(No Model.)

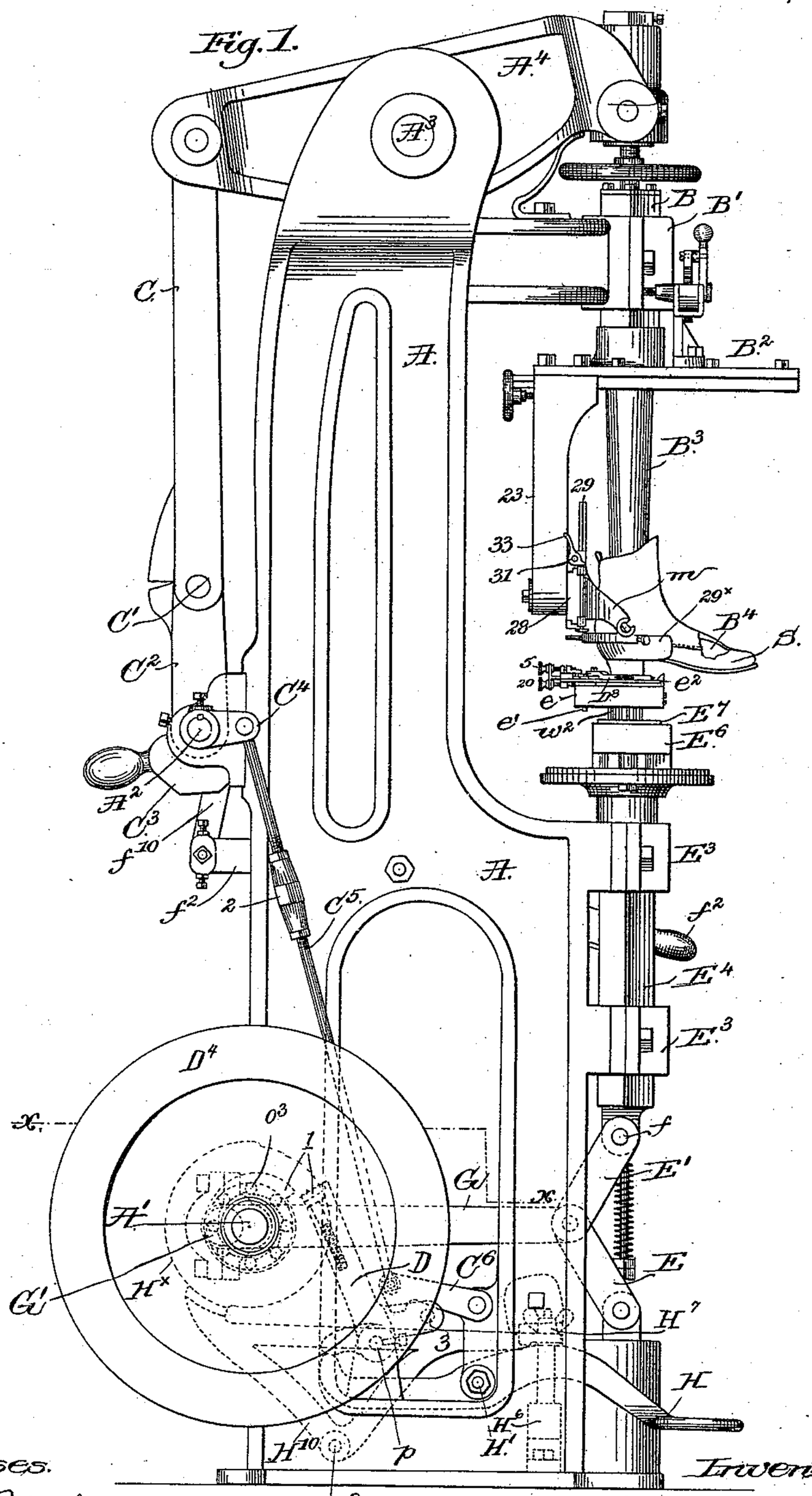
5 Sheets—Sheet 1.

C. W. GLIDDEN & A. D. ELLIOTT.

HEELING MACHINE.

No. 446,383. Patented Feb. 10, 1891.

Fig. 1.



Witnesses.

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(No Model.) 5 Sheets—Sheet 2.

C. W. GLIDDEN & A. D. ELLIOTT.

HEELING MACHINE.

