

(No Model.)

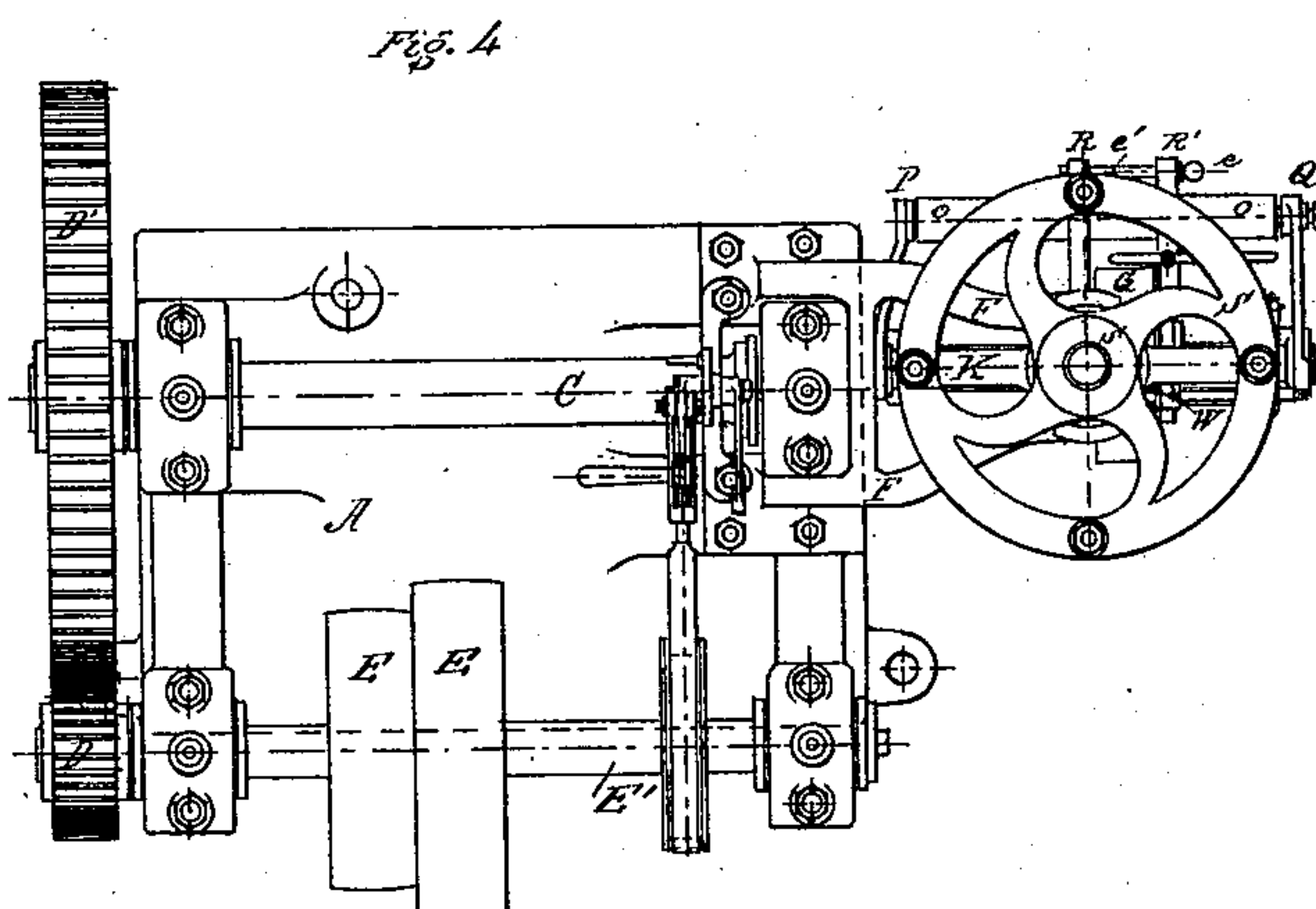
