(No Model.)

4 Sheets—Sheet 1.

C. V. WOERD.

MACHINE FOR ROUGHING OUT PINIONS, ARBORS, AND STAFFS FOR WATCHES.

No. 268,340. Patented Nov. 28, 1882.

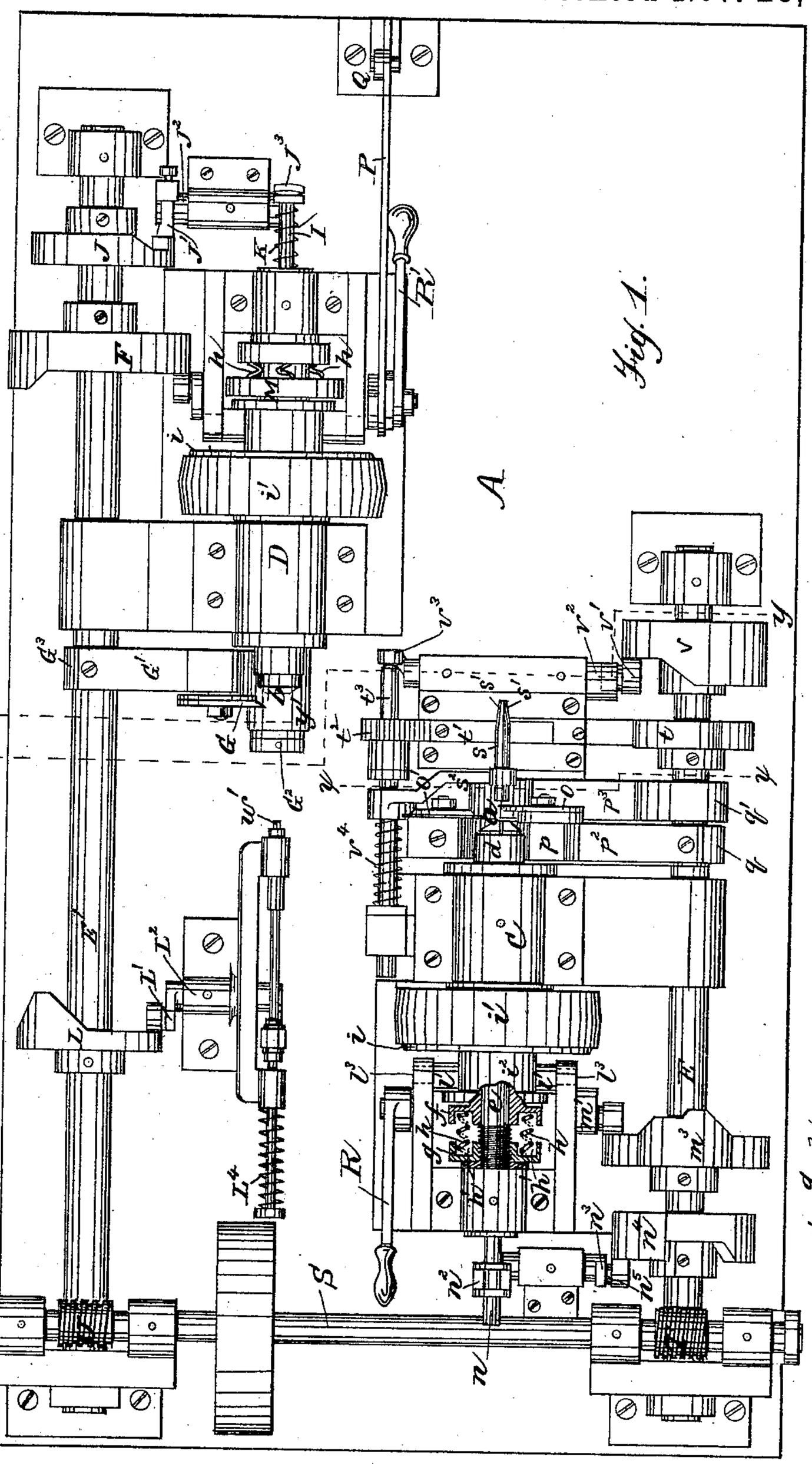

Fig. 1.

