(No Model.) 9 Sheets—Sheet 1.

J. CHANTRELL.

STAPLE FORMING AND CLINCHING MACHINE.

No. 405,342. Patented June 18, 1889.

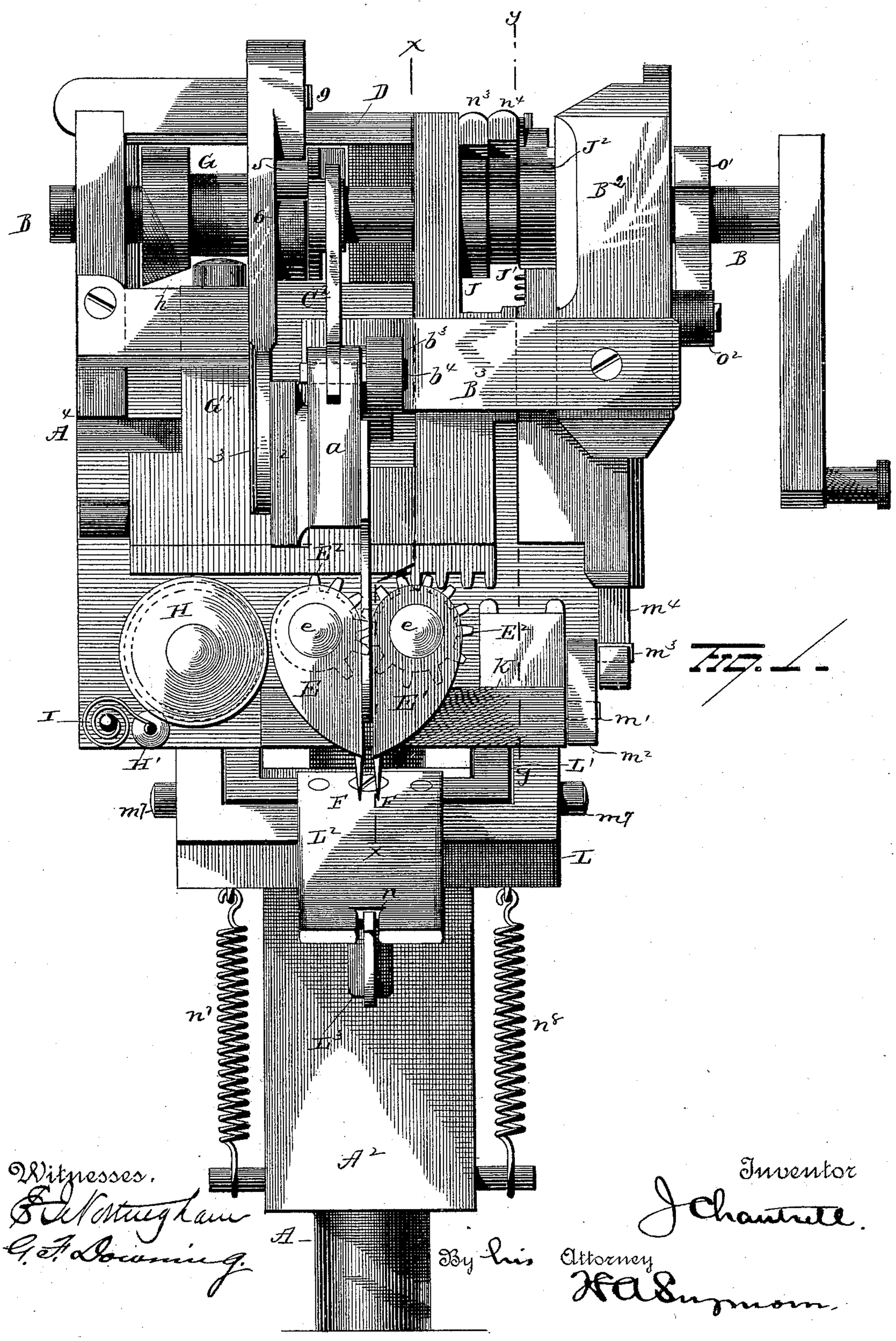

FIG. 1.

Witnesses.
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(No Model.) 9 Sheets—Sheet 2.

J. CHANTRELL.

STAPLE FORMING AND CLINCHING MACHINE.

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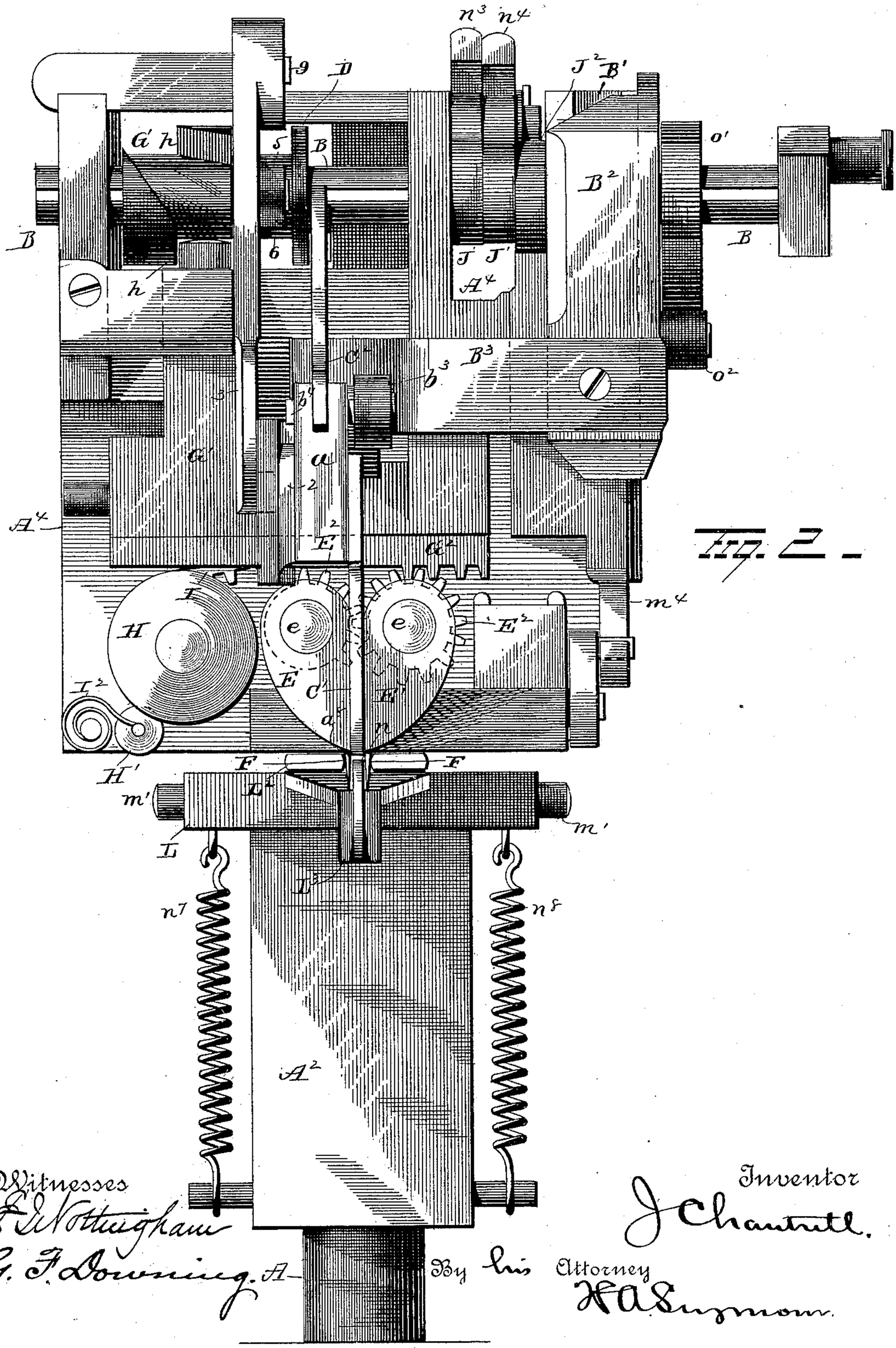

FIG. 2.

Witnesses
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(No Model.) 9 Sheets—Sheet 3.

J. CHANTRELL.

STAPLE FORMING AND CLINCHING MACHINE.

