

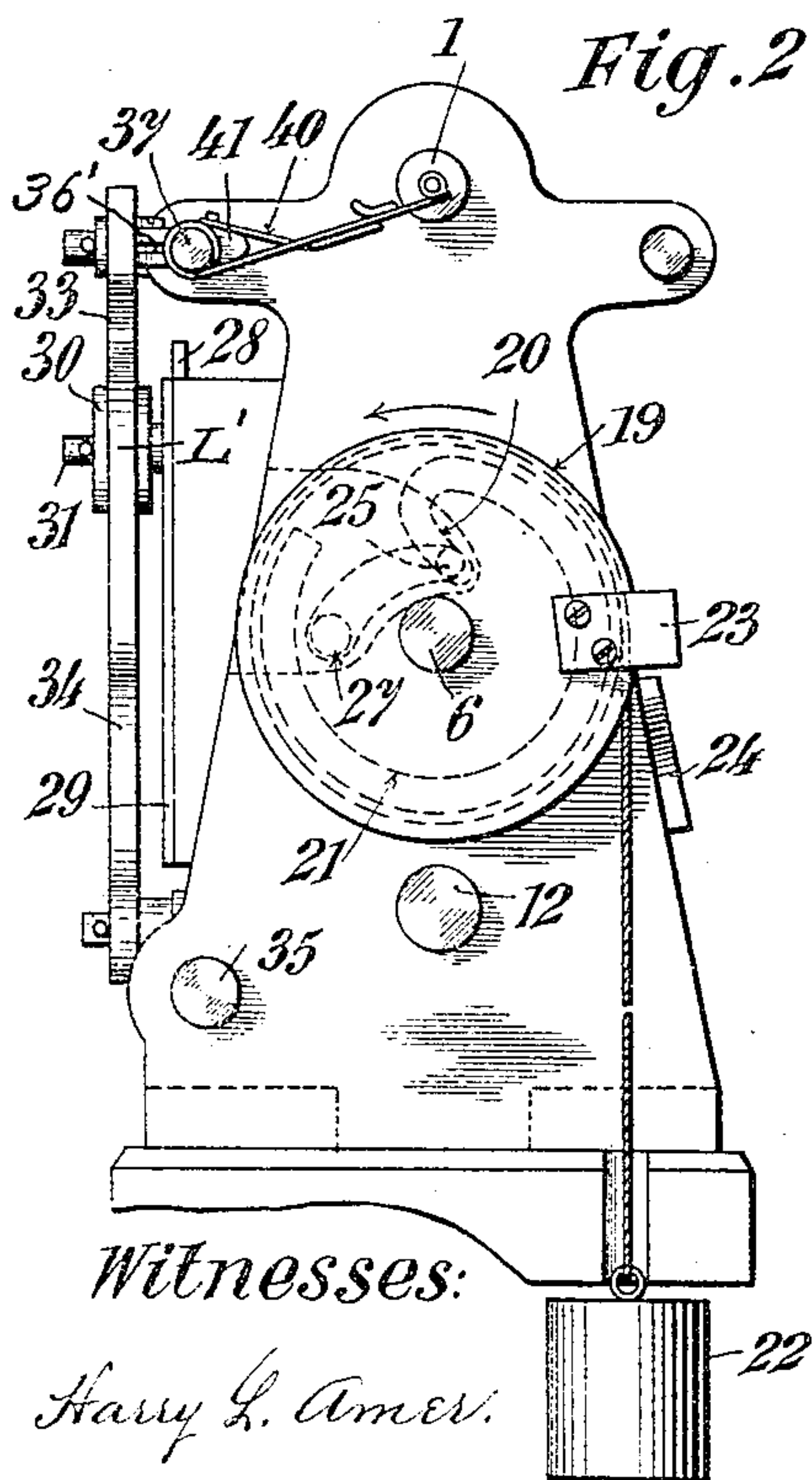
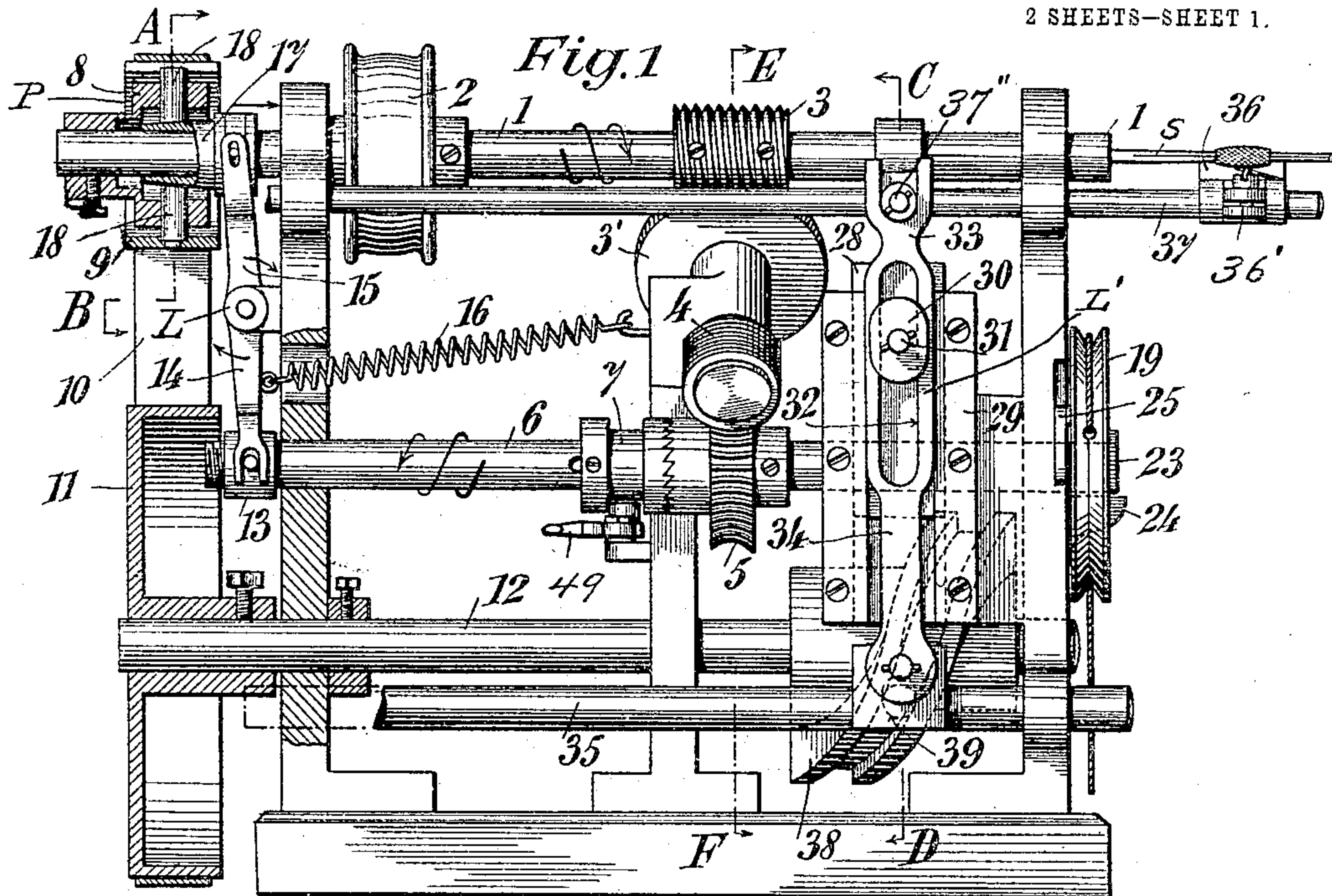
No. 808,468.