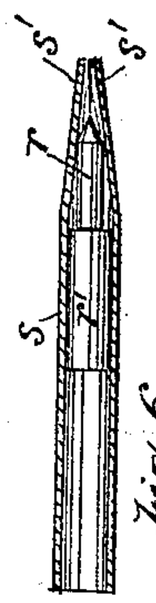

Fig. 6.

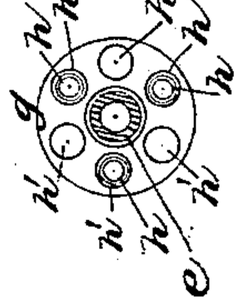

Fig. 5.

Witnesses:
H. G. Wadlin.
L. B. Morrison.

Inventor:
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Attorneys.

(No Model.)

4 Sheets—Sheet 2.

C. V. WOERD.

MACHINE FOR ROUGHING OUT PINIONS, ARBORS, AND STAFFS FOR WATCHES.

No. 268,340. Patented Nov. 28, 1882.

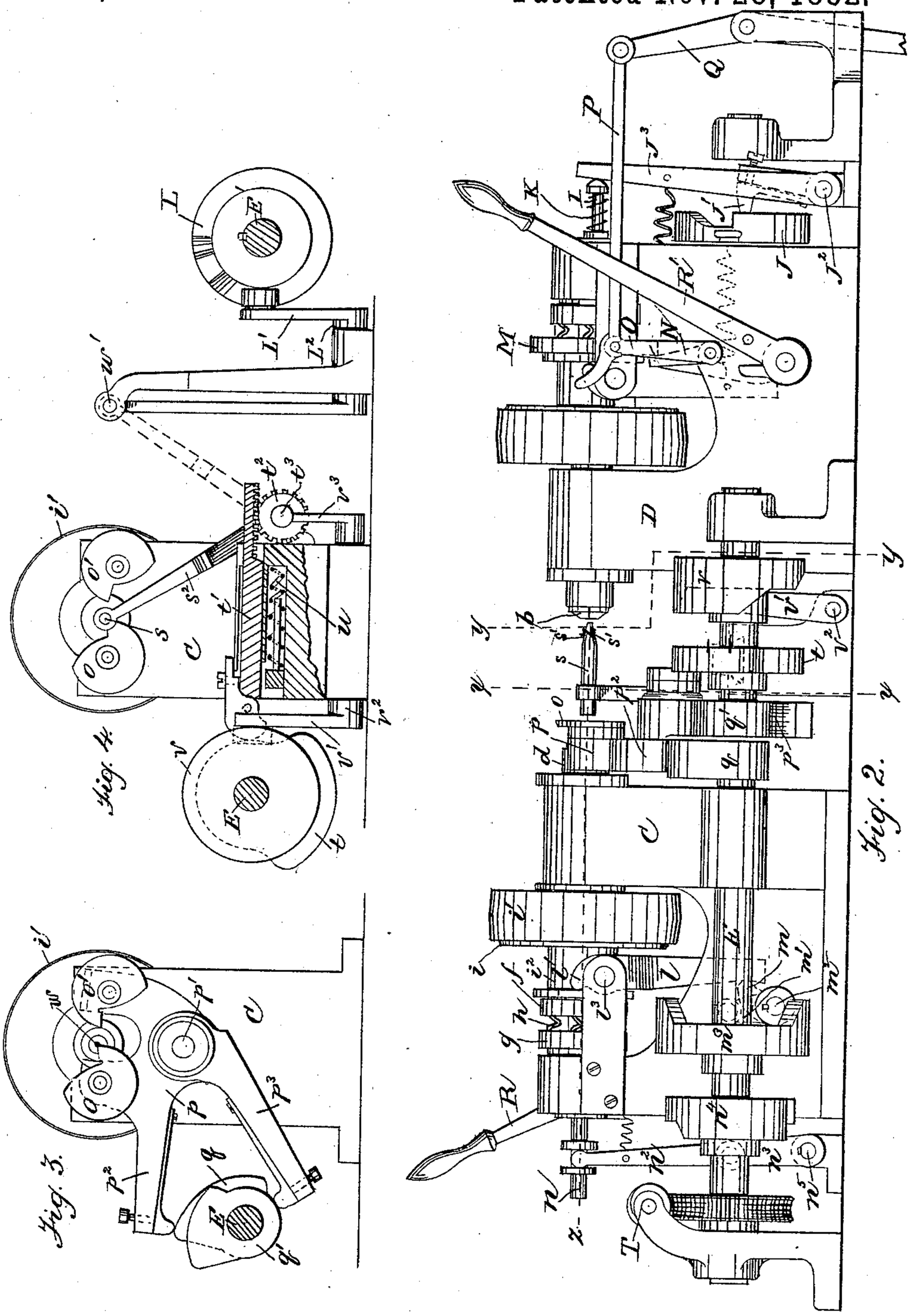

