(Model.) 3 Sheets—Sheet 1.

C. V. WOERD.

Rosette Lathe.

No. 232,584. Patented Sept. 21, 1880.

Fig. 1.

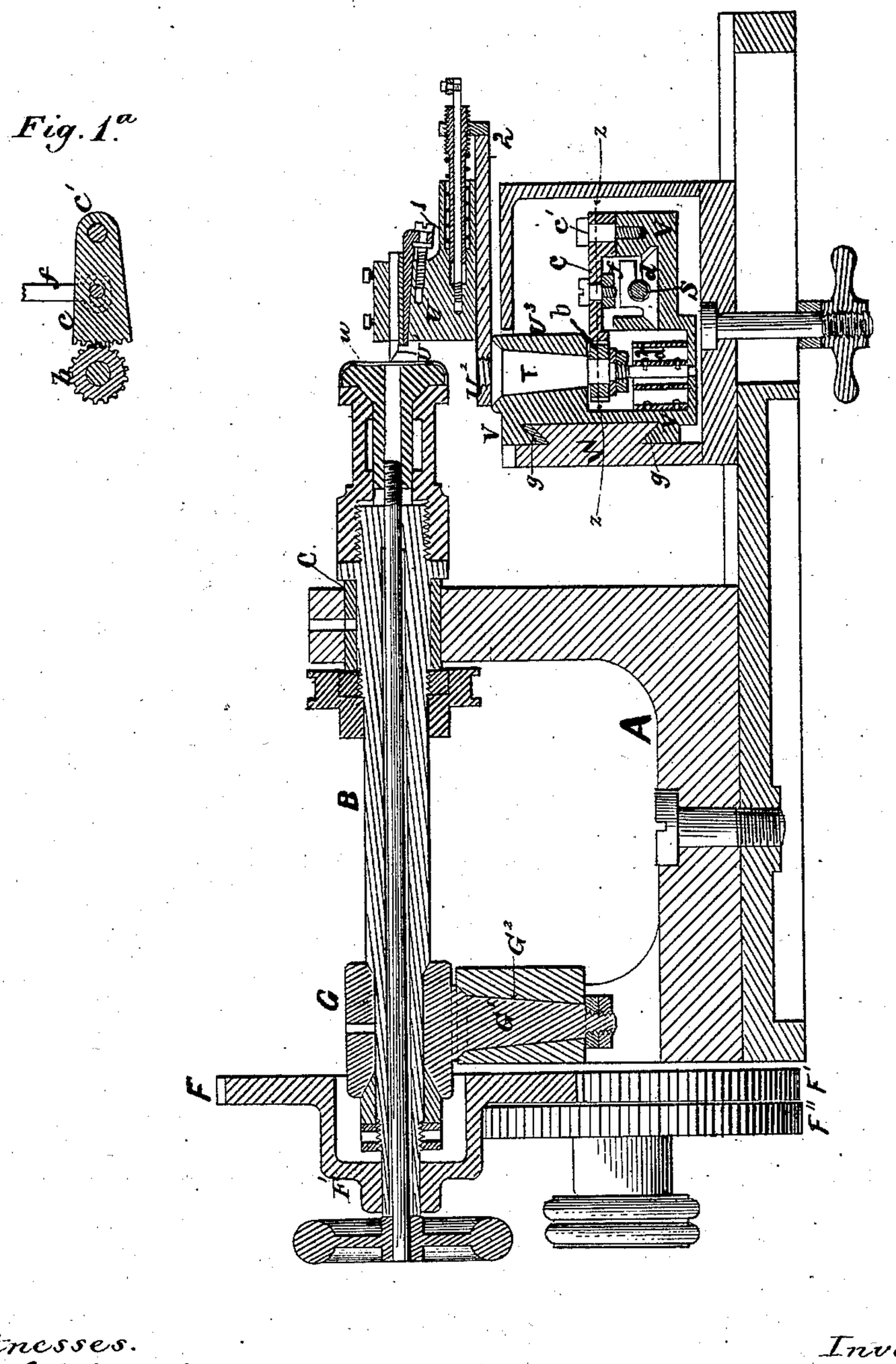


Fig. 1ª

Witnesses.
H. C. Sherman
W. Blackstock.