PATENTED DEC. 26, 1905.

C. MORIGGL.
WINDING MACHINE.

APPLICATION FILED FEB. 10, 1905.

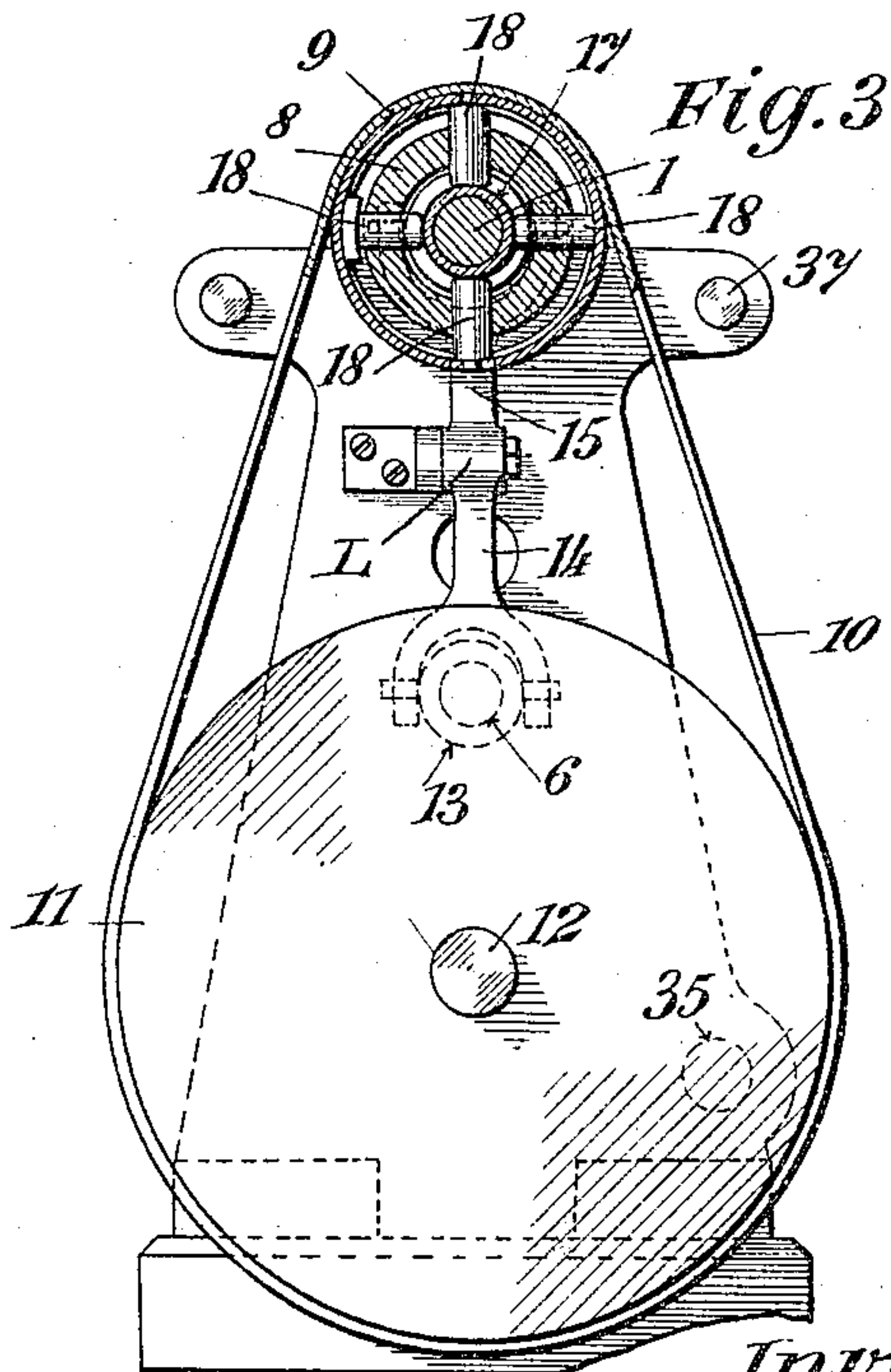
2 SHEETS—SHEET 1.