Fig. 2.

Fig. 4.

Fig. 3.

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(No Model.) 4 Sheets—Sheet 3.

C. V. WOERD.

MACHINE FOR ROUGHING OUT PINIONS, ARBORS, AND STAFFS FOR WATCHES.

No. 268,340. Patented Nov. 28, 1882.

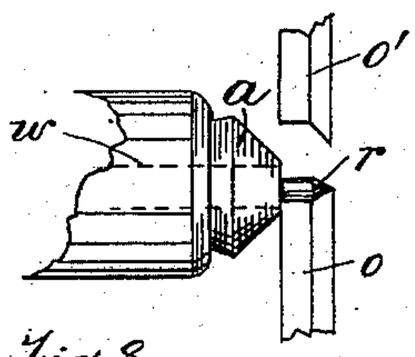

Fig. 8.

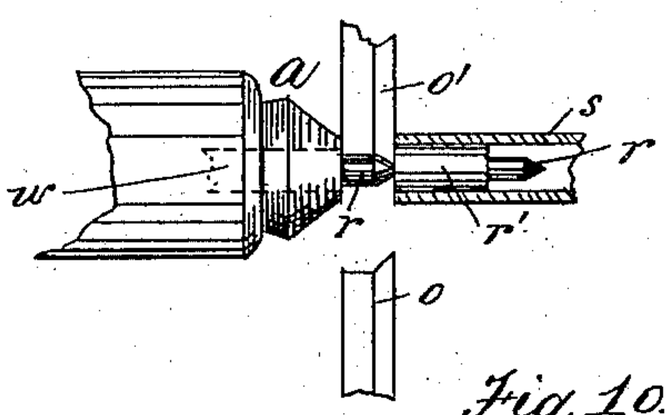

Fig. 10.

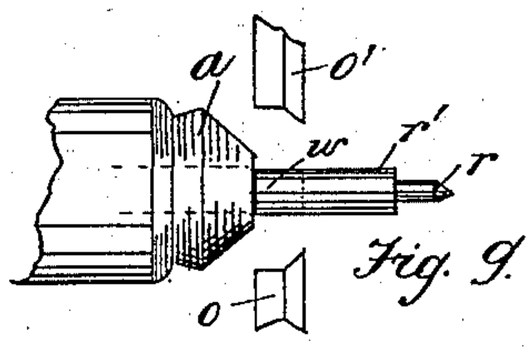

Fig. 9.

