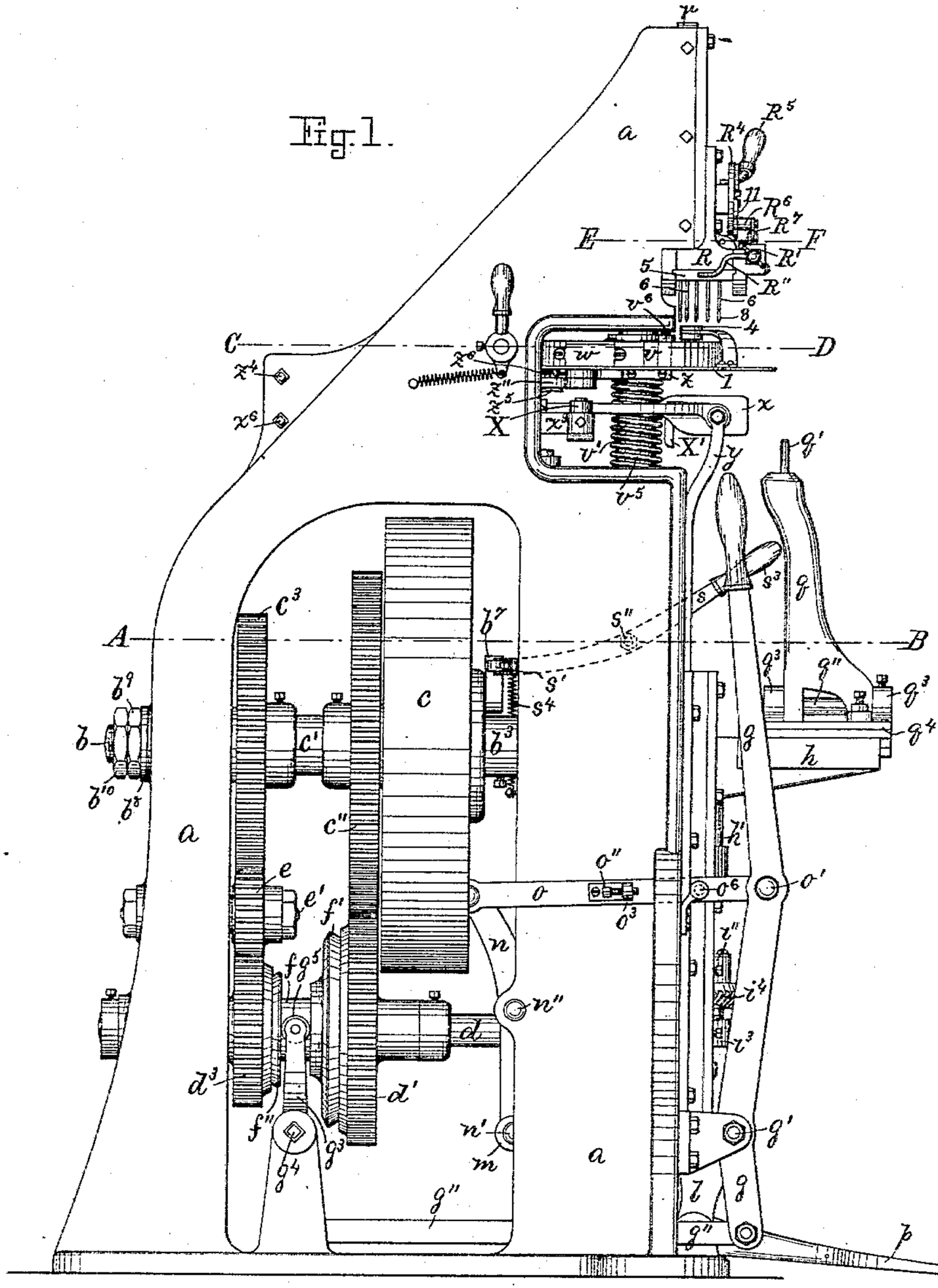
(No Model.) 4 Sheets—Sheet 1.

M. A. TYLER & E. MERRITT.

HEELING MACHINE.

No. 321,401. Patented June 30, 1885.

Fig. 1.



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(No Model.) 4 Sheets—Sheet 2.

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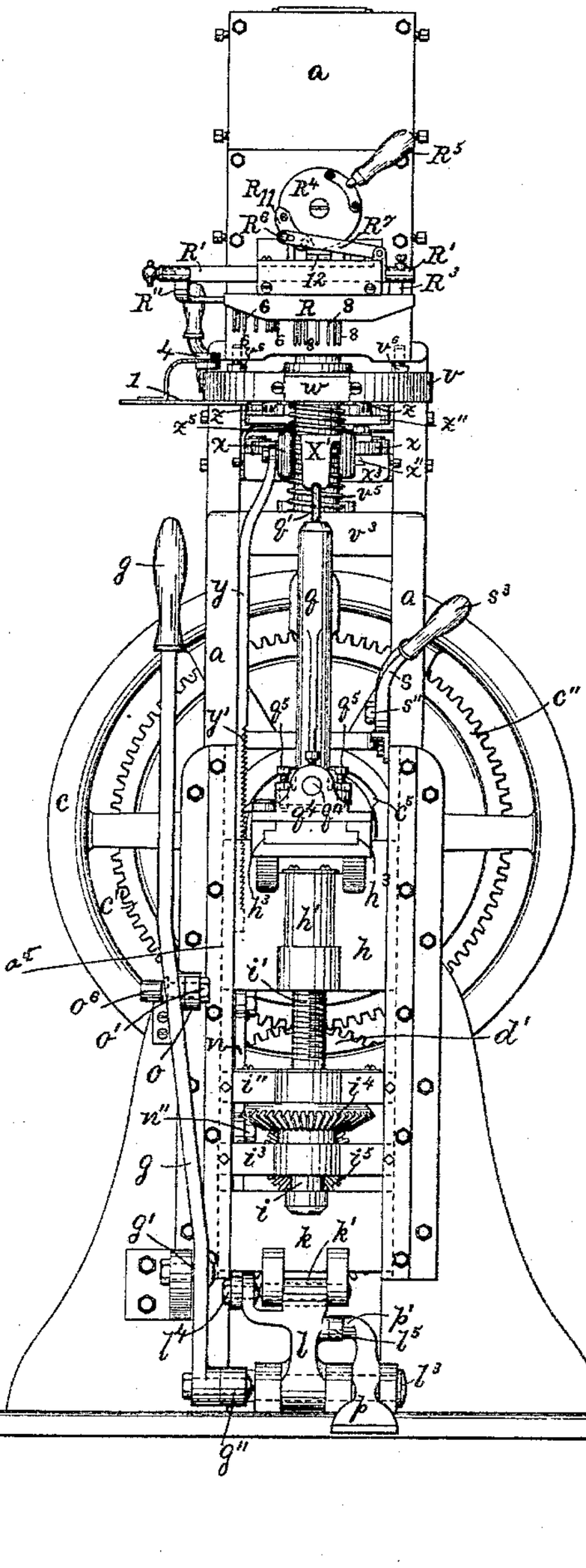
Fig 2.