Witnesses:

Harry L. Amer.

C. Mommers



Inventor.

Carl Moriggl.

by Harry Orth atty.

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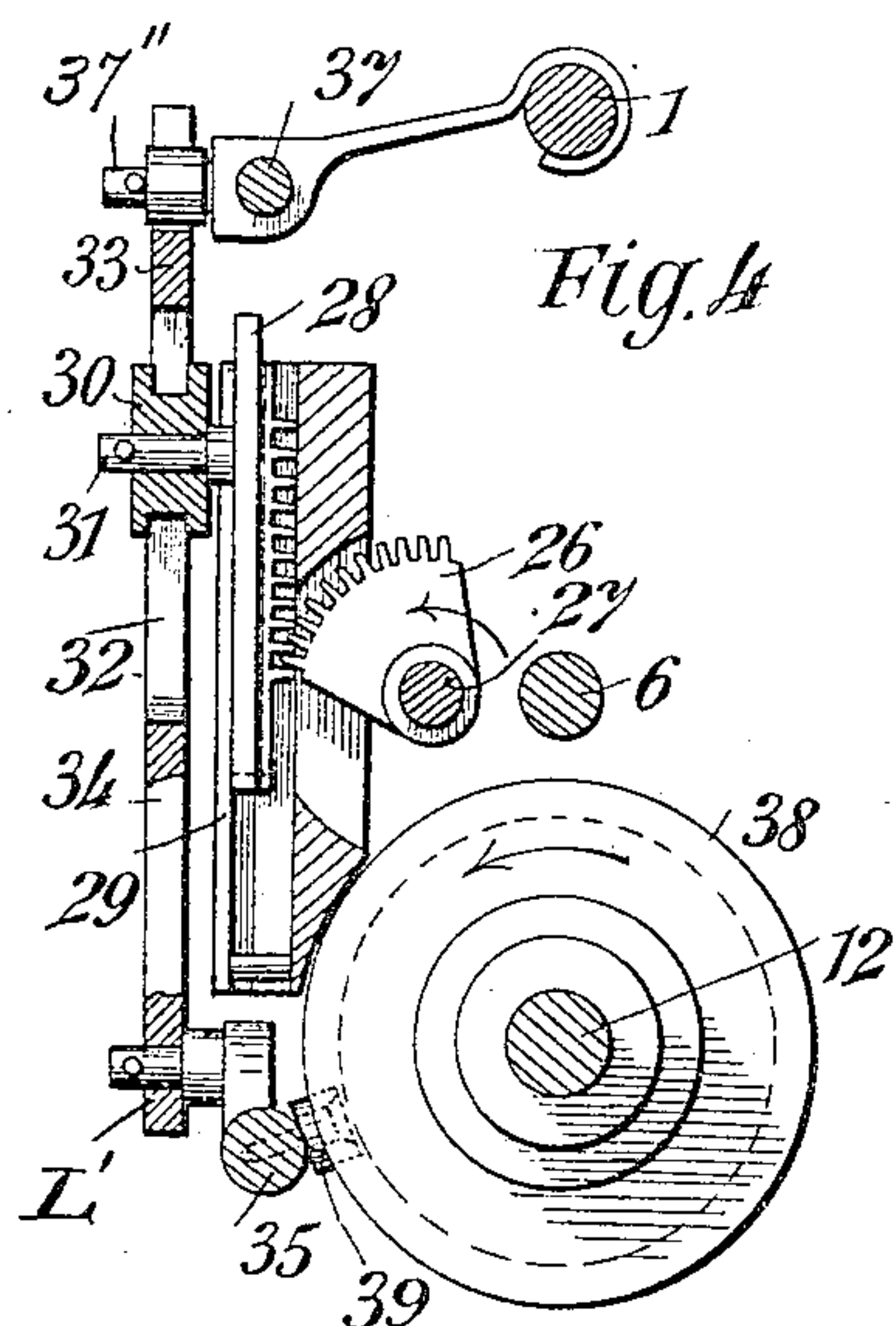