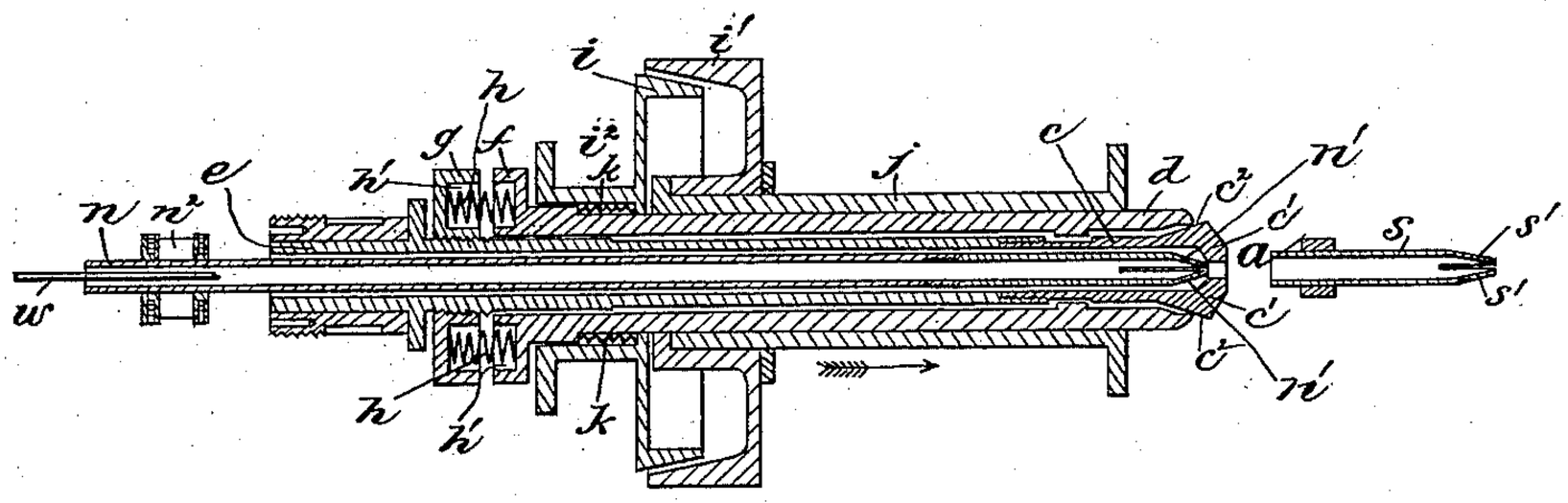

Fig. 7.

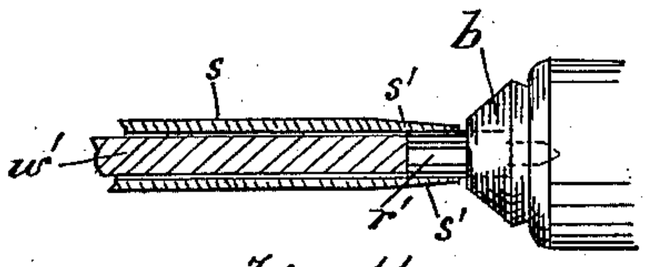

Fig. 11.

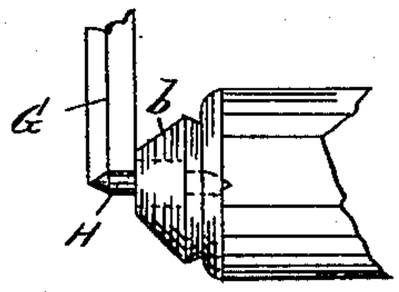

Fig. 12.

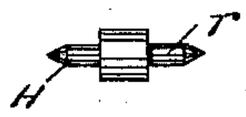

Fig. 13.

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

C. V. WOERD.

MACHINE FOR ROUGHING OUT PINIONS, ARBORS, AND STAFFS FOR WATCHES.

No. 268,340. Patented Nov. 28, 1882.

