No. 641,149. Patented Jan. 9, 1900.

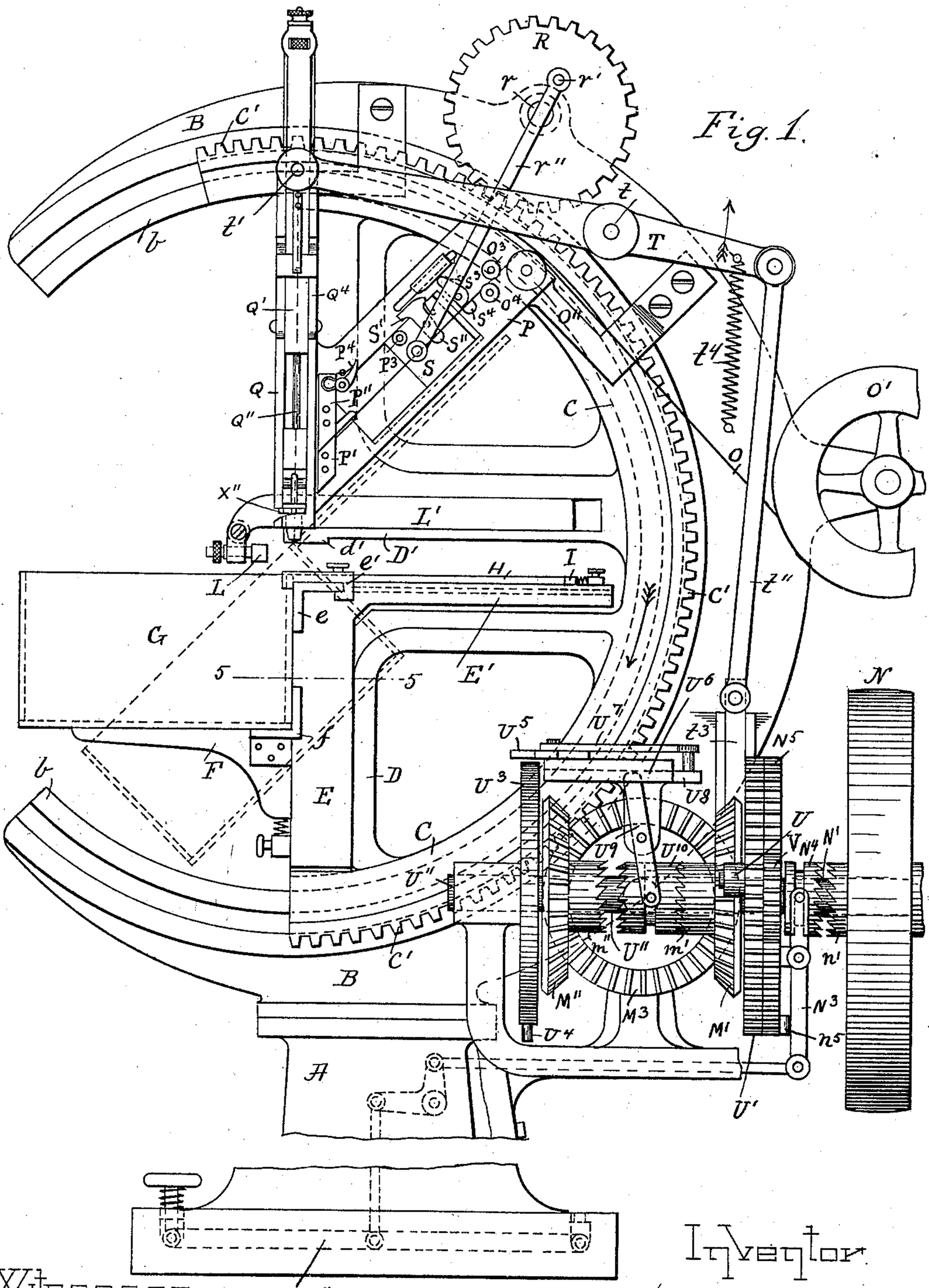
D. H. SAUNDERS.

BOX HINGING MACHINE.

(Application filed July 11, 1899.)

(No Model.) 5 Sheets—Sheet 1.

Fig. 1.