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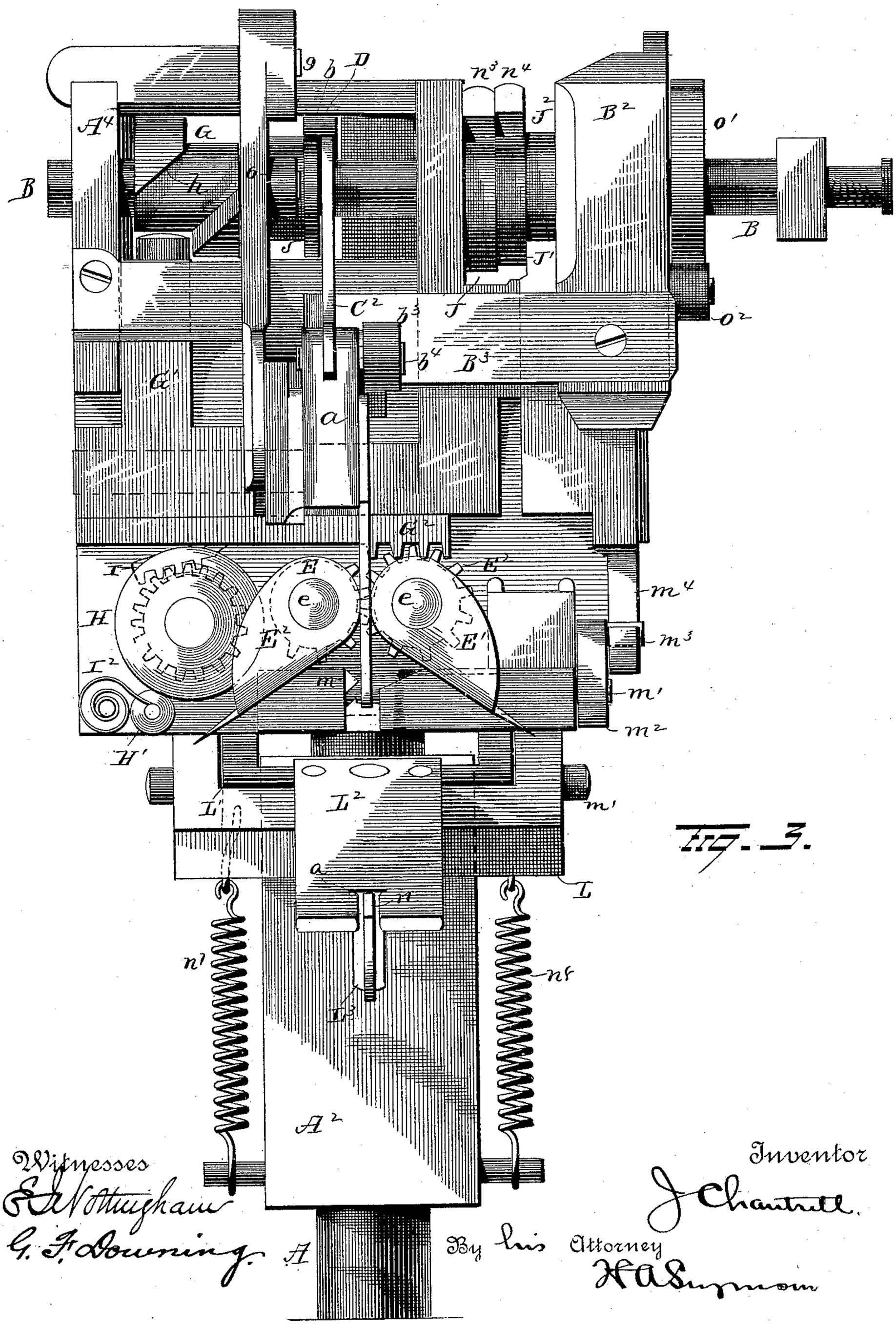

FIG. 3.

Witnesses
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(No Model.) 9 Sheets—Sheet 4.

J. CHANTRELL.

STAPLE FORMING AND CLINCHING MACHINE.

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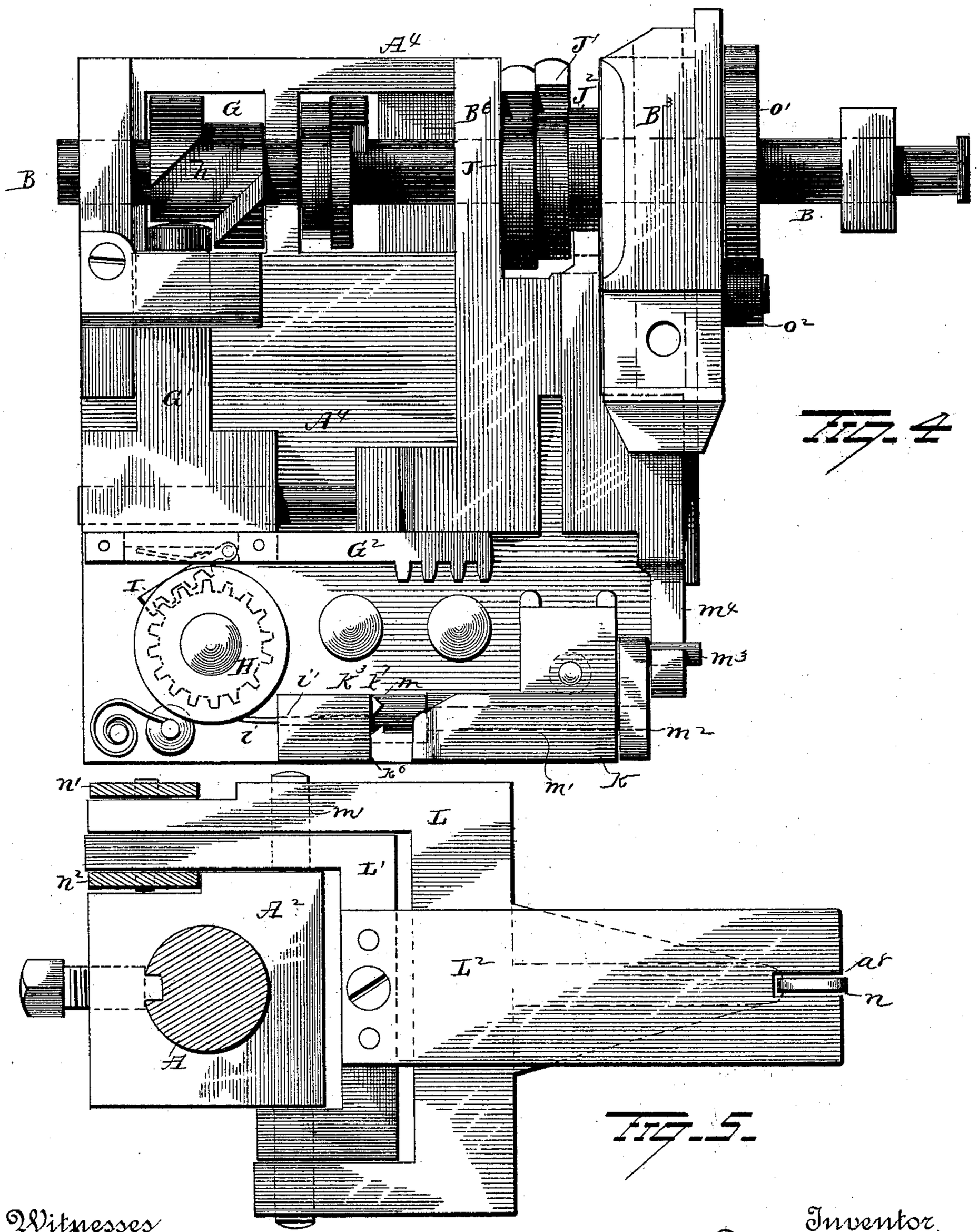

Fig. 4

Fig. 5.

Witnesses
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(No Model.) 9 Sheets—Sheet 5.

J. CHANTRELL.

STAPLE FORMING AND CLINCHING MACHINE.

No. 405,342. Patented June 18, 1889.

FIG. 1.