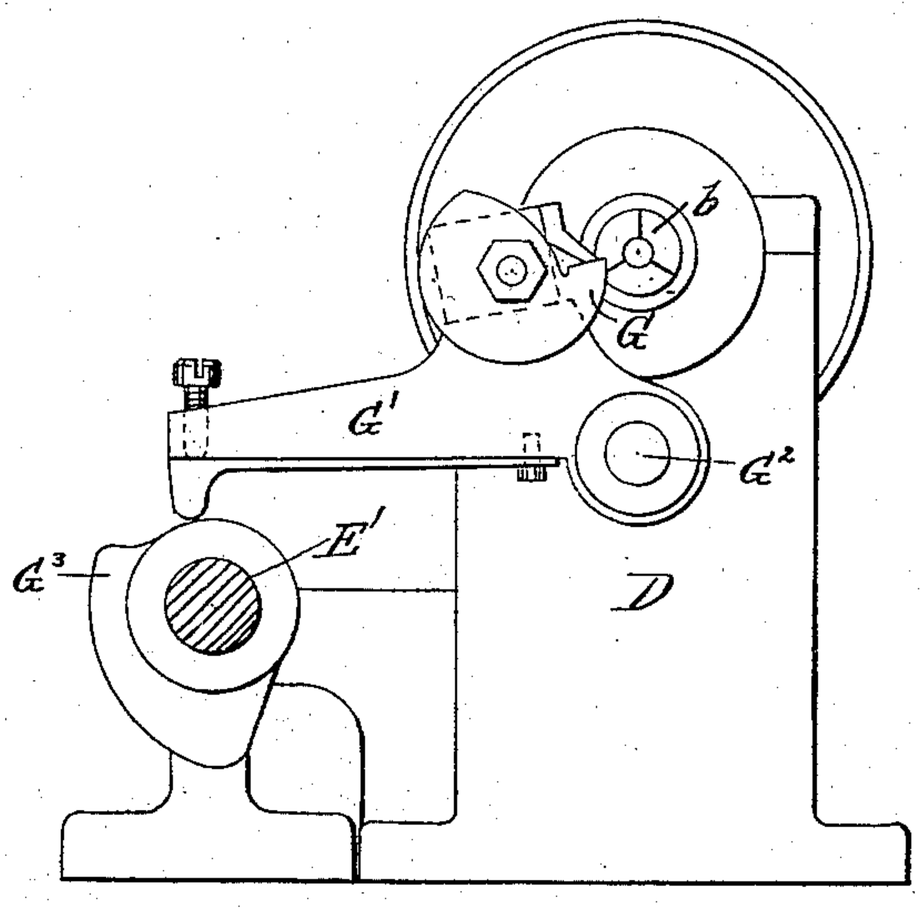

Fig. 14.

Witnesses:
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L. B. Morrison.

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UNITED STATES PATENT OFFICE.

CHARLES V. WOERD, OF WALTHAM, MASSACHUSETTS.

MACHINE FOR ROUGHING OUT PINIONS, ARBORS, AND STAFFS FOR WATCHES.

SPECIFICATION forming part of Letters Patent No. 268,340, dated November 28, 1882.

Application filed August 22, 1881. (No model.)

To all whom it may concern:

Be it known that I, CHARLES V. WOERD, of Waltham, in the county of Middlesex and State of Massachusetts, have invented certain Improvements in Machines for Roughing Out Pinions, Arbors, and Staffs for Watches, of which the following is a specification.

This invention has for its object to provide a machine to automatically rough out pinions, arbors, and staffs for watches, or, in other words, to form the ends or journals thereof from a cylindrical rod or blank, leaving a cylindrical enlargement between said journals, to be afterward finished as desired.

The invention also has for its object to provide certain improvements in the chucks employed to hold the work in such a machine.

To these ends the invention consists in combinations of mechanism hereinafter described, whereby, first, the end of a cylindrical rod is caused to project from a chuck and turned down at its projecting end to form one of the journals of a pinion, arbor, or staff; second, said rod is severed at a distance from the turned-down portion, thus forming a blank having one end reduced; third, said blank is grasped, carried forward, and its reduced end inserted in a second chuck projecting in an opposite direction from the first chuck; and, fourth, the other end of the blank is reduced to form the other journal, leaving a central enlargement between the two journals.

The invention also consists in the improvements in the means for closing the jaws of the chuck, all of which I will now proceed to specifically describe.