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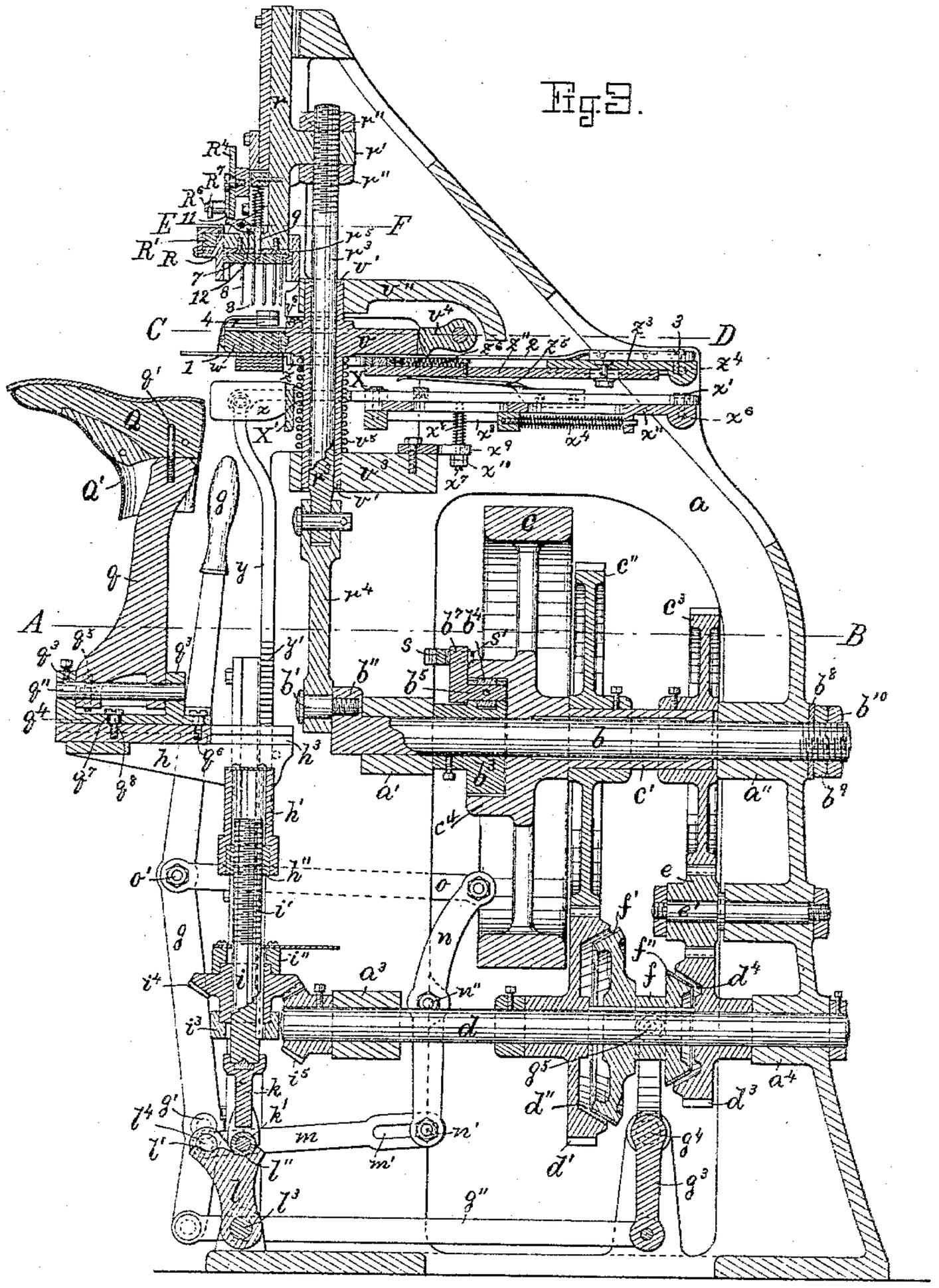
(No Model.) 4 Sheets—Sheet 3.

M. A. TYLER & E. MERRITT.

HEELING MACHINE.

No. 321,401. Patented June 30, 1885.

Fig. 3.



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(No Model.) 4 Sheets—Sheet 4.

M. A. TYLER & E. MERRITT.

HEELING MACHINE.

No. 321,401. Patented June 30, 1885.

Fig. 4.