Inventor.
C. V. Woerd.
by Wright & Brown.
Attys.

(Model.)

3 Sheets—Sheet 2.

C. V. WOERD.

Rosette Lathe.

No. 232,584. Patented Sept. 21, 1880.

Fig. 2.

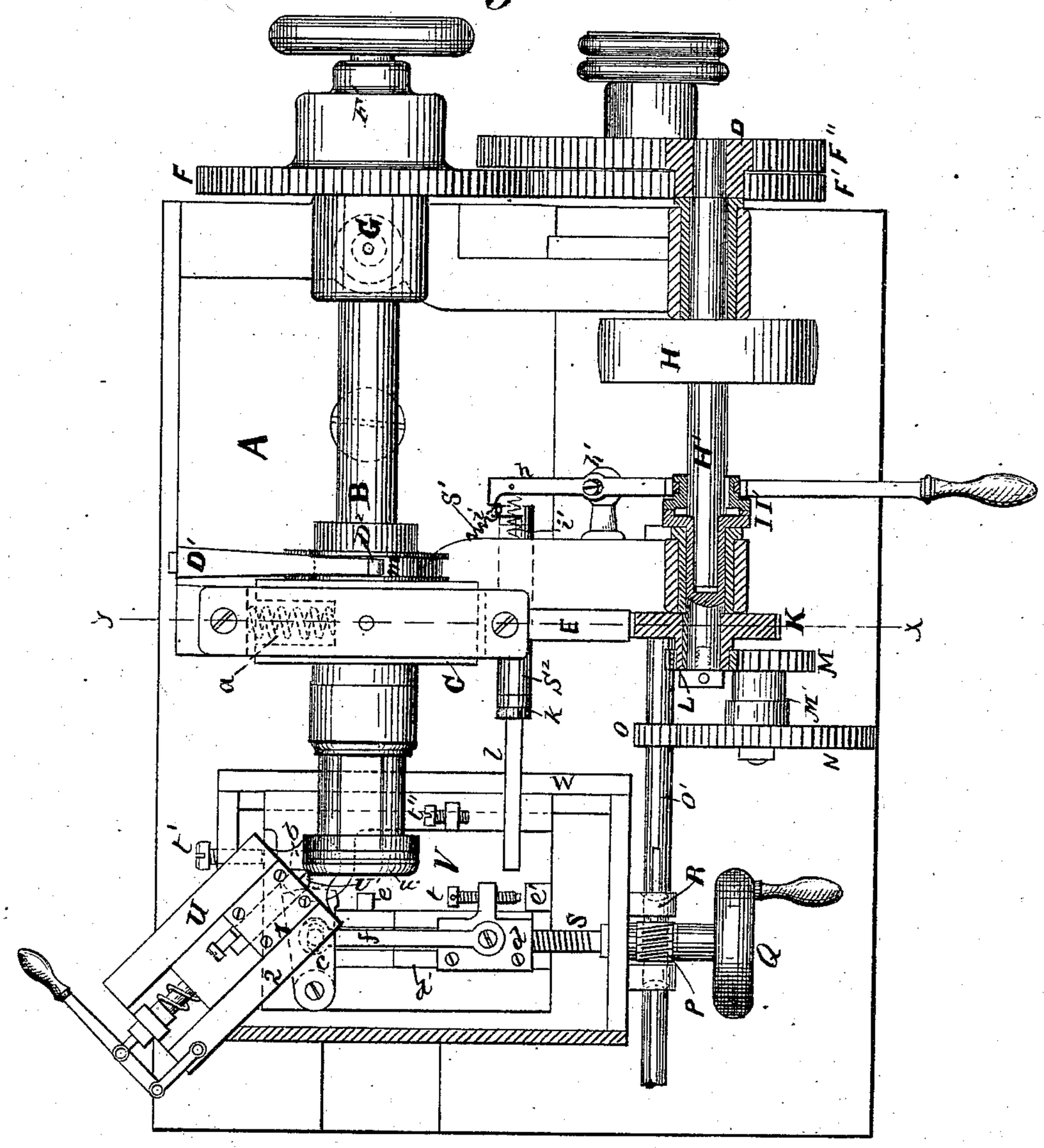
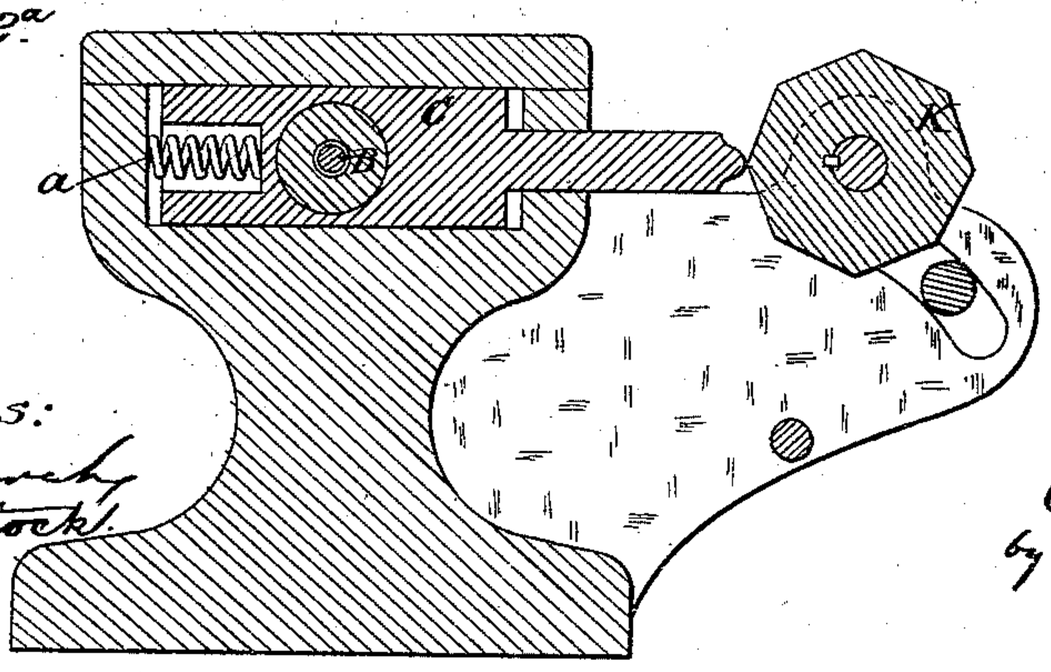