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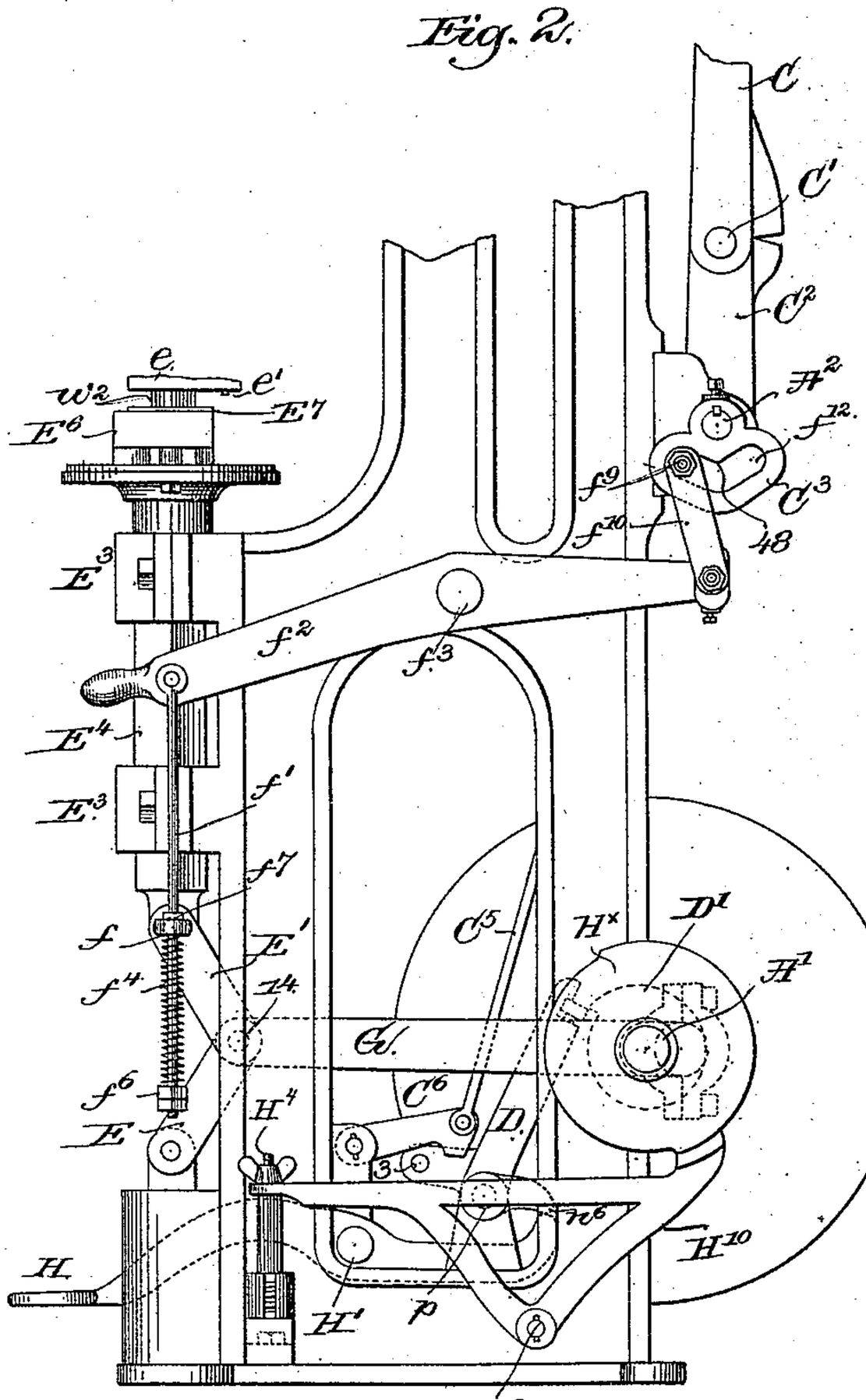
Fig. 2.



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(No Model.) 5 Sheets—Sheet 3.

C. W. GLIDDEN & A. D. ELLIOTT.

HEELING MACHINE.

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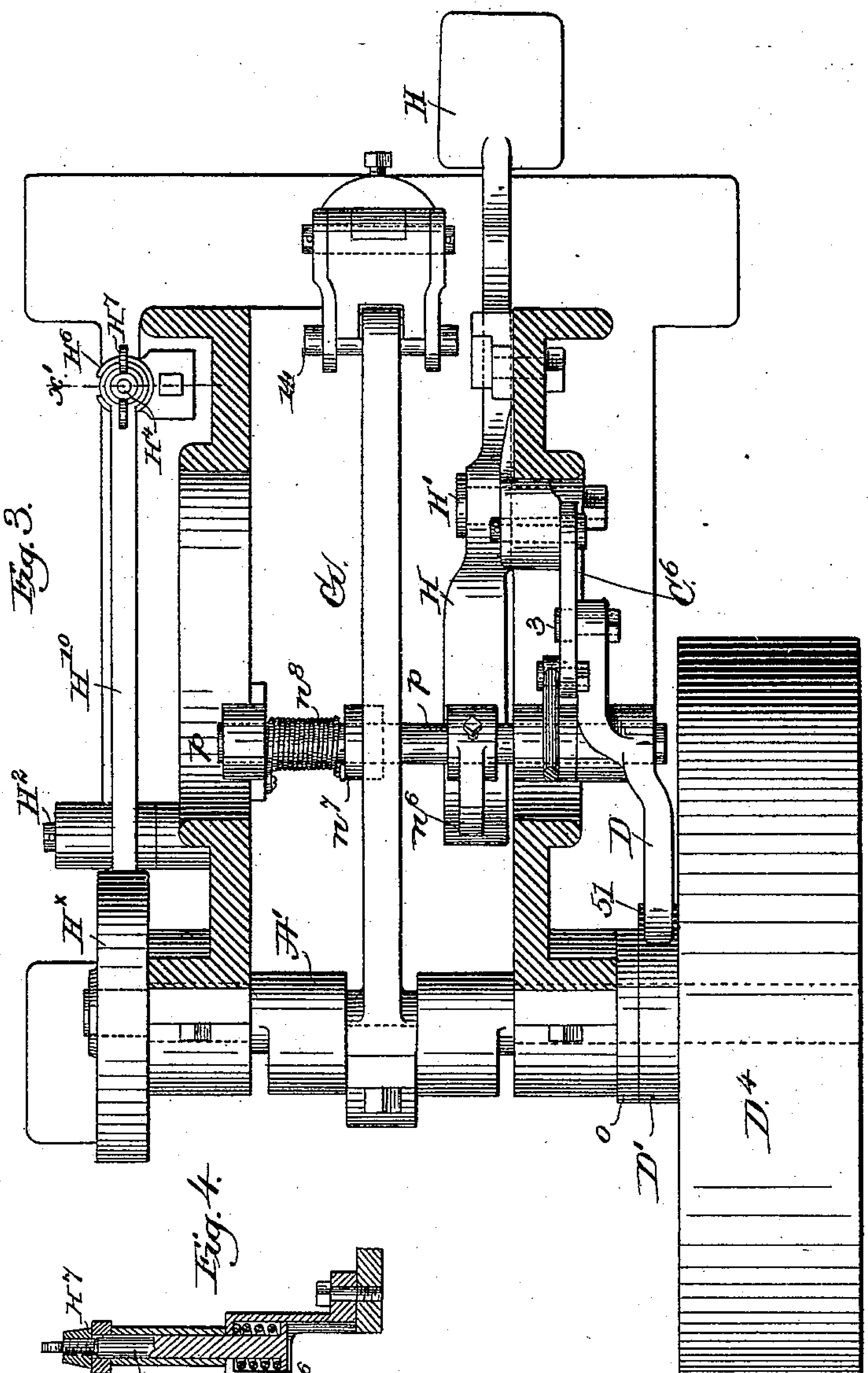

Fig. 3.

