

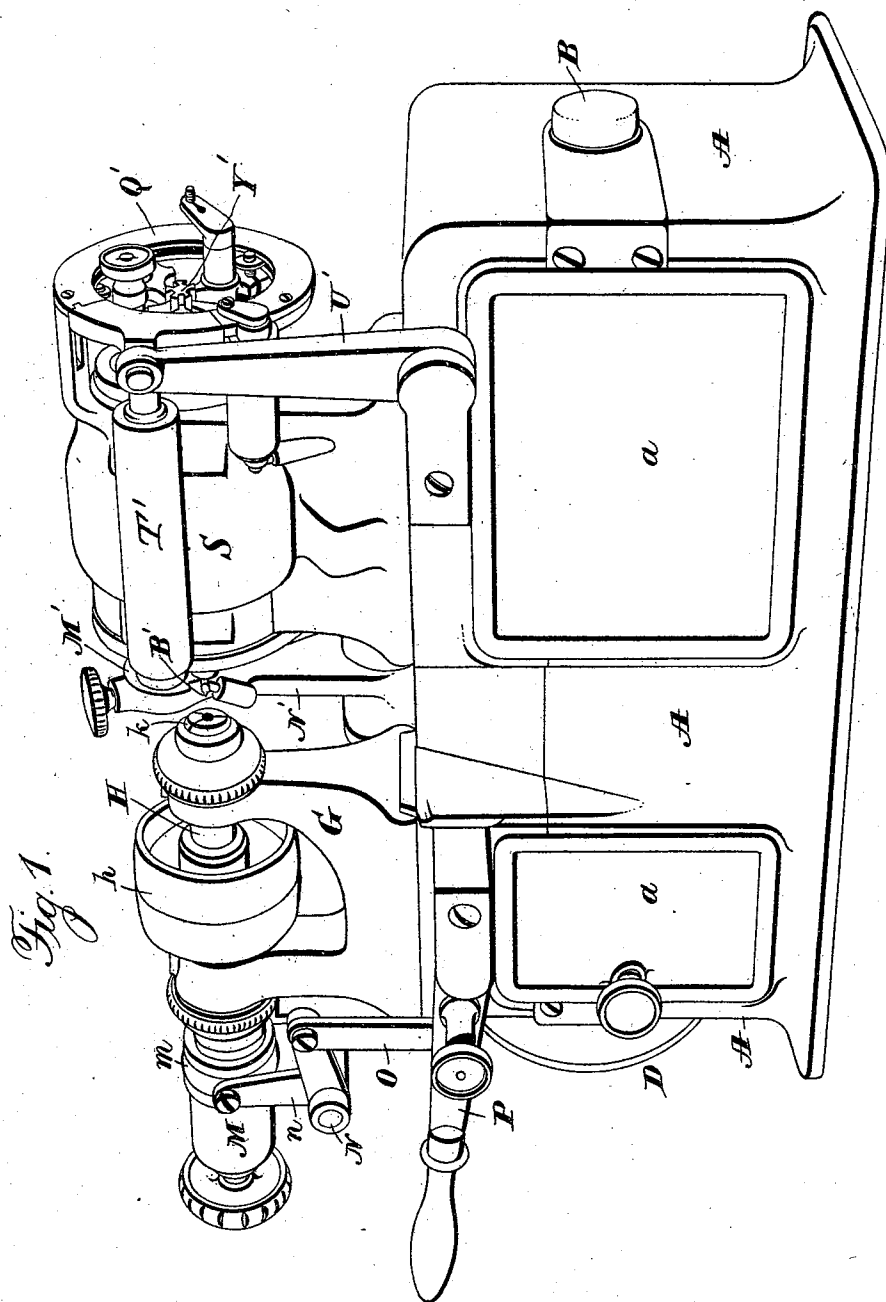
(No Model.)

7 Sheets—Sheet 1.

G. E. HUNTER.
JEWEL SETTING MACHINE.

No. 555,447.

Patented Feb. 25, 1896.



Witnesses:
Jas. E. Hutchinson
Chas. F. Williamson

Inventor.
George E. Hunter, by
Prindle and Russell, his Attys

(No Model.)