Fig. 2a



Witnesses:
M. Schmuck
W. Blackstock.

Inventor:
C. V. Woerd.
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(Model.) 3 Sheets—Sheet 3.

C. V. WOERD.

Rosette Lathe.

No. 232,584. Patented Sept. 21, 1880.

Fig. 3.

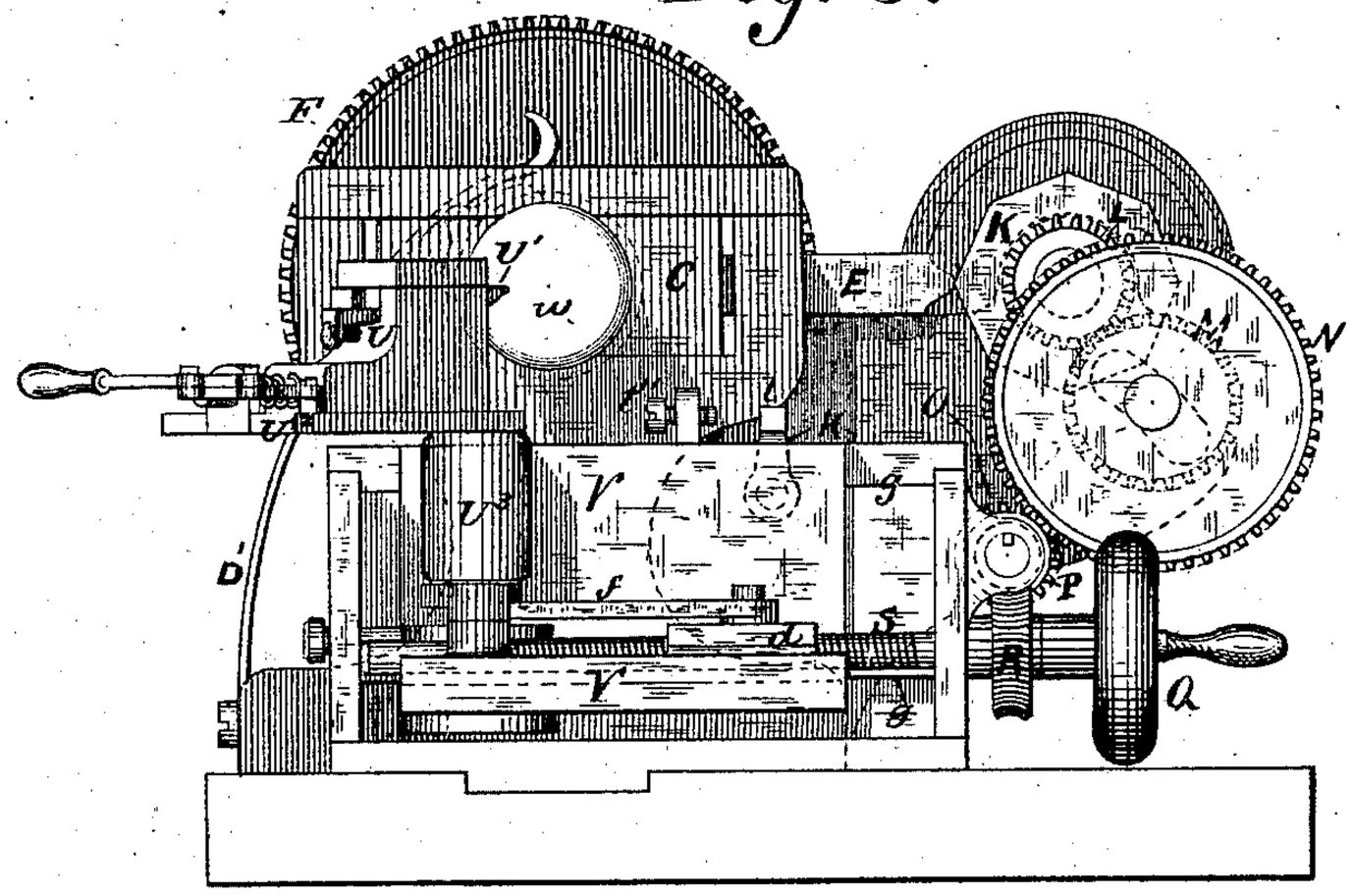

Fig. 4.