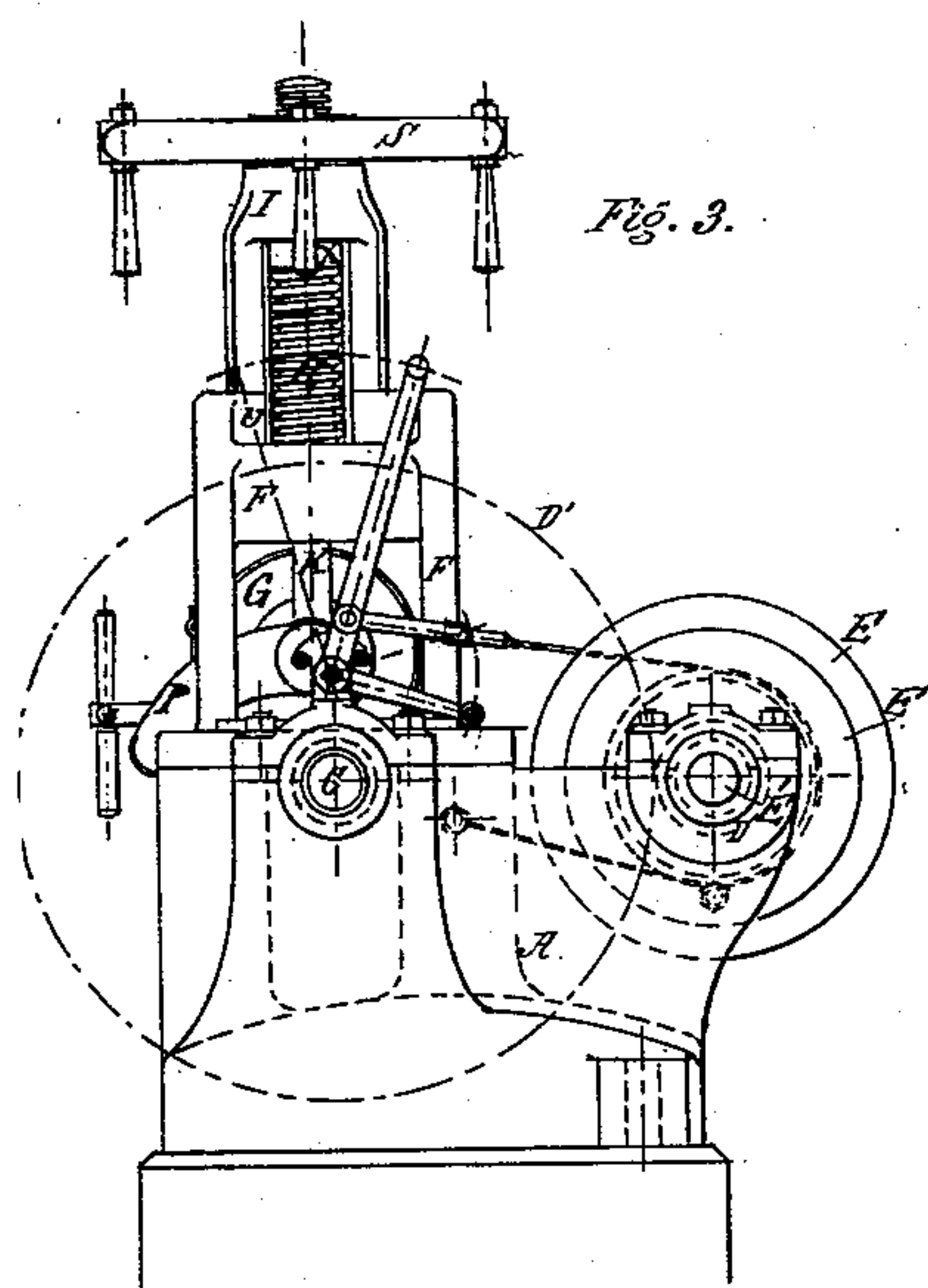