Fig. 4.

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(No Model.) 5 Sheets—Sheet 4.

C. W. GLIDDEN & A. D. ELLIOTT.

HEELING MACHINE.

No. 446,383. Patented Feb. 10, 1891.

Fig. 5.

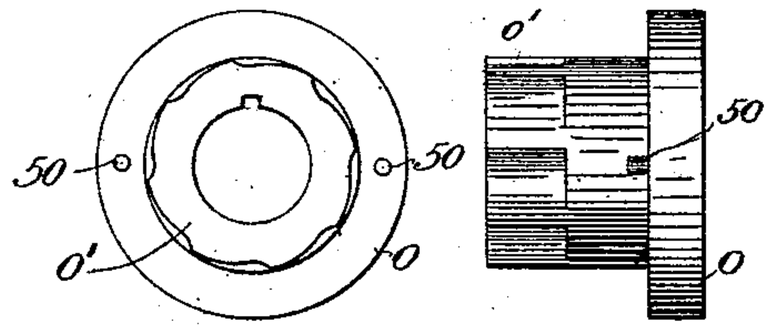


Fig. 7

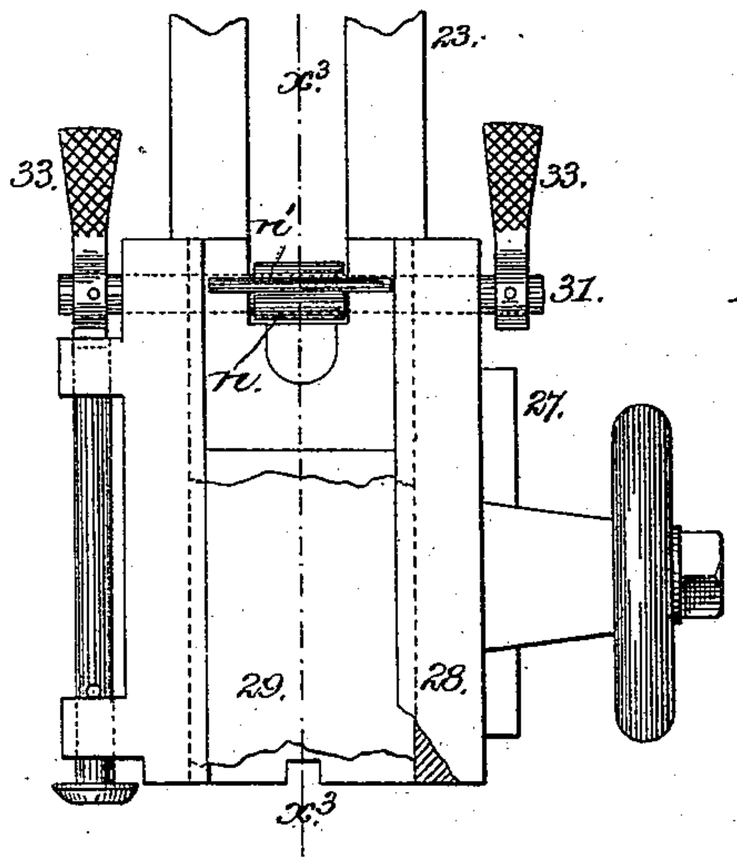


Fig. 8.

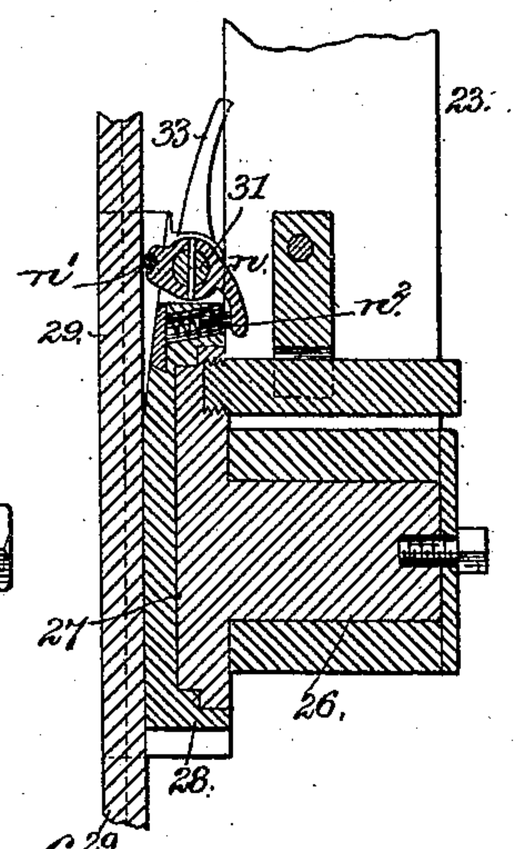
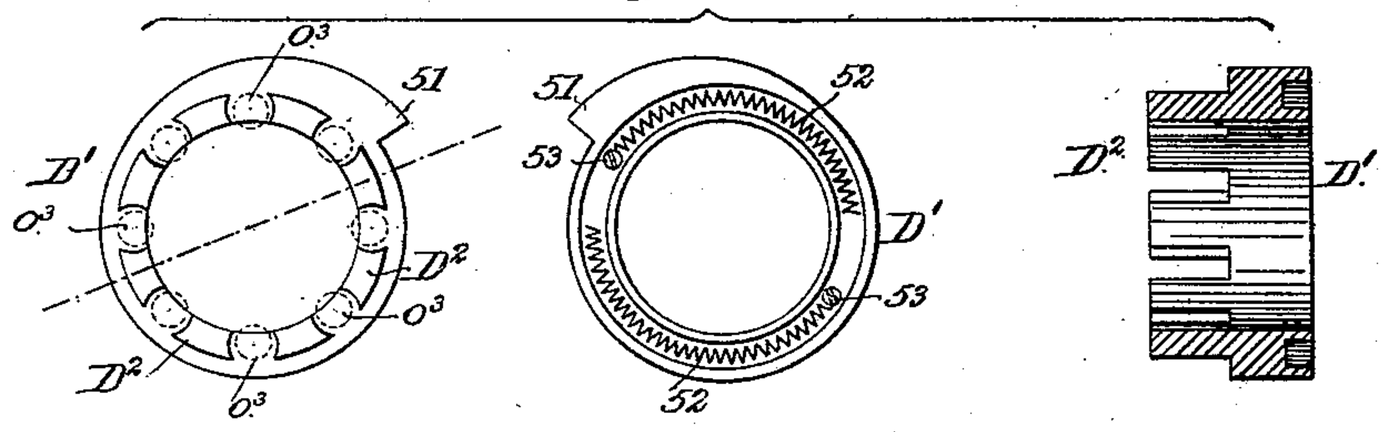