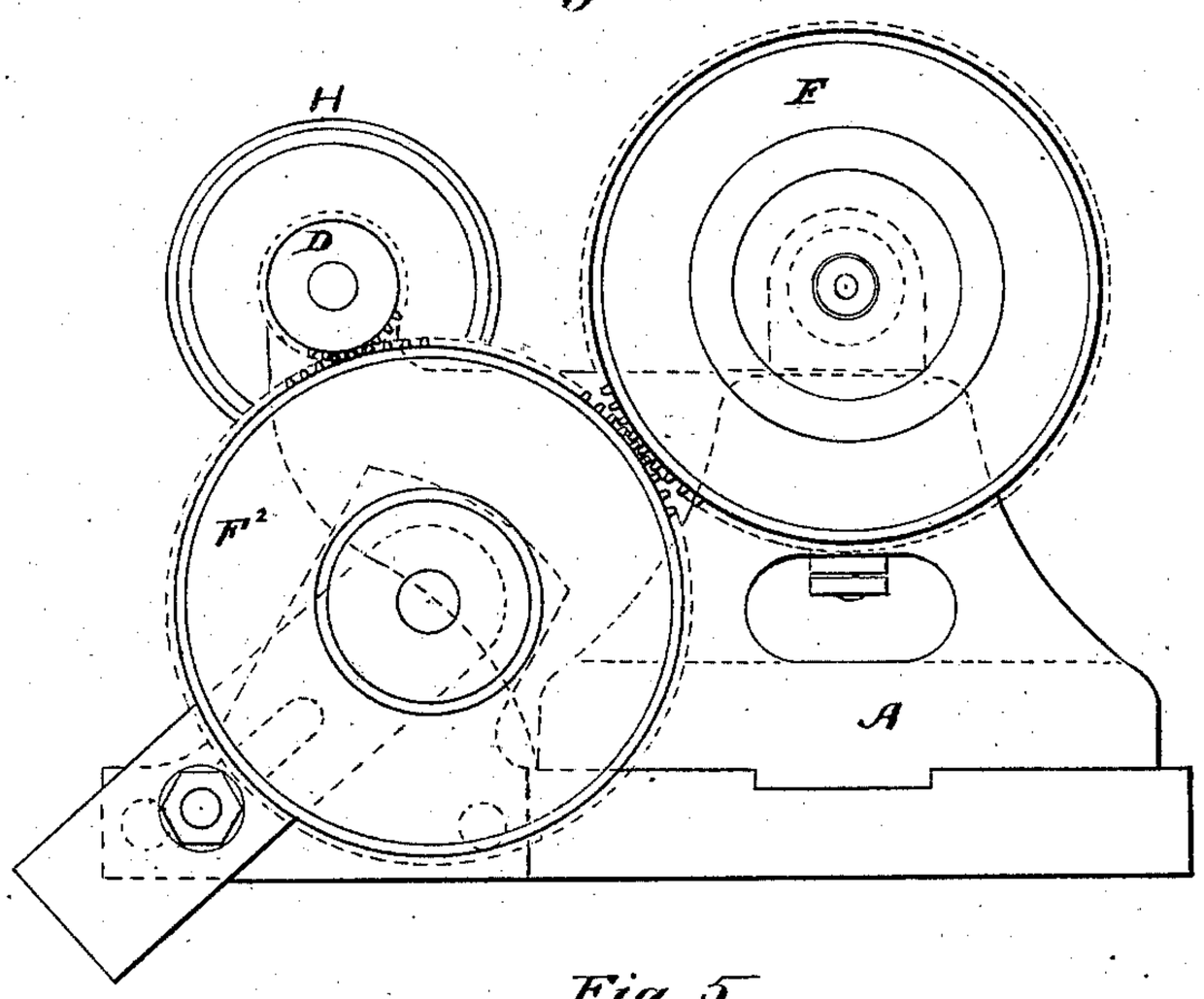

Fig. 5.

Witnesses.
M. Schmidt
W. Blackstock.

Inventor
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Attys.

UNITED STATES PATENT OFFICE.

CHARLES V. WOERD, OF WALTHAM, MASSACHUSETTS.

ROSETTE-LATHE.

SPECIFICATION forming part of Letters Patent No. 232,584, dated September 21, 1880.

Application filed May 6, 1880. (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 Rosette-Lathes, of which the following is a specification.

My invention relates to machines in which the figures known as "barleycorns" are engraved upon the backs or lids of watch-cases by simultaneously rotating and reciprocating the case or lid while it is subjected to an engraving-tool having a constant movement from the margin toward the center of the case, a series of waves or curves being thus formed by the engraving tool, which combine to form the figures above named.

The object of my invention is to produce an improved automatic machine by which the barleycorns may be engraved with greater speed and precision than heretofore, thereby improving the appearance and decreasing the labor and the cost of manufacturing watch-cases.

To this end my invention consists, first, in the means employed for applying the vibrating motion to the oscillating spindle to which the case-chuck is attached.

The invention consists, secondly, in the arrangement of gears by which the proper relation of speed between the rosette-wheel and chuck-spindle is maintained, so that the curves formed by the engraving-tool will always sustain the proper relation to the curves previously formed.

The invention consists, thirdly, in means employed for causing the engraving-tool to travel first in the arc of a circle while engraving the rounded outer portion of the watch-case, and then in a straight line to the center of the case.

The invention consists, fourthly, in the provision of automatic means for stopping the engraving-tool when it reaches the center of the watch-case.

The invention also consists in certain combinations of parts relating to the accomplishment of the ends above named, all of which I will now proceed to describe and claim.