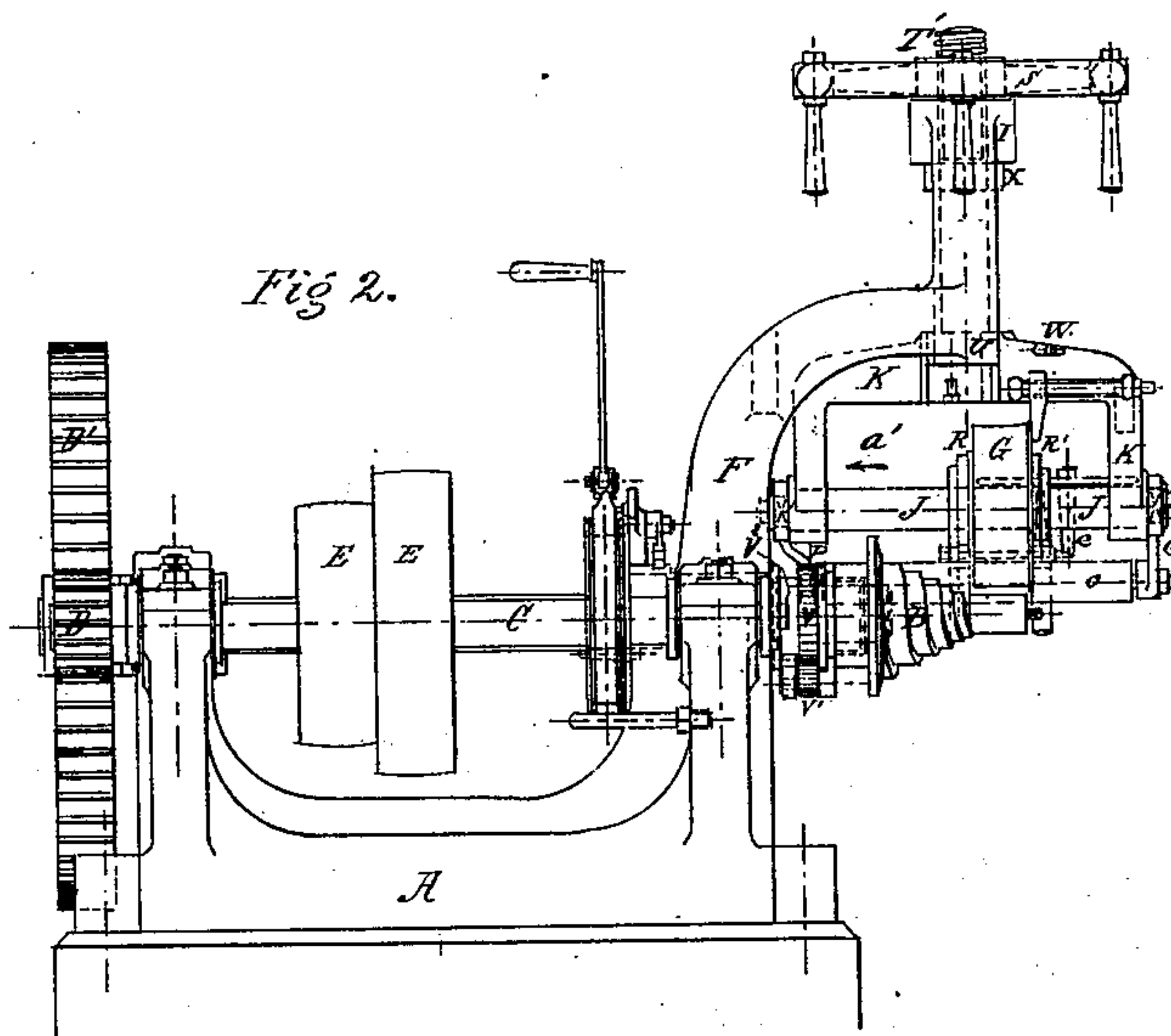