Fig. 6.



Witnesses.
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(No Model.) 5 Sheets—Sheet 5.

C. W. GLIDDEN & A. D. ELLIOTT.

HEELING MACHINE.

No. 446,383. Patented Feb. 10, 1891.

Fig: 9.

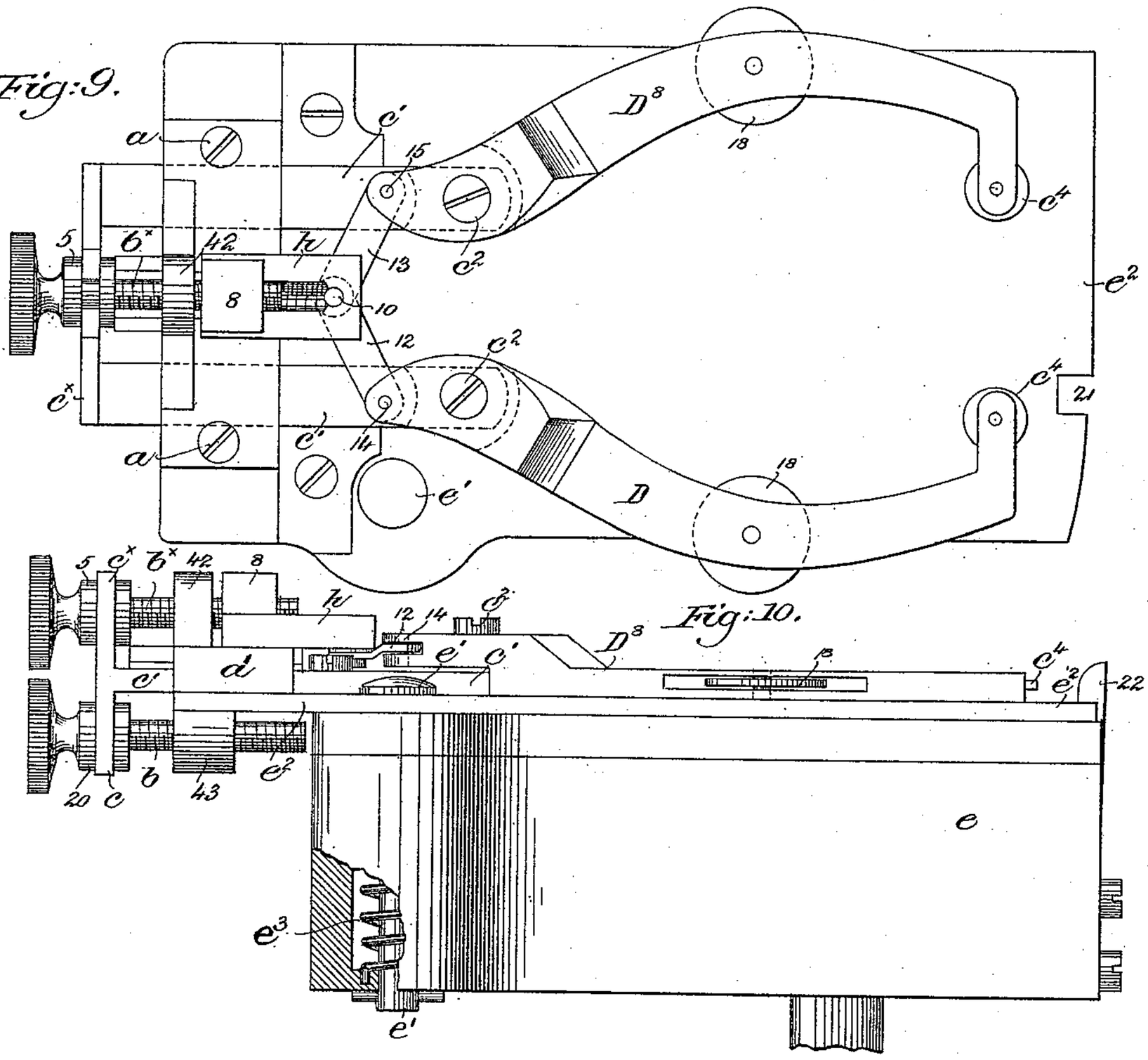

Fig: 10.

