon. This die is perforated with holes G′ corresponding with the number of rivets or nails which are to be driven from the inside of the boot or shoe, the holes or perforations being arranged in the direction in which the rivets are to be driven.

The ram D is provided with a number of grooves or channels, 7, corresponding with the holes in the die G, and a thin casing of metal on the exterior forms with the grooves passages for the rivets. On the lower end of the ram D are hinged drivers or punches D^3, (shown most clearly in Fig. 7ª,) of a flat section, with the lower end thicker to form two shoulders, 16. The middle or flat part, 17, of each passes into a groove, 18, in the die, while the broader end, 16, slides up the passage G′ for the rivets, which is wider than the groove near the top of the die or presser G. The passage G′ slopes off toward the center, as shown at 19. When the ram D is raised the spring 6, pressing on the bolt D^2, forces it down, and the drivers or punches D^3 fall back toward the center into the slope at 19 in the top of the die, and allow the rivets 9 to pass down the back. This position of the parts is represented in Fig. 7ª.

The rivets are conveyed to the ram by small tubes H, (one to each channel 7 in the ram,) which are fixed in a bracket, H′, secured to the frame A of the machine. When the ram rises the channels in the ram pass freely over the tubes. The rivets or nails are conveyed to the tubes by holes 8 through the stand I by means of the racks or guides I^1, which are grooved to allow the shank of the rivet to slide freely down the head or shoulders resting on the edges.

The springs I^2 (which are shown on an enlarged scale in Fig. 10) retain the rivets 9 in the rack by the lower or longer leg, 10, of the spring being in contact with the last rivet in the rack, and the shorter leg, 11, being clear of the head of the said rivet. When the bar I^3 is raised by the ram D rising it presses against the shorter leg 11 of the spring, which retains the next rivet in place, while the bar I^3, still rising, presses out the longer leg 10 of the spring and releases the rivet, which slides down the rack or falls into the tubes direct. The lift of the bar I^3 is adjusted by the nuts or screws at 12 on the upper end of the rods I^4, and by a slotted lever and adjusting-screw, I^5, on the head of the ram.

The die G is maintained in close contact with the insole by the cam F, and holds the heel *a*′ firmly on the block J, which rests on the stand or table A, the clip or cap U, which in my drawings is shown clear of the heel, being employed to maintain the lifts and top piece of the heel in position previously to the descent of the die G and during the operation of attaching the heel to the sole.

The block J, which is perforated with holes corresponding to the number of rivets or nails required in the top piece or under side of the heel, is made hollow, and has a piece, J′, fitted inside to move up and down a distance slightly exceeding the length of the longest rivets. In this piece are fitted drivers or punches similar to those of D^3 in the upper ram, and working through holes or grooves in the block J. The lifting-piece J′ rests on the top of the ram K, which is elevated by the cam K^1, wheel K^2, and lever K^3.

The rivets are fed into the holes in the block by the rack L, (see Fig. 11,) which swings on

the stud L^1 and extends over the block J when the ram D is up. The rack is fitted with springs L^2 and tubes L^3, similar to the tubes and springs with which the rack I^1 for the upper ram, D, is provided, with the exception that the rivets 12, after being delivered by the springs, slide down the lower slope, and the lower part of the shank comes in contact with a stop, L^4, Fig. 11, which turns the rivets head downward before they fall into the tubes L^3. The tubes terminate in a piece with perforations similar to those in the block J.

On depressing the lever L^5 the bar L^6 is operated. A rivet is released for each tube and passed down into the holes in the block. The rack L is then turned out of the way.

It will thus be seen that the heel is made and attached to the sole in one operation, the descent of the upper ram or holder, D, having the effect of forcing the rivets supplied from the rack I^1 downward through the inside lifts and top piece, thereby attaching the heel bodily to the sole, and if the top piece is to be riveted on at the same time the rivets supplied from the rack L are forced upward by the driver K, and the parts are thereby united together.

When the upper ram or holder has descended and the rivets have been thereby forced into the heel, the clip or cup U is withdrawn, by the means hereinafter explained, out of the way of the cutting or paring knife M, which next comes into operation, and the function of which is to pare round three sides of the heel. This position of the parts is that indicated in the drawings.