Of the accompanying drawings forming a part of this specification, Figure 1 represents a vertical longitudinal section of a machine embodying my invention on line *x x*, Fig. 2, showing the bed-plate, head-stock, spindle, slide-rest, and tool-post, the latter being turned so as to bring the tool in line with the center of the spindle. Fig. 1ª represents a section on line *z z*, Fig. 1. Fig. 2 represents a plan view with the cover and front plate of slide-rest removed, the tool-post being in the position it occupies at the beginning of the operation. Fig. 2ª represents a transverse vertical section through the rosette-wheel. Figs. 3 and 4 represent views of opposite ends of the machine. Fig. 5 represents an enlarged view of portions of two adjoining convolutions made by the engraving-tool on the metal case.

The same letters of reference indicate the same parts in all the figures.

In the drawings, A represents the head-stock, upon which is fitted the case-chuck spindle B, the forward end of which is adapted to support a watch-case, *w*, in the usual manner. The forward end of the spindle B rests in a sliding block, C, while the rear end rests in a block, G, which is provided with a pivot, G′, adapted to turn in a socket, G^2, rigidly attached to the head-stock. By this arrangement the forward end of the spindle is adapted to move laterally, so as to reciprocate the case *w*, as hereinafter described.

On the spindle B is permanently secured a cog-wheel, F, which is offset from its hub F′, so that its plane is as near the pivotal point of the bearing G as possible, in order that it may not be materially displaced by the lateral motion of the spindle B.

H′ represents the driving-shaft, which receives motion through a pulley, H, and transmits the same through a pinion, D, and gears F′ F^2 to the gear F, the gears F′ F^2 being rigidly attached to each other.

On a detachable portion of the driving-shaft H′, and made to revolve with the same by a clutch-coupling, I I′, is fastened the rosette-wheel K, the periphery of which is formed by any desired number of plane or concave faces, the number of which depends on the size of the watch-case and number of barleycorns to be formed thereon.

E represents a pin or bar, which is firmly attached to the sliding block C, and is pressed with the latter toward the rosette-wheel by a

spring, *a*, the bar E passing through an orifice in the frame C′ that supports the block C, and being kept in close contact by the spring with the faces of the rosette-wheel K, so that when the rosette-wheel rotates a reciprocating motion is imparted to the rotating spindle B.

It will be seen that, as the spindle B is pivoted at G′, its forward end, which carries the watch-case, will move in the arc of a circle; but the reciprocating motion being very short in comparison to the radius of the spindle, the circular motion of the outer end of the spindle will not make any perceptible difference in the appearance of the work, nor interfere with the working of the gears F F′, the plane of said gears being very near the pivotal point of the spindle, as above described.

U′ represents the engraving-tool, which is suitably attached to a tool-post, U. The tool-post is supported on a sliding carriage or slide-rest, V, which is adapted to move in dovetail guides *g g* on the slide-rest frame W in a direction substantially at right angles to the spindle B. The connection of the tool-post to the carriage V is effected by means of a pivot, T, rigidly attached to the base U^2 of the tool-post, and fitted to rotate in a socket formed in an enlargement, U^3, on the vertical portion of the carriage V. By this means the tool-post is enabled to move in the arc of a circle on the carriage, and this motion is effected by means of a segment-gear, *c*, pivoted at *c′* to the carriage V, a pinion, *b*, on the pivot-pin T meshing with the teeth of the segment-gear, a nut, *d*, sliding in a guide-groove, *d′*, in the base of the carriage V, a rod or link, *f*, connecting the nut *d* with the segment-gear *c*, and a screw, S, journaled in the ends of the slide-rest frame W and passing through the nut *d*. The screw S is rotated by connections with the driving-shaft, hereinafter described, and when the tool-post is in the position shown in Fig. 2 the rotation of the screw causes the nut *d* to move independently of the carriage V, this motion of the nut through the rod *f* causing the segment-gear *c* and pinion *b* to partially rotate the tool-post on its pivot, giving the tool a movement in the arc of a circle until the segment-gear *c* reaches a stop, *e*, and an adjusting-screw, *t*, in the nut *d* reaches a stop, *e′*, on the carriage V, the gear and nut reaching the stops simultaneously. The rotary movement of the tool-post is thus arrested, and the carriage V is caused to move with the nut, so that the tool-post is moved with the carriage in a straight line.