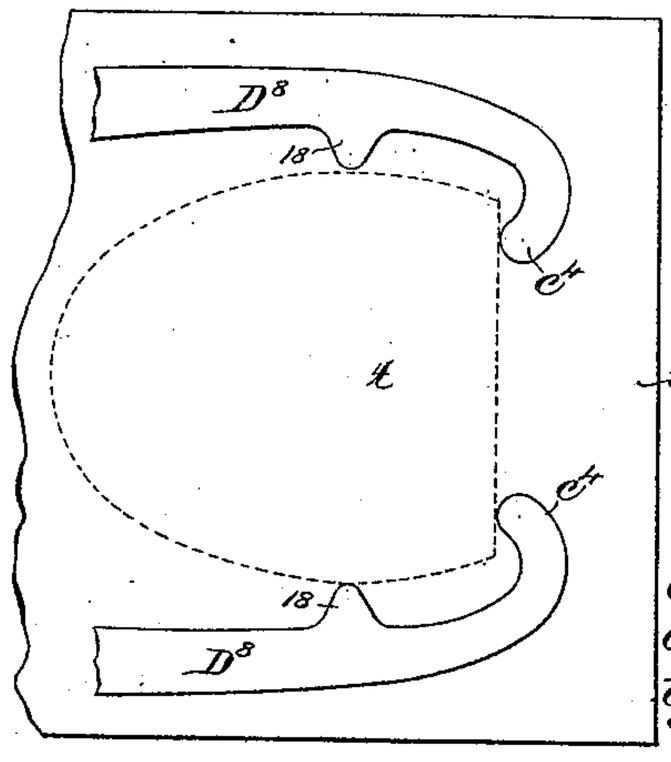

Fig. 11.

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UNITED STATES PATENT OFFICE.

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HEELING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 446,383, dated February 10, 1891.

Application filed January 31, 1889. Serial No. 298,192. (No model.)

To all whom it may concern:

Be it known that we, CHARLES W. GLIDDEN, of Lynn, county of Essex, State of Massachusetts, and ALVIN D. ELLIOTT, of Lawrence, county of Essex, State of Massachusetts, have invented an Improvement in Heeling-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention has for its object to improve and simplify the construction of heeling-machines in such manner that the machine may be run very rapidly to first nail a heel upon a boot or shoe and then blind a top lift upon the heel.

In the machine herein to be described the usual toggle connected to the so-called "die-bed spindle" has pivoted to its central joint a connecting-rod, which at its opposite end is made to embrace a cam or eccentric on a shaft, which is rotated twice and then automatically stopped, the first rotation of the cam or eccentric elevating the die-bed spindle to nail the heel in place, while the second rotation, following instantly, blinds the top lift in place, the top lift being interposed automatically between the usual nail-box and the heads of the nails employed to attach the heel to the shoe. The said machine is also provided with means whereby the vertical position of the last-holding spindle and its attached parts are changed vertically to occupy a position in a higher horizontal plane between the first descent of the die-bed spindle and its second rise to blind the top lift upon the heel, the extent to which the last-holding spindle is raised corresponding substantially to the thickness of the top lift.

The particular features in which this invention consists will be hereinafter described, and designated in the claims at the end of this specification.

Figure 1 is a left-hand side elevation of a heel-nailing machine embodying this invention, the parts being shown in the position they will occupy just after the top lift has been blinded upon the heel and the spindle lowered to draw the last-holding spindle forward for the removal of the shoe, the latter being partially broken out to show the last inside of it. Fig. 2 is a partial right-hand side elevation of the machine shown in Fig. 1, the upper part of the machine shown clearly in Fig. 1 being omitted, and also the greater part of the nail-box. Fig. 3 is a section below the dotted line x, Fig. 1, the section-line not, however, cutting the clutch-pulley. Fig. 4 is a sectional detail in the line x', Fig. 3. Fig. 5 shows on an enlarged scale the collar, which in practice is fast on the rotating shaft of the machine, the said collar having a cam-hub which enters a space in the hub of the driving or clutch pulley. Fig. 6 shows in three different views the roll-holding loose collar. Fig. 7 is an enlarged detail of the slides to be described, carrying the clamp for holding the shoe in place, the greater part of the slide 29, shown in Figs. 1 and 8, being omitted. Fig. 8 is a section of Fig. 7 in the line x^3, but showing more of the slide 29. Fig. 9 is a plan view of an enlarged scale of the top-lift holder and swing-plate; Fig. 10, a side elevation of the swing-plate and top-lift holder. Fig. 11 is a modification as to the forward ends of the top-lift holder.

The frame-work A, of suitable shape to sustain the working parts, has suitable bearings for the main shaft A′ and the rock-shaft A^2. The cross pin or rod A^3 at the upper end of the frame-work serves as a fulcrum for the walking-beam A^4, the latter deriving its movement through the link C, which is jointed by pin C′ to an arm C^2, fast upon the rock-shaft A^2, the said rock-shaft having at one end (see Fig. 2) a cam-plate C^3, provided with a cam-slot f^{12}. The rock-shaft A^2 is turned at intervals in one and then in the opposite direction to break the joint between the link C and arm C^2 through the action of a stud f^9, carried by a link f^{10}, jointed to the rear end of a lever f^2, pivoted at f^3 at the side of the frame and actuated by the die-bed spindle E^4. The lever f^2 near its front end has jointed to it a rod f', which extends down through an eye of a bolt or stud f, which in this instance constitutes the upper pivot used to connect the upper member of the toggle-joint E′ E to the die-bed spindle E^4, the said rod f' below the said eyebolt f being surrounded by a

spiral spring f^4, the rod below the spring being provided with a nut f^6, on which the said spring rests. The nut or shoulder f^7, secured to the rod f', rests upon the upper side of the eye f, through which the rod is extended, as stated, when the die-bed spindle is depressed, as shown in the drawings. As the die-bed spindle is elevated the eye-bolt f, resting against the nut f^7, lifts the link f' and turns the lever f^2, causing the stud f^9 to move from its position, Fig. 2, down into the lowest part of the cam-groove f^{12}. As the die-bed spindle is again lowered the eye-bolt f, acting upon the spring f^4, resting on the nut f^6, pulls the rod f' down, raising the rear end of the lever f^2 and causing the stud f^9 to pass into the opposite end of the cam-slot f^{12} and the cam-plate to break the joint between the link C and arm C^2, as will be further described.