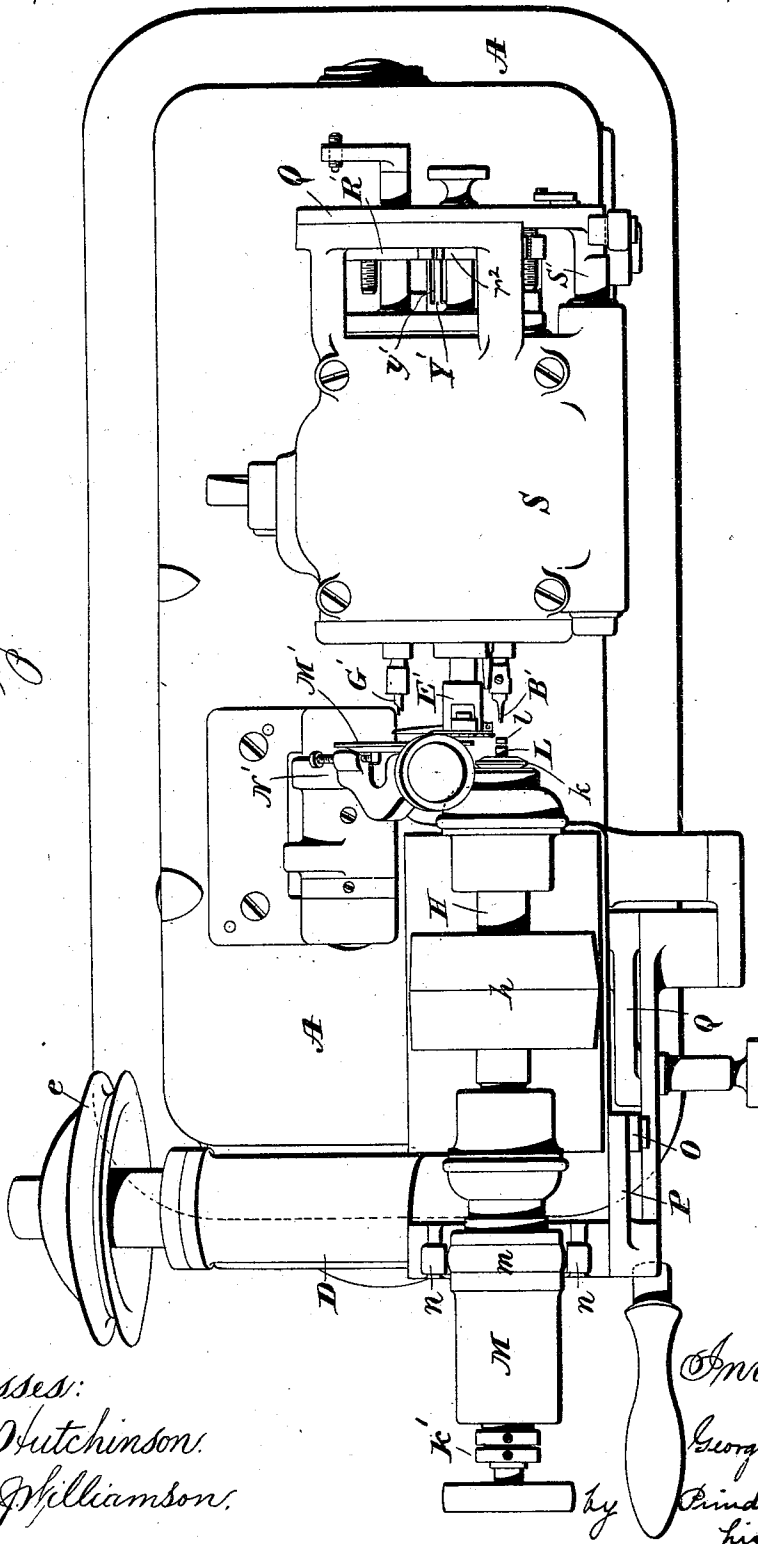
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Fig. 2.