The cutting or paring knife M is made of the desired shape for the back of the heel, and fixed in a lever, M^1, pivoted on a center, M^2. The tail end of the lever is provided with a friction-roller, resting on a shaper-bar, N. This bar is hinged at N^1, and is adjusted horizontally by the bolt and nut N^2. The center M^2 is carried on a slide, M^3, which can be moved to adjust the knife to the size of the heel.

The knife M is worked round three sides of the heel by the cam O and lever O^1, moving the toothed rack O^2 and toothed pinion P, the axis of which latter is the ram K, on which it works.

To the pinion P is connected by a sleeve the radial arm P^1, with angular sides to form guides, on which works the slide P^2, having a boss or cylindrical part on its upper side, with a hole therein for the reception of the round shank of the part M^4, on which slides the knife-carrier M^3.

The cylindrical part of the slide P^2 fits into a groove or slot, G′, in the top of the table-stand A, made, by preference, a separate piece and let into the table. This slot is of a shape corresponding with the shape of the lower part of the heel, so that when the arm P^1 moves round its axis the cylindrical part of the slide P^2 follows the groove or slot G′, and moves the knife-carrier in the form of the heel.

On the end of the round shank of the part M^4 is fixed a crank, R, with a friction-roller, R^1, at its outer end, which works in a groove or slot, R^2, in the plate R^3. This groove is of similar shape to the groove or slot G′, and the two extremities are a corresponding distance from the center of the axis of the pinion P; but the opposite center-line is set at a distance from the center-line of the groove G′ (see dotted lines in Fig. 4) equal to the distance between the centers of the friction-roller R^1 and the shank on the crank R.

As the cylindrical part of the slide P^2 passes round the groove G′ the friction-roller R^1 also moves round the groove R^2, and thus turns the shank of the part P^1, and with it the cutting-knife M, so that the cutting-edge is always at the same relative angle with the material being cut.

The ends of the grooves G′ and R^2 turn outward from the center to draw the knife farther from the heel when the cut is finished and before it commences.

The shaper N is made of such a form and so adjusted that when the cutting-knife moves from a central position the tail end of the lever M^1 rises or falls, as may be desired, and so moves the upper edge of the knife nearer to the heel relatively with the lower edge or draws it farther from it.

On the upper part of the lever M^1 is fixed a small knife or cutter, S, which cuts round the seating of the heel at the same time that the main knife M moves round. The knife or cutter S is adjustable, so that its position may be varied as required.

The paring round of the heel having been completed, the knife M returns, and a knife, T, is raised automatically for cutting the front of the heel. This knife is fixed in a curvilinear slide, T^1, which receives an upward motion from the cam T^2, roller T^3, and levers T^4, T^5, and T^6, and is withdrawn by a spring, 20. The ram or holder D is then raised and the operation is complete, the machine stopping automatically by the means hereinbefore described.

The clip or cup U, for supporting the parts of the heel previously to and during the operation of riveting, is moved toward and from the block J in the following manner: The cup or clip U is drawn forward by hand, and is held in position by the catch and spring U^1. At the proper time the catch U^1 is pressed back by the lever U^2, actuated by the cam U^3 and roller U^4, and the clip is thus pushed back and held clear of the cutting-knife M until the paring operation is completed.

When it is required to burnish or polish the heel the knife-slide M is removed and a burnishing-tool is inserted. This tool may be of any suitable description, and may be heated by a gas-jet or other convenient means. The burnishing or polishing motion is derived from the crank V and rod V^1, which latter is connected to the bell-crank lever V^2, working on the same fulcrum as the lever O^1, so that the pin which engages the cam O can be withdrawn from it and inserted in the eye of the

lever V^2. The crank then gives rapid motion to the slide (similar to the slide M^3) in which the burnishing-tool is fixed.