Witnesses
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Lauritz N. Møller

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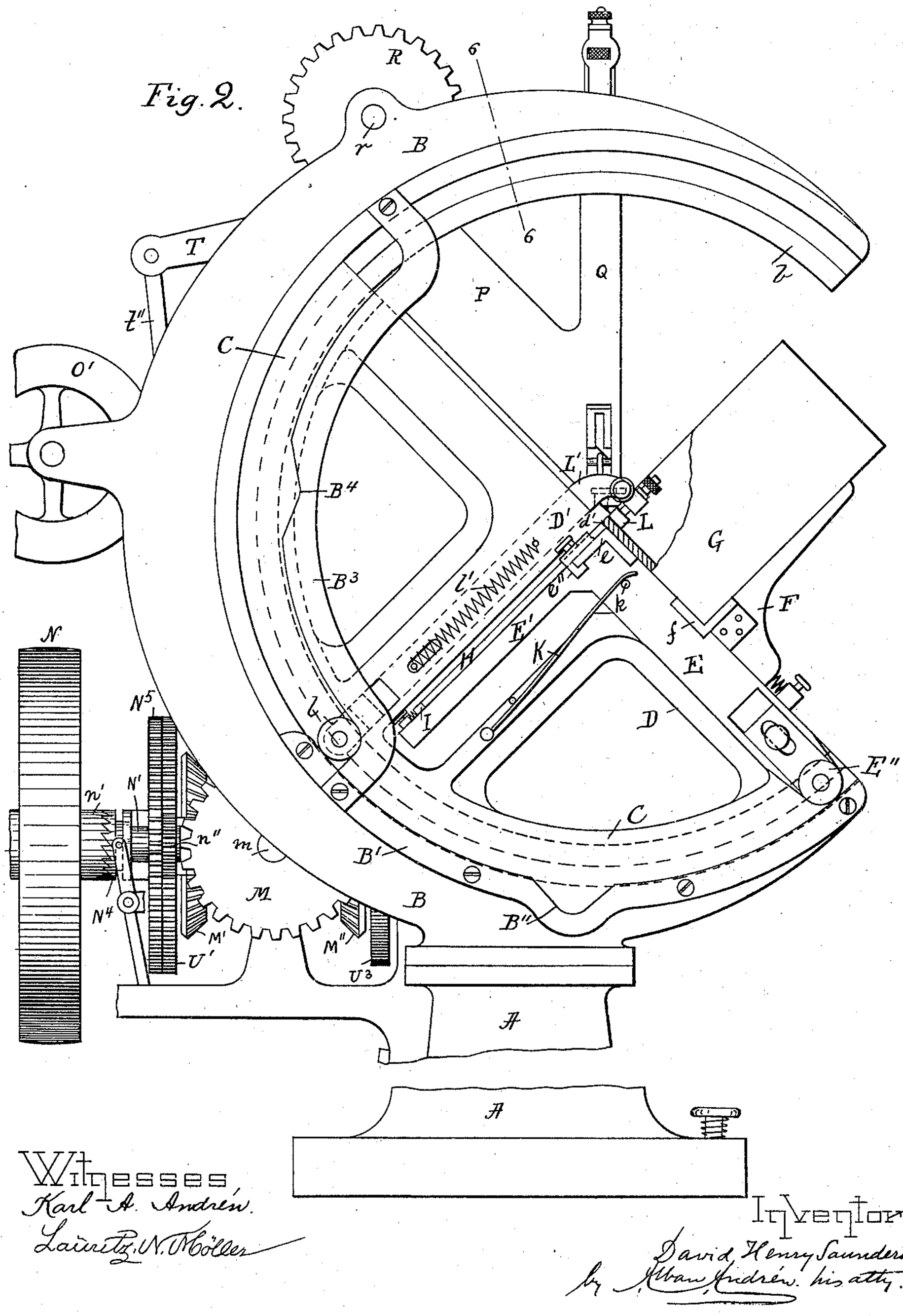
(No Model.) 5 Sheets—Sheet 2.

Fig. 2.



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5 Sheets—Sheet 3.

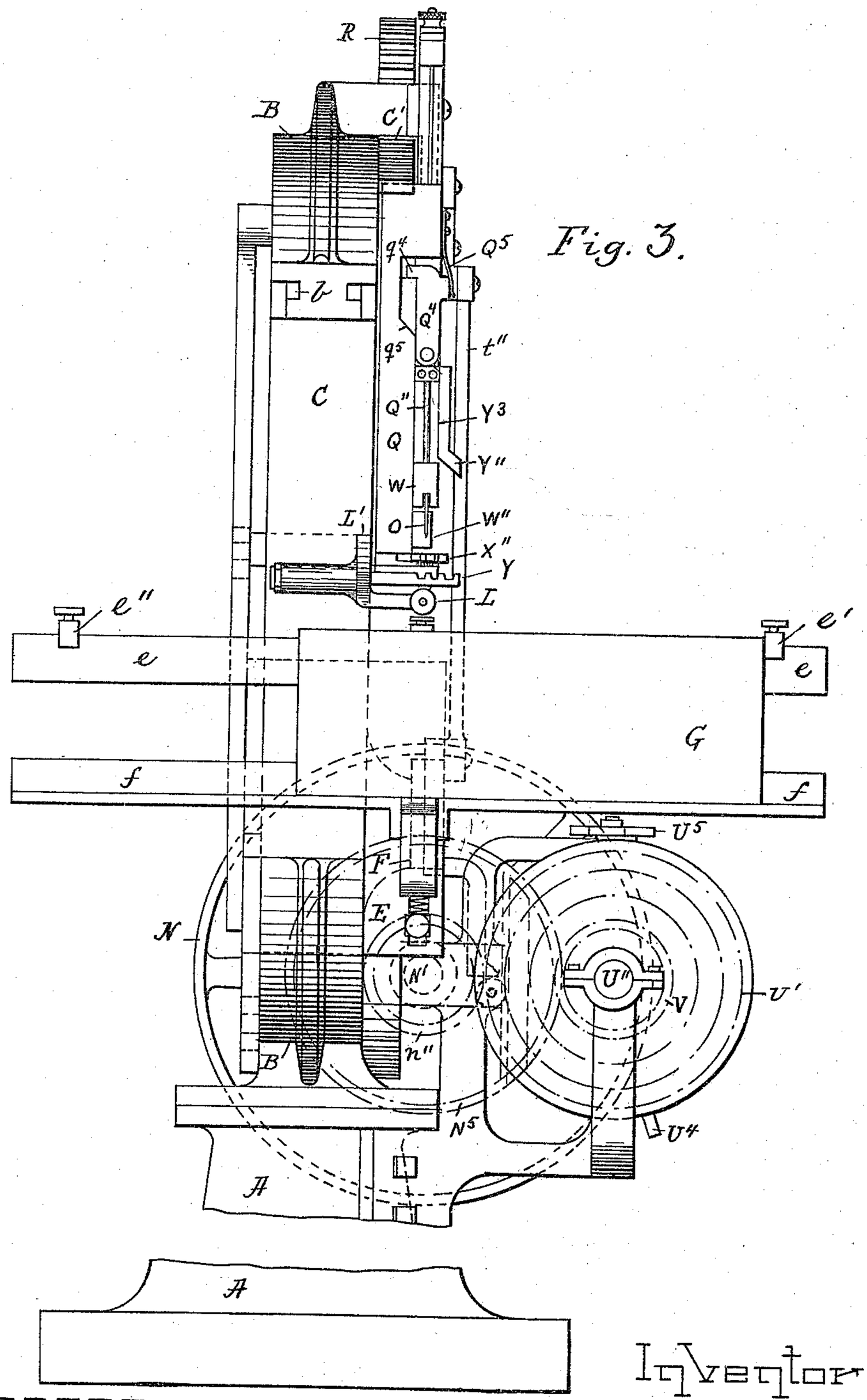

Fig. 3.