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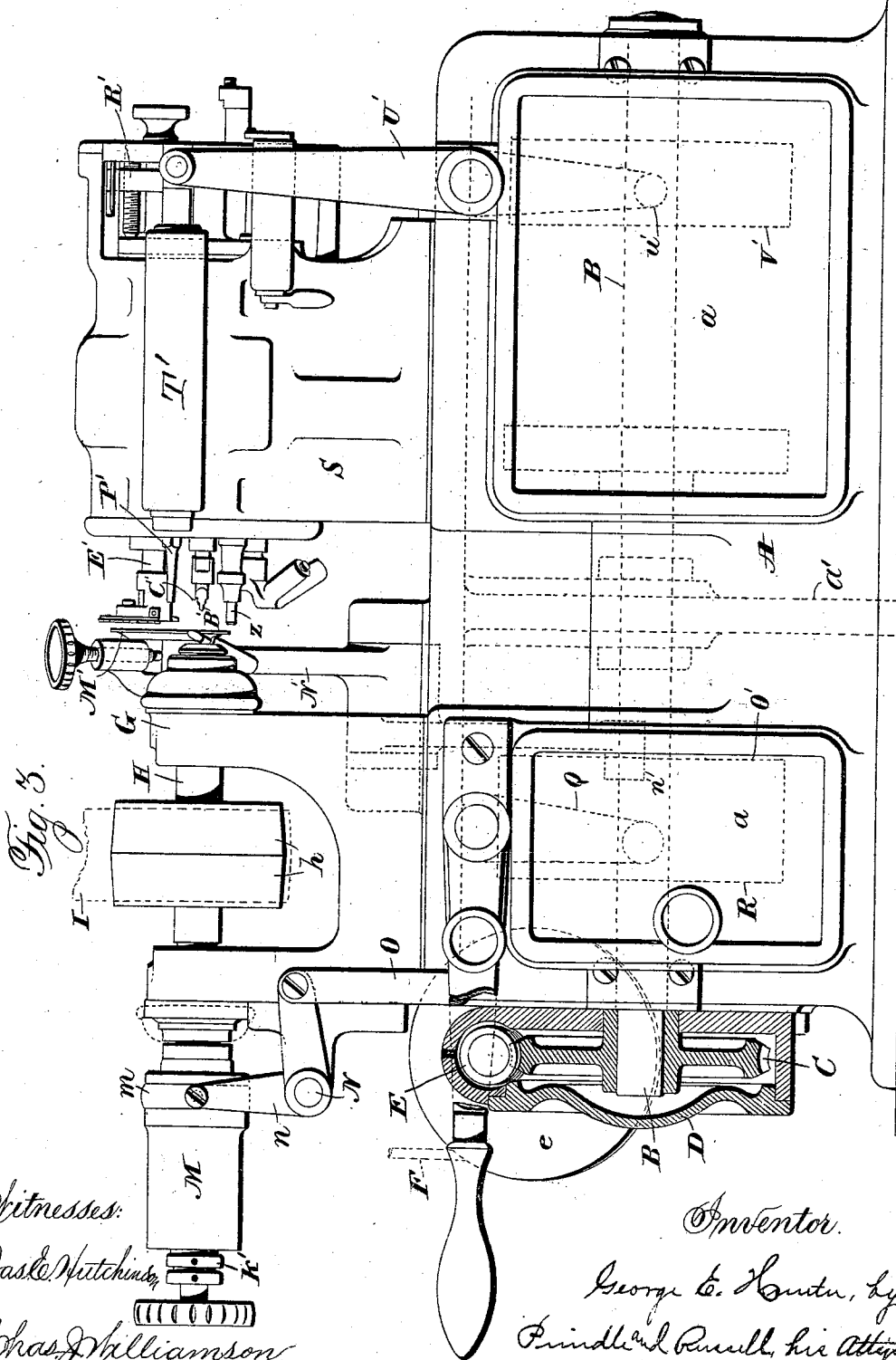


Fig. 3.