The die-bed spindle is provided at its upper side with a block E^6, upon which rests the driver-plate E^7, containing the drivers w^2. The upper ends of the said drivers enter usual holes in the nail-box e, it having at its under side a rod or stem, which enters a hole in the block E^6 and rests upon a spring therein, as common in United States Patent No. 166,795.

The nail-box has pivoted upon it at e' a top lift or swing-plate e^2, shown enlarged, (see Figs. 9 and 10,) which is normally acted upon by a spring e^3 (shown only in Fig. 10) to keep the said swing-plate in position above and to cover the usual nail-holes in the top of the nail-box e. This swing-plate e^2 has fast upon it near its inner end a block a', having an upwardly-extended ear 42 and a downwardly-extended threaded ear 43.

The ear 42 receives in it loosely the threaded shank of a screw $b^\times$, which screw is made to enter a threaded ear 8 of a block h.

The screw $b^\times$ has an annularly-grooved collar 5, which is entered by a lip $c^\times$ of a slide c', made as a fork, (see Fig. 9,) the said slide sustaining at its forward end the studs c^2, which serve as a fulcra for the top-lift-holding arms D^8, provided, as represented, with dogs 18, which engage or bear against the side edges of the top lift, (represented by dotted lines, Fig. 9,) the said arms having their forward ends inturned to form bearings for the breast end of the top lift, the inturned ends of the said arms, as represented clearly in Fig. 9, being provided with engaging projections c^4, shown as rolls; but, if desired, the said engaging projections may be formed as represented in Fig. 11, the breast end of the top lift coming against the inturned ends of the arms, and so, also, the dogs 18, instead of being made as in Figs. 9 and 10, may be made as rigid projections, as represented in Fig. 11.

The slide-plate c' has a downturned ear c, notched for the reception of the annularly-grooved collar 20 of a screw b, which is extended through the threaded ear 43, forming part of the block a', fixed to the swing-plate e. Rotation of the screw b moves the plate c' longitudinally with relation to the swing-plate e^2, so as to place the holding-arms D^8 in proper position with relation to the usual holes in the nail-box to thereby place the top lift in the desired position according to the particular shape of the heel being nailed and upon which the top lift is to be blinded. The rotation of the screw $b^\times$ moves the block h longitudinally, and through the connections 12 13, shown as links, which are attached to the said block at 10 and also to the said arms at 14 15, causes the said arms to be simultaneously moved toward or from each other so as to adapt the arms to the width of the top lift.

The heels employed have, it will be understood, the nails partially driven therein, and when a shoe to receive a heel has been properly placed upon the usual last B^4 at the end of the last-holding slide B^3 the operator takes a heel and places the projecting ends of the partially-driven nails into the usual holes at the top of the nail-box e, and to do so the operator has to turn the swing-plate aside against the action of the spring e^3, the edge of the swing-plate being permitted to bear against the edge of the heel. After the swing-plate has been turned aside the operator or an assistant places between the arms of the top-lift holder the top lift which is subsequently to be blinded upon the heel. In this condition of the parts the top plate of the nail-box rests against the under side of the heel and the upper side of the heel or its seat end rests just below the sole.

Referring again to the walking-beam A^4 and its supports, the spindle B is adapted to slide in suitable bearings B' of the frame-work, the lower end of this spindle B having secured to it a plate B^2, suitably shaped at its under side to constitute a guide for the upper end of the last-holding slide B^3, the lower end of which has applied to it the usual last, (not shown,) upon which is placed the shoe S, which is to have the heel nailed to it.

The plate B^2 at the lower end of the spindle B has depending from it a bracket 23, substantially such as shown and designated by like letters in United States Patent No. 377,301. This bracket (see Figs. 1 and 8) near its lower end receives the hub 26 of a block or holder 27, provided at bottom and top (see Fig. 8) with projections constituting guideways, on which is mounted in adjustable manner a cross-slide 28, it having a vertically-arranged recess or groove for the reception of a vertically-movable slide 29, (shown as broken off in Figs. 7 and 8,) which slide, near its lower end and shown only in Fig. 1, has ears m extended from each side thereof, which ears have open, slotted, or other proper bearings for the journals of a heel-clamp 29, the said clamp being common to United States Patent No. 166,795, the clamp serving to embrace the quarter or heel part of the shoe and center it properly with relation to the heel to be nailed upon it.

The holder 27 and slides 28 29 are designated by like letters in and are common to United States Patent No. 377,301. Herein the cross-slide 28 referred to has a rock-shaft 31 mounted in bearings therein. This rock-shaft 31 near its center has attached to it a dog *n*, the acting face of which, next the rear side of the slide 29, is recessed for the reception of a roll *n'*, the longer downturned arm of the said dog (see Fig. 8) being acted upon by a spring n^2, which normally acts to turn the rock-shaft 31 and keep the roll *n'* of the dog against the rear side of the slide 29. This rock-shaft, as shown best in Fig. 7, has at its opposite ends like finger-pieces 33.

It is well understood that the last to which the shoe is applied has one or more holes, into which is extended one or more pins at the lower end of the slide B^3.

After a top lift has been blinded upon the heel the slide 29 and clamp are elevated in the cross-slide 28, and the slide 29 is retained elevated by the action of the dog *n'* against it.

After a new heel has been put in a machine and a shoe to have a heel applied to it has been placed upon the usual last and the slide B^3 has been brought into proper position, then the operator pushes against one or the other of the finger-pieces 33, whichever may be nearest to him, turns the rock-shaft 31, and removes the dog *n'* from contact with the slide 29, permitting it to drop, it sustaining the weight of the shoe and last until the sole of the shoe meets the seat of the heel.

In the Patent No. 377,301 referred to the slide 29 was held up through the action of pawls engaging teeth at the rear side of the slide; but with such contrivances the pawls could engage the teeth of the slide 29 only when the slide was in a certain position; but the slide 29 could not always be held in exactly the proper position, because if the teeth were made very fine to thereby provide for fine adjustments they would be too small to be durable; but by reason of the dog herein described, which acts as a clutch, fine adjustments can be had.