When the tool-post is in the position shown in Fig. 2 the point of the engraving-tool is in position to bear against the margin of the case *w*, and the rotary movement imparted to the tool is just sufficient to carry the tool around the rounded outer portion of the case, the arc in which the tool moves corresponding substantially to the curvature of the outer portion of the case *w*. The stoppage of the rotary motion of the tool-post occurs when the tool reaches the flat portion of the case, and the succeeding straight movement of the tool-post carries the tool to the center of the case.

In the operation of the machine the case *w* is applied to the end of the spindle B. The latter is rotated by the pinion D, intermediate gears, F^2 F′, and gear F, and oscillated by the rosette-wheel K and spring *a*. The engraving-tool is applied to the margin of the reciprocating and rotating case *w* and caused to move over the rounded and flat portions to the center, as above described, the combined rotating and reciprocating motion of the case and the progressive movement of the tool causing the tool to make a continuous volute line made up of short waves or curves extending from the margin to the center of the case. The number of teeth on the gear F is four times the number of teeth on the pinion D, and therefore the rosette-wheel K rotates four times while the spindle B rotates once.

The intermediate gears, F′ F^2, which are fastened together, and are of the same diameter, differ in the number of their teeth, the gear F^2, which engages with the pinion D, having one tooth more or one less than the gear F′, which engages with the gear F. This arrangement of gearing will cause a difference of one-half of a vibration of the spindle B for each complete rotation of the spindle. Consequently the waves or curves of each convolution formed by the engraving-tool will not be parallel with the waves or curves of the preceding convolution, but the angles of each convolution will meet the angles of the preceding convolution, so that the diamond-shaped barleycorns will be formed as shown in Fig. 5.

The screw S, which operates the tool-post U and carriage V, is rotated by means of a pinion, L, (on the detachable portion of the driving-shaft carrying the rosette-wheel,) intermediate gears, M N, on a shaft, M′, (the former engaging with the pinion L,) a pinion, O, on a shaft, O′, and a worm-gear consisting of a screw, P, on the shaft O′ and a spirally-toothed wheel, R, on the shaft of the screw S. When the clutch-coupling I I′ is disconnected, by moving its sliding member I′ on the shaft H′ the motion of the rosette-wheel K and the screw S is stopped, so that the engraving operation will cease.

I prefer to disconnect the clutch-coupling by automatic means when the engraving-tool reaches the center of the watch-case. To this end I employ a shaft, S^2, fitted to turn in an orifice in the frame of the machine, having at one end an arm, *i*, which is normally held by a spring, S′, in position to form a stop or bearing for a toe or projection on the end of the clutch-lever *h*, (the latter being pivoted at *h′*,) held at one end against the arm *i* by a spring, *i′*, and engaged at its opposite end with a groove on the sliding part I′ of the clutch-coupling. The end of the shaft S^2 opposite the arm *i* has a crank composed of arms *k l*, the latter of which projects over the carriage V.

When the carriage reaches the point in its movement that brings the engraving-tool to the center of the watch-case a stop, t^2, on the carriage strikes the arm *l* and partially rotates the shaft S^2, so that the arm *i* is moved away from the toe or projection of the lever *h*, and the latter, being unsupported, is turned on its pivot by the spring *i'* sufficiently to disconnect the parts of the clutch-coupling and stop the carriage and rosette-wheel. The carriage V, with tool-post U, may now be returned to its starting-point by disengaging the worm-gear P R and reversing the motion of the screw S by the hand-wheel Q. An adjustable stop, *t'*, limits the return movement of the carriage.

During the swinging motion of the tool-post, and before the stop or screw *t* of the nut *d* strikes the stop *e'* of the carriage V, the screw-shaft S, nut *d*, connecting-rod *f*, segment-gear *c*, and pinion *b* co-operate in holding the carriage V rigidly and preventing it from moving on its guides, the independently-moving nut *d*, by its connection with the swinging segment-gear *c*, holding the carriage through the pivot of the segment-gear as firmly and rigidly as it would if the nut and segment-gear were not moving. By this rigid holding of the carriage during the swinging movement of the tool-post, I prevent any possibility of accidental deviation of the engraving-tool from its proper path, which deviation might occur with serious injury to the work if the carriage were free, so that it could be moved by the binding of the nut *d* in its guides, or by other accidental cause. It will be seen, therefore, that the same mechanism that rotates the tool-post at the same time performs the additional function of holding the carriage.