Of the accompanying drawings, forming part of this specification, Figure 1 represents a plan view of a machine embodying my invention. Fig. 2 represents a side elevation of the same. Figs. 3 and 4 represent respectively transverse sections on lines *x x* and *y y*, Figs. 1 and 2. Figs. 5 and 6 represent details. Fig. 7 represents a horizontal section on line *z z*, Fig. 2. Figs. 8, 9, 10, 11, and 12 are views representing different stages of the operation. Fig. 13 represents a roughed-out cannon pinion blank after it leaves the machine. Fig. 14 represents a section on line *y' y'*, Fig. 1, viewed from the left.

The same letters refer to the same parts in all the figures.

In carrying out my invention I locate upon a suitable base, A, two head-stocks, C D, supporting respectively chucks *a b*, the two chucks being out of line with each other and facing in opposite directions. The chucks are substantially alike in construction, so that a description of one will suffice for both. The chuck is composed of a tube, *c*, split at its ends to form spring-jaws *c' c'*, which are normally held open or apart from each other by their own resilience, and are provided with external inclined surfaces, c^2 c^2. The tube is inclosed in a compound spindle composed of a longitudinally-movable tube, *d*, journaled in the forward portion of the head-stock, and a tube, *e*, mainly contained in the tube *d*, adapted to rotate with the tube *d* without moving longitudinally, journaled at its rear end in the rear portion of the head-stock, and having the chuck secured to its forward end. The tubes *d e* are provided respectively with collars *f g*, between which are interposed two or more spiral springs, *h h*, adapted to press the sliding tube *d* in the direction indicated by the arrow in Fig. 7, so that the end of said tube will normally bear upon the inclines of the chuck-jaws and close the latter or force them toward the center of the chuck.

i represents one member of a friction-clutch adapted to rotate with and slide on the sliding tube *d*. The other member, *i'*, of said clutch is journaled on a fixed sleeve or bushing, *j*, forming one of the journals of the sliding tube, and is formed to receive a driving-belt. The sliding member *i* of the clutch is provided with a flanged sleeve, i^2, and is pressed toward the member *i'* by a spring, *k*. A bifurcated lever, *l*, terminating in short arms *l' l'*, bearing on the flange of the collar i^2 of the sliding member, and pivoted at l^3 l^3 to fixed supports, is adapted, by means hereinafter described, to be moved on its pivots at stated intervals, so as to first push the sliding member of the clutch away from the other member, and thereby stop the rotation of the compound spindle and chuck; and, secondly, to press said flanged sleeve i^2 against the flange *f* of the sliding tube *d*, and thereby move said tube backwardly and cause

its outer end to release the spring-jaws of the chuck, the latter being thus caused to release the rod or wire *w*, previously grasped by it. The bifurcated lever *l* is operated to produce the results described by arms *m m'* on a shaft, m^2, and a cam, m^3, on the shaft E, bearing on the arm *m'*.

R represents a lever rigidly attached to the shaft m^2, and enabling the operator to move the sliding member of the clutch backwardly by hand and release the spring-jaws whenever desired by rotating the shaft m^2.

n represents a feeding-tube, in which the wire to be formed into pinions, arbors, or staffs is placed and grasped by spring-fingers *n' n'*, formed by splitting the inner end of the tube. The feeding-tube *n* projects nearly to the jaws of the chuck, and is adapted to be reciprocated, its spring-fingers grasping the rod with sufficient firmness to feed or move the rod when the tube is moved forward, said movement being effected by mechanism hereinafter described, and timed so that it takes place while the chuck-jaws are open, so that they will not resist the feeding of the wire. The backward movement of the feeding-tube takes place when the wire is grasped by the chuck-jaws, so that the wire is not moved backwardly, the tube merely slipping back to again feed the wire forward. The movements of the feeding-tube are effected by means of levers n^2 n^3 and a cam, n^4, on the cam-shaft E, the levers n^2 n^3 being on a shaft, n^5.