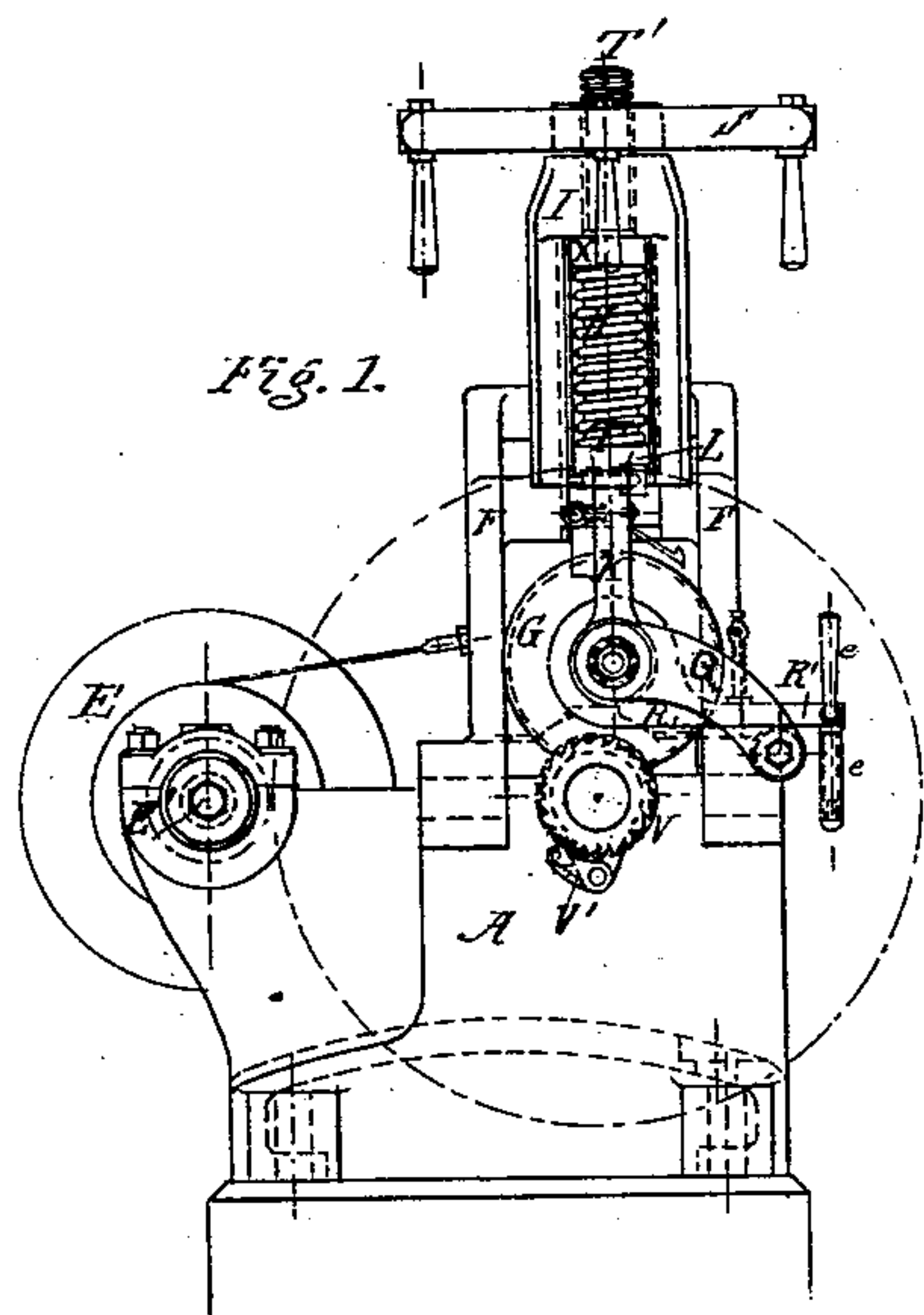
**2 Sheets—Sheet 1.**