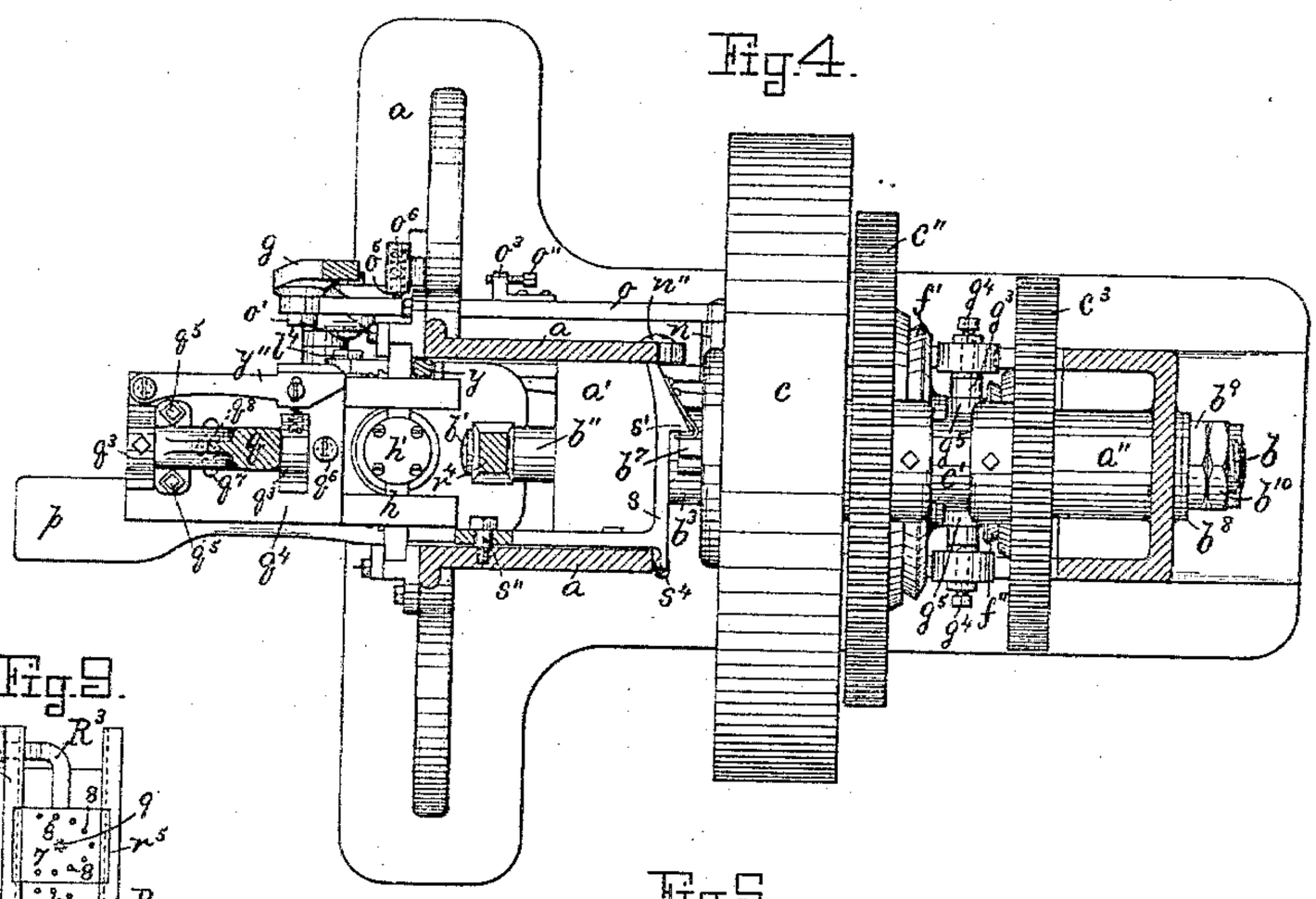


Fig. 9.

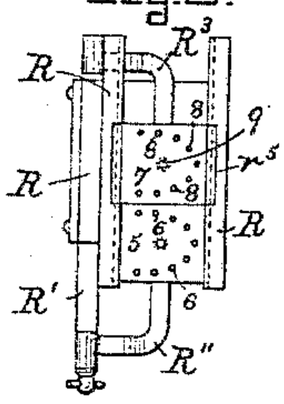


Fig. 5.

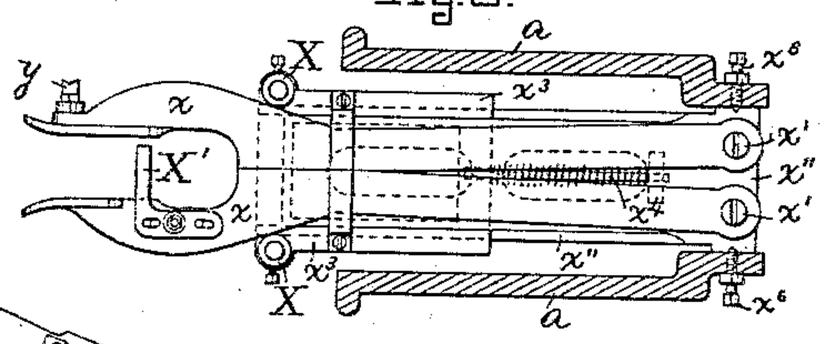


Fig. 10.

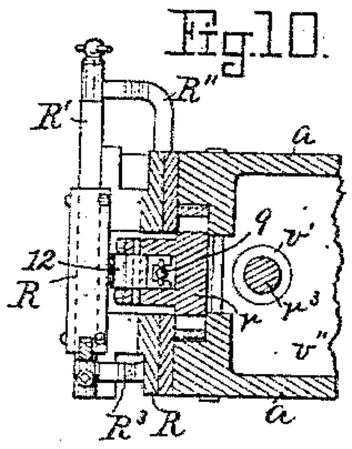


Fig. 6.

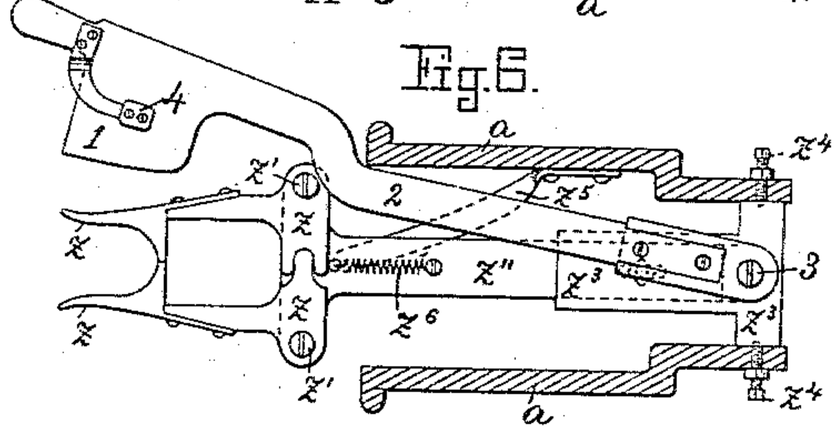


Fig. 8.