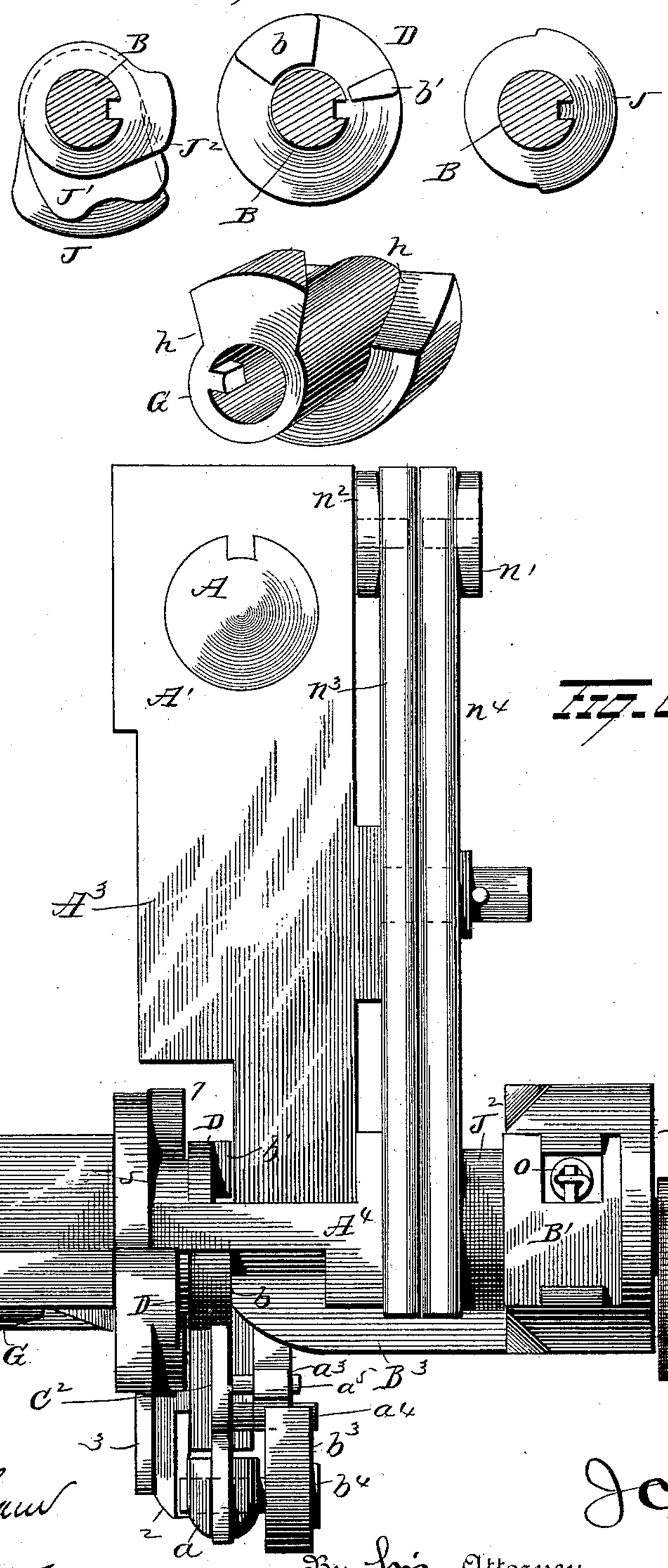

FIG. 6.

Witnesses,
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(No Model.) 9 Sheets—Sheet 6.

J. CHANTRELL.

STAPLE FORMING AND CLINCHING MACHINE.

No. 405,342. Patented June 18, 1889.

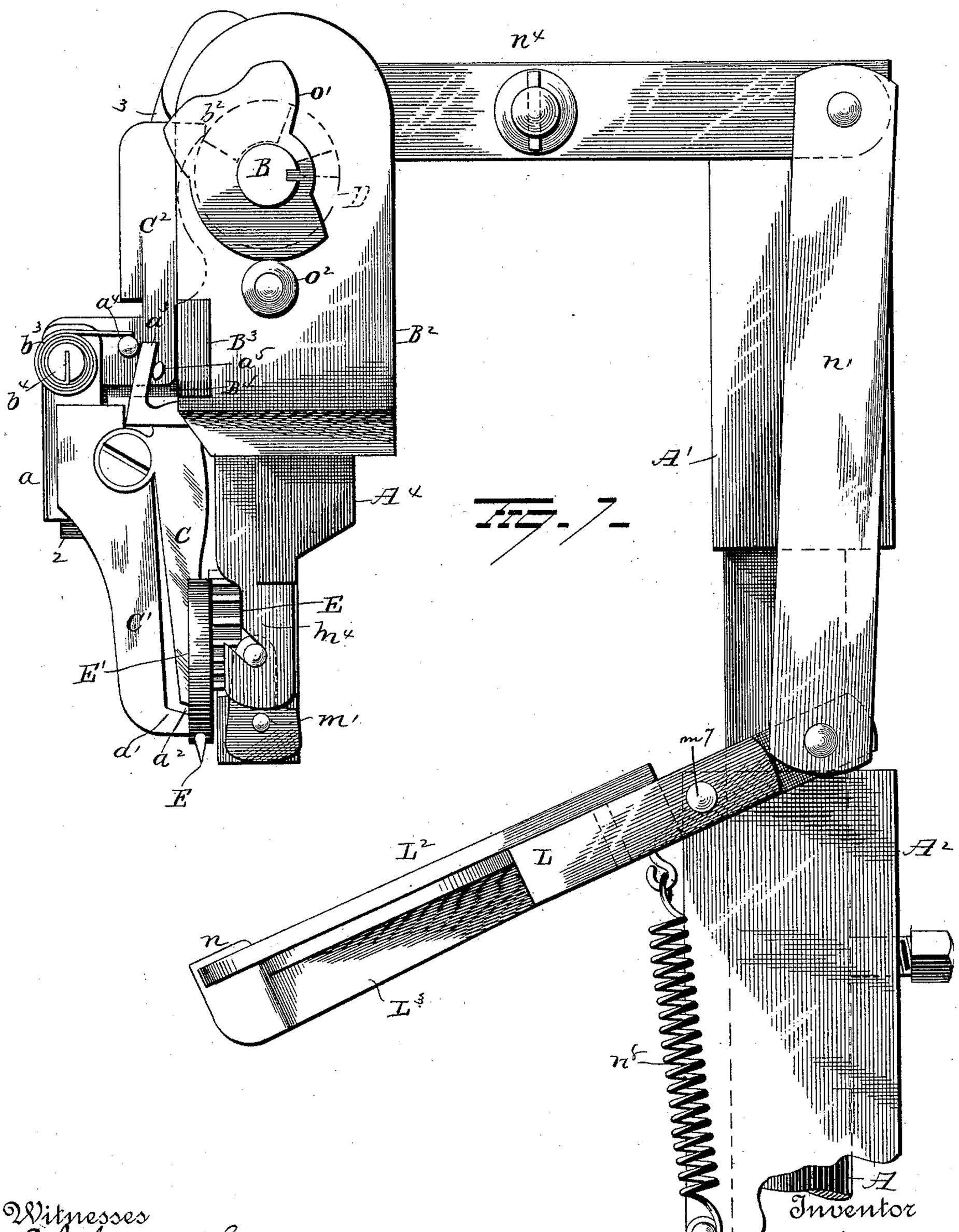

FIG. 1.

Witnesses
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STAPLE FORMING AND CLINCHING MACHINE.

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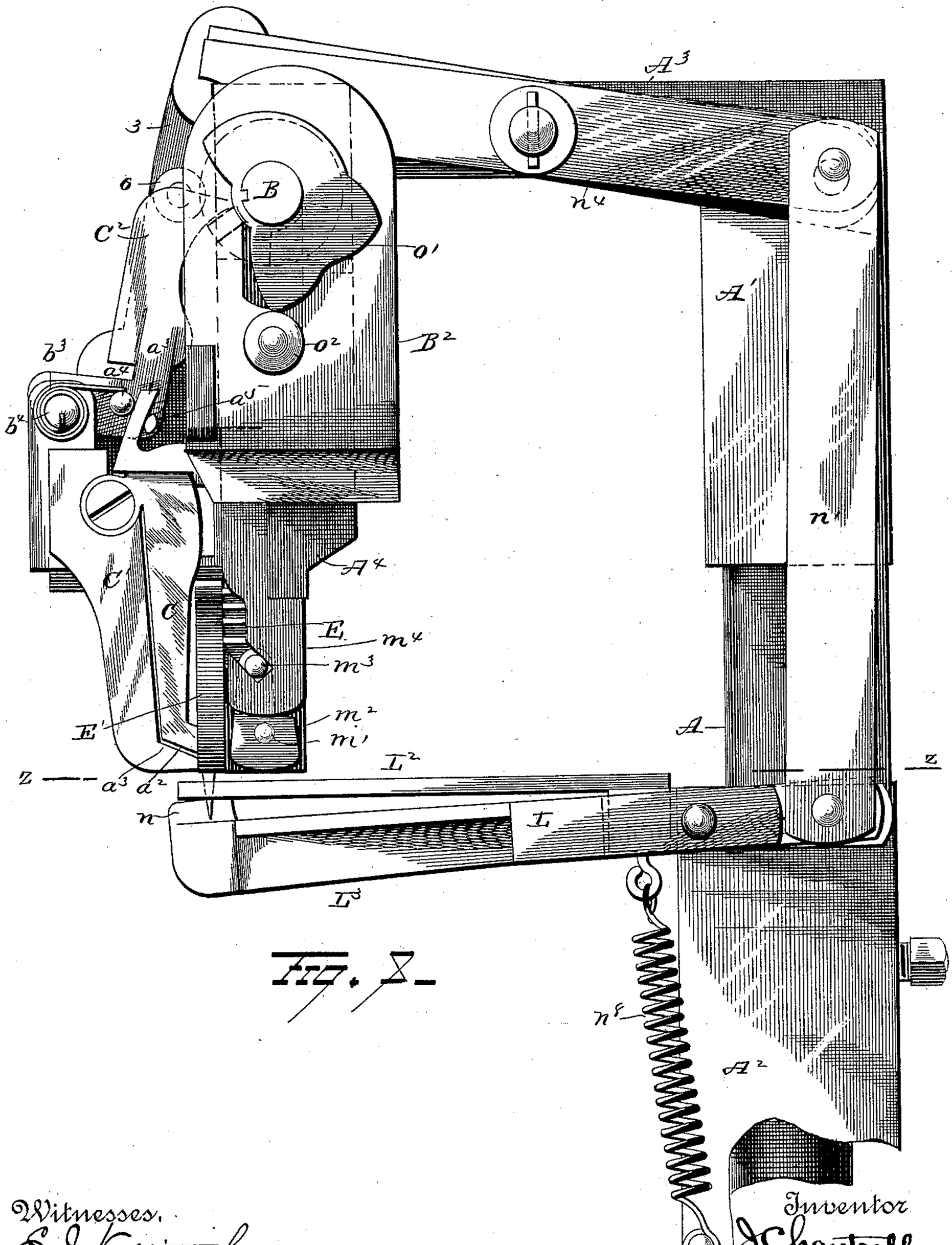

FIG. 1.