As heretofore common in the so-called "McKay & Bigelow heeling-machine," the toggle-links employed in moving the die-bed spindle have been moved only after the rising of a lever having a shoulder, which, as the lever was lifted was brought within the range of a crank. Herein the toggle-links referred to at the points where they are connected together have attached to them a connecting-rod G, the rear end of which, through a usual box or cap to constitute a strap, surrounds a crank or eccentric G', (shown by dotted lines in Fig. 1,) forming a part of the main rotating shaft A'.

The shaft A' has keyed upon it a collar *o*, having extended from one side of it a hub *o'*, provided with cams or inclines, as best shown in Fig. 5, the said hub being long enough to enter a chamber in the inner side of the driving-wheel D^4, which is normally loose on the said shaft and which in practice runs constantly. The collar *o* at its inner side has two pins 50. (See Fig. 5.) The hub *o'* is surrounded by a loose clutch-collar D', having extended from one side of it a series of fingers D^2, (see Fig. 6,) the adjacent faces of which are concaved to receive between them and the hub *o'* a series of rolls o^3, (shown by dotted lines, Figs. 1 and 6,) the said rolls also extending through between the said fingers, so as at proper times to be brought in contact with the inner side walls of the chamber made in the constantly-moving driving or fly wheel D^4. The hub D' has also a projection, as 51, and next the flange part of the collar *o* the said hub has an annular groove, in which is placed two spiral springs 52, one end of each of the said springs being attached to a like pin or screw 53 of the said hub. When the collar D' is placed upon and so as to surround the hub *o'*, the pins 50, projecting from the collar *o*, enter the groove in the hub 51 at the rear ends of the springs 52, the springs being of sufficient strength, so that when the collar 51 is not held by a clutch-controlling device D, to be described, the said springs will normally turn the collar 51, and, through its fingers acting upon the rolls o^3, will move the said rolls upon the high parts of the cam projections of the hub *o'*, and will thereby cause the rolls to move outwardly between the fingers D^2 of the hub, coming forcibly in contact with the inner portion of the chamber made in the fly or driving wheel D, so that the said driving-wheel will, by clutching against the rolls, carry the collar and shaft A' with it, the shaft continuing to rotate with the said driving-wheel until the collar 51 is arrested, the arrest of the collar, causing the cam-hub to continue to rotate, bringing the rolls opposite the low parts of the cam-hub and releasing the rolls from contact with the driving-pulley, so that the latter is left entirely free or unclutched. The collar 51, the roll, and the cam-hub constitute a clutch which may be instantly engaged with or freed from the continuously-rotating pulley.

The shaft A^2 at its end opposite the cam-plate C^3 has an arm C^4, (best shown in Fig. 1,) which by an adjustable link C^5 is connected with a lever C^6.

The controlling-lever D, shown as of elbow shape, is fixed upon a rocker-shaft *p*, having bearings in the frame-work, the said shaft having fast upon it a cam n^6 and a collar n^7, a spring n^8 being connected at one end with the said collar and at the other end with one of the bearings for the rocker-shaft *p* or with some rigid part of the machine, so that the said spring normally acts to keep the cam n^6 against the upturned inner end (see Fig. 2) of the foot-treadle H, pivoted at H', the spring being of sufficient strength to lift the front end of the said foot-lever, and at the same

time throw the long or acting end of the controlling-lever D into position to be struck by the projection of the collar 51.

The controlling-lever D has extended from its short arm a pin 3, which stands across the path of movement of the holding-lever C^6, the said lever when pushed down, as will be described, through the action of the crank C^4 and link C^5, acting against the pin 3 to remove the acting end of the controlling-lever D from the path of movement of the projection 51 of the collar *o*, the lever C^6 being so operated just as the said projection arrives opposite the end of the lever D immediately at the completion of the first rotation of the shaft A′.

In operation as the toggle-link of the die-bed spindle is elevated to drive the nails farther through the heel and into the sole to attach the heel to the shoe the stud f^9 at the upper end of the link f^{10}, connected to the inner end of the hand-lever f^2, is moved to a position just beyond the point 48 of the cam-plate C^3. The nails having been driven during the first half-revolution of the main shaft, the latter shaft in its second half of its first rotation acts to break the toggle-joint and pull down the die-bed spindle, and in so doing the eye-like portion *f*, acting on the spring f^4, pulls down the link *f*′ at the other end of the lever f^2 and moves the latter lever so as to place the pin f^9 in the outer end, viewing Fig. 2, of the cam-slot f^{12}, this happening just before the die-bed spindle fully completes its first descent, the final movement of the spindle in this descent causing the pin f^9, acting in the outer end of the cam-slot f^{12}, to turn the rock-shaft A^2 and move the pin C′ toward the frame, thus turning the link C out of vertical position, causing the front end of the walking-beam A^4 and its attached parts, before described, including the slide B^3, to be lifted vertically for a distance substantially equal to the thickness of the top lift which is to be blinded onto the heel. During the first descent of the die-bed spindle the nail-box is lowered and removed from contact with the end of the heel which has just been nailed to the shoe, and the spring e^3 of the swing-plate then immediately acts to turn the swing-plate and top-lift holder, supplied, as before described, with a top lift, into position immediately above the nail-box, so that as the die-bed spindle next rises the top lift will be blinded upon the heel, the end of the heel occupying a position in a higher horizontal plane during the operation of blinding the lift upon the heel. As the rock-shaft A^2 is moved as described to effect the elevation of the front end of the walking-beam, the arm C^4, connected to the said rock-shaft, acts through the link C^5 to depress the controller-mover, shown as a lever C^6, far enough to act upon the pin 3 of the controlling device D and place its acting upper end out of the range of the projection 51 of the collar *o* just before the said projection arrives at the upper end of the said stop, and consequently the said collar *o* is not arrested, and the shaft A′ continues to rotate without stopping the die-bed spindle. During the first half of the second rotation of the shaft A′ the die-bed spindle is again elevated, this time to blind the top lift upon the heel, as stated. During the second ascent of the die-bed spindle the eye-like bolt *f*, acting against the nut f^7 of the rod *f*′, leaves the outer end of the hand-lever f^2, so that by the time the die-bed spindle is fully lifted the stud f^9 referred to stands at the left-hand side of the point 48 of the cam C^3, viewing Fig. 2, and during the second half rotation of the shaft A′, at which time the die-bed spindle is lowered, the said stud f^9 is caused to travel in the slot f^{12} toward the left-hand end thereof, viewing Fig. 2, and just before the die-bed spindle completes its second descent the said stud meets the cam-plate at the end of the said slot and acting against the cam-plate turns the rock-shaft A^2 into the position shown in Figs. 1 and 2, and in so doing the arm C^4 at the opposite end of the rock-shaft is lifted to raise to the controller mover or lever C^6 away from the pin 3, permitting the clutch-controlling device D to fall in the range of movement of the projection 51 of the collar *o*, thus stopping the collar and the shaft at the completion of the second rotation thereof with the die-bed spindle down. During these two rotations of the shaft A′ the heel has been nailed upon the shoe and the top lift has been blinded upon the heel, the machine running at a high rate of speed and without any intermission of motion.