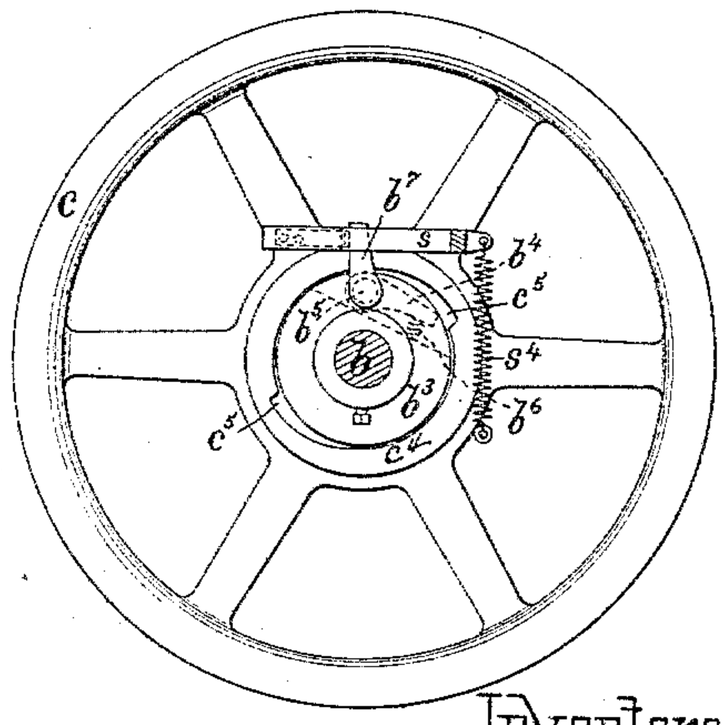


Fig. 7.

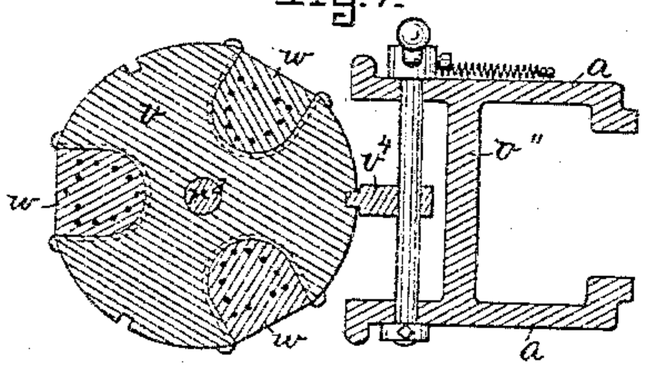
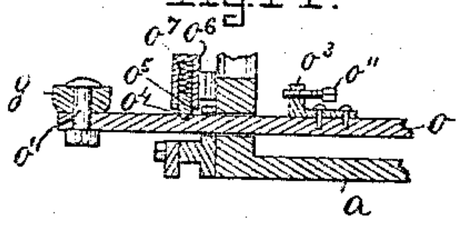


Fig. 11.



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by Urban Andrew

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UNITED STATES PATENT OFFICE.

MERRILL A. TYLER, OF NORTH EASTON, AND EDWARD MERRITT, OF BROCKTON, MASSACHUSETTS.

HEELING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 321,401, dated June 30, 1885.

Application filed July 17, 1884. (No model.)

To all whom it may concern:

Be it known that we, MERRILL A. TYLER, a citizen of the United States, residing at North Easton, in the county of Bristol and State of Massachusetts, and EDWARD MERRITT, a citizen of the United States, residing at Brockton, in the county of Plymouth and State of Massachusetts, have jointly invented certain new and useful Improvements in Heeling-Machines; and we do hereby declare that the same are fully described in the following specification, and illustrated in the accompanying drawings.

This invention relates to improvements in heeling-machines for the purpose of nailing the heels to boots and shoes while the latter are held on a wooden last-support on a jack, and also to secure a top lift to the heel without driving the nails through such top lift.

The features of the invention consist, first, in forcing the jack-last and slide upward with a gradual pressure, automatically or otherwise, against the heel held in lateral expansive clamps on the under side of the turret or heel-rest, such turret being capable of a revolution on its axis to bring any of the different sizes of forms above the jack and heel, according to the size of heel to be nailed, as hereinafter described and claimed; also, in laterally-sliding awl and driver blocks having respective awls and drivers adapted to be moved to and from a position directly below the plunger to be forced downward into the heel to perforate it and drive the nails into it and into the sole of the boot or shoe, as hereinafter described and claimed; also, in a jack having four motions, as follows: up and down to confine and release the boot, forward and back to allow the boot to be placed on the jack and removed from it, a rocking motion sidewise to allow the boot to be automatically centered by the boot-clamps in case the lasts should not be uniformly bored at the place where they are put on the jack peg or spindle, and a horizontal oscillating motion to adjust it for right and left boots, as hereinafter described and claimed; also, in a stop mechanism on the main shaft for the purpose of stopping the plunger always at the same place—that is, its extreme upper position—as hereinafter described and claimed; also, in a friction device for raising or lowering the jack and the boot supported therein; also, in a releasing mechanism operated by a foot-treadle for releasing the pressure on the jack pressure-screw previous to lowering the jack and shoe after being heeled, and also for the purpose of lowering the boot that has been heeled sufficiently to allow for the spanker top lift being placed above the heel in case the heel is to be finnished with a top lift, as hereinafter described and claimed; also, in a device for clamping and centering the rear end or heel-seat of the boot, as well as a device for clamping and centering the heel previous to attaching the latter to the former, as hereinafter described and claimed; also, in the construction and arrangement of the top-lift spanker, by which a minimum of lateral motion is required in its operation to move it directly under and to one side of the drivers; and also in a device for holding the awl or driver plates in their proper positions centrally below the plunger while the drivers or awl are in operation, as hereinafter described and claimed; also, in a device to regulate the amount of friction on the friction-clutch for elevating the jack, as hereinafter described and claimed, reference being had to the accompanying drawings, where—