Fig. 4

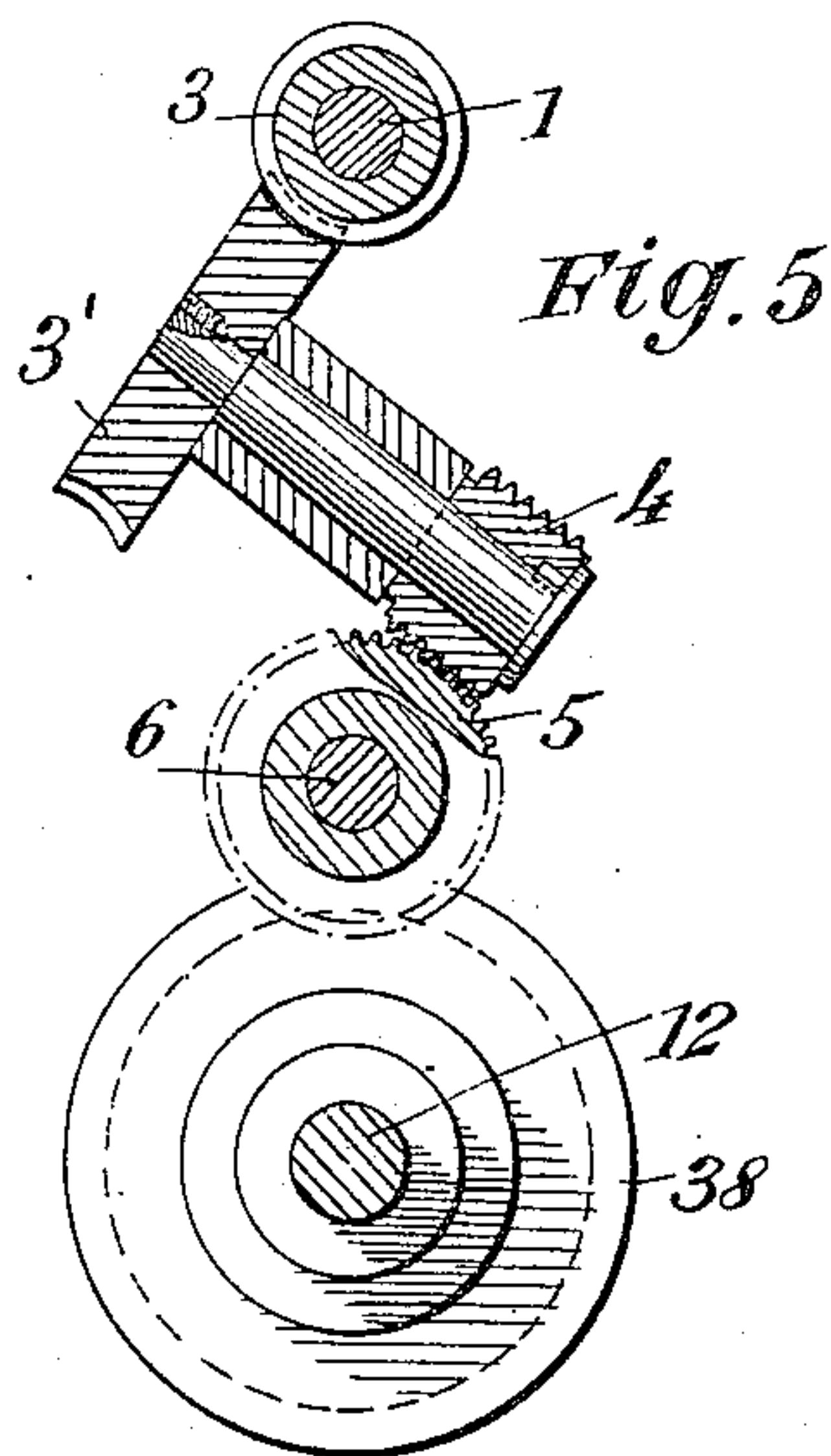


Fig. 5

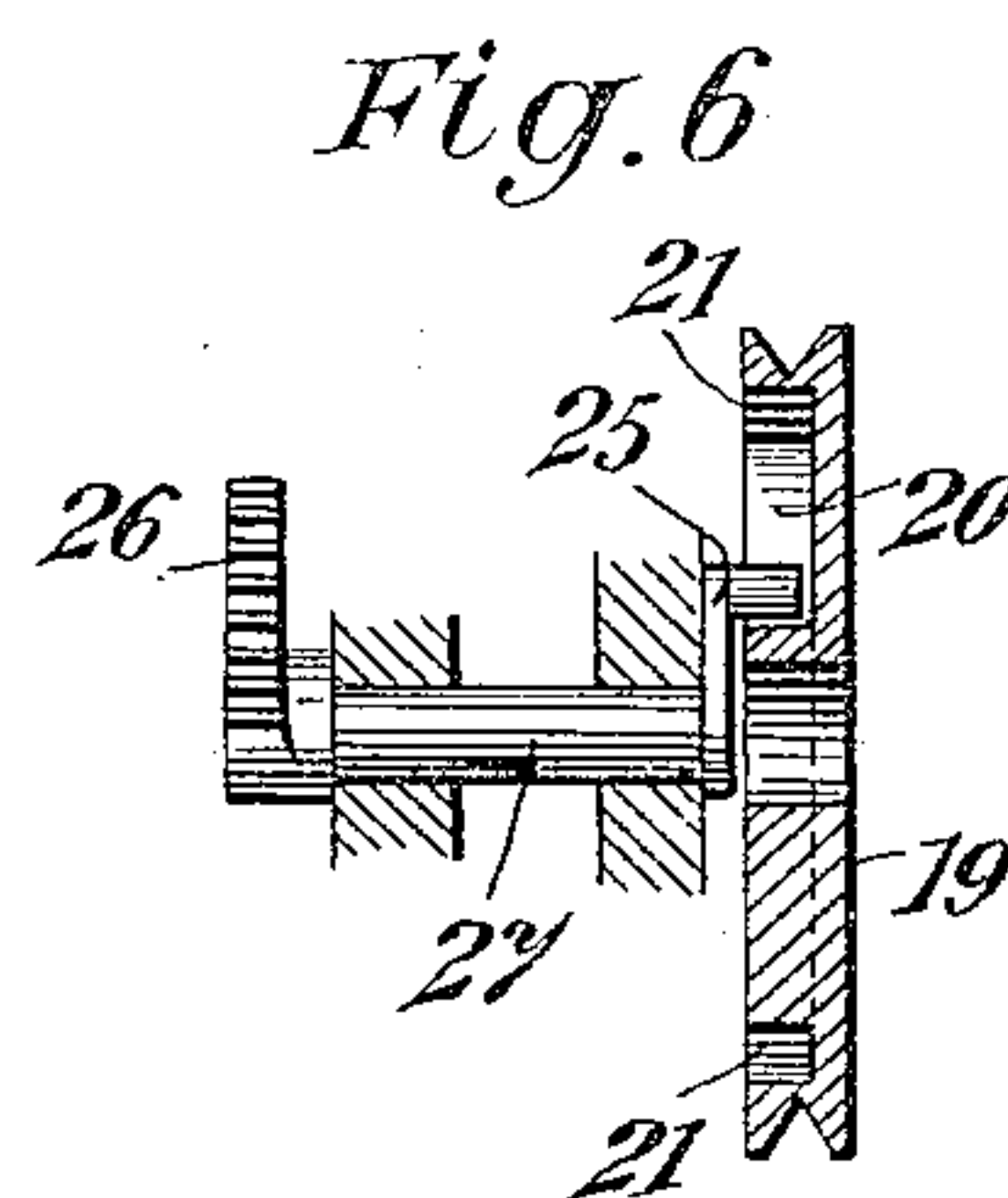


Fig. 6

Fig. 7