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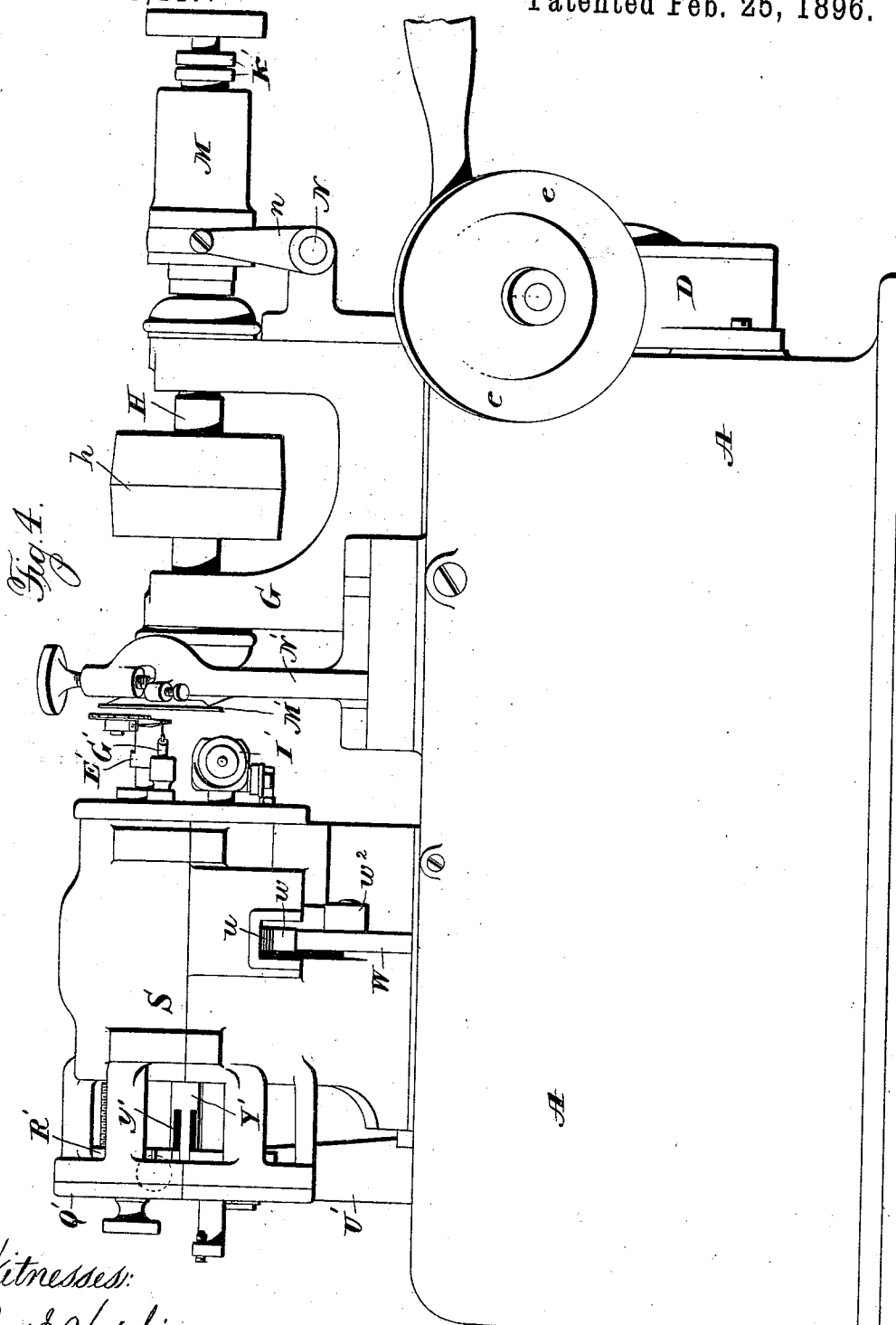
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G. E. HUNTER.
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Witnesses:
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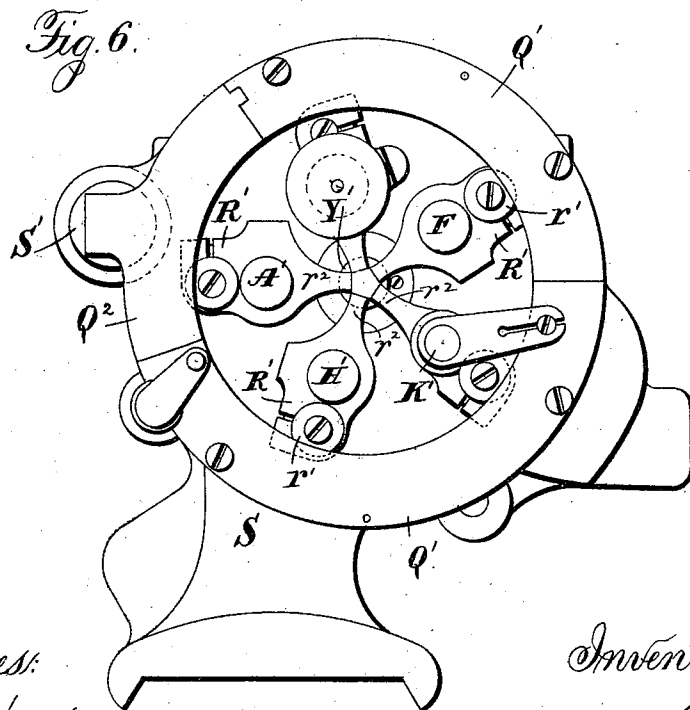
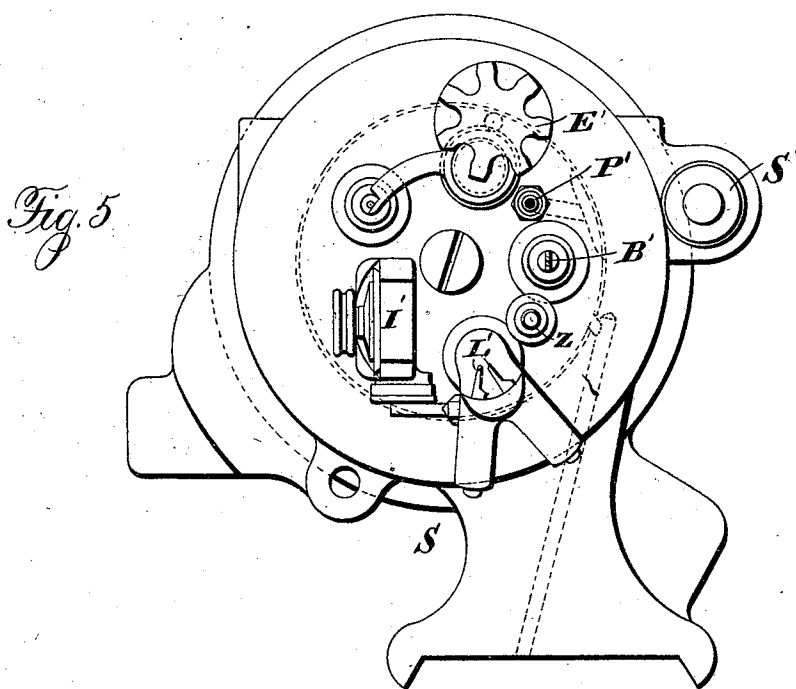
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Witnesses:

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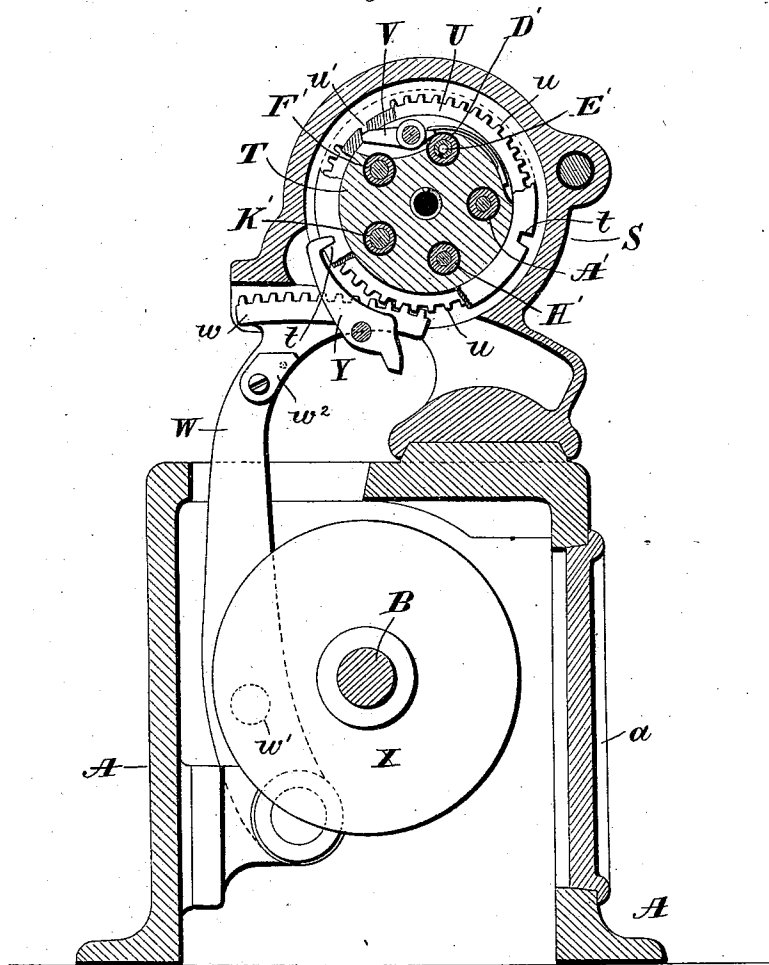
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Fig. 7.



Witnesses:

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(No Model.)

7 Sheets—Sheet 7.

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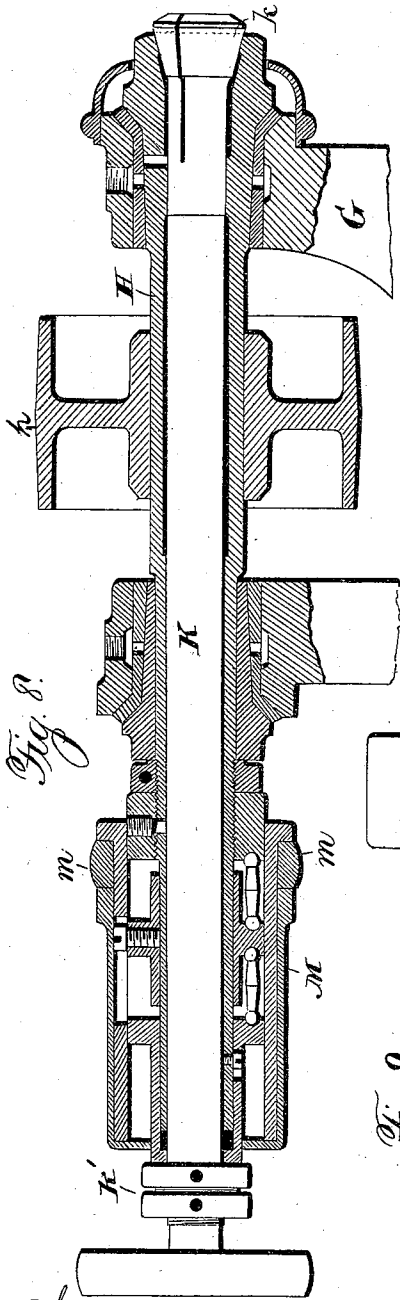


Fig. 8.