Witnesses.
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STAPLE FORMING AND CLINCHING MACHINE.

No. 405,342. Patented June 18, 1889.

Fig. 9.

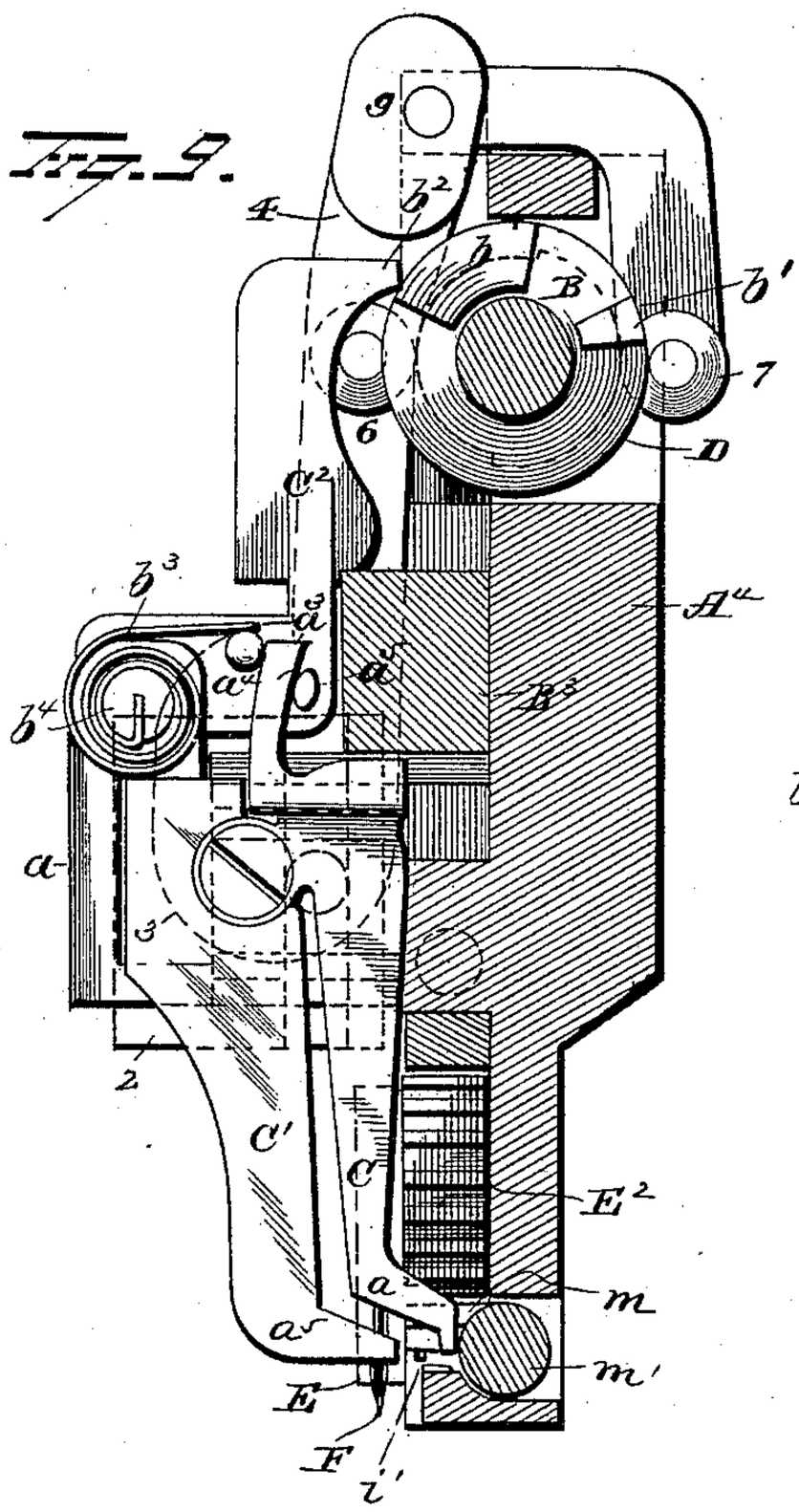


Fig. 10.

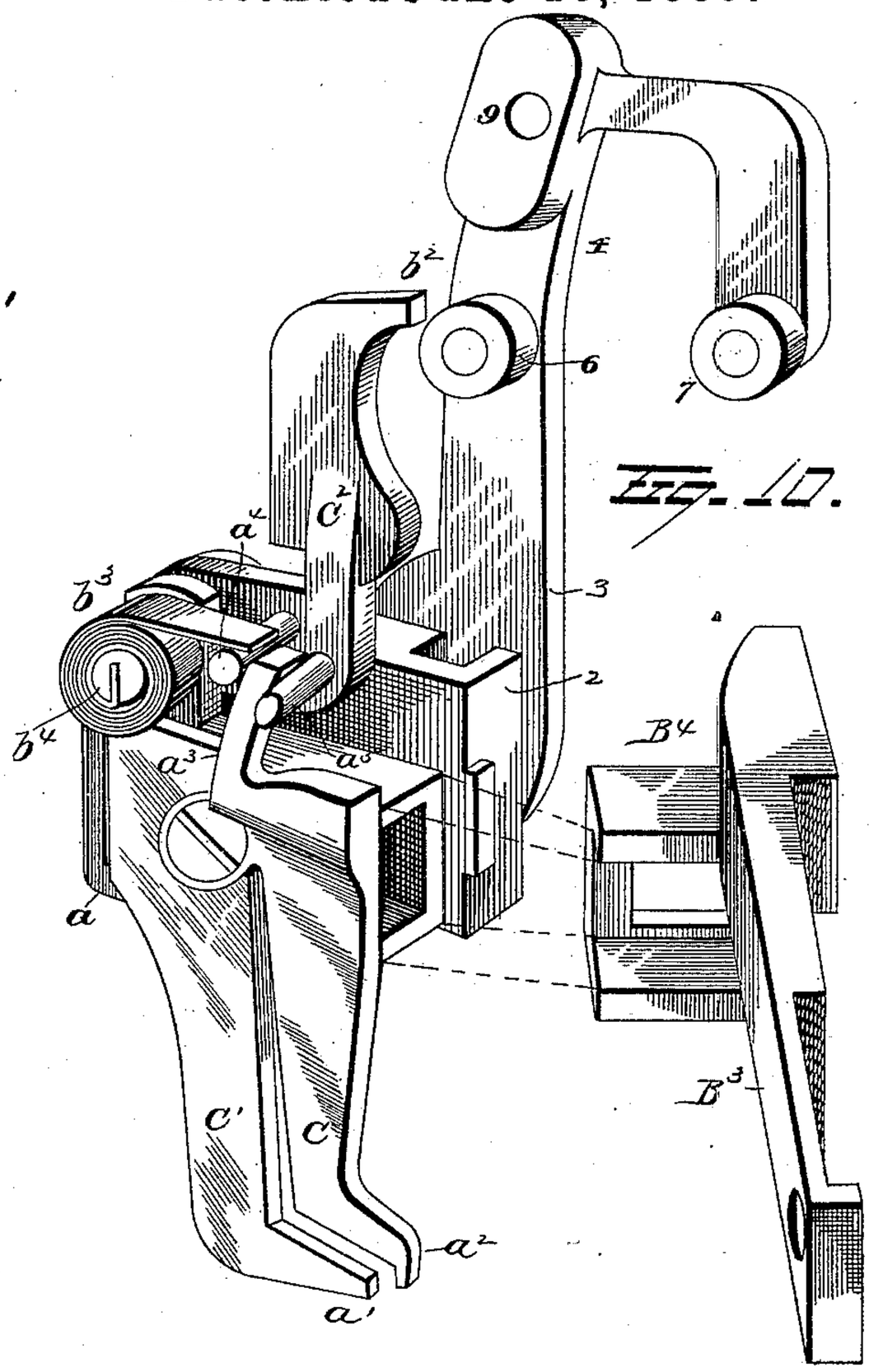


Fig. 15.