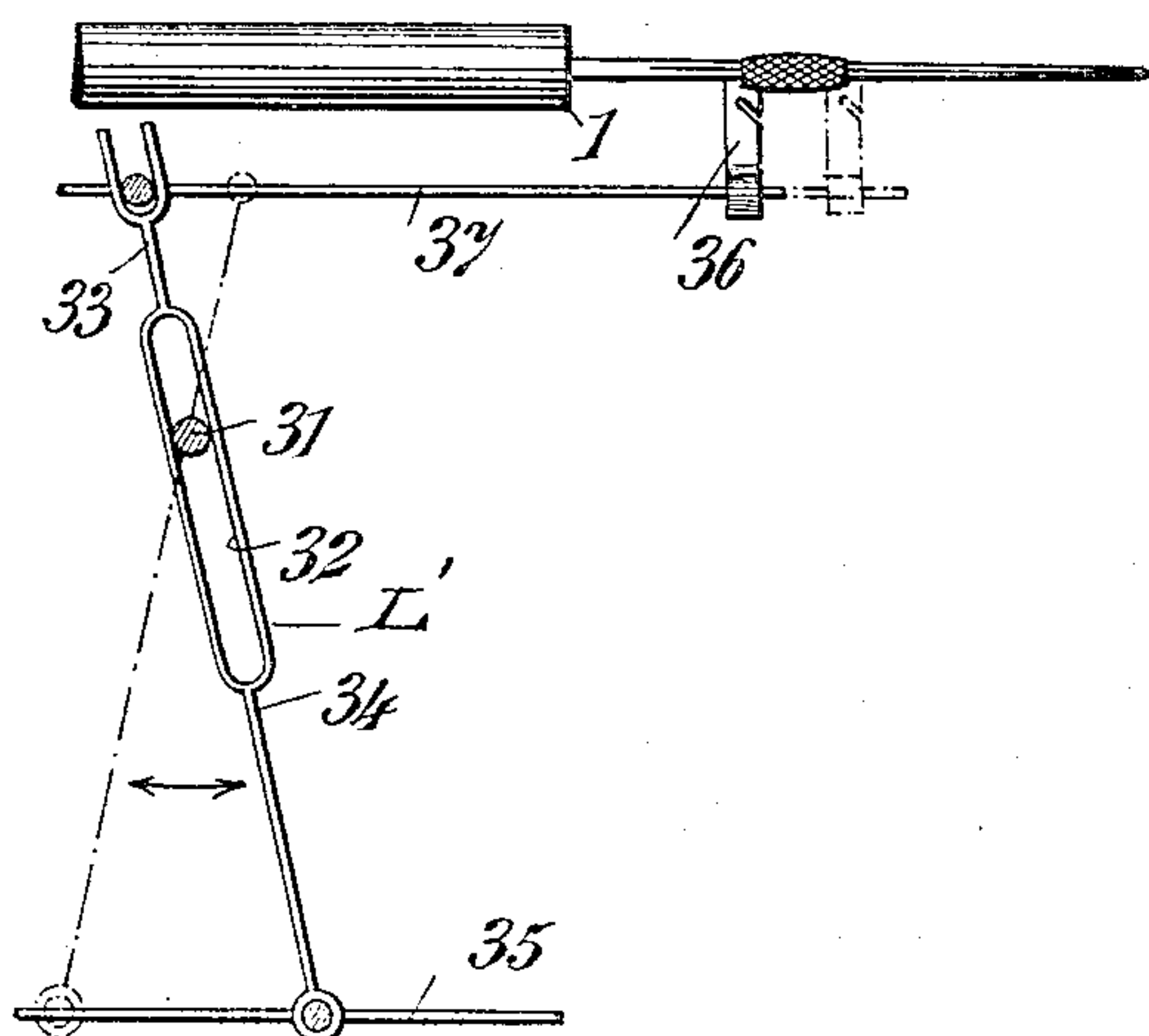


Fig. 8

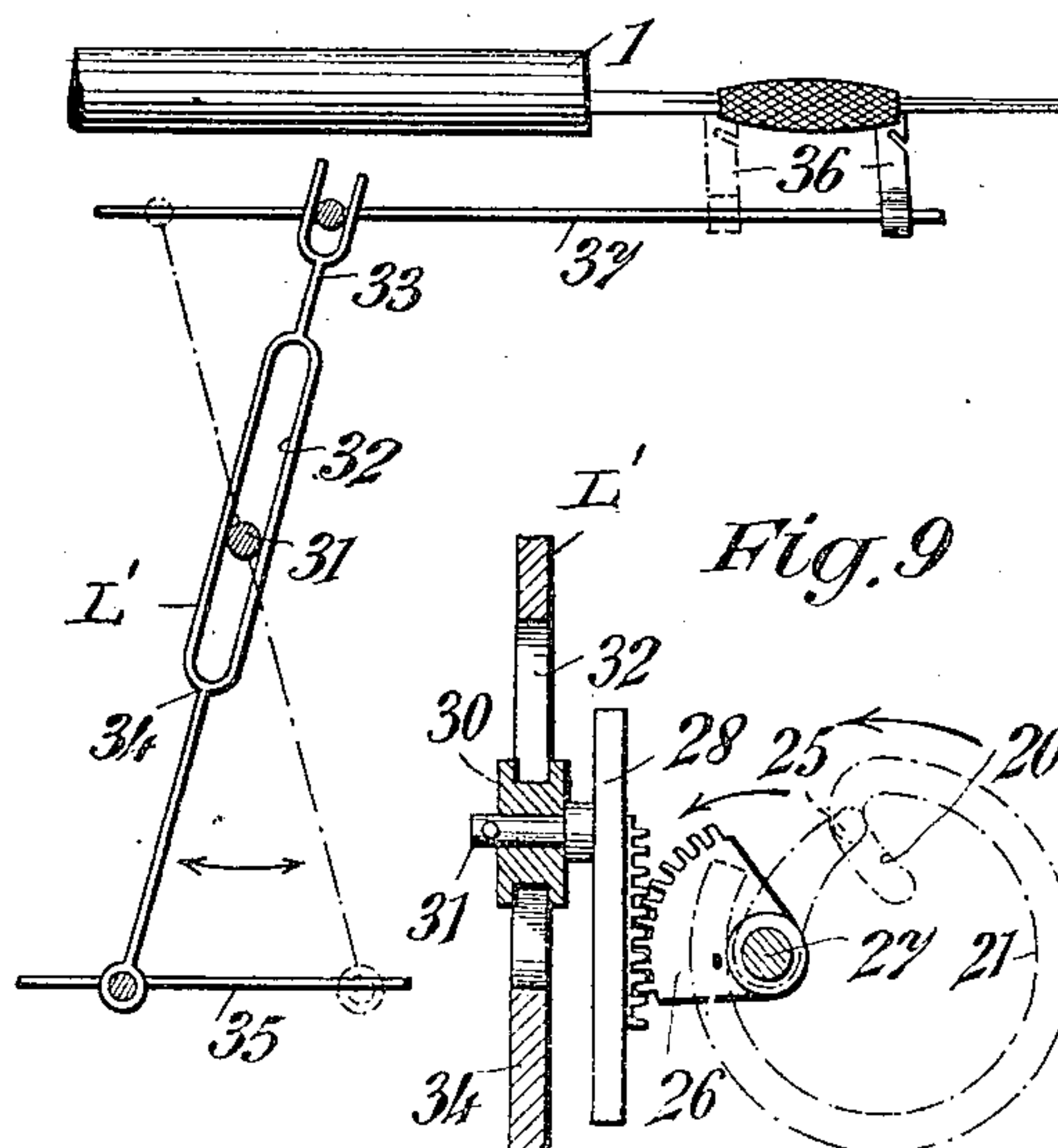
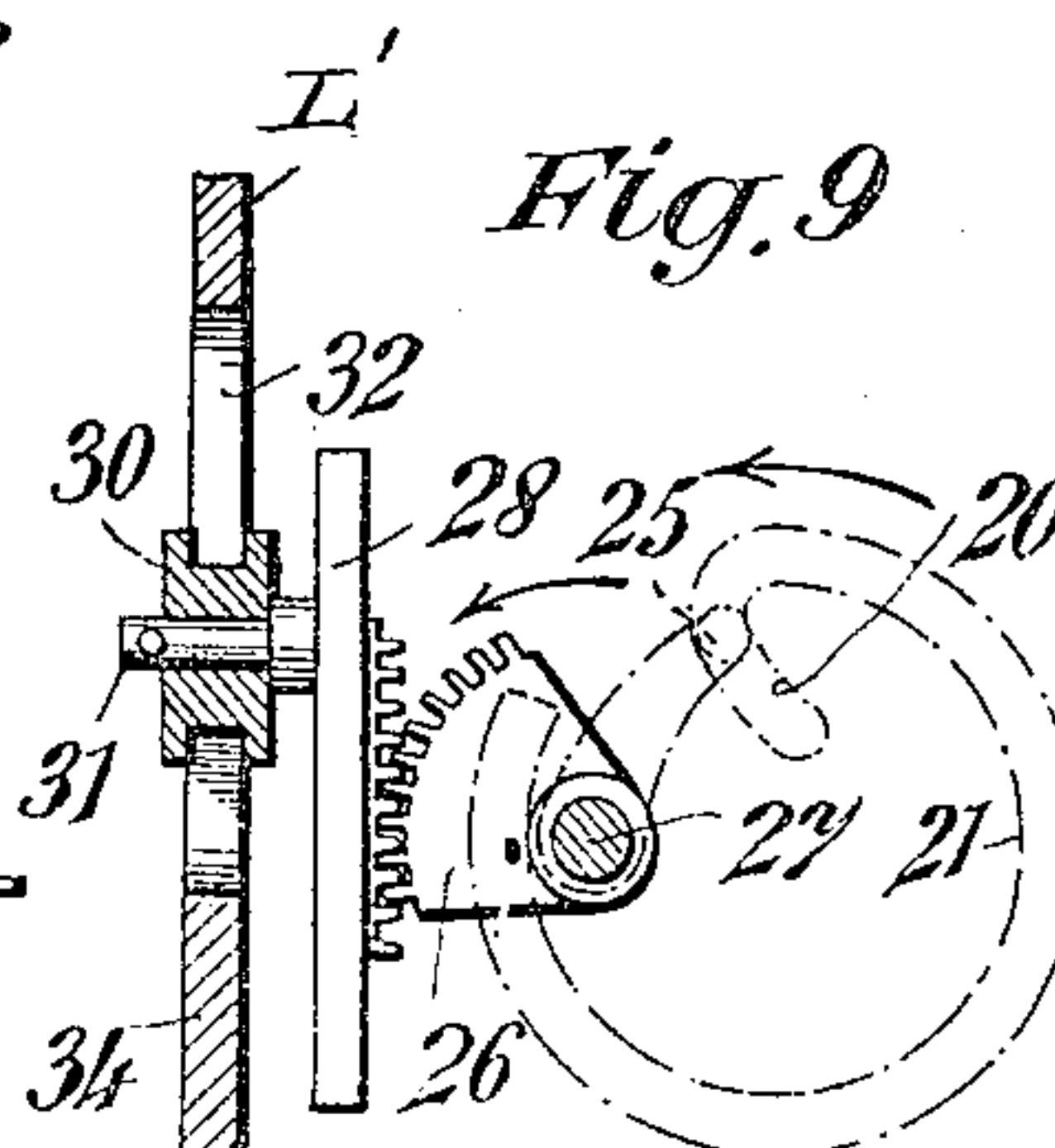


Fig. 9



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UNITED STATES PATENT OFFICE.