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(No Model.) 5 Sheets—Sheet 4.

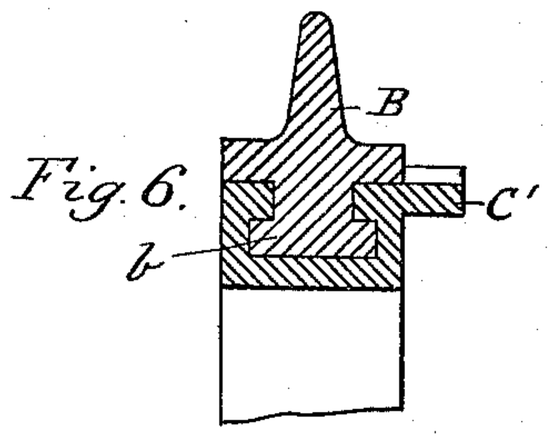

Fig. 6.

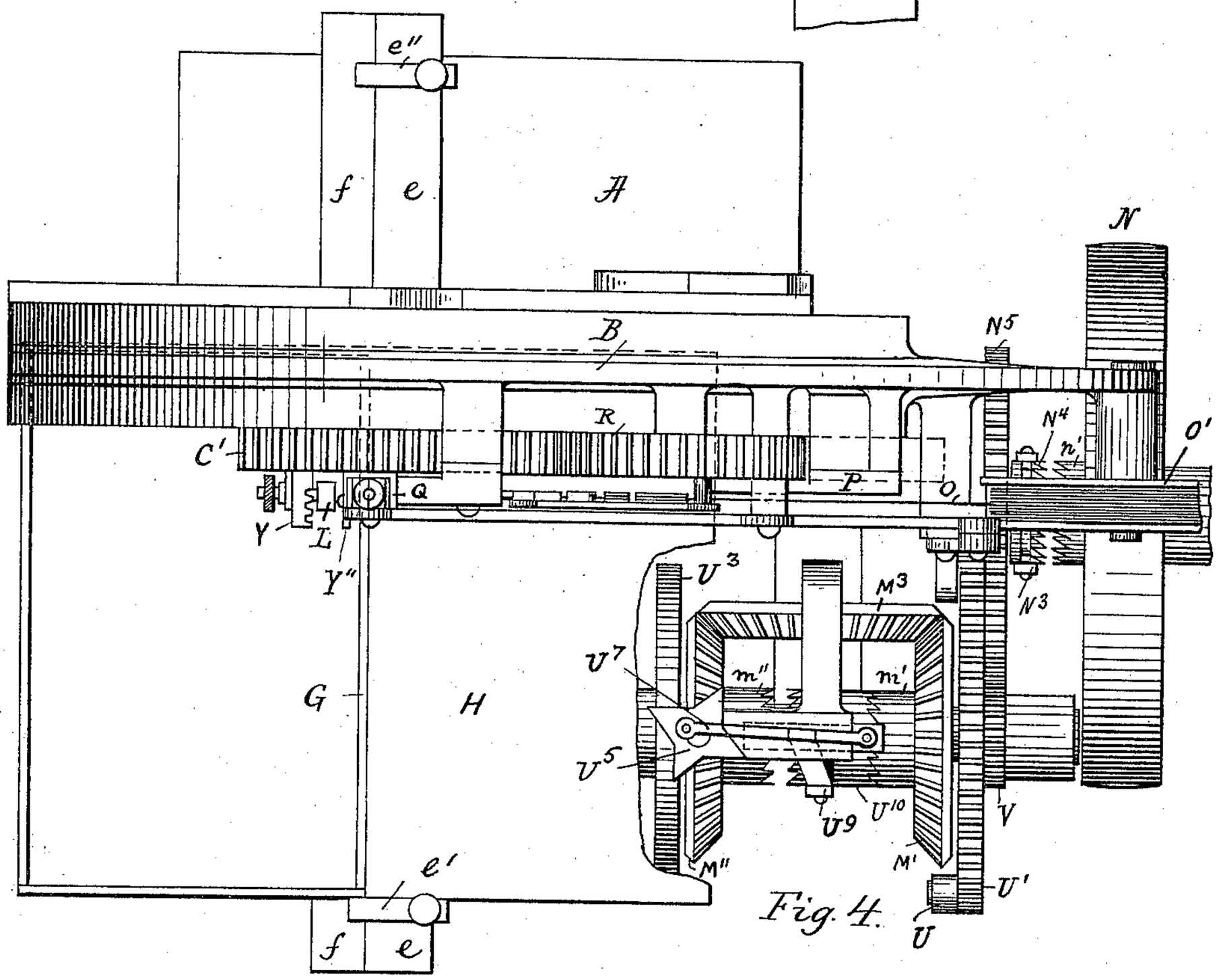

Fig. 4.