Figure 1 represents a side elevation of the machine. Fig. 2 represents a front elevation of the same. Fig. 3 represents a central longitudinal section of the machine. Fig. 4 represents a cross-section on line A B in Figs. 1 and 3. Fig. 5 represents a detail plan view of the boot-clamping device. Fig. 6 represents a detail plan view of the heel-clamping device and top-lift spanker. Fig. 7 represents a cross-section on line C D in Figs. 1 and 3. Fig. 8 represents a detail view of stop-motion for awls and drivers. Fig. 9 represents a bottom view of awls and drivers and their guides. Fig. 10 represents a cross-section on line E F in Figs. 1 and 3. Fig. 11 is a sectional detail view of the spring-stop for the pressure-lever.

Similar letters refer to similar parts wherever they occur on the different parts of the drawings.

On the drawings, *a a* represent the general frame of the machine, having bearings *a'* and *a''*, for the driving-shaft *b*, on which is loosely

supported the driving-pulley and balance-wheel *c*, provided with a hollow-sleeve, *c'*, that fits loosely on the shaft *b*, and to which sleeve are secured the gear-wheels *c''* and c^3. Below the shaft *b* is located, in bearings a^3 and a^4, the shaft *d*, to which the gradual friction mechanism is applied to raise and lower the jack and to force the latter and its last and shoe with a gradual pressure against the heel held on the under side of the turret or heel-rest. To the shaft *d* is loosely journaled the gear-wheel *d'*, meshing into the gear-wheel *c''*, and provided on its side with an annular conical clutch-recess, *d''*. A smaller clutch-gear, d^3, is also loosely journaled to shaft *d*, a proper distance behind the gear *d'*, and, like it, it has on its side an annular conical clutch-recess, d^4. The gear d^3 meshes into the intermediate gear, *e*, running loosely on stud or spindle *e'*, said gear meshing into the teeth of the gear-wheel c^3.

On the shaft *d* is splined the hub *f*, having cast in one piece with it the larger friction-clutch *f'*, provided with the usual leather or other suitable lining, which, when forced against the clutch recess *d''*, will cause the shaft *d* to rotate, and, by its intermediate connecting mechanism to the jack-support, will cause the jack and its wooden last and shoe, held thereon, to be forced with a gradual pressure against the under side of the heel, held against the turret.

To the rear end of hub *f* is cast the smaller friction-clutch *f''*, also provided with an exterior friction-lining, as usual, which, when forced against the clutch-recess d^4, will cause the shaft *d* to rotate in an opposite direction, with an increased speed, to lower the jack and its support. The hub *f* is longitudinally adjustable on shaft *d*, and is manipulated forward and back to bring either of the clutches in operative positions, or neither of them, by means of lever *g*, hinged at *g'* to front of frame *a*, and provided in its lower end with link *g''*, hinged in its rear end to the rock-lever g^3, that is supported on the fulcrum-pin g^4, and forked in its upper end to embrace the hub *f* between the clutches *f'* and *f''*, and provided in such upper end with anti-friction rollers g^5. (Shown in dotted lines in Fig. 3.)

h is the jack-supporting frame, that is movable up and down in the guides a^5 a^5, that are secured to the front of the machine, as shown in Fig. 2. The under side of frame *h* is made in the form of a hollow post or tube, *h'*, having a nut, *h''*, secured to it or cast in one piece with it.

i is the vertical pressure-shaft for raising and lowering the jack, and its upper end has an external screw-thread, *i'*, fitting into the screw-threaded nut *h''*, as shown in Fig. 3. The pressure-shaft *i* is guided in stationary bearings *i''* i^3, secured to front of machine, and between them, splined on the said shaft, the bevel-gear i^4, meshing into the teeth of the bevel-gear i^5, secured to front end of clutch-shaft *d*, as shown in Fig. 3. The lower end of shaft *i* rests in a cup-bearing in the vertically-adjustable block *k*, that is slightly movable in the guides a^5 a^5, and is provided in its lower end with a roller, *k'*, adapted to rest in either of the two curved recesses *l'* *l''* in the step *l*, which is hinged in its lower end at l^3 to the main frame of the machine and jointed in its upper end at l^4 to the link *m*, having a slot, *m'*, in its rear end that embraces a pin or screw, *n'*, on the lower end of rock-lever *n*, such rock-lever being supported on the stationary fulcrum-pin *n''*, and jointed in its upper end to the link *o*, the forward end of which is hinged at *o'* to the clutch-operating lever *g*, as shown in Fig. 3, by which arrangement the step *l* is swung to the rear sufficiently to cause the roller *k'* to rise up the incline toward the outer recess, *l'*, and thereby cause the block *k*, shaft *i*, and jack-supporting frame *h*, with its jack, last and shoe, to be raised slightly during the commencement of pulling the clutch-lever *g* outward, and by a further motion of said lever in the same direction the clutch-wheel *f'* is brought to bear against the recess *d''* in wheel *d'*, by which and the driving-gear *c''* the shaft *d* is set in a rotary motion, causing the screw-shaft *i i'* to rotate, and thereby raising the jack-support with a gradual pressure, in a manner and for the purpose as set forth.

The object of forcing the jack upward with a gradual pressure, instead of a blow, is to be able to utilize an ordinary wooden last without injury to it, which would be the case if the same pressure were obtained by a sudden blow.

After the desired upward pressure on the jack is obtained by the friction-clutch mechanism, as described, the lever *g* is moved back sufficiently to disengage the clutch *f'* from wheel *d'*, and this can be done without changing the position of step *l* on account of the slot *m'* in link *m*.