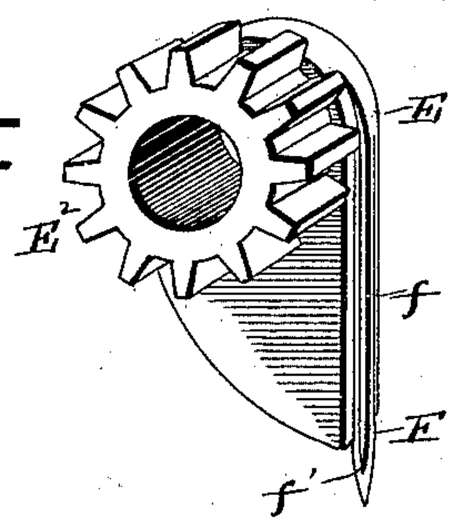
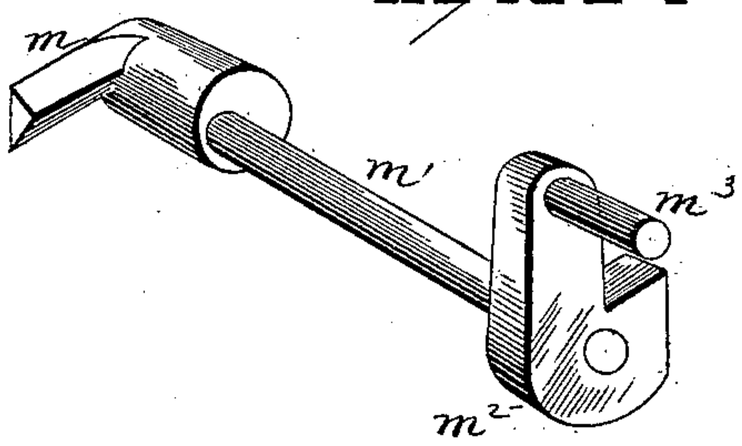


Fig. 16.



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(No Model.) 9 Sheets—Sheet 9.

J. CHANTRELL.

STAPLE FORMING AND CLINCHING MACHINE.

No. 405,342. Patented June 18, 1889.

Fig. 11.

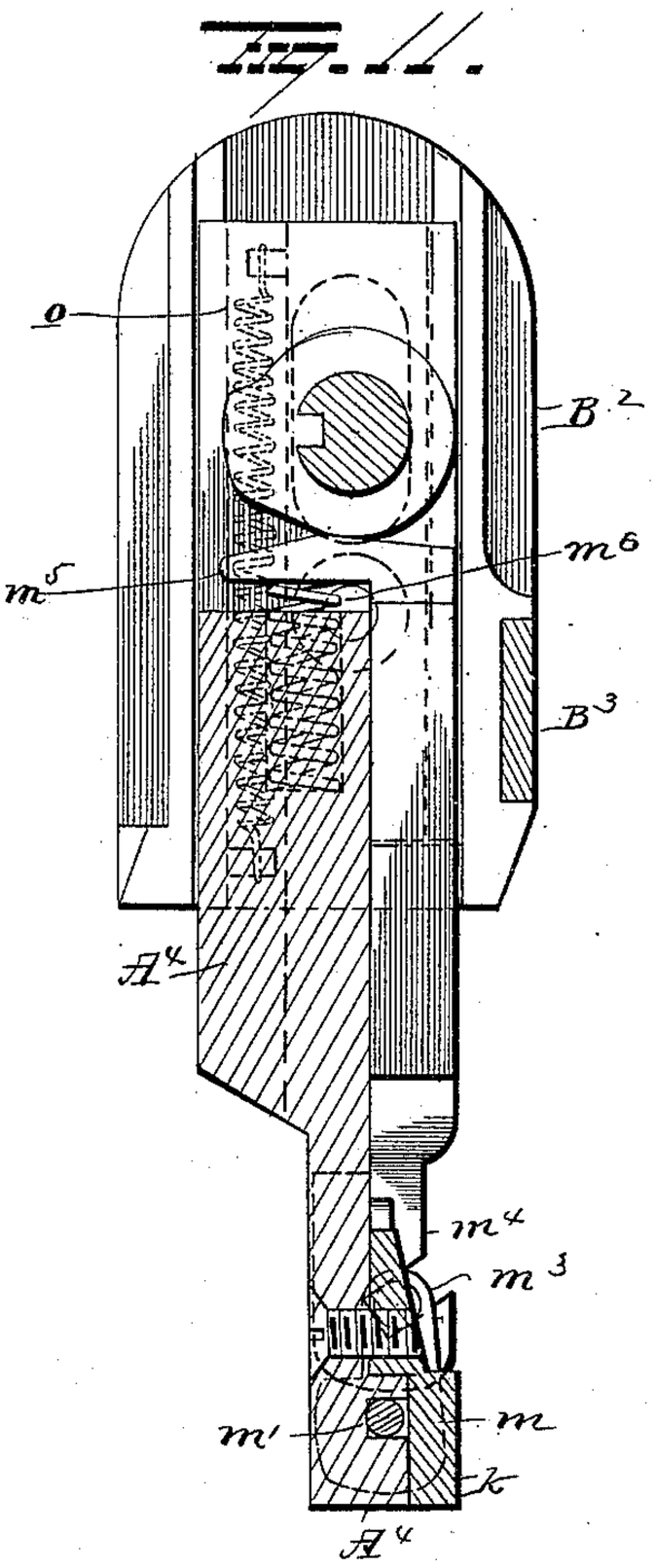


Fig. 12.

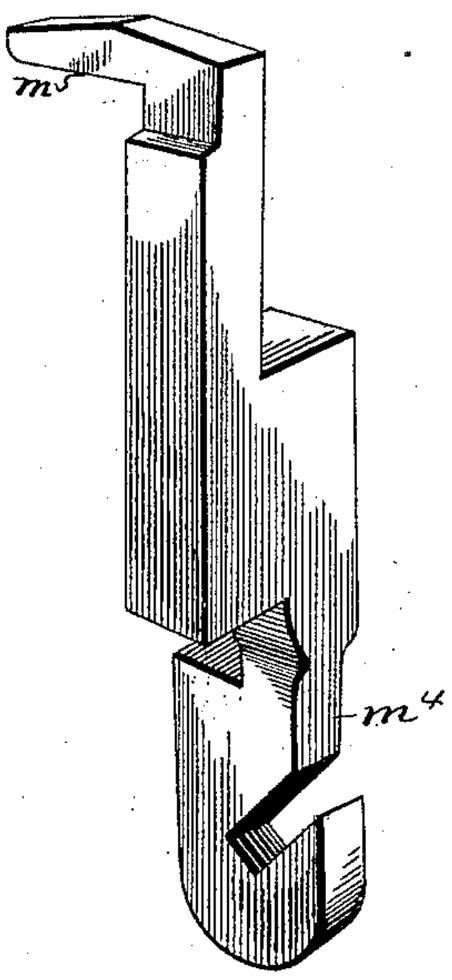


Fig. 13.

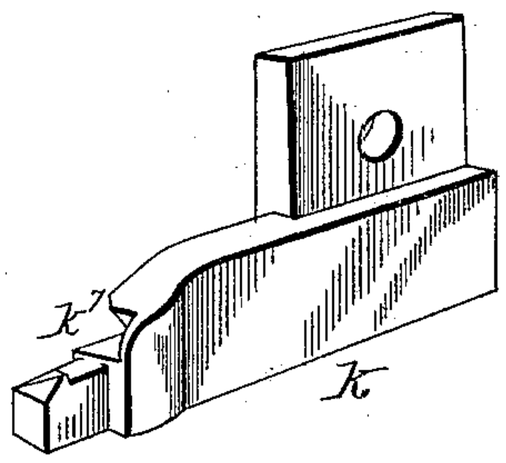
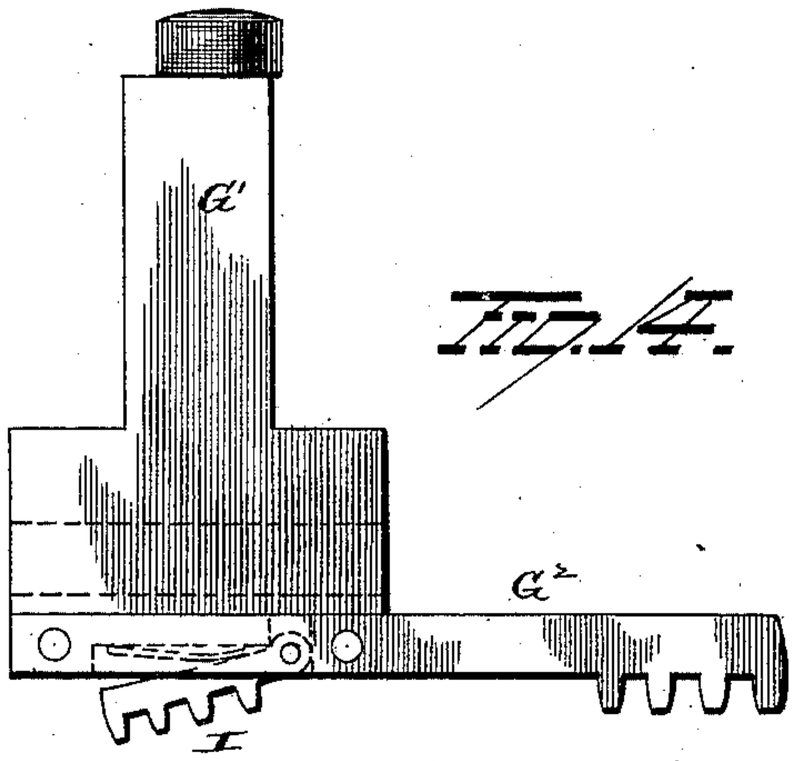


Fig. 14.