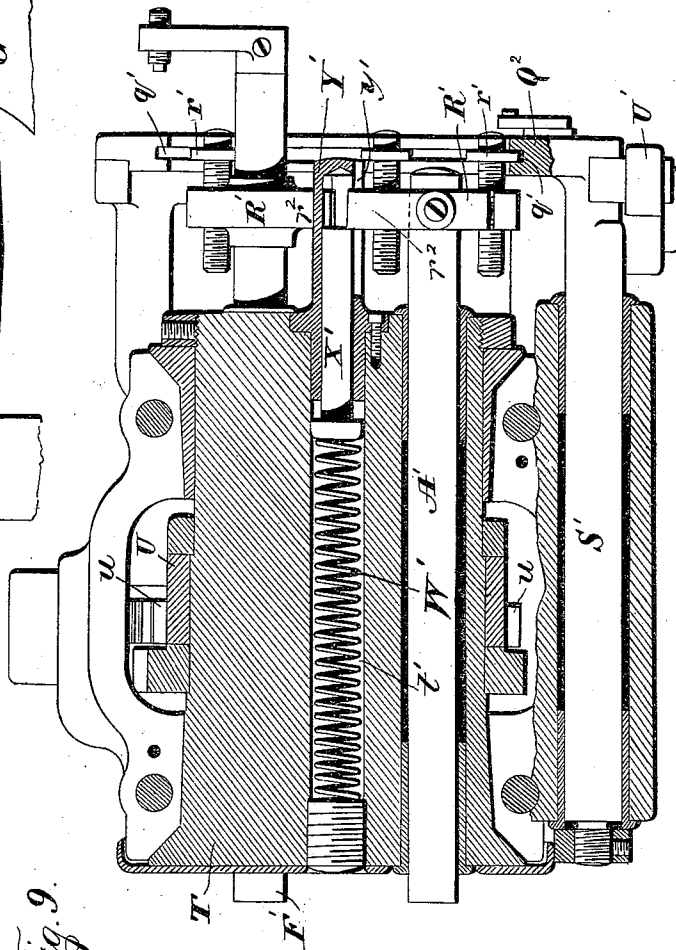


Fig. 9.

Witnesses:

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Chas. J. Williamson.

Inventor.

George E. Hunter, by
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UNITED STATES PATENT OFFICE.

GEORGE E. HUNTER, OF ELGIN, ASSIGNOR TO THE ELGIN NATIONAL WATCH COMPANY, OF CHICAGO, ILLINOIS.

JEWEL-SETTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 555,447, dated February 25, 1896.

Application filed October 13, 1893. Serial No. 488,086. (No model.)

To all whom it may concern:

Be it known that I, GEORGE E. HUNTER, of Elgin, in the county of Kane, and in the State of Illinois, have invented certain new and useful Improvements in Jewel-Setting Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

- Figure 1 is a perspective view of my mechanism from the front; Fig. 2, a plan view of the same from above. Figs. 3 and 4 are respectively front and rear elevations of said mechanism. Figs. 5 and 6 are enlarged elevations of the tail-stock from the front and rear ends, respectively. Fig. 7 is a transverse section on a line passing through the tail-stock. Fig. 8 is a central longitudinal section of the head-stock upon a vertical line. Fig. 9 is a like view of the tail-stock upon a horizontal line.

Letters of like name and kind refer to like parts in all of the figures.

- The design of my invention is to provide mechanism for automatically forming the settings for watch-jewels and securing the jewels therein; and to this end said invention consists in the mechanism having the construction and combination of parts hereinafter specified.

- In the carrying of my invention into practice I preferably employ as a support for the operative mechanism a frame, which consists, principally, of a rectangular hollow base A, that has its front side a removable, and within its interior is provided with a vertical partition *a'*, which, in connection with the ends thereof, furnishes bearings for a horizontally-arranged shaft B, that is provided at one end with a worm-wheel C. The worm-wheel C is contained within a suitable housing D, which is secured upon the end of the base A, and upon its upper rear side is provided with a bearing for a worm E, which worm engages with said wheel, and upon its rear end is provided with a pulley *e*, around which passes a belt F, that operates to rotate said pulley, and through the same and said worm to give rotation to the shaft B.