The main shaft has applied to it a brake-wheel $H^\times$, which is acted upon by a brake-lever H^{10}, pivoted at H^2, the said lever having extended through it a bolt H^4, the head of which is extended into a stand H^6, (see Fig. 4,) where it is surrounded by a spiral spring H^5, a nut H^7 being applied to the bolt above the brake-lever, the rotation of the nut adjusting the strength of the spring and the effective force of the lever on the brake-wheel.

The end of the swing-plate (see Fig. 9) is notched, as at 21, to be engaged by a catch 22, attached to the breast end of the nail-box, the said catch locking the swing-plate in place when the top lift is being blinded upon the heel.

We claim—

1. In a heeling-machine, the following instrumentalities, viz: a last-holding slide, its last, means to place the last in different horizontal planes for the operation of nailing the heel to the shoe and then attaching the top lift to the heel, a nail-box, an automatically-operated swing-plate having an attached top-lift holder, nail-drivers, a die-bed spindle to actuate the drivers, a rotating shaft, connections between it and the die-bed spindle, a continuously-moving driving-wheel to rotate the said shaft intermittingly, a clutch between the said driving-wheel and shaft, and a clutch-controlling device and means to op-

erate it at stated intervals, substantially as described, whereby the rotating of the clutch and shaft are stopped as the said shaft completes two rotations, the heel being nailed to the shoe and the top lift being blinded thereon between the commencement of the first rotation of the shaft and the completion of the second rotation thereof, substantially as described.

2. In a heeling-machine, the die-bed spindle, its nail-box, the drivers, the swing-plate, its attached top-lift holders, the toggle-joint, the shaft having the crank G′, the link G, the normally-loose driving-wheel, the interposed clutch, and the clutch-controlling device, combined with the rock-shaft and connecting devices between it and the said clutch-controlling device to operate it automatically, whereby the clutch-controlling lever is made to arrest the clutch and release the wheel only after each two rotations of the said shaft and two ascents and descents of the die-bed spindle, substantially as described.

3. In a heeling-machine, a shaft, the clutch, the clutch-controlling device, the rocker-shaft *p*, having a cam, a spring to turn the said rocker-shaft in one direction, and the treadle to turn the rocker-shaft in the opposite direction, substantially as described.

4. In a heeling-machine, the main shaft A′, the die-bed spindle, a connecting-link between the said spindle and shaft, a wheel D^4, normally loose on the said shaft, a clutch, and a clutch-controlling device, combined with a treadle to move the said clutch-controlling device in one direction to start the rotation of the said shaft, and with a shaft, as A^2, link C^5, and lever C^6, actuated by the said shaft to operate the said clutch-controlling device automatically, substantially as described.

5. In a heeling-machine, the main shaft A′, the die-bed spindle, a connecting-link between the said spindle and shaft, a wheel D^4, normally loose on the said shaft, a clutch, and a clutch-controlling device, combined with a treadle to move the said clutch-controlling device in one direction to start the rotation of the said shaft, and with a shaft, as A^2, link C^5, and lever C^6, actuated by the said shaft to operate the said clutch-controlling device automatically, and with a brake-wheel and brake-lever, substantially as described.

6. In a heeling-machine, the top lift or swing-plate and pivoted lever-arms, combined with a plate carrying the fulcra of the said arms, and with arm-links and a slide-block *h* to engage and turn the said arms positively for a like distance in opposite directions, substantially as described.

7. In a heeling-machine, the top lift or swing-plate, combined with top-lift-holding arms having projections to serve as gages for the breast end of the top lift and having other gages to act against the side edges of the top lift between its breast and rear part, substantially as described, and with arm-turning devices by which to turn the said arms positively and equally in opposite directions, to operate substantially as described.

8. In a heeling-machine, the nail-box, the top lift or swing-plate, and the pivoted lever-arms, combined with a plate carrying the fulcra of the said arms, links, and a slide-block to engage and turn the said arms positively for a like distance in opposite directions, and with an adjusting device to adjust the relative positions of the arms longitudinally, substantially as described.

9. In a heeling-machine, the slide-bar 29 and the clamp carried by it, combined with the slide 28, the rock-shaft 31, and its attached dog having a roll *n′* to act against and hold the said slide-bar frictionally, substantially as described.

10. In a heeling-machine, the nail-box, the swing-plate pivoted with relation thereto, and pivoted holding-arms movable upon and with the swing-plate to hold a top lift, combined with a catch connected to the nail-box and adapted to engage and hold the said swing-plate in place while the latter is in position for blinding a top lift, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

CHARLES W. GLIDDEN.
ALVIN D. ELLIOTT.

Witnesses:
EDWARD W. HUTCHINGS,
WILBUR E. ROWELL.