After the heel has been punched and nailed, as will hereinafter be described, the jack and its support *h* is lowered at first by foot-pressure on treadle-lever *p*, that is hinged at l^3, and provided with a peg, *p'*, that strikes a projection, l^5, on step *l*, and thus causes the latter to swing outward sufficiently to permit roller *k'* to drop into lower recess, *l''*, by which the block *k*, shaft *i*, with the jack-support *h*, are correspondingly lowered and the upward pressure on such parts relieved, and the jack withdrawn and the shoe removed, and replaced by another, after which the lever *g* is thrown backward, causing the friction-clutch *f''* to engage with clutch-recess d^4 on wheel d^3, by which the shaft *d* is turned in an opposite direction by the influence of gears c^3 *e*, and by the bevel-gears i^4 i^5, the screw-shaft *i i'* is turned to feed the jack-support downward the required distance.

q is the jack, having pin or peg *q'* in its upper end, adapted to be inserted in a hole in the wooden last Q, that carries the shoe Q', as shown in Fig. 3. Besides its up-and-down motion, the jack *q* has three additional motions—namely, forward or back, to enable the shoe to be put on, the jack and shoe to be moved

in positions for nailing the heel, and to be withdrawn when finished. The second motion is a rocking motion sidewise, to compensate for inequalities in position of the peg-hole in different lasts; and the third motion is a horizontal swinging motion, to enable the heel of the shoe to be placed in proper position in relation to the awls and drivers, according to whether the shoe is a left or right one. To accomplish this the jack q is hinged in its lower end by means of pin or shaft q'' to bearings q^3 q^3, attached to or cast in one piece with plate q^4, and by this means the jack may be rocked sidewise, and is limited in such rocking motion by means of adjustable stop set-screws q^5 q^5, passing through ears or projections at the sides of the jack, as shown in Fig. 2, and causing their lower ends to strike against top of plate q^4 as the jack is rocked in either direction to its desired limit. The plate q^4 is made to slide to and from the machine in guides h^3 h^3 on the jack-support h, as shown in Figs. 2 and 3, by which the back-and-forward motion of the jack is obtained. The horizontal swinging motion of the jack is obtained by having the forward part of the base of the jack hinged or pivoted by means of screw q^6 to the sliding plate q^4, and provided in its outer end with a curved slot, q^7, as shown in Fig. 4, into which passes the head of screw q^8, secured to plate q^4, by which means such horizontal swinging motion is limited.

r is the plunger, carrying the awl and driver blocks, such plunger being movable up and down in vertical guides in the head of the machine, and provided on its rear with an ear, r', to which is secured, by means of the adjustable check-nuts r'' r''', the upper end of the shaft r^3, the latter passing through the hollow sleeve v' of the turret v, and having hinged to its lower end the connecting-rod r^4, the lower end of which is hinged to crank-pin b' on crank b'', secured to shaft b, as shown in Fig. 3, by which arrangement a vertical motion is imparted to plunger r during the revolution of shaft b; but it is essential that the plunger and its awl and driver blocks should be returned to and held in its upper position (shown in Fig. 3) at all times, except when it is in the act of perforating the heel and driving the nails into said heel, and for this purpose we use, in connection with it, the automatic stop mechanism, as follows: To the shaft b is secured a block, b^3, projecting into the hollow hub c^4 of the pulley c, the interior of which hub is provided with one or more notches or locking-recesses, c^5 c^5, as shown in Fig. 8. In a groove in block b^3 is located the locking-pawl b^4, attached to a pin, b^5, having bearings in said block b^3, and said locking-pawl b^4 is forced into a locked position with one of the recesses c^5 by the influence of the pressure-spring b^6, as shown in dotted lines. To the outer end of pin b^5 is secured a secondary pawl or dog, b^7, which is caused to come in contact with a tooth, s', on the lever s, that is hung at s'' to the front of the frame of the machine, and provided with a handle, s^3, in its outer end, as shown in Figs. 1 and 2; and when the dog b^7 strikes the tooth s' on lever s it causes the pawl b^4 to be tripped on its fulcrum and disengaged from its locking-recess c^5 in hub c^4, as shown in Fig. 8, and allows the pulley c to continue its rotation without imparting rotary motion to the shaft b, the latter having a certain amount of frictional resistance to overcome by means of the friction-washer b^8, located between the outer end of bearing A'' and the tightening-nut b^9, screwed on rear end of said shaft b.

b^{10} is a set-nut, screwed on rear end of shaft b, to hold nut b^9 in place and prevent it from getting loose. The normal position of lever s is shown in Figs. 2 and 8, and in such portion of it its tooth s' is held against the dog b^7 by the influence of a suitable spring, s^4, or equivalent means, and during such normal position of lever s and the pawls b^4 b^7 the shaft b remains stationary, although the drum c rotates. Thus it will be seen that to cause the plunger to descend and afterward return to its normal highest position it is only necessary to depress lever s and disengage its tooth s' from contact with dog b^7, when the latter is tripped by influence of spring b^6, causing the pawl b^4 to be forced into the nearest recess c^5 in hub c^4, and thus lock the shaft b and pulley c together until a revolution of the latter is made, when the pawl-locking mechanism is again tripped by the tooth s' on lever s, and so on. v is the turret, attached to the hollow sleeve v', that is free to turn around its axis, and to yield slightly downward in suitable bearings, v'' v^3, on the frame of the machine. The rotary motion of said turret is for the purpose of placing it in position according to the die that is to be used, and its yielding motion downward is to permit the turret to descend while in the act of spanking a top lift on the nailed heel. The turret is held in position while in use by means of the hinged locking-pawl v^4, adapted to lock into suitable recesses on the outer periphery of said turret or in a suitable manner.