Figs. 8 and 9 illustrate another modification of knife-holder for the knife M, employed for shaping the heel. The knife is carried on a sliding piece, W, which moves freely on a curved slide, W′, which is fixed on the part M^4. The piece W is moved up and down the slide by the lever X, which has its fulcrum at M^3. One end of the lever is connected to the knife-holder W, and the other end carries two friction-rollers, 13 14, the one, 13, being under and the other, 14, over the shaper-bar Y, which is of suitable shape to move the upper part of the knife closer to or farther from the seating of the heel. The seating-knife S is carried on the top of a lever, Z, which has its fulcrum on a pin in the slide M^4. It is caused to approach nearer to the seating when the sliding piece W rises by the pin Z′ moving in a diagonal slot in the lever Z.

Fig. 12 shows another modification of nail or rivet feeder, in which, in lieu of employing a rack to receive the rivets and passing them to the springs, the rivets are fed into a tube, H′, of suitable size for the heads to pass down freely. The rivets stand one upon another, and at the point where the feeding-springs I^2 operate an opening, 15, is cut in the tube H′. The rivets thence pass one into each of the series of tubes H.

Fig. 12^a is a vertical section, illustrating an arrangement of ram or holder and rivet-drivers in which the holding-down motion is separate from the riveting motion, one half being shown with the drivers down and the other with them elevated.

D is the holder or ram, carried by the arm D^1. The die or presser G is fixed on the ram, and perforated for the passage of the rivets. The drivers or punches D^3 are continued through the ram and work on inclined surfaces D^4, corresponding with the angle at which the rivets are to be driven. The upper parts of the drivers are connected by a flange and bush, D^5, (sliding on a continuation of the ram,) to an arm, D^6, which moves simultaneously with the arm D^1, by a cam on the shaft C^1, and after the die G presses the heel firmly on the block the arm D^6 still descends and drives the rivets home.

When the drivers return to the top of their stroke they slide up the inclined surfaces D^4 and leave a space between the bottom of the groove in which they work and the back of the drivers, down which the rivets pass into the die G. The rivet-tubes H are fixed in the cap of the ram, and can be fed by either arrangement hereinbefore described.

If desired, the rivets for attaching the heel to the sole may be driven vertically in lieu of at an angle, different lengths of rivets being employed to suit the configuration of the heel.

I claim as my invention—

1. In a boot and shoe heeling machine, the combination of the ram D and die carrying the nailing or riveting devices, and adapted to the inside of the boot or shoe, with a block, J, adapted to support the heel-pieces, and also provided with nail or riveting mechanism, all substantially as and for the purpose set forth.

2. The combination of a perforated die, G, with the ram D and a series of drivers or punches, D^3, hinged to said ram, as described.

3. The slide P^2, in which is fitted the shank of the knife-carrier M^3, and which is provided with a boss adapted to a groove in the table, in combination with a crank, R, on the lower end of said shank, and adapted to a groove in the frame, as and for the purpose set forth.

4. The combination of a block and die for holding the boot or shoe and a cutting-tool for paring the rounded portion of the heel with a knife, S, carried by the same holder, and adapted to pare or trim the upper edge or seat of the heel, substantially as described.

5. The combination of devices for holding the boot or shoe with a knife, T, having a curved upward movement for cutting the front of the heel, as described.

6. The combination, in a boot and shoe heeling machine, of the knives M, S, and T, for trimming the sides and edges of the heel.

7. The combination of devices, substantially as described, for carrying the cutter M, with guide-slots G and R^2, as set forth.

8. The combination of the pivoted tool-carrying lever with the adjustable shaper-bar N, substantially as described.

9. The combination of a supporting-block with a ram, D, carrying a die, G, a number of channels for the nails or rivets, and a series of punches or drivers, whereby said drivers or punches may be operated simultaneously, as set forth.

10. The ram D of a boot and shoe heeling machine and a die, G, carried by said ram, and having a series of holes arranged at an angle, in combination with punches for driving the nails or rivets in an angular direction, substantially as specified.

11. The combination of the ram and nailing or riveting devices with the independent clip or cup U, adapted to be moved into and out of position in relation to said ram, as set forth.

12. The combination of the nail, racks or guides I^1 with a spring, I^2, having legs 10 11, and with a bar, I^3, as set forth.

13. The combination of the knife M and its holder with the adjustable knife S, as specified.

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

THOMAS COWBURN.

Witnesses:

JAMES PLATT,
Gloucester.

JAMES FIELDING,
Gloucester.