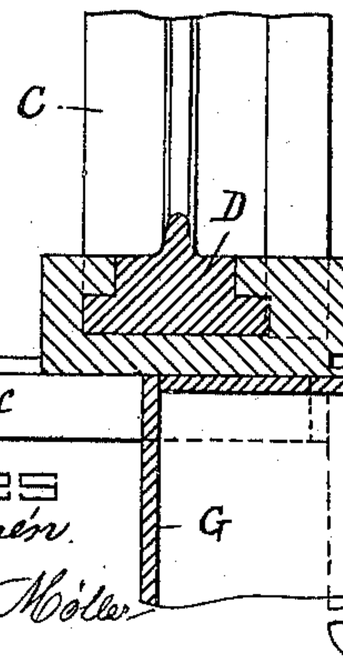

Fig. 5.

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(No Model.) 5 Sheets—Sheet 5.

Fig. 7.

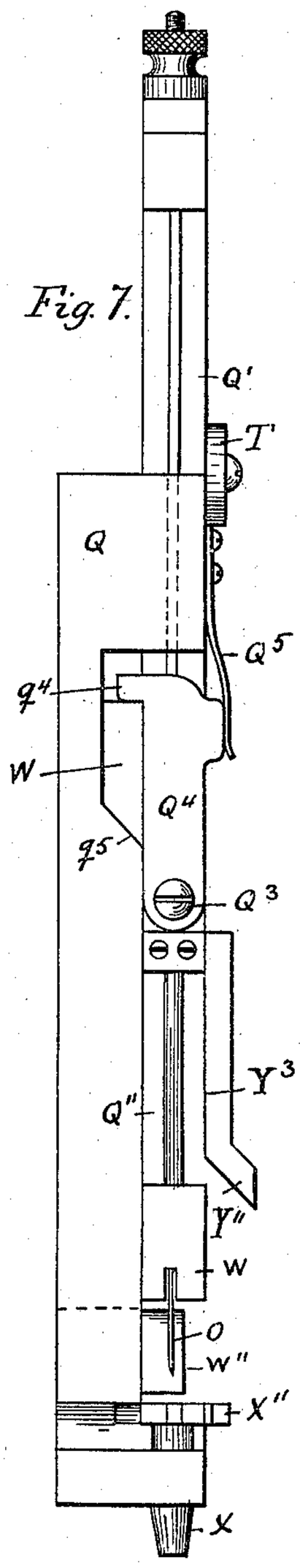

Fig 8.

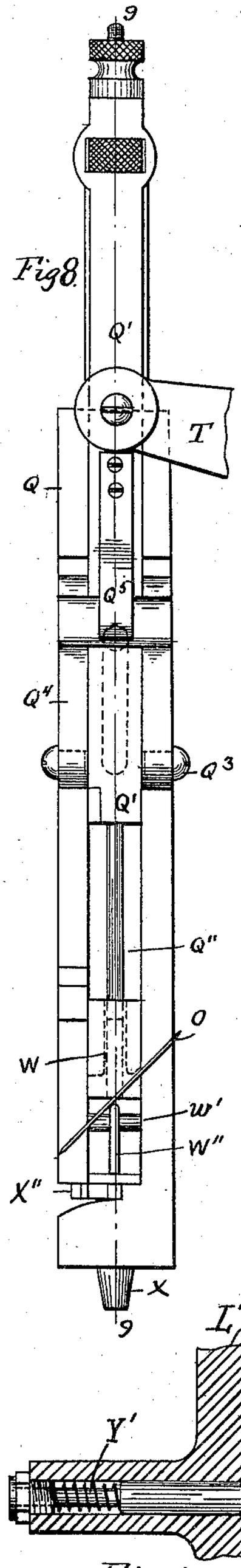

Fig 9.

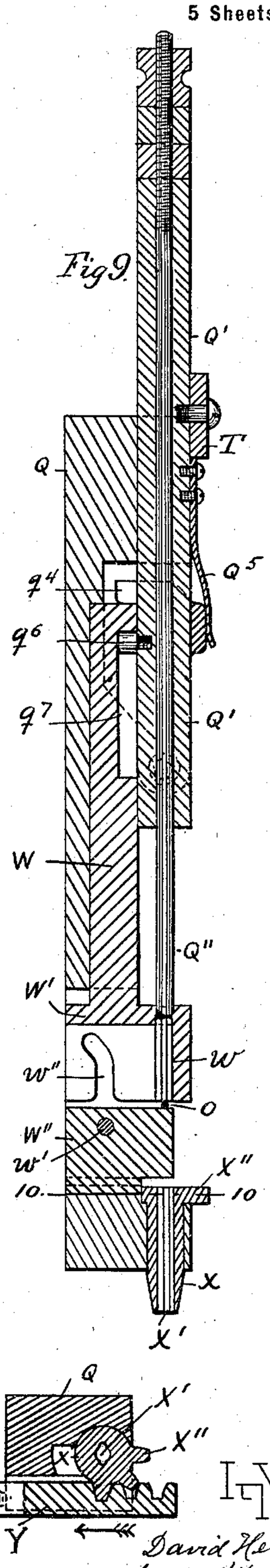

Fig. 10.

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UNITED STATES PATENT OFFICE.

DAVID HENRY SAUNDERS, OF GLOUCESTER, MASSACHUSETTS, ASSIGNOR TO THE MERCHANT MANUFACTURING COMPANY, OF KITTERY, MAINE.

BOX-HINGING MACHINE.

SPECIFICATION forming part of Letters Patent No. 641,149, dated January 9, 1900.

Application filed July 11, 1899. Serial No. 723,462. (No model.)

To all whom it may concern:

Be it known that I, DAVID HENRY SAUNDERS, a citizen of the United States, residing at Gloucester, in the county of Essex and State of Massachusetts, have invented new and useful Improvements in Box-Hinging Machines, of which the following is a specification.