Between the under side of turret v and its lower bearing, v^3, is located around the sleeve v' the coiled spring v^5, which normally holds the upper surface of the turret against the regulating-screws v^6, screwed into the lower part of bearing v'', as shown in Figs. 2 and 3. The spring v^5 permits the turret to yield slightly downward, while the top-lift spanker is placed in operative position on the turret while in the operation of securing the top lift. w w are the nail-dies attached in a suitable detachable manner to the turret, and secured thereto by means of set-screws or other means.

x x represent the boot-clamps for centering and holding the rear of the boot in position while in the act of perforating and nailing the heel to it, such clamps being pivoted in their rear ends at x' x' to the block x'', on which the guide-piece x^3 is made to slide forward and back and forced automatically forward by means

of spring x^4 or a weight. The block x'' is journaled on horizontal fulcrum-pins x^6 x^6, screwed through ears on the frame a, to permit the block x'', guide x^3, with the boot-clamps x x, to move up and down to prevent the last from being lifted off its jack-peg while the jack is descending. The up-and-down motion of clamps x x is limited by means of pins x^7 x^7, secured to guide-piece x^3, and having on them coiled springs x^8 x^8, guided in their lower ends in perforation, in the stationary rest x^9, secured to frame a, and provided on their lower ends with stop-nuts x^{10}, as shown in Fig. 3. The guide-piece x^3 has in its outer end a pair of guide-rollers, X X, which act on the outside of the boot-clamps to close them upon the shoe while the latter is placed between them and forced backward against the adjustable gage X', secured to one of the clamps. One of the clamps x has hinged to it a downwardly-projecting rod, y, having ratchet-teeth y' in its lower end, as shown in Fig. 2, adapted to lock with a spring-pawl, y'', on the sliding plate to which the jack is hinged, so as to cause the latter, when forced upward into nailing position, to be locked to the boot-clamps for the purpose of lowering the boot-clamps when the jack is lowered, and thereby preventing the last from getting off the jack-peg, as described.

z z, Fig. 6, are the expansive heel-clamps located directly below the turret v, and pivoted at z' z' to the bar z'', that is adjustably connected in its rear end to the pivot-blocks z^3, that is pivoted on the horizontal set-screws z^4 z^4, secured to ears on frame a, so as to permit said heel-clamps to yield downward when the spanker-plate is inserted between under side of turret v and top of heel-clamps. The bar z'' is held upward against the turret (or spanker-plate, when inserted) by means of a spring, z^5, secured to the frame a or in any other suitable manner. The rear inner ends of the heel-clamps z z are toothed together, as shown in Fig. 6, and connected at such place by means of a spring, z^6, to the bar z'' to automatically cause the said clamps to close upon and hold the heel or top lift when inserted between them.

1 is the spanker-plate, attached to or made in one piece with rod or arm 2, that is hinged in its rear end, by means of pin or screw 3, to the pivot-block z^3, and being hinged in this manner back of the turret it can be swung out and into position relative to the drivers with a less motion as compared to machines in which the spanker-plate is pivoted directly to the turret or its axis. In its forward end the spanker-plate 1 has a handle for the operator to take hold of when operating it, and to such handle is connected a yielding spanker-block, 4, projecting above the turret v, and adapted to be moved above it centrally with the nail-die w that is in use, and to receive the blow upon it from the descending plunger when the driver-plate is placed above such spanker-block and the machine is used for driving and securing a top lift to the projecting heads of the nails on the heel, and during such operation the spanker-plate is swung into position below the nail-die w between the turret and the top lift that is held between the expansive heel-dies.

r^5 in Fig. 3 is a grooved plate secured to bottom of plunger r, and to the front of the machine is secured a bracket, R, having similar grooves on its under side, such grooves being located in a line with the aforesaid grooves in the plunger-plate r^5, and made to correspond in size and shape with the latter. Midway on the under side of bracket R is a rectangular opening to permit the plunger-plate r^5 to pass through it, with either driver or awl blocks locked to it.

5 represents the driver-block, with its downwardly-projecting drivers 6 6; and 7 represents the awl-block, with awls 8 8 attached to it, as shown in Fig. 9. Both of said blocks have tongues on their sides to fit into the side grooves in the lower part of bracket R and plunger-plate r^4, so that either of the driver or awl blocks may be moved from the grooves in bracket R to the grooves in plate r^4, or vice versa. In a guide in front of bracket R is located the laterally-adjustable bar R', to the ends of which are secured in a suitable manner the bent fingers R'' R'', the inner ends of which lie in contact with the outer ends of driver and awl blocks, respectively, and said bar R' is moved forward and back in its guides by means of the crank-plate R^4, provided with a handle, R^5, as shown in Fig. 2, such plate having secured to it a crank-pin, R^6, passing through a slot in the end of link R^7, the outer end of which is jointed to the bar R', and by turning the crank-plate R^4 to the right or left one or the other of the blocks 5 and 7 is moved into the grooved plunger-plate r^4 and centered in such a position by means of the vertically-operated rod 9, the lower end of which projects through the bottom of the plunger r into a tapering recess in the top of the respective awl and driver blocks, such rod being normally held downward by a spring and raised by a cam, 11, on the crank-plate R^4, acting on a rock-lever, 12, hinged to the plunger and having its inner end forked to embrace rod 9 below a pin or collar on which the spring rests, as shown in Figs. 3 and 10.

The object of slot in the inner end of link R^7 is to permit the cam 11 to depress the lever 12 and liberate the rod 9 from the tapering recess in the awl or driver blocks previous to moving them in or out of position. The link o is provided on its side with an adjustable stop-screw, o'', adapted to stop against any desired portion of frame a to limit and regulate the pressure on friction-clutch d'' when the lever g is brought to the extent of its forward motion, by which a too great pressure is prevented between the turret heel and shoe as the lever g is brought forward. By turning the stop-screw o'' in its screw-threaded bearing-bracket o^3 any desired adjustment of such pressures may be obtained.

To hold and temporarily lock the lever *g* in such a position that none of the friction-wheels *f' f''* shall be operative, we make on the link *o* a recess or perforation, o^4, into which is automatically forced the outer end of a pin, o^5, located in a sleeve, o^6, secured to frame of machine, and having a spring, o^7, in said sleeve back of the pin o^5 to force the latter outward into the recess o^4 when the lever *g* reaches its midway position, for the purpose set forth.