Witnesses
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UNITED STATES PATENT OFFICE.

JOHN CHANTRELL, OF READING, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO EDWIN B. WIEGAND, OF SAME PLACE.

STAPLE FORMING AND CLINCHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 405,342, dated June 18, 1889.

Application filed May 8, 1888. Serial No. 273,224. (No model.)

To all whom it may concern:

Be it known that I, JOHN CHANTRELL, of Reading, in the county of Berks and State of Pennsylvania, have invented certain new and useful Improvements in Staple Forming and Clinching Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to staple forming and clinching machines, the object being to provide a machine which will automatically feed metal wire from a continuous roll, cut off a proper length for a staple, bend it into form, insert it into place, and clinch it by the coaction of several working parts in one complete machine.

A further object is to construct a machine of the type mentioned which will rapidly and effectually form, insert, and clinch the inserted staples in flexible or yielding fabric, so as to afford a means for the speedy and effective joining together of two or more separate pieces of such material.

With these ends in view my invention consists in certain features of construction and combinations of parts, which will be hereinafter described, and pointed out in the claims.

Referring to the drawings making a part of this specification, Figure 1 is a front elevation of the machine in position to receive work. Fig. 2 is a front elevation of the machine with the working parts in the position they assume when the staple has been formed and clinched. Fig. 3 is a front view of the machine, showing the table and rocking anvil in a lowered position. Fig. 4 is a front elevation with parts removed. Fig. 5 is a horizontal section on line *z z* of Fig. 8. Fig. 6 is a plan view of the machine. Fig. 7 is a right side elevation of the machine as shown in Fig. 1. Fig. 8 is a right side elevation of the machine as shown in Fig. 2. Fig. 9 is a section on line *x x* of Fig. 1. Fig. 10 is a perspective view of the forming and clinching mechanism. Fig. 11 is a section on line *y y* of Fig. 1. Figs. 12, 13, 14, 15, 16, and 17 are detached views.

A suitable supporting-base (not shown in drawings) is provided for the machine, and on it is erected a vertical standard A, which has two adjustable blocks A′ A^2 mounted on it, the upper block A′ having a forwardly-extended arm A^3 formed on or affixed to it, which latter projects a proper distance to afford clearance distance between its front end and the vertical standard A. On the front extremity of the arm A^3 a depending bracket-plate A^4 is secured in vertical position, this plate constituting the main supporting-frame of the staple-forming mechanism. On the front face of the bracket-plate A^4 the cam-shaft B is mounted in boxes that allow a revoluble movement of this shaft. Several removable cams of different shapes are mounted on the shaft B and secured in place by keys or other means. The form of construction and uses of these cam hubs and disks will be explained in proper connection with the parts of machinery they engage.

On the right side of the machine as viewed from the front a portion B′ of the bracket-plate A^4 is properly shaped to afford a sliding support for a recessed or skeleton head-block B^2. The portion B′ has its opposite front and rear edges grooved to receive corresponding tongues, which project inwardly from the side walls of the recessed head-block B^2, which will hold the head from lateral displacement and allow it to reciprocate vertically.

Upon the front face of the sliding head B^2 a horizontal arm B^3 is attached, which projects toward the middle of the machine, and on this arm an outwardly-projected and downwardly-depending limb B^4 is integrally formed, which is intended to afford support to a peculiar wire-gripping device, that will be described. Said gripping device mainly consists in two depending limbs C C′. The outer limb C′ is rigidly secured to a sliding block *a*, which is fitted between parallel jaws formed on the projecting portion B^4 of the arm B^3, and thus allowed to slide in a horizontal plane. This movement will be more fully explained in its proper order. The other limb C is loosely secured by a pivot screw-bolt to the block *a*, both the limbs C C′ having inwardly-projecting jaws *a′* a^2 formed, respectively, upon their lower ends, the meeting edges of these jaws being inclined or cut to slope inwardly and

downwardly at the same angle, so that when made to approach each other they will be adapted to bite upon a piece of wire interposed between them and hold it firmly.

The upper end of the pivot-limb C is provided with an integral finger a^3, which is bent or slightly curved rearwardly from a vertical plane, and is engaged loosely on its front and rear edges by the pins a^4 a^5, that are projected from the adjacent side surface of the upright cam-arm C^2, which is bent outwardly at its lower end at a right angle and pivoted to the sliding block a. When the upper end of this cam-arm C^2 is moved by its engagement with the projections b b', formed on the side of the cam-disk D, the pivoted limb C of the gripping device will be vibrated to spread apart or close up the jaws a' a^2 of said device. To cause the cam-arm C^2 to press inwardly and hold its upper projecting toe b^2 in engagement with the cam projections b b', a volute spring b^3 is secured to a stud b^4, which projects from the right side of the slide-block a, its free end pressing on the pin a^4, and as the stud b^4 is in reality a pivot-bolt, on which the cam-arm C^2 is loosely mounted, it is evident that the pressure of the spring end will rock this arm inwardly on its fulcrum.

At a proper point above the lower edge of the bracket-plate A^4 the awl-carrier blocks E E′ are supported on cylindrical studs e e, which project from the bracket-plate. These awl-carriers are preferably made integral with the pinions E^2 E^2, which are of equal diameter, and so located that their teeth will have meshing contact. The carriers are elongated and project downwardly, their inner adjacent edges being parallel when at their point of closest adjustment and separated such a distance as to afford a sufficient space for the reception and reciprocation between them of the limbs C C′, that form the wire-gripper.

On each inner parallel edge of the awl-carrier blocks E E′ the piercing-awls F F are embedded. These awls project below the blocks a proper distance to permit them to penetrate fabric on which they are intended to operate, and both have longitudinal grooves f made in their bodies, which grooves are of sufficient width and depth to receive and guide the limbs of a staple when it is formed, as will be further explained. The grooves f are extended to a point f' within a short distance of the sharpened free lower ends of the awls F, and are at their terminal ends curved outwardly, so as to bend inwardly the wire points of a staple when it is pushed down these grooves to abut against their lower curved terminals.

It is necessary in the operation of the machine that the awls and their carrier-blocks be spread apart, in order to move the awls out of the way, and thus allow material which is to have staples inserted through it to be placed in position below the awls. To effect this movement, a cam-head G is mounted on the cam-shaft B, near the left end of said shaft considered from the front of the machine. This cam-head G has two diagonal grooves h cut in its periphery, which slope in opposite directions, and are of a proper depth and width to engage the upper end of the inverted-T-shaped slide-bar G′, which is supported and adapted to reciprocate in a horizontal plane, the lower edge of said bar G′ having a horizontal rack G^2 attached to it. It will be seen that the teeth on the rack G^2 are so disposed that they will only have meshed engagement with the awl-carrier block E′ which is located toward the right side of the machine, so that a movement of the rack and meshed engagement of the pinions E^2, that are fastened to the carrier-blocks E E′, will cause the latter to rock toward or from each other, as may be necessary in the operation of this staple making and clinching machine. The grooves h in the cam-head G are cut to incline oppositely, as before stated, and are thus enabled to cause a reciprocation of the rack G^2 when the cam-shaft is rotated.