This invention relates to improvements on the patent granted to me for box-hinging machines, dated April 25, 1899, No. 623,834; and it consists, in combination, of a stationary device for feeding the wire from a reel, automatic mechanism for straightening, pointing, and cutting the wire for the formation of the staples, automatic mechanism for driving the staples interlocked through the box and cover and clenching the same during the driving operation, and an oscillating box and cover supporting device for automatically placing such box and cover in position to receive the staples forming the hinging device, as will hereinafter be more fully shown and described. reference being had to the accompanying drawings, wherein—

Figure 1 represents a side elevation of the improved box-hinging machine. Fig. 2 represents a side elevation of the same as seen from the opposite side of Fig. 1. Fig. 3 represents a front elevation of the machine. Fig. 4 represents a top plan view. Fig. 5 represents a detail cross-section on the line 5 5 shown in Fig. 1. Fig. 6 represents a cross-section on the line 6 6 shown in Fig. 2. Fig. 7 represents a detail side elevation of the staple forming and driving device. Fig. 8 represents a front elevation of Fig. 7. Fig. 9 represents a longitudinal section on the line 9 9 shown in Fig. 8; and Fig. 10 represents a horizontal section on the line 10 10 in Fig. 9, showing the rack for oscillating the staple-receiver intermeshed with the teeth of the latter.

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

In the drawings, A represents the frame or standard of the machine, to the upper end of which is secured the segmental head B, preferably provided on its interior portion with a segmental guide projection *b*, adapted to receive the correspondingly-grooved segmental box and cover carrier C, which during the operation of the machine is automatically caused to oscillate in the guide on the said segmental head B, as will hereinafter be more fully described.

Preferably integral with the oscillating carrier C is made an inwardly-projecting guide D, on which is radially movable the box-supporting slide E, provided with a spring-pressed yielding bracket F, upon which the box G is supported, as shown in Figs. 1 and 2. In one piece with the movable box-support E is made an angular extension E′, upon which the box-cover H is supported during the box-hinging operation, as shown in said Figs. 1 and 2.

The inner end of the box-cover H is held during the staple-driving operation against a yielding spring-pressed gage I, arranged at the rear portion of the angular cover-support E′ in a manner similar to that shown and described in my aforesaid patent.

To the sides of the bracket F are secured lateral box-supporting angle-irons *f f*, upon which the lower inner portion of the box G is supported during the box-hinging operation.

To the upper end of the box-supporting slide E is secured a laterally-extending angle-iron *e*, which serves as a support for the box-cover H, as well as a rear guide for the box G, during the lateral adjustment of said box and cover previous to and during the box-hinging operation.

D′ is a clamping-arm, preferably made integral with the oscillating carrier C, and during the box-hinging operation the box-cover H and upper edge of the box G are automatically held firmly against a projection *d′* on the under side of said clamping-arm by means of a roller E″, journaled on a pin adjustably secured to the outer end of the box-supporting slide E, which roller bears against or rolls upon a segmental rib B′, secured to one side of the segmental head B, as shown in Fig. 2. The box and cover are automatically released from the said clamping-arm when the carrier C reaches the central or midway position, (shown in Fig. 1,) at which time the roller E″ is caused to enter a notch or recess B″ on the rib B′, causing the slide E to be forced outward, preferably by a suitable spring K, se-

cured to the bracket D and acting on a pin or projection *k*, secured to the slide E, as shown in Fig. 2. Said rib B′, with its notch B″, and the said spring K are fully shown in Fig. 2. Immediately upon the box reaching the position relative to the clamping projection *d′* on the clamping-bar D′, as shown in Fig. 2, its side is automatically clamped against the slide E by the movable clamping and clenching block L, which is adjustably secured to a slide L′, guided in ways upon the clamping-bar D′. The said slide L′ has journaled at its outer end a roll *l*, which bears against a segmental rib B^3, secured to one side of the segmental head B, as shown in Fig. 2, by which arrangement the clamping and clenching block L is caused to hold the side of the box G firmly against the slide E and the cover H against the yielding gage I during the driving and clenching operation, as fully represented in Fig. 2.

The clamping and clenching block L is automatically released from the box G when the carrier C reaches the central or midway position shown in Fig. 1, and this is accomplished by the roller *l* entering a notch or recess B^4 on the rib B^3, into which such roller *l* is forced by the influence of a suitable spring *l′*, attached in one end to the clamping-arm D′ and in the other end to the clamp-slide L′, as shown in Fig. 2.

An oscillating motion is automatically imparted to the segmental carrier C and its box and cover supporting and clamping devices by the following mechanism: In one piece with said carrier C or attached to it is made a toothed segment C′, the teeth of which mesh in the teeth of a spur-gear M, secured to a shaft *m*. (Shown in Fig. 2.) Said gear is intermittently operated in opposite directions from a continuously-rotating pulley N, as will be hereinafter more fully shown and described.

O in Fig. 1 is the wire from which the staples that form the hinges are made, and said wire is fed from a suitable reel O′ in a manner similar to that shown and described in my aforesaid patent.

To the head B is secured in a suitable manner an inwardly-projecting arm or plate P, preferably made integral with the driver-block, guide, or arm Q, as shown in Figs. 1, 2, 4, 7, 8, and 9.

R is a spur-gear, the teeth of which mesh into the teeth of the segmental gear C′. The said gear R is attached to a spindle *r*, preferably journaled in a bearing in the segmental head B, and to such gear R is attached a crank-pin *r′*, to which is pivotally connected a link *r″*, the lower end of which is pivotally connected to a block S, adapted to slide in suitable guides in the arm or plate P, as shown in Fig. 1.

The wire O as it comes from the reel O′ is guided around a portion of the guide-roller O″, pivoted on a pin secured to the arm or plate P, and from such guide-roller the wire O passes between the straightening-rollers O^3 O^4 in a manner similar to that shown and described in my aforesaid patent. The rollers O^3 O^4 are journaled on pins attached to the arm or plate P, as shown in Fig. 1.