- Secured upon the upper side of the base A is a head-stock G, within which is journaled

a hollow spindle H, that is caused to rotate by means of a pulley *h* and a belt I which passes around the same and a suitable driving-pulley. Within said spindle or arbor H is fitted a second spindle K, that upon its front end carries a split chuck *k*, which by being drawn rearward will have its split end closed inward and caused to grasp a wire stock L, that passes through the same and through said spindle, while by releasing said parts from such rearward pressure said wire stock will be released and may be moved forward by any of the usual means employed for such purpose. Such manipulation of the chuck is effected by means of a sleeve M, that is placed upon the rear projecting portion of said spindle and adapted to slide lengthwise of the same, and when moved rearward to engage with a nut *k'* at the rear end thereof and by such engagement to move said spindle in such direction. Journaled loosely upon said sleeve is a collar *m*, which has pivoted to opposite sides the ends of two arms *n* and *n'*, that project from a shaft N, which is journaled beneath and at a right angle to the sleeve, while from the front end of such shaft a third arm projects horizontally along the front side of the head-stock and has its outer end engaged by a rod O, which from thence extends downward to and is pivoted upon a horizontally-arranged lever P. As arranged, by raising the free end of said lever, said sleeve will be moved forward so as to release the stock-wire.

The chuck *k* is automatically closed and opened at predetermined intervals by means of a bell-crank Q, which is pivoted within the front side of the base A, with one end in engagement with a cam R, that is secured upon and revolves with the shaft B, and its opposite end adapted to be engaged by the lever P. Said cam has such form as to cause the chuck to be opened and held open until the wire stock is fed forward, and to be then closed and securely held in such position a predetermined time.

Upon the upper side of the base A is secured a tail-stock S, within which is journaled a head T, that in turn journals five spindles or arbors, which are located at equidistant points around its axis, the position of such

tail-stock being such as to cause each spindle, when occupying the front central position, to be in a line axially with the axis of the split chuck *k*. Upon said head is journaled a collar U, which is provided exteriorly with gear-teeth *u* and *u* and interiorly has five teeth or their equivalents, radial slots *u'* and *u'*, that are adapted to engage with a pawl V, that is arranged radially within said head and by means of spring-pressure is held with a yielding force at the outer limit of its motion. Said pawl has one of its sides beveled, so that when said collar is rotated in one direction said pawl will spring outward into said slots as each of the latter comes into coincidence, and will be immediately pressed inward out of the way; but when said collar is rotated in the opposite direction said pawl will engage with the first coinciding slot and lock the parts together, so that a farther movement of said collar in such direction will cause said head to be likewise moved.

The collar U is given a reciprocating rotary movement by means of a lever W, which has its lower end pivoted upon a suitable support within the base A and its upper end provided with a toothed segment *w*, that is adapted to mesh with the teeth *u* and *u*. Between its ends said lever has secured to one side a stud *w'*, which projects laterally into a cam-groove that is provided in the adjacent face of a disk X, which is secured upon and rotates with the shaft B. The radial variations in the path of said groove from a line concentric with the shaft are each such as to swing the lever to and fro a distance sufficient to cause the head to be turned one-fifth of a revolution, and the number of such variations from the path of a circle are such as to cause said head to make one step-by-step rotation, with intervals of rest between each step, for each revolution of said shaft, and at one point to have a period of rest equal in time to two of the other periods. At the termination of each partial rotation said head is locked in position by means of a pawl Y, which engages with one of a series of peripheral teeth *t t*, that are formed upon the former. Said pawl is arranged so that it is unlocked by means of a lug *w³* upon the lever W, which lug engages with the tail of said pawl and moves it out of engagement at the instant that the pawl V is engaged by the collar U.

The various operations performed by the machine are as follows, viz: First, the wire stock L is fed forward until its end impinges upon a stop or gage Z, which projects forward from the head T and at that instant is in a line axially with such wire, after which the chuck closes and said wire rotates with the spindle. The gage is located midway between two spindles, and the head now moves forward until the spindle A', carrying a drill B' and end cutter C', is in a line with the blank, when said spindle is moved forward and then back, and said tools form the jewel-opening and square the end of the blank *l*.

Another partial rotation of the head brings the second spindle D' containing a jewel-holder E' in front of the blank *l*, and a jewel is automatically fed into the opening, after which said head makes another partial revolution and brings into position the third spindle F', which carries on its end a burnishing-tool G'. The forward and then rearward movement of said spindle causes the latter to impinge upon the blank *l*, and burnish the jewel into place, when said head is again partially rotated and the fourth spindle H' brought into position. Said spindle carries upon its end a cutter I', which turns from the end of said blank all surplus metal, after which a further partial rotation of the head brings into position the fifth spindle K' that carries a cutter L', which by a forward and back movement turns the outside of said blank to size. At the instant when the cutter L' completes its operation the finished bushing is cut from the rod L by means of a cutter M', which is secured upon one end of a bar N', that is pivoted centrally within the base A, and is adapted to be swung upon its pivotal bearing, so as to move said cutter toward and from the work. The lower end of said bar is provided with a stud *n'*, which projects laterally into a cam-groove that is formed in the contiguous face of a disk O', which is secured upon and revolves with the shaft B.