# 0. ВІНЕТ.

## Machine for Making Volute Springs.

**No. 243,491.**

**Patented June 28, 1881.**



*WITNESSES*

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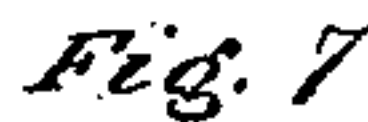
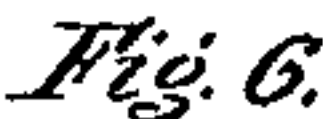
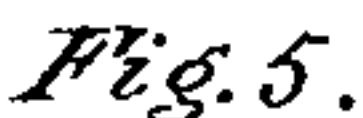
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# 0. БИХЕТ.

## Machine for Making Volute Springs.

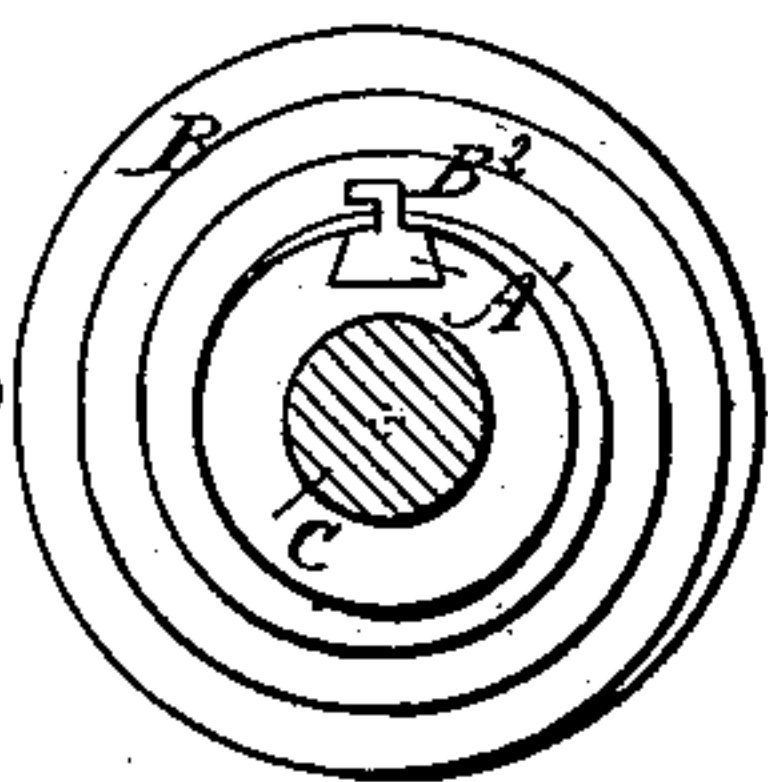
**No. 243,491.**

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# UNITED STATES PATENT OFFICE.

OSCAR BIHET, OF LIEGE, ASSIGNOR TO JOSEF CREMER, OF BRUSSELS,  
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## MACHINE FOR MAKING VOLUTE SPRINGS.

SPECIFICATION forming part of Letters Patent No. 243,491, dated June 28, 1881.

Application filed April 6, 1881. (No model.) Patented in England May 20, 1879, and in Germany June 8, 1879.

*To all whom it may concern:*

Be it known that I, OSCAR BIHET, of Liege, Belgium, have invented a new and Improved Machine for Making Volute Springs, of which the following is a full, clear, and exact description.

The object of my invention is to provide a new and improved machine for coiling a band or rod of metal into the shape of a helix or volute spring.

The invention consists in a machine provided with a helical mandrel mounted on a suitable shaft, and provided with a detachable hook for seizing the bar or rod of which the spring is made, immediately after the same leaves the furnace, which bar or rod passes over and between suitable guards, and is pressed upon the mandrel by a flanged roller loosely mounted on a shaft journaled in the ends of a fork attached to a vertical shaft, that is forced downward by a spring surrounding it, and is provided with a screw passing through a hand-wheel, by the rotation of which the flanged roller may be raised.

The invention further consists in mounting the mandrel loosely on the shaft and holding it in the desired position by means of a spring-pawl engaging with a ratchet-wheel on the base of the helical mandrel.

In the accompanying drawings, Figure 1 is a front-end elevation of my improved machine for making volute springs. Fig. 2 is a longitudinal elevation of the same. Fig. 3 is a rear-end elevation of the same. Fig. 4 is a plan view of the same. Fig. 5 is a plan view of the same, showing parts in section. Fig. 6 is a plan view showing parts in section, and also showing the position of the flanged roller and the fork supporting its shaft while a spring is being wound upon the mandrel; Fig. 7, a detail end elevation of the mandrel. Fig. 8 is a detail longitudinal elevation of the same, and of the hook for holding the band or rod.