CARL MORIGGL, OF ARBON, SWITZERLAND, ASSIGNOR TO THE FIRM OF
ADOLPH SAURER, OF ARBON, SWITZERLAND.

WINDING-MACHINE.

No. 808,468.

Specification of Letters Patent.

Patented Dec. 26, 1905.

Application filed February 10, 1905. Serial No. 245,113.

To all whom it may concern:

Be it known that I, CARL MORIGGL, a subject of the Emperor of Austria-Hungary, residing at Arbon, Switzerland, have invented new and
5 useful Improvements in Winding-Machines, of which the following is a specification.

My invention relates to winding-machines, and more particularly to machines for winding thread or yarn into cop or bobbin form. In
10 machines of this kind the thread is wound upon a polished metal spindle, usually a steel spindle or mandrel, generally of slightly-tapering form, to permit the ready stripping off of the completed cop. The first windings do not,
15 therefore, firmly adhere to the spindle; hence are liable to slide to and fro. If in such machines the throw of the thread-guide is uniform from beginning to finish of the cop or if the throw of the guide is gradually reduced from
20 beginning to finish, it very frequently happens that the thread on the spindle at each change of direction of movement of the thread-guide is crowded or carried back toward the starting-point of said guide, thereby forming
25 loose loops, which are then covered by subsequent layers of thread. This will be readily understood from the fact that at the beginning the difference between the diameter of the spindle and the length of thread laid on—
30 or, in other words, the length or amplitude of the throw of the thread-guide—is very great and from the further fact that the spindle is tapered. Furthermore, owing to the taper of the spindle, the thread guided thereto by
35 a guide whose amplitude of reciprocation is equal to the length of the cop is liable to drag the first windings to one or the other side of the center of throw of the guide, so that the body of the cop will not be central between
40 its ends. Cops so produced cause trouble in the loom, the thread cannot be uniformly unwound from beginning to end, the weft-thread is apt to pull on the fabric being woven, which, as is well known, is injurious, or the thread
45 is liable to break, entailing quite serious losses in waste, as well as loss of time in replenishing the shuttles.

My invention has for its object the provision of means whereby the above-recited disadvantages are effectually overcome, said
50 means comprising mechanism for increasing the amplitude of reciprocation of said thread-guide from a minimum at the beginning of

the winding of the thread onto the spindle to a maximum and then maintaining the amplitude of reciprocation of the guide uniform
55 until the cop is completed. I have also found that the thread of the superposed layers can be wound more uniformly and closely if the speed of reciprocation of the thread-guide is
60 reduced in accordance with the gradually-increasing diameter of the cop being formed and if said thread-guide is at all times substantially in contact with the thread on the
65 spindle.

A further object of my invention lies in the provision of means for reducing the speed of reciprocation of the thread-guide relatively to the increase of the diameter of the cop and in maintaining the guide substantially in contact with the spindle or the thread thereon at
70 all times during the formation of the cop.

My invention also comprises mechanisms and combinations of mechanisms whereby the objects aimed at are automatically carried out.
75

In the drawings forming part of this specification, Figure 1 is a front elevation, partly in section, and Figs. 2 and 3 are right and left hand end elevations, the latter likewise partly in section, on the line A B of Fig. 1,
80 of a winding-machine embodying my invention. Figs. 4 and 5 are sectional views taken on lines C D and E F, respectively, of Fig. 1. Fig. 6 is a sectional detail view, and Figs. 7 and 8 are diagrammatic views, illustrating the
85 operation of winding the cops; and Fig. 9 is a sectional view of parts of the mechanism, illustrating means for varying the throw of the thread-guide.

Referring more particularly to Fig. 1 of the drawings, 1 indicates the winding-spindle or
9 mandrel-shaft, carrying at one end (the right-hand end, as illustrated) the spindle *s*, on which the cop is formed, said shaft also constituting the main driving-shaft and carrying
95 a pulley 2 to be belted to any suitable prime mover. On the opposite end of shaft 1 is mounted a conical sleeve 17 constituting the hub of an expansible pulley P, presently to be described. Said shaft 1 also carries a worm
100 3, gearing in a worm-wheel 3', to the stub-shaft of which is secured a worm 4, gearing in a worm-wheel 5, loosely mounted on a shaft 6, the hub of wheel 5 constituting one member of a clutch-coupling adapted to be engaged by a companion member 7, having lon-
105

itudinal motion only on said shaft and adapted to be operated by a suitable shifting lever 49.

The described worm-gearing is so proportioned as to cause the shaft 6 to make about one revolution to a given number of revolutions of the shaft 1 and spindle *s*, the ratio being in practice such that shaft 1 will make the required number of revolutions to complete a cop before shaft 6 has quite completed one revolution. The latter shaft carries at one end (the right-hand end, as illustrated) a grooved pulley 19, while its other end is screw-threaded and has screwed thereto a correspondingly-threaded sleeve 13, having radial pins engaged by the forked end of the arm 14 of a two-armed lever *L*, whose other arm 15 is also forked and engages pins on the conical hub 17 of expansion-pulley *P*, above referred to, while the arm 14 of said lever *L* is connected by a spring 16 to the machine-frame for obvious purposes.