To the slide S is pivotally connected the feed cam or lever S′, between which and a projection S″, attached to the movable slide S, the wire is intermittently fed toward the cutting-off device during the downward movement of the slide S in a manner like that shown and described in my aforesaid Letters Patent. In connection with said wire-feed device I make use of a brake device consisting of a spring-pressed rock cam or lever S^3, adapted to clamp the wire O against a stationary projection S^4 during the upward motion of the slide S in a manner like that shown and described in my aforesaid Letters Patent.

To the lower end of the stationary arm P is secured a stationary cutter P′, and above it is arranged on the said arm P a movable cutter P″, between which the staple-wire O is intermittently cut off previous to being fed into the staple forming and driving device hereinafter to be described.

The movable cutter P″ is automatically reciprocated by any suitable device, it being preferably moved upward by means of a suitable spring and moved downward relative to the stationary cutter P′ by means of a pin or roll P^3, attached to the slide S, acting on a dog or lever P^4, pivoted to the arm P and suitably and pivotally connected to cutter P″, as shown in Fig. 1.

The device for guiding, straightening, feeding, braking, and cutting off the wire O is substantially like that shown and described in my above-mentioned patent and need not therefore be particularly described in detail.

In connection with this my improved box-hinging machine I use a staple-forming and staple-driving device, which is constructed as follows: Preferably integral with the arm or plate P is made a stationary arm or guide Q, in which is longitudinally movable the driver-block Q′, to which is adjustably secured the driver-bar Q″. A vertical reciprocating motion is automatically imparted to the driver-block Q′ and its driver-bar Q″ by means of a rock-lever T, pivoted at *t* to the segmental head B and pivotally connected at *t′* to the driver-block Q′, as shown in Figs. 1, 3, 7, 8, and 9. To the rear end of said rock-lever T is pivoted a link *t″*, the lower end of which is pivotally connected to a slide t^3, movable in suitable guides attached to the head B. Said slide is intermittently moved upward by means of a pin or pin and roll U, attached to the side of a rotary gear-wheel U′, secured to a rotary shaft U″. (Shown in Figs. 1 and 3.) During the upward motion of the slide t^3 the lever T is rocked in the direction of the arrow shown in Fig. 1, causing the wire staple to be driven, and when the said pin or pin and roll ceases to act on said slide t^3 it is released and forced downward by the in-

fluence of a spring t^4, connected to the lever T and head B, as shown in Fig. 3, causing said lever to be moved in an opposite direction for the purpose of automatically raising the driver-bar Q″ to the position shown in Figs. 7, 8, and 9 preparatory to forming and driving another staple. The driving-pulley N is loosely rotating on a shaft N′ when the machine is at rest. To start the machine, I employ any well-known treadle-shipper device, and I have for this purpose shown in Fig. 1 a spring-pressed pivoted treadle-lever N″ suitably connected to a pivoted shipper-lever N^3, pivotally connected to a clutch N^4, splined on the shaft N′ and adapted to interlock with a similar clutch n' on the pulley N, as shown in Fig. 3. By depressing the treadle-lever N″ the pulley N will be connected to the shaft N′ and cause it to rotate. To the shaft N is secured a pinion n'', the teeth of which mesh in the teeth of the spur-gear U′, attached to the shaft U″, and to said shaft is secured a pinion V, the teeth of which mesh in the teeth of a spur-gear N^5, loosely journaled in the pulley-shaft N′, as shown in Figs. 1, 2, 3, and 4, and by this gear device a reduced rotary motion is imparted to the gear N^5 for the purpose of automatically disconnecting the clutch N^4 from the pulley-clutch n' when the segmental gear has been brought to its feeding position after a complete hinge has been formed and driven. Such automatic clutch-releasing mechanism consists of a cam or projection n^5 on the gear N^5 at the proper time coming in contact with the shipper-lever N^3, thereby causing the clutch N^4 to be disconnected from the pulley-clutch n', as represented in Fig. 1, and by this arrangement the machine is automatically stopped until again set in motion by the depression of the treadle-lever N″.

An intermittent rotary motion is automatically imparted to the spur-gear M, meshing in the segment-gear C′, preferably by the following mechanism: To the intermittently-rotary shaft U″ is secured a disk U^3, provided at its periphery with a pin or projection U^4, which during its rotation comes in contact with a four-pointed star-wheel U^5, journaled on a bracket U^6 and provided with a crank-pin, to which is connected a link U^7, the other end of which is pivotally connected to a slide U^8, that operates a clutch-lever U^9, connected in its lower end to a clutch U^{10}, splined on the shaft U″, as shown in Figs. 1, 3, and 4. On the shaft U″ are loosely journaled a pair of bevel-gears M′ and M″, having clutches m' m'', adapted to be intermittently and alternately connected to the clutch U^{10}. The said bevel-gears M′ M″ intermesh with the teeth of a bevel-gear M^3, that is secured to the shaft m, to which is also secured the spur-gear M, the teeth of which mesh into the teeth of the segment-gear C′, and by this arrangement an intermittent rocking movement is automatically imparted to the segmental carrier C and the box and cover supported therein.

I wish to state that although I have hereinabove shown and described a certain automatic driving mechanism for intermittently imparting a rocking movement to the carrier C and the box and cover supported therein and a shipper device for automatically stopping the machine after one complete hinge has been formed and driven I do not desire to confine myself to such exact mechanism, as any other well-known device or devices may be used for this purpose without departing from the essence of my invention.