A mandrel, B, having the shape of a volute or helix, is loosely mounted on a shaft, C, and is provided with a ratchet-wheel, V, at its inner end or base, with which ratchet-wheel a spring-pawl, V', pivoted to an arm, V<sup>2</sup>, of the shaft C engages, so that when the shaft ro-

tates from right to left the pawl will catch in the teeth of the ratchet-wheel and will rotate the same with it. The mandrel can also be rotated in the same direction when the shaft is not rotating, but the mandrel cannot be rotated in the reverse direction, either by the shaft C or independent of the same. The shaft C rotates in suitable journals in a frame or casting, A, and has a large cog-wheel, D', mounted on the end opposite the mandrel B, and this cog-wheel engages with a pinion, D, mounted on a shaft, E', provided with the belt-pulleys E E, and also journaled in the frame A.

Two arms, F, projecting forward and upward and terminating in a vertical portion, forming two guides, U U, are made integral with or bolted to the front end of the frame or casting A. The upper ends of the two guides U U are connected by a centrally-perforated block, I, which forms a guide for a shaft, T, passing through the same and down between the guides U U, which fit closely against a collar, L, of the shaft, which collar has two segmental projections, so that two segmental recesses are formed on the collar, the arc of the recesses being longer than the arc of the inner surfaces of the guides U, so that the shaft T can be rotated a short distance on its longitudinal axis without striking the ends of the projection against the edges of the guides.

By means of a set-screw, W, the size of one of the recesses in the collar L may be decreased and the rotation of the shaft T may thus be limited. The upper end, T', of this shaft is provided with a screw-thread taking in the threads of a central aperture of a hand-wheel, S, resting on the top of the guide-block I.

A ring, X, surrounds the shaft T below the guide-block I, and is pressed against the same by a very powerful spiral spring, H, the lower end of which rests upon the collar L, and thus forces the entire shaft T, and the parts attached thereto, downward.

Two arms, K K, of a fork are fastened to the collar L. A shaft, J, is journaled in the lower ends of this fork, and a flanged roller, G, is loosely mounted on this shaft J. This roller G can be moved longitudinally on the



shaft J, and as the shaft T rotates on its axis the fork and the shaft J, and consequently the roller G, will move with it, and finally, as the shaft T can be raised or lowered by rotating the wheel S, the roller G will be raised or lowered likewise, so that this roller rotates on its shaft, can be moved longitudinally on the same, and is raised or lowered with and rotates with the shaft T and the forked arm K K.

The arms P and Q are attached to the ends of the fork-arms K, and a roller, *o*, is loosely mounted on a shaft connecting these arms P and Q, or is journaled in these arms.

Guide-arms R and R' are loosely mounted on the shaft J, at each side of the roller G, and the outer ends of these guides R and R' rest on the roller *o*, and are connected by a rod, *e'*, provided with the handle *e*.

The front end of the mandrel B is provided with a longitudinal dovetailed groove into which a dovetailed slide, A', fits, which slide has a hook, B<sup>2</sup>, extending transversely across the same, attached to its upper surface. The hook has a quadrilateral ground plan, as shown in Fig. 8. The furnace for heating the bars or strips of steel for making the springs is about eighteen inches from the mandrel, and the base of the heating-chamber of the furnace is at the same height as the mandrel B. The center lines of the shaft C and the shaft J are not directly over one another, but the latter is slightly to one side of the former.