Upon the left side of the bracket-plate A^4, below the rack G^2, a disk H is mounted loosely on a stud. This disk or wheel is grooved on its edge, and is given motion by an auxiliary toothed rack I, which is pivoted at one end to the horizontal rack G^2, and by pressure of a spring on its upper edge is held in yielding engagement with the pinion I′, that is affixed to the rear surface of the disk H concentric with it. The disk H is designed to feed wire from a reel (not shown) continuously to the staple-former. To effect this action, a volute spring I^2 is supported on a stud near the lower left corner of the bracket-plate A^4, said spring affording revoluble and yielding support to a disk H′, which tracks in the groove of the other disk H. As the wire i is inserted between their peripheries, it is apparent that a rotative movement of the disk H will, if made in a proper direction toward the left edge of the bracket-plate A^4, project the free end of the engaged wire i through an orifice i', made horizontally in an adjacent projecting portion k^3 of the bracket-plate A^4.

Between the upwardly-projecting portion B′ of the bracket-plate A^4 and an adjacent parallel edge B^6 of said bracket-plate three cam-disks J J′ J^2 are located on the cam-shaft B and secured. The disk J^2, which is nearest the portion B′ of the bracket-plate, is designed to give rocking motion to a knife-blade m, that is formed on a rock-shaft m', which lies horizontally in a box formed for its reception upon or near the lower edge of the bracket-plate A^4, said shaft being held in place by the cap-plate k. The rock-shaft m' has a crank m^2 affixed to its outer end, the pin m^3 of said crank engaging a diagonal slot formed in the lower end of the vertical slide-bar m^4, the upper end of which is engaged by the cam J^2, and to hold this slide-bar m^4 in contact continuously with the cam its upper end m^5 is bent rearwardly at a right angle,

said bent portion of the bar being engaged by a spiral spring m^6, which has been forcibly compressed when inserted in a retaining-cavity made for its reception in the bracket-plate A^4, so that the expansive energy of the spring will force the horizontal limb m^5 of the slide-bar m^4 upwardly against the cam J^2 in an obvious manner.

Immediately below the pinions E^2, which are affixed to the awl-carrier blocks E E′, a rectangular slot is cut through the bracket-plate A^4, which produces a square wall or shoulder k^6 on the outwardly-projecting portion k^3 of the bracket-plate, or the portion of said plate which is perforated for the insertion of wire through it, as before stated. Against this shoulder k^6 of the bracket-plate the knife-blade m projects from the rock-shaft m', or, rather, from a cylindrical enlargement of this shaft, which is formed on the inner end of the shaft. This from its location in the rectangular slot in the bracket-plate A^4 holds the cutting-edge of the knife-blade m in proper engagement with the shoulder k^6 to insure proper cutting action of the blade.

It will be noticed that the knife-blade m is made angular or wedge-shaped in cross-section of its body, the thick portion being above, which produces an inclined surface, and on the adjacent end of the cap-plate k a flattened portion is formed on the upper edge, that terminates in an undercut shoulder k^7, the length of the flattened portion to this undercut shoulder determining the length of the piece of wire cut off by the knife-blade.

The lower block A^2, that is placed on the standard A, is secured at such a distance above the base as will permit the parts of the machine they support to coact properly with the staple-forming devices just explained. The former consists of a rocking table and a rocking anvil, which will be described.

On the upper portion of the block A^2 two yokes L L′ are pivoted, both yokes being adapted to rock on the same pivotal points. This is effected by fitting the yoke L′ within the yoke L, perforating the limbs of each yoke in line at opposite points, and also forming perforations for the reception of dowel-pivots m^7 in the opposite side edges of the block A^2, so that these pins may penetrate through the mated holes of the yoke and block to afford a hinged connection of the yokes with the block, each yoke being independent of the other in its vertical movement.

The yoke L′ affords support to a table or platen L^2, which extends outwardly of a proper length to cause its free end to assume a position immediately below the wire-gripping jaws a' a^2, a slot a^8 being cut at the center of width of the table from its outer edge inwardly to align with the gripping-jaws when the table is at its point of highest elevation, the slot a^8 having sufficient width to allow the awls F to enter the slot when the table is at this point of adjustment. On the yoke L a stout bar L^3 is affixed. This projects toward the gripping-jaws a' a^2 and lies in the same vertical plane with the links on which these jaws are formed, the outer end of the bar L^3 being shaped to form a clinching-anvil m, that is adapted to press on the lower surface of material placed on the table L^2.

In order to give proper rocking motion to the table and anvil just mentioned, the limbs of the yokes L L′ are extended to the rear of the pivot-pins m' on the right side of the machine, and to the ends of these extensions two vertical links n' n^2 are loosely secured. Said links are of a length to allow their upper ends to be pivotally attached to the centrally-pivoted rocking cam-bars n^3 n^4, which latter have their front ends in bearing contact with the cam-disks J J′, that are mounted on and secured to the cam-shaft B.

To assure a proper movement of the table L^2, clinching-anvil n, and cam-bars n^3 n^4, the spiral springs n^7 n^8 are attached to the under side of each yoke L L′ by one of their ends, the opposite end of each spring having engagement with the lower portion of the block A^2. The springs are thus extended to exert their contractile force on the yokes and attached parts and depress them when free to do so.

The sliding head-block B^2, that is attached by the arm B^3 to the block a, (which latter carries the fixed and pivoted gripping-limbs C C′,) is given a vertical reciprocal movement by the coaction of a spiral spring o and a cam o'. The first named is secured by its lower end to the bracket-plate A^4 and its upper end to the head-block B^2, thus by the contraction of the spring elevating the head-block when it is not acted upon by the cam o'. The cam o' is affixed to the shaft B and has its edge formed to impinge on an anti-friction roller o^2, that is loosely supported on a stud, which projects from the side of the head-block B^2, so that a revolution of the shaft B will actuate the gripping-jaws a' a^2 at proper intervals, as will be further explained.

To enable the wire-gripping jaws just mentioned to receive the free end of the wire fed from a coil and be subsequently cut off at a proper length, it is necessary that the jaws be held open across the path of the forwardly-projected wire, and after the wire is cut off, thus forming a staple-blank, the jaws must close upon it at its center of length and lift it high enough to draw this wire-blank between the inclined surface of the knife-blade m and the undercut shoulder k^7, formed on the cap-plate k, so as to bend the wire around the lower grip-jaw in staple form. After the staple is thus formed the gripping-limbs, which have been rearwardly located with regard to the awl-carrier blocks E E′, must now be forwardly moved, thus aligning the limbs of the bent staple-blank with the longitudinal grooves made in the adjacent surfaces of the awl-bodies to allow a descending stroke of the gripping-limbs on which the jaws a a^2 are

formed to project the staple down in said grooves and insert it into the fabric, which is at this time in position on the table L^2 and being upwardly forced by said table.

To effect the requisite movements above stated, the slide-block *a* has an integral guide-plate 2 formed on its left side, which plate is grooved vertically to receive a projecting pin formed on the depending lever 3, that is an extension of the yoke 4, which latter is made to straddle the upper edge of the bracket-plate A^4 and be pivoted to it at 9, so that it will be enabled to vibrate thereon.

On the cam-shaft B a cam 5 is secured, which is cut away on one side, which will cause a periodic vibration of the lever-arm 3 by reason of the engagement with the recessed peripheral face mentioned of the anti-friction rollers 6 7, that are loosely secured on studs which project from the yoke 4 at points opposite each other and coincident with the axis of the cam-shaft B. It will thus be seen that at a proper instant with regard to the vertical movement of the gripping-jaws A' A^2 they, together with the gripped and partially-bent staple, will be outwardly moved to line the staple with the awl-bodies F, the devices just described effecting such a movement in an obvious manner.

To properly form a staple and then clinch it by a consecutive movement of the clinching devices herein employed, it is essential that the several parts of the mechanism shall coact together at proper instants of time and at other instants they shall operate successively.

An explanation of the operation will now be given to exemplify the manner in which these peculiar motions of the forming and clinching mechanism are effected.