The construction of the chuck and compound spindle is common and no part of my invention, excepting the arrangement of the springs *h h*, which press the sliding tube of the compound spindle forward. These springs are two or more in number, (six being employed in the present instance,) and are arranged at equal distances apart. Heretofore in a chuck of this kind the sliding tube of the compound spindle has been pressed forward by a single spiral spring encircling the spindle, as shown in Letters Patent of the United States No. 144,178, issued to me October 28, 1873. By providing two or more springs arranged at equal distances apart I distribute the pressure on the sliding tube, and therefore on the jaws of the chuck, among several points at equal distances apart, without any preponderance of pressure at any one point or side, as is the case with the single spiral spring heretofore used. Each jaw of the chuck therefore receives the same degree of pressure as the other jaws, and the work is held with precision at the center of the chuck. The springs *h h h* are let into sockets *h'*, formed in the proximate faces of the flanges *f g*, as shown.

o o' represent cutters arranged to act alternately on the end of the wire *w*, projecting from the chuck *a*. These cutters are mounted on a rocking lever, *p*, pivoted at *p'* to the head-stock C, and provided with arms p^2 p^3, bearing respectively on cams *q q'* on the cam-shaft E, and oscillating the lever *p*. The cutter *o* is thus first brought in contact with the end of the wire *w* at the commencement of the operation, reducing said wire and forming a pointed journal or spindle, *r*, as shown in Fig. 8. The cutter *o* is then moved away, and before the cutter *o'* reaches the wire the latter is fed along, as shown in Fig. 9, so that the cutter *o'* acts upon a portion of the wire separated from the journal or already turned portion *r* by an unreduced portion, *r'*. It will be observed that by mounting the cutters *o o'* upon a pivoted lever and oscillating the latter to present the cutters alternately to the material held by the chuck, the friction of moving parts and the cost of construction are much less than when the cutters are mounted on a carriage reciprocating in guides or ways, as heretofore. The function of the cutter *o'* is to cut the wire off, thus forming a blank enlarged at one end, and at the same time partially forming the journal *r* of the next blank, as shown in Fig. 10, so that the cutter *o*, at its next operation and thereafter until the wire is cut up, will only have to perform a part of the operation of forming said journal, instead of the whole, as in the first instance. Before the blank is completely severed from the wire a carrier or tube, *s*, moves upon and receives it, as shown in Fig. 10, and removes it after it is severed to a point in line with the center of the chuck *b*. The carrier is of such internal diameter at one end as to fit somewhat closely upon the larger portion of the blank, and its opposite end is split to form inwardly-bent spring-fingers *s' s'*, which are adapted to bear upon the reduced journal of the blank. The carrier is mounted on a pivoted carrier-arm, s^2, which is adapted to vibrate so as to be alternately in line with the chuck *a* and the chuck *b*, and to be moved laterally toward and from each chuck while in line with the same. These movements enable the tube, first, to move upon the unsevered blank; secondly, to recede from the chuck *a*; thirdly, to swing over into line with the chuck *b*; fourthly, to move toward the last-named chuck; fifthly, to recede from said chuck after the blank has been forced into the same by the device hereinafter described; and, sixthly, to swing back into line with the chuck *a*. The carrier-tube is moved as described by first, a cam, *t*, on the shaft E, operating a rack, *t'*, and pinion t^2 and causing the swinging movement of the carrier from the chuck *a* to the chuck *b*, the pinion t^2 being located on a shaft, t^3, to which the carrier is attached, and rotating said shaft; secondly, a spring, *u*, operating the rack and pinion and causing the opposite swinging movement of the carrier; thirdly, a cam, *v*, on the shaft E, acting on an arm, *v'*, connected by a shaft, v^2, to an arm, v^3, which bears against the end of the carrier-arm shaft and moves the latter longitudinally in one direction, (said shaft being connected to the pinion t^2, so as to slide therein and yet rotate therewith,) thereby giving the carrier-tube one of its movements when in line with one or the other chuck; and, fourth-