To operate the machine, we proceed as follows: The heel is first put between the heel-clamping jaws and up against the nail-die on the under side of the turret. The wooden last that carries the shoe is then put upon the peg or pin of the jack, and the latter, with the last and shoe, is pushed back until the rear of the boot is properly centered between the boot-clamping jaws, and the heel portion of the shoe will then be placed in proper position below the nail-die in the turret, and its rear end resting against the gage on the boot-clamping jaws, and the jack may be turned a little to right or left if the boot is a right or left one. The operator then grasps the lever *g* and pulls it toward himself, causing the rocker *l* to raise the jack and shoe about nine-sixteenths of an inch, and by a further motion of said lever *g* in the same direction the large friction-wheel *f'* will be brought against the friction-clutch *d''*, by which and the connecting mechanism to the jack-support, as described, the latter is forced upward with a gradual pressure and the rear end of the boot forced against the under side of the heel until the required pressure is obtained, when the friction-clutch will slip, and the lever *g* pushed back to its stop, and the friction-clutch released to keep the shaft *d* stationary. The awl-block is then moved into its position in the grooved plate underneath the plunger by swinging the handle R^5 on crank-plate R^4 to the right, and the handle of lever *s* depressed, by which and the connecting mechanism, as described, the pulley *c* and shaft *b* are locked together, causing the plunger, with the awl-block, to descend, so that the awls will perforate the heel, and the plunger and awl-block to return to their upper normal positions. The handle R^5 on crank-plate R^4 is then moved to the left, causing the awl-block to be moved out of position and the driver-block to be moved into the position on the plunger first occupied by the awl-block. The loader, filled with nails, is then placed in the recess on the turret above the nail-die and the nails discharged into the perforations made in the heel by the awls, after which the loader is removed and the handle on lever *s* depressed, by which the plunger and its driver-block and drivers descend to drive the nails in a manner as described.

If the shoe is to be of the kind termed a "face or surface nailed heel," the drivers are to be made long enough to come just through the nail-die, and the shoe-heel is nailed on with one operation, after which the operator depresses the treadle-lever *p* by foot-pressure thereon, by which the upward pressnre on the jack, shoe, and heel is relieved, and by pressing lever *g* backward the jack is lowered by the friction-wheel *f''* acting on clutch-wheel d^4 sufficiently to remove the last and its shoe and replace it with another, and so on.

If the shoe-heel is to be of the kind termed a "blind-heel"—that is, with the nails not showing through the top lift—we use a gang of drivers about one-eighth of an inch shorter than the face-heel drivers above mentioned, and the nails driven will project above the heel about one-eighth of an inch, after which the jack is lowered sufficiently to place a top lift above it, between the heel-clamps, and the top lift spanker-plate 1 is swung in operative position between the under side of turret and upper side of top lift, with its yielding block 4 placed above the turret and directly below the plunger. If the plunger is now made to descend, as it strikes the block 4 it will cause the turret to yield slightly downward against its supporting spring, and thereby force the top lift on the projecting heads of the nails, which enter about half way (more or less) into the under side of the top lift, leaving its upper surface blind—that is, without any nails in sight. The shoe is then ready to be lowered and removed, and the spanker-plate swung out of place to the left, and so on.

Having thus fully described the nature, construction, and operation of our invention, we wish to secure by Letters Patent, and claim—

1. In a heeling-machine, the jack *q*, operated up and down by a gradual friction-pressure device, in combination with the hinged step *l*, having the upper notches, *l' l''*, and the releasing-treadle *p*, as and for the purpose set forth.

2. In a heeling-machine, the jack *q*, operated up and down by means of a friction-clutch device and intermediate connecting mechanism, in combination with the lever *g*, link *o*, and its adjustable stop *o'' o³*, for regulating the amount of pressure, so that the clutch shall slip when the desired upward pressure on the jack is obtained, substantially as described.

3. In a heeling-machine, the block *x''*, horizontally pivoted to swing up and down, in combination with the laterally-expansive boot-clamps *x x*, pivoted at their rear ends to the block *x''* to move horizontally, whereby an automatic vertical movement of said clamps may take place as the jack and shoe are lowered, substantially as described.

4. In a heeling-machine, the laterally-expansive and vertically-adjustable boot-clamps *x x*, combined with toothed rod *y* and pawl *y''* on the jack-support to prevent the last and jack from being disengaged when the latter is lowered, as set forth.

5. In a heeling-machine, the combination, with the spanker-plate, constructed substantially as set forth, of a supporting-frame horizontally pivoted to swing up and down, and expansive and automatically-closing heel-clamps

pivoted to said supporting-frame, whereby an automatic vertical movement of said clamps will take place while introducing the said spanker-plate above the clamps, substantially as described.

6. In a heeling-machine, the combination of turret *v*, and expansive heel-clamps *z z*, with the spanker-plate 1, pivoted in its rear end at a point back of the turret *v*, for the purpose of enabling it to be swung out of or into position with a minimum of motion, as set forth.

7. In a heeling-machine, the laterally-expansive and vertically-adjustable boot-clamps *x x*, as described, combined with the adjustable shoe-gage X′, for the purpose set forth.

8. In a heeling-machine, the vertically-adjustable jack-support *h*, its pressure-screw *i i′*, and vertically-adjustable supporting-block *k k′*, combined with the step *l*, and its two notches, *l′ l″*, the connecting mechanism to lever *g*, and the friction-clutch mechanism to permit the jack-support *h* to be released and lowered independent of the friction-clutch mechanism, as set forth.

9. In a heeling-machine, the crank-plate R^4, with its handle R^5, and cam 11, combined with the tripping-lever 12, and yielding locking-pin 9, adapted to lock into and be released from the recesses in the respective awl and driver blocks 7 and 5, as set forth.

10. In a heeling-machine, the combination, with clutch-shaft *d*, provided with gear i^5, and shaft *i*, provided with gear i^4, of the lower pivoted step, *l*, formed with notches *l′ l″*, and side projection, l^5, the blocks *k*, connected with shaft *i*, pivoted treadle-lever *p*, and its side projection, *p′*, and lever *g*, substantially as described.

In testimony whereof we have affixed our signatures in presence of two witnesses.

MERRILL A. TYLER.
EDWARD MERRITT.

Witnesses:
ALBAN ANDRÉN,
HENRY CHADBOURN.