The tool-post is preferably made in two parts, 1 2, the part 1 being the tool-post proper and holding the engraving-tool, and the part 2 being a base or support for the part 1 and rigidly attached to the pivot T. The part 1 is adapted to slide in guides in the part 2, and is pressed forward toward the end of the spindle B by a suitable spring, which enables the engraving-tool to yield and conform to watch-cases having different curvatures, the spring having sufficient power to cause the tool to make a line of the desired depth in the watch-case.

For every change in the number of barleycorns a different rosette-wheel having as many faces as there are barleycorns to be produced must be used. The intermediate gears, $F' F^2$, must be replaced by others of appropriate size, which always have the same relative number of teeth, and the feed-motion must be correspondingly changed, all of which can be done expeditiously without disturbance to other parts of the machine by the described construction. For every difference in the curve of the outer portion of the watch-case the motion of the segment-gear *c* must be changed by adjusting the connecting-bar *f* toward or from the pivot of said gear, the bar *f* being slotted to permit such adjustment, as shown in dotted lines, Figs. 2 and 1a. A strong evolute spring, d^2, fastened at one end to the pivot-pin T and at the other end to the carriage V, keeps the pinion *b* and segment-gear *c* in close contact, thus preventing all backlash and any accidental motion of the tool-post.

The spring D' on head-stock A, with a friction-brake, D^2, pressing against the friction-pulley *m* on the spindle B, prevents all jumping of said spindle and secure steadiness and safety to the motion, the spring D' being an auxiliary to the spring *a*.

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

1. A rotary spindle mounted at its inner end in a pivoted bearing-block and at or near its outer end in a laterally-sliding block, in combination with a rosette-wheel and a spring or springs, whereby the outer end of the spindle is automatically moved back and forth in the same plane and in lateral direction while the spindle is being rotated, substantially as described.

2. The combination of the rotary spindle, pivoted at its rear end and adapted to oscillate at its forward end, the driving-shaft carrying the rosette-wheel, the pinion and gears $D F^2 F' F$, relatively proportioned, as described, whereby the spindle and rosette-wheel are timed in their rotation so that the curves of each convolution will occupy the desired relation to the curves of the preceding convolution, as set forth.

3. The combination of the rotary and oscillating spindle B, a carriage movable in guides at right angles to the spindle, a tool-post pivoted to the carriage so as to oscillate in the same plane as that in which the carriage moves, and automatic mechanism for first holding the carriage in a fixed position and meanwhile turning the tool-post on its pivot to carry the tool over the rounded portion of a watch-case, and, secondly, moving the tool-post and carriage in unison to carry the tool in a straight line to the center of the watch-case, as set forth.

4. The combination of the carriage V, having the segment-gear *c*, the tool-post U, having the pivot T and pinion *b*, the nut *d*, connected to the segment-gear and having a limited independent movement in the carriage V for the purpose of turning the tool-post on its pivot, the journaled screw for moving the nut, and suitable stops to arrest the turning movement of the tool-post and to cause the tool-post, carriage, and nut to move together in a straight line, as set forth.

5. In a rosette-lathe, the swinging plate U^2, shaft T, pinion *b*, and spring d^2, in combination with the segment *c*, substantially as herein described.

6. The combination of the spindle B, the carriage V, supporting the tool-post and provided with a stop, t^2, the screw-shaft S, whereby the

carriage is moved to carry the engraving-tool to the center of a watch-case back on the spindle, the two-part driving-shaft rotating the screw S through suitable intermediate gearing, the clutch-coupling connecting the parts of the driving- haft, the spring-lever *h*, whereby the parts of the coupling are normally separated, and the spring-impelled rock-shaft s^2, interposed between the lever *h* and stop t^2, whereby the lever is held to connect the parts of the clutch-coupling until the engraving-tool reaches the center of the watch-case, and then released to separate the parts of the coupling and stop the motion of the rosette-wheel and carriage, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 22d day of April, 1880.

CHAS. V. WOERD.

Witnesses:
E. A. MARSH,
M. S. G. WILDE.