ly, a spring, v^4, adapted to move the shaft t^3 in the opposite direction, and thereby give the carrier its opposite movement when in line with one or the other of the chucks. When the carrier is in line with the chuck *b* and moved up to the same, as shown in Fig. 11, a plunger, *w'*, is moved forward, enters the carrier, and forces the blank through the carrier and partially inserts the enlarged part of the blank into the open jaws of the chuck *b*, which at once close on the blank, said jaws being opened and closed in the same manner that the jaws of the chuck *a* are opened and closed, a cam-shaft, E', being provided, having a cam, F, acting on devices for opening and closing the jaws, which devices are duplicates of those already described. The plunger *w'* is then withdrawn from the carrier, and the latter is withdrawn from the chuck *b* and subsequently returned to the chuck *a*, leaving the larger end of the blank projecting somewhat from the chuck *b*. A cutter, G, is then moved forward by cam G^3 on the shaft E', and caused to reduce the projecting end of the blank and form a pointed journal or spindle, H, thereon, thus completing the blank so far as the machine is concerned, the blank having the form shown in Fig. 13, or the form required. The blank is ejected from the chuck *b*, in a direction opposite to that in which it entered the chuck, by a plunger, I, which is actuated by a cam, J, on the shaft E', acting on an arm, J', on one end of a shaft, J^2, the other end of said shaft having an arm, J^3, acting on the plunger I. A spring, K, retracts the plunger after the blank is ejected. A spring, J^4, connected to the arm J^3 and to a fixed support, holds the arm J' against the side of the disk in which the cam J is made. The cam J is formed, as shown in Fig. 2, to allow the arms J' J^3 to move suddenly inward when the cam reaches the arm J', thus causing the plunger I to enter the chuck suddenly against the force of the spring K.

The plunger *w'*, which forces the blank from the carrier into the chuck *b*, is forced forward by a cam, L, on the shaft E', acting on an arm, L', on one end of a shaft, L^2, the other end of said shaft having an arm, L^3, engaged with the plunger. The plunger is retracted by a spring, L^4. When the wire is consumed and there are no blanks to enter the chuck *b* said chuck closes by reason of the continued pressure of the springs *h h* against the sliding tube of its compound spindle, there being nothing to resist the compression of the chuck. Said sliding tube will therefore move farther than usual toward the outer end of the chuck, so that a flange, M, formed on it will strike levers N O and move a connecting-rod, P, and stop-lever Q out of gear with a suitable belt-shipping mechanism, (not shown,) thus stopping the operation of the machine.

The chuck *b* is provided with a hand-lever, R', which enables the operator to release the jaws thereof in the same manner that the lever R releases the jaws of the chuck *a*, as above described.

The cam-shafts E E' are rotated by a driving-shaft, S, engaged with the cam-shafts by worm-gears T U.

The cutter G is mounted on a rocking lever, G', pivoted at G^2 to the head-stock D, the other extremity of said lever bearing on a cam, G^3, on the cam-shaft E', said cam being adapted to oscillate the lever and thus operate the cutter G.

Having thus described my invention, I claim—

1. The combination of two oppositely-facing chucks automatically opened and closed, mechanism for feeding wire to the first chuck, cutters to reduce and sever the wire held by the first chuck into blanks finished at one end, a carrier to move each blank from the first chuck and present its finished end to the second, means for forcing the blank into the second chuck, a cutter to finish the opposite end of the blank, and an ejector to remove the finished blank from the second chuck, all arranged and operating substantially as described.

2. The combination, with the two oppositely-facing chucks, the wire-feeding mechanism, and the cutters pertaining to said chucks, of the carrier composed of a tube of suitable internal diameter to receive the larger part of the blank severed from the wire, and having at one end inclined spring-fingers adapted to fit upon the reduced portion of the blank, and a plunger adapted to enter said tube and force the blank through the same, as set forth.

3. The combination, with a chuck having spring-jaws adapted to open by their own resilience, and a sliding tube adapted to close said jaws, of a series of two or more springs, arranged, as described, to press said tube upon the jaws and prevent an increase of pressure upon any one side of the spindle, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 26th day of July, A. D. 1881.

CHAS. V. WOERD.

Witnesses:
M. S. G. WILDE,
CHAS. A. BERRY.