The device being adjusted as shown in Figs. 1 and 8, the pieces of fabric to be joined are placed upon the rocking table L^2 and the cam-shaft B rotated in a direction from the operator, who stands in front of the machine. The feeding of the wire into position to form a staple is effected when the awl-carrier blocks are being spread apart; hence it should be understood that a staple-blank has been fed forward when the machine is in the position named, as the awls and their carrier-blocks are there shown at their widest point of spreading movement. When the work is properly held to receive a staple, the revoluble movement of the cam-shaft B will cause the cam J^2 to press down the slide-bar m^4, and by its engagement with the rock-shaft m' rock the knife-blade k^4 forwardly, cutting off the wire to a proper length for a staple. Simultaneously with the severing of the wire *i* the cam o' will elevate the sliding head-block B^2, attached arm B^3, and the gripping-limbs C C′, the jaws a' a^2 of said limbs being at the same time closed to grip the wire blank by proper action of the volute spring b^3, that by its pressure on the pin a^4 causes such a clamping action. When the shaft B has partially revolved to allow the low portion *q* of the cam o' to be in contact with anti-friction roller on the side of the head-block B^2, the spring O will raise the head-block and carry with it the gripping-limbs C C′ to their highest point of elevation. The table L^2 will at this stage in the operation have been raised to carry the material on it close to the points of the awls F F, and the anvil *n* will also have approached these awls, but in position below the table a short distance, and the awl-carrier blocks will have partially revolved to bring the awls in a perpendicular position parallel to each other. The cam 5, which engages the yoke 4 and depending lever 3, is now in position to move outwardly the gripping-limbs C C′, so as to carry the staple into alignment with the grooves in the awl-shanks. This movement is effected at the instant when the gripping-jaws a' a^2, with a bent staple held between them, are at their dead-point of upward movement ready to be forced down by the continuation of revoluble motion of the cam-disk o', said disk having a swell o^3 formed on it, which will force the head-block B^3 down with the attached gripping-jaws. The awls F now remain stationary, as the cam which operates the driving rack-bar that is in engagement with the pinions which move these awls is cut away, so as to permit them to remain dormant while the clinching operation is in progress. When the staple is driven down in the grooves of the awls F, the table L^2 is elevated by its cam and forces the fabric on it upwardly, causing the awls to pierce it, and the anvil, following the table, passes up between the points of the awls and abuts against the ends of the staple-limbs, which have been deflected inwardly by their abutment on the terminal shoulders of the grooves in the awls, as has been previously mentioned, this deflection of the points from the grooves taking place at the instant that the fabric has been pierced through by the awl-points. The staple will now have been partially clinched; but as it is still held between the jaws a' a^2 of the gripping-limbs C C′ a provision must be made to release the gripping contact, remove the staple from off of the lower jaw, and further clinch or upset the points of the staple to finish the operation. This is effected by the contact of the projection b^2 of the cam D with the hooked end of the cam-arm C^2, which contact will vibrate the pivotal limb C′ and cause it to release the staple *i*. The table and anvil will at the same time drop slightly, thus freeing the staple from the lower jaw a^2, which is on the fixed limb C. The cam projection *b* is narrow on its bearing-edge, as is also the hooked end b^2 of the arm C^2, so that the toe of this hooked end will slip off of the projection *b* and allow the pressure of the volute spring b^3 to close the jaw a' onto the mating jaw a^2. The progressive motion of the shaft B will again lift the table and compress the staple *i* between the lower edge of the jaw a^2 on the fixed limb C′, and thus completely

clinch the staple in place, embedding its return bent ends into such yielding material.

A repetition of the operation can be effected by a change of position of the fabric to be stapled together, and any desired number of the staples be inserted at spaced intervals, either in the body of a hat to affix a "sweat-cloth" in place in it, or any other kind of pliable material in superimposed layers may be secured together in a neat and remarkably-secure manner with dispatch.

Many slight changes might be made in the details of construction of this device without exceeding the scope or violation of the spirit of the invention; hence I do not wish to limit myself to the exact forms and combinations herein shown; but,

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a machine for forming and applying wire staples, the combination, with a wire-feeding device and a cutter for severing the wire into proper lengths for staple-blanks, of grippers and formers constructed and arranged to grip the staple-blanks and form the staples, and then insert them into the material to be fastened, substantially as set forth.

2. In a machine for forming and applying wire staples, the combination, with a wire-feeding device and a cutter for severing the wire into proper lengths for staple-blanks, of grippers and formers constructed and arranged to form the staple-blanks into staples and awls for guiding the staples through the material, substantially as set forth.

3. In a machine for forming and applying wire staples, the combination, with a wire-feeding device and a cutter for severing the wire into proper lengths for staple-blanks, of grippers and formers for forming and inserting the staples and grooved needles for guiding the ends of the staples through the material, substantially as set forth.

4. In a machine for forming and applying wire staples, the combination, with a wire-feeding device and a cutter for severing the wire into proper lengths for staple-blanks, of grippers and formers for forming and inserting the staples, and grooved needles having inclines constructed to bend the free end of the staple after its insertion into the material, substantially as set forth.

5. In a machine for forming and applying wire staples, the combination, with a wire-feeding device and a cutter for severing the wire into proper lengths for staple-blanks, of grippers and formers for forming and inserting the staples, and a support for automatically moving the material toward the staples as they are being inserted in the material, substantially as set forth.

6. In a machine for forming and applying wire staples, the combination, with a wire-fastening device and a cutter for severing the wire into proper lengths for staple-blanks, of grippers and formers for forming and inserting the staples, and an anvil for clinching the free ends of the staples after they have been inserted in place, substantially as set forth.

7. In a machine for forming and applying wire staples, the combination, with devices for forming and inserting the staples, of a clinching-anvil constructed and arranged to clinch the free ends of the staple while it is held by the inserting devices and to clinch them again after the staple has been released from the inserting devices, substantially as set forth.

8. In a machine for forming and applying wire staples, the combination, with grippers, of staple-forming jaws provided with inserting-awls, substantially as set forth.

9. In a staple forming and clinching machine, a wire-gripping device for inserting the staples, composed of a fixed limb and a pivoted limb having mating jaws, substantially as set forth.

10. In a staple forming and clinching machine, the combination, with a wire-cutter, of a gripping device adapted to grip the staple-blank near its center, substantially as set forth.

11. In a staple forming and clinching machine, a wire-gripping device which is adapted to move vertically and by pivotal movement of one limb grip a staple-blank, then elevate and bend its limbs into staple form, substantially as set forth.

12. In a staple forming and clinching machine, the combination, with a wire-cutter, of two vertically supported and reciprocating gripping-limbs, which are adapted to separate and close to grip a staple-blank between their jaws, substantially as set forth.

13. The combination, with devices for holding a staple, of a vertically-rocking table adapted to support the material into which the staple is to be inserted.

14. The combination, with devices for holding a staple, of a vertically-rocking anvil or clinching-bar adapted to engage the ends of the staple while the latter is held by the holding devices.

15. In a staple and clinching machine, two grooved awls secured to movable blocks and adapted to move toward or from each other in the same plane, substantially as set forth.

16. In a staple forming and clinching machine, two grooved awls supported to lie parallel in the same plane and adapted to move away from each other, substantially as set forth.

17. In a staple forming and clinching device, the combination, with a staple-blank-gripping device supported to reciprocate and adapted to bend the blank on its upward stroke, of a pair of supported grooved awls which receive the staple on its downward passage in the gripping device, substantially as set forth.

18. In a staple forming and clinching machine, the combination, with reciprocating wire-gripping jaws, of a wire-feeding device

and means to consecutively move the feeder and close the gripper, substantially as set forth.

19. In a staple forming and clinching machine, the combination, with a wire-gripping device and means to reciprocate this device vertically, of a wire-feeder, a wire-cutter, and mechanism to move the feeder, cutter, and gripper, substantially as set forth.

20. In a staple forming and clinching machine, the combination, with a wire-gripping device having a fixed and a moving jaw and made to reciprocate periodically, and two grooved awls, of a wire-feeder, a wire-cutter, a rocking table, a rocking anvil, and means to support these parts of the machine and move them in harmony with each other, substantially as set forth.

21. In a staple forming and clinching machine, the combination, with a supporting-standard, of a rocking anvil and a rocking table supported on this standard, and mechanism to rock the anvil and table simultaneously as well as consecutively, substantially as set forth.

22. In a staple forming and clinching machine, the combination, with a bracket-plate which affords support to staple-forming devices, a cam-shaft, and cam-hubs and cam-disks mounted on and secured to the cam-shaft, of a wire-gripping device composed of one rigid and one movable jaw, the said gripping device having a vertical and also a horizontal reciprocation periodically by the action of the cam-disks and projections thereon, substantially as set forth.

23. In a staple forming and clinching machine, the combination, with a supporting-frame or bracket-plate and a standard, of a cam-shaft revolubly mounted on the frame, cam disks and hubs fixed on this shaft, and a pair of gripping-jaws, one of which is movable, actuated periodically to open, close, and move vertically as well as horizontally by the revolution of the cam-shaft, substantially as set forth.

24. In a staple forming and clinching machine, the combination, with a standard, a bracket frame or plate secured on the standard, a cam-shaft adapted to rotate, and cams affixed upon this shaft, of two gripping-jaws which are given an opening and closing as well as vertically and horizontally reciprocating movements at periodic intervals, a wire-feeding device, two adjustable grooved awls, and a wire-cutter, substantially as set forth.

25. In a staple forming and clinching machine, the combination, with a frame or supporting device, a cam-shaft revolubly supported on this frame, and cam disks and hubs affixed upon this shaft, of a pair of gripping-jaws which open, close, and move in a vertical as well as a horizontal plane at proper intervals, two grooved awls adapted to move toward or from each other in the same vertical plane and remain periodically fixed parallel to each other, a wire-feeding device, a wire-cutting device, a rocking table, and a clinching-anvil, substantially as set forth.

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

JOHN CHANTRELL.

Witnesses:

S. M. MEREDITH,

A. K. STAUFFER.