The wire-staple forming and driving mechanism is shown in Figs. 7, 8, 9, and 10 and is constructed as follows: In guides in the arm Q is guided the former-slide W, having secured to or made integral with its lower end the female former W′, as shown in Figs. 7, 8, and 9. Below the female former W′ is arranged the male former W″, which is horizontally adjustable in suitable guides in the lower portion of the arm Q. The female former W′ has a vertical perforation w for receiving the driver-bar and for the formation of the staple like that shown and described in my aforesaid patent. To the male former is secured a pin or projection w', adapted to be received in slots w'' in the wings of the female die or former. Said slots are vertical at their lower ends and inclined at their upper ends, as shown in Fig. 9, so as to permit the female die to descend during a part of its stroke to form the staple by bending it over the male former W″ without causing the latter to move backward during the staple-forming operation. After the formation of the staple the male die or former W″ is caused to move longitudinally backward relative to the female former by the action of the pin w' on the male former passing into the upper inclined portions of the slots w'' in the female die or former, and this is done for the purpose of carrying the male former backward out of the way from the formed staple, so as to allow the driver-bar Q″ to drive the staple through the throat or receiver without coming in contact with the male former in a manner similar to that shown and described in my above-mentioned patent. To the lower portion of the driver-block Q′ is pivoted at Q^3 a latch Q^4, having a lip q^4 at its upper end, adapted to rest on the upper end of the former-slide W during the first part of the downward stroke of the driver-block for the purpose of causing the former-slide and female die or former to descend during the formation of the staple and the withdrawal of the male former, and during such downward motion of the former-slide and female former the latch Q^4 is held interlocked with the upper end of the former-slide by the influence of a suitable spring Q^5, secured to the driver-block Q′ and having its free end bearing against the upper portion of said latch, as shown in Figs. 7, 8, and 9. After the staple has been formed and the male former moved backward, as above stated, the former-slide

W is automatically released from the driver-block by the lip q^4 coming in contact with inclines q^5 on the arm Q, as shown in Fig. 7, by which action the latch Q^4 is automatically released from the former-slide W, allowing the driver-block and its driver to descend for driving the staple into the box or cover without imparting a downward motion to the former-slide during the staple-driving operation. After the staple has been driven and as the driver-block is moved upward it causes the former-slide to be raised to its normal position (shown in Figs. 7, 8, and 9) by the action of a pin or projection q^6, secured to the driver-block Q′, coming in contact with the upper end of a slot or recess q^7, made in the front portion of the former-slide W, as shown in Fig. 9. In the lower part of the arm Q is journaled the centrally-perforated throat or staple-receiver X, which is normally held in the position shown in Figs. 9 and 10. The throat or receiver X is provided with a central longitudinal perforation X′ for receiving the staple and holding it in position previous to and during the driving operation.

In this machine I employ means for automatically oscillating the throat or staple-receiver, so as to cause one staple to be driven at or about a right angle to the other staple for the purpose of interlocking said staples for the formation of a proper hinge. For this purpose I provide the upper portion of said throat or receiver with a toothed segment X″, which is arranged so as to be intermittently engaged with a toothed rack-bar Y, guided in a bearing in the end of the clamp-slide L′, as shown in Figs. 1, 2, 3, 4, and 10. Said rack-bar is normally held in its outer position by the influence of a suitable spring Y′, as shown in Fig. 10. The said rack Y is automatically and intermittently moved inward in the direction of the arrow shown in Fig. 10 by means of a cam or incline Y″, having an upwardly-extending shank Y^3 secured to the driver-block Q′, as shown in Figs. 3, 4, 7, and 8. When the segmental carrier C and its box and cover supporting and clamping devices reach the position shown in Fig. 2, the rack Y has been automatically swung into position so as to intermesh with the toothed segment X″ on the throat or receiver X, as represented in Fig. 10, and while so intermeshed the driver-block descends and places the formed staple into the throat or receiver X. A further descent of the driver-block causes the cam projection Y″ to come in contact with the outer end of the rack-bar Y, by means of which it is caused to move inward in the direction of the arrow shown in Fig. 10, causing the throat or receiver containing the formed staple to be turned about one-fourth of a revolution for the purpose stated and held so during the driving operation by the inner face of the shank Y^3 until the driver-block ascends after the staple has been driven, when the rack-bar Y is released and carried by its spring Y′ to the position shown in Fig. 10, causing the throat or receiver X to be automatically turned to its normal position, (shown in Fig. 10,) in which position the said throat or receiver is held at all other times during the operation of the machine, and it will thus be seen that the staples are intermittently driven at or about a right angle to each other, so as to cause one staple to be interlocked with its fellow for the formation of a proper hinge.

Upon the upper box-guide or angle-iron *e* are arranged longitudinally-adjustable gages *e′ e″*, as shown in Figs. 1, 2, 3, and 4, against either one of which the box and cover may be held during the hinging operation.

Previous to driving the first staple-hinge the box and cover may be moved to the position relative to the gage *e′* as shown in Figs. 3 and 4, and after such staple-hinge has been driven the box and cover may be moved upon the guides *f* and *e* until the said box and cover come in contact with the opposite gage *e″*, and by this arrangement the hinges may be properly spaced.