The operation is as follows: The tension of the spring H is increased more or less by increasing the thickness of the ring X, and the roller G will be forced upon the band and mandrel with more or less pressure accordingly. The band of steel that is to be formed into a volute spring has a quadrilateral aperture of the same size as the hook B<sup>2</sup> at its forward end; but this aperture is not at right angles to the edges of the band, but is inclined toward the same. The hook B<sup>2</sup> is passed into this aperture, and as the shaft C revolves the band is drawn out of the furnace and is wound upon the mandrel. The roller G is lowered to rest upon the band by rotating the wheel S, and as the roller is pressed downward by the powerful spring H it will glide up the volute of the mandrel as rapidly as the band is wound upon this mandrel, the roller being rotated by the great friction between the roller and the band. The roller G also travels in the direction of the arrow *a'* with the band, and as the guides R and R' are loosely mounted on the shaft J at each side of the roller, and as these guides are connected they will also move in the direction of the arrow *a'* with the roller G. The band passes over the roller *o* between the guides R and R', between which it also traverses along the roller *o* in the direction of the arrow *a'*. In this manner the band is gradually wound upon the mandrel, and as the mandrel increases in diameter the roller G, and with it the fork-arms K and the shaft T, will rise, the spring H being compressed ac-

cordingly. As the shaft T rises it would raise the wheel S with it, and therefore this wheel is rotated accordingly as the shaft T rises, so that the hand-wheel will always rest upon the guide-block I, and will hold the shaft T in the position it has at the time when the machine stops and the roller is drawn from the mandrel, which takes place when the entire band has been wound upon the mandrel. The spring thus formed and the dovetailed slide A' are drawn from the mandrel, and the spring is thrown into cold water to cool and harden it. The roller G is drawn in the reverse direction of the arrow *a'* by means of the handle *e*, and a fresh slide, A', is passed into the groove in the mandrel, a fresh band hooked to it, the roller G is lowered by turning the wheel S, and the above operation is repeated.

As has been stated, the shaft T and the shaft J are not vertically above the shaft C, but slightly to one side of it, and as the aperture in the band is inclined to the edges of the band, which are parallel to the volutes of the mandrel, and as the edges of the band will lie up closely against the volutes of the mandrel, therefore the shaft J and the fork holding it will be slightly inclined to the shaft C, as is shown in Fig. 6, so that the roller G will be parallel to the volutes of the mandrel B, which position is necessary to permit the roller to follow the volutes.

To permit the shaft T to rotate slightly when the shaft J inclines itself toward the shaft C the recesses in the collar L have been made larger than the guides U U, as has been stated. By means of the set-screw W the inclination of the fork and shaft T can be regulated, for if the screw projects a greater distance the inclination will be less. The inclination is regulated according to the angle of the volute.

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

1. In a machine for making volute springs, the helical mandrel B, mounted on the shaft C, in combination with the roller G, loosely mounted on a shaft in swinging and vertically-adjustable frame, substantially as herein shown and described, and for the purpose of following the band as it is wound upon the volutes of the mandrel.

2. In a machine for making volute springs, the combination, with the shaft C and the pawl V', mounted on the arm V<sup>2</sup> thereof, of the helical mandrel B, provided with a ratchet-wheel, V, engaging with the pawl V', substantially as herein shown and described, and for the purpose set forth.

3. In a machine for making volute springs, the combination, with the mandrel B, of the slide A', provided with a hook, B<sup>2</sup>, substantially as herein shown and described, and for the purpose set forth.

4. In a machine for making volute springs, the combination, with the roller G, the arms K K, and the shaft J, of the two guides R and



R' and the connecting-rod  $e'$ , substantially as herein shown and described, and for the purpose set forth.

5 5. In a machine for making volute springs, the combination, with the roller G, the arms K K, and the shaft T, of the guides R R', the arms P and Q, rod  $e'$ , and the roller o, substantially as herein shown and described, and for the purpose set forth.

10 6. In a machine for making volute springs, the combination, with the shaft T, having a threaded upper end and a collar, L, of the spring H, the ring X, the guides U and I, and the wheel S, substantially as herein shown and  
15 described, and for the purpose set forth.

7. In a machine for making volute springs, the guides U and the segmentally-recessed collar L of the shaft T, in combination with the adjusting-screw W in one of the arms K, substantially as herein shown and described, 20 and for the purpose of regulating the angle of the pressure-roller frame to the main shaft, as set forth.

O. BIHET.

Witnesses:

P. FOLLET,  
J. RICHELL.