Between the first and second spindles A' and D' a tube P' projects from the head T and is so connected with a supply of air under pressure that at the instant when by the rotation of said head said tube is in a line with the blank *l*, air is emitted and all chips and dust which may be within the opening just made by the drill B' are blown away, leaving such opening free for the reception of a jewel.

It is necessary that each of the head-spindles except the jewel-holder spindle should be automatically moved forward and back at the proper time, and that at other times they should be free to rotate with the head. Such result is secured by attaching to the rear end of the tail-stock a ring Q', which is provided within its inner periphery with a groove *q'*, and then securing upon the rear end of each of the longitudinally-movable spindles a collar R', that carries a disk *r'*, which at one edge enters into and travels in such groove. At the front side of the machine the ring Q' is divided and the severed portion Q²—about one-fourth—is secured upon one end of a rod S', that extends into and is adapted to slide longitudinally within a suitable housing T' upon the front of the tail-stock S.

To the outer end of the rod S' is loosely connected one end of a bar U', which from thence extends downward, is pivoted at or near its longitudinal center, and at its lower end is provided with a stud *u'* that engages with and travels in a cam-groove which is formed in the periphery of a disk V' attached to and rotating with the shaft B. Said groove has

such longitudinal configuration as to give to each of the spindles the precise amount of longitudinal motion required and at the precise instant with reference to the step-by-step rotation of the head. The length of the severed portion Q^2 of the ring Q' enables a portion of the forward motions of the head-spindles to be accomplished while said head is moving forward a step, by which means a material saving in time is effected.

The spindles are pressed backward from the work by means of a coiled spring W' placed in a longitudinal axial opening t' in the head T that forces rearward a plunger or rod X' , whose outer end engages the ends of fingers r^2 that project radially inward from the collars R' on the spindles. The plunger X' is guided in its longitudinal movements by a tube Y' attached to and projecting rearward from the axial center of the head. Said tube has in its sides a longitudinal slit y' for the passage and movement of each finger r^2 .

Having thus described my invention, what I claim is—

1. In a jewel-setting machine, the combination with a jewel-holder adapted to feed a jewel to a setting and a rotatable head of a series of tools carried by said head adapted to form a setting and to secure the jewel therein, substantially as and for the purpose specified.

2. In a jewel-setting machine, the combination with a rotatable head of a series of tools adapted to form a setting and to secure the jewel therein, and a jewel-holder, said tools and holder being carried by said head, substantially as and for the purpose shown.

3. In a jewel-setting machine the combination of a jewel-holder a rotatable head provided with a longitudinally-slotted tube, and with a number of longitudinally-movable spindles that carry a series of tools, fingers attached to and extending from said spindles through the slots in the tube, and a coiled spring for applying pressure to such fingers to move the spindles, substantially as and for the purpose set forth.

4. In a jewel-setting machine, the combination of a jewel-holder, a rotatable head provided at one end with a longitudinally-slotted tube, a number of longitudinally-movable

spindles carried by said head, and provided with a series of tools, a spring within the head, and collars secured to the spindles having each a finger projecting into the tube in rear of said spring, substantially as and for the purpose described.

5. In a jewel-setting machine, the combination of a rotatable head, a jewel-holder and a series of tools carried thereby, to form a jewel-setting and to secure the jewel therein, a revoluble work-holding chuck to hold the stock to form the setting, and means to move each tool toward and from said chuck substantially as and for the purpose specified.

6. The combination of a rotatable head, longitudinally-movable spindles carried thereby, and the grooved ring having a movable section, with which said spindles engage, substantially as and for the purpose shown.

7. The combination of a rotatable head, longitudinally-movable spindles carried thereby, a disk carried by each spindle, and the ring provided with a groove, with which said disks engage, and having a movable section, substantially as and for the purpose set forth.

8. In a jewel-setting machine, the combination of a rotatable head, a jewel-holder, and a series of tools carried thereby, the toothed feeding-ring on said head, the lever having a toothed segment to mesh with the teeth of said ring, and means to move said tools toward and from the work successively, substantially as and for the purpose shown.

9. In a jewel-setting machine, the combination of a rotatable head a jewel-holder, and a number of tool-holding spindles carried thereby the toothed feeding-ring on said head, the lever having a toothed segment to mesh with the teeth of said ring, a disk carried by each spindle, a grooved ring engaged by such disks having a movable section, and means to move the latter, substantially as and for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 11th day of August, 1893.

GEO. E. HUNTER.

Witnesses:

GEO. S. PRINDLE,
CARLOS H. SMITH.