The operation of the machine is as follows: Previous to starting the machine the carrier C is held stationary in the position shown in Fig. 1, and while it is in such position the operator places a cover H upon the cover-supports E′ *e* in such a manner as to bring the rear edge of the cover against the yielding gage I and one side of said cover against the spacing-gage *e′*, after which the box G is placed upon the yielding bracket F and its angle-irons *f f*, with one end of said box adjusted against the said spacing-gage *e′*, as shown in Figs. 1, 3, and 4. The machine is then set in operation by depressing the treadle N″, causing the segmental carrier C to move in the direction of the arrow shown in Fig. 1, by which movement the automatic clamping devices cause the box to be forced in close contact with the edge of the cover, the rear of the box against the slide E, and the upper portion of the box and cover to be clamped between the movable box and cover-support and the under side of the clamping projection *d′* on the clamping-bar D′. After the box and cover have been automatically clamped, as above described, the carrier C (and box and cover clamped thereto) continues to move in the direction of the arrow shown in Fig. 1 until said parts reach the position shown in Fig. 2, and during such motion of the carrier the wire O has been fed, straightened, cut off, and pointed and placed in position to be formed and the rack Y has been brought into position to intermesh with the toothed segment X″ on the throat or receiver X. When the carrier C reaches the position shown in Fig. 2, it is automatically caused to be held stationary by the automatic shipper or controlling device, heretofore described, and while held stationary in such position the staple is formed, placed in the receiver, turned at a right angle, driven through the cover, and clenched. The driver-

block is then automatically raised to its normal position, after which the segmental carrier, with the box and cover thereon, is rocked in an opposite direction until the box and cover assume the position shown by dotted lines in Fig. 1, in which they are held temporarily stationary, and during such reverse motion of the carrier another portion of the wire has been fed, straightened, cut off, and pointed and placed in position to be formed. While the box and cover are held stationary in the position shown in dotted lines in Fig. 1, another staple is formed, placed in the receiver, driven, interlocked with the previous staple, into the box, and clenched, after which the driver-block is automatically raised to its normal position. The segmental carrier C, with box and cover supported thereon, then commences to move in the direction of the arrow shown in Fig. 1 until the position shown in full lines in Fig. 1 is reached, when the box and cover are automatically released from their clamping devices and the carrier held temporarily stationary to enable the operator to adjust the position of the box and cover for receiving another hinge, in a manner as hereinabove described, after which the hinged box and cover are removed, when the carrier C is returned and held stationary in the position shown in Fig. 1, and a new box and cover placed in position, as before, and the operation of the machine repeated.

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

1. In a box-hinging machine in combination, a stationary staple making and driving device, and an oscillating or rocking box and cover supporting and clamping device, substantially as and for the purpose set forth.

2. In a box-hinging machine in combination, a stationary and intermittently-operated staple forming and driving device, an intermittently-operated wire feeding, straightening, cutting and pointing device, and an oscillating or rocking box and cover supporting and clamping device, substantially as and for the purpose set forth.

3. In a box-hinging machine in combination, a stationary and intermittently-operated staple forming and driving device, an intermittently-operated wire feeding, straightening, cutting and pointing device, and an oscillating box and cover supporting and clamping device, which by its oscillation presents the box and cover in different directions to the staple-driving device, so as to cause the interlocking staples to be driven in different directions through the cover and box, substantially as and for the purpose set forth.

4. In a box-hinging machine, in combination, a stationary intermittent combined wire feeding, straightening, cutting and pointing device, a stationary staple forming and driving device, and an automatically-actuated oscillating or rocking box and cover supporting and clamping device, adapted to be automatically rocked and moved to and from the staple-driving device, and means for turning one staple at or about a right angle to its fellow, substantially as and for the purpose set forth.

5. In a box-hinging machine, in combination, a stationary intermittently-operated combined wire feeding, straightening, cutting and pointing device, a stationary staple forming and driving device, and an automatically-operated oscillating or rocking box and cover supporting device, adapted, during its oscillation, to be automatically moved to and from the staple-driving device and to different positions for receiving the driven interlocking staples in different directions respectively through the box and cover, substantially as and for the purpose set forth.

6. In a box-hinging machine, in combination, a stationary wire feeding, straightening, cutting and pointing device, a staple forming and driving mechanism, and an automatically oscillating box and cover supporting device, adapted to rock forward and back, relative to the stationary staple-driving device, so as to cause the staples to be driven interlocked at about a right angle respectively through the box and cover, and means for clenching the same, substantially as and for the purpose set forth.

7. In a box-hinging machine, in combination, a stationary segmental head, a segmental oscillating carrier guided in said head, a box and cover supporting and clamping device on said carrier, and an intermittently-actuated wire feeding, straightening, cutting and pointing mechanism, and a staple forming and driving device, substantially as and for the purpose set forth.

8. In a box-hinging machine, in combination, a stationary segmental head, a segmental oscillating carrier guided in said head, and having a segmental gear intermeshing with a reciprocating rotary driving-gear, a box supporting and clamping device on said carrier, and an automatic staple making and driving device, substantially as and for the purpose set forth.

9. In a box-hinging machine, in combination, a staple making and driving device, and a box and cover supporting device, consisting of an angular adjustable slide E, E′, having a yielding bracket F arranged thereon, and having side extensions or supporting-arms *e*, *f*, and adjustable gages *e′*, *e″*, substantially as and for the purpose set forth.

10. In a box-hinging machine, in combination, a staple making and driving device, an oscillating carrier, a box and cover supporting device adjustably arranged thereon, automatic means for moving the latter to and from the driving device, and an automatically-operated clamping device, adapted to clamp the box against the cover and box support, substantially as and for the purpose set forth.

11. In a box-hinging machine, in combina-

tion, a staple making and driving device, an oscillating or rocking box and cover supporting and clamping device, and automatic mechanism for intermittently oscillating the box and cover supporting and clamping devices, substantially as and for the purpose set forth.

12. In a box-hinging machine, in combination, a staple making and driving device, an oscillating or rocking box and cover supporting and clamping device, and automatic mechanism for intermittently oscillating the box and cover supporting and clamping device, and intermittently operating the staple-making and staple-driving mechanism, substantially as and for the purpose set forth.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

DAVID HENRY SAUNDERS.

Witnesses:

ALBAN ANDRÉN,

LAÜRITZ N. MÖLLER.