In the machine-frame, below shaft 6, is mounted a shaft 12, which carries at its right-hand end a cam 38 and at its left-hand end a belt-pulley 11, connected by belt 10 to the expansible pulley *P* on shaft 1, and in said frame are mounted to slide freely to and fro two rods 37 and 35. A thread-guide 36 is loosely mounted on rod or carrier 37 and adjustable along the same through the medium of a clip 36', provided with a lug 41, fitting between the forked leg of said guide, which is held in proper relation to the spindle or substantially in contact therewith, and yieldingly, so as to recede therefrom as the thread is wound thereon, by means of a spring 40, having one end secured to said lug 41, while its other free end passes between the legs of the guide 36 under the same, as more clearly shown in Fig. 2. To the rod 37 is also secured an arm provided with a pin 37'', carrying a roller, said arm being extended rearwardly and formed into a hook or loop loosely embracing shaft 1, on which it is free to slide.

The rod 35 is provided with a pin 39, which projects into the cam-groove of cam 38 on shaft 12, and to said rod is pivoted one arm 34 of a longitudinally-slotted oscillating lever *L'*, whose other arm 33 is forked and embraces the pin 37'' on rod 37. In the longitudinal slot 32 of lever *L'* is fitted a slide-block 30, through which passes the fulcrum-pin 31 for said lever, said pin being secured to a rack-bar 28, guided in a suitable guide on the machine-frame.

A toothed sector 26 on a short crank-shaft 27, mounted to rotate by the side and in rear of shaft 6, gears with the aforesaid rack-bar, Fig. 4, and the pin 25 of the crank on said shaft projects into a groove in the proximate inner face of the pulley 19 on shaft 6, Fig. 2. This groove, as shown in dotted lines at 21, Fig. 2, is for the greater part concentric with the shaft 6 and has a reëntering or inwardly

and laterally curved portion 20. To the pulley 19 within its peripheral groove is secured one end of a cord, wire, or the like, to the other end of which is secured a weight 22, Fig. 2, and to the outer face of said pulley is secured a stop 23, which with a companion stop 24 on the frame serves to determine the extent of angular movement of said pulley in opposite directions.

The expansible and contractible pulley *P* hereinbefore referred to is composed of a cylindrical web 8, the eye or bore of which is of sufficiently greater diameter than that of the shaft 1 to allow the conical hub 17 of the pulley *P* to slide freely to and fro on said shaft, the web of said pulley having an extension provided with a bearing for shaft 1 and by means of which it is secured thereto, as shown in Fig. 1. The pulley *P* is further composed of a split spring-rim 9, having an internal peripheral groove for the reception of the outer ends of the spokes 18, which pass through apertures in the web 8, their inner ends bearing on the aforesaid conical hub 17, one or more of said spokes having a pin stepped in a step formed in the bottom of said groove, while one of said spokes may be provided with a shoe or head, as shown in Fig. 3, to form an enlarged bearing for the split pulley-rim.

When the winding mechanism is in its starting position, the lever *L'* and thread-guide 36 are at the center of their stroke, Fig. 1, the spokes 18 of the expansible and compressible pulley *P* have bearing on the conical hub 17 at or about at its greatest diameter, the threaded sleeve 13 being substantially at the limit of its inward movement on shaft 6, while the crank-pin 25 on shaft 27 lies in the inner end of the reëntering portion 20 of the groove 21 in the left-hand face of pulley 19, as shown in dotted lines in Fig. 2, while the stop 23 on said pulley lies on frame stop or abutment 24, the cord or wire carrying the weight 22 being unwound, while the fulcrum-pin 31 for the thread-guide-carrier-actuating lever *L'* is held at its greatest elevation in slot 32 of said lever by the toothed sector 26 on crank-shaft 27 gearing with rack 28, which carries said pin, the arm 33 of said lever *L'* being shortened to its minimum. If the winding-shaft 1 is now rotated in the direction of the arrow thereon, both shafts 6 and 12 will be rotated in the same direction. The lever *L'* will be oscillated, the thread-guide making its shortest strokes. As shaft 1 continues to rotate the reëntering portion 20 of the groove 21 in the face of pulley 19 acting on pin 25 of the crank on shaft 27 gradually turns said shaft in the direction of arrow, Fig. 4, thereby shifting the fulcrum-pin for lever *L'* down in the slot 32 of said lever, gradually lengthening the lever-arm 33, thereby correspondingly increasing the throw of the thread-guide carrier 37 and its thread-guide 36 until the pin 25 has entered the concentric portion 21 of the groove

in pulley 19, at which time the throw of the carrier 37 will be greatest and will be maintained uniform until said crank-pin 25 has reached or is about to reach the end of said concentric portion 20 of the groove in pulley 19, at which time the stop 23 on said pulley will abut against the under face of the frame stop or abutment 24, the wire or cord being meanwhile wound up against the pull of its weight 22.

During the described operation of varying the throw of the thread-guide the rotation of shaft 6 screws the sleeve 13, and with it the arm 14 of lever L, toward the left, thereby gradually moving the arm 15 of said lever, and with it the hub 17 of pulley P, in an opposite direction, allowing the spring-rim 9 of the pulley P to contract or close up by reason of the conicity of said hub until the spokes 18 bear on its end of least diameter, thereby gradually reducing the speed of rotation of belt-pulley 11 and shaft 12 and correspondingly reducing the speed of the oscillations of lever L' and reciprocations of the thread-guide carrier 37 and thread-guide 36.

It has hereinbefore been stated that the shaft 6 makes about one revolution during the time required to wind a cop, and if at the completion of the winding of a cop, which is indicated by the stops 23 24, the clutch-shifting lever 49 is moved to uncouple shaft 6 from worm-wheel 5 the pulley 19 will be rotated in an opposite direction by the weight 22 until its stop 23 bears on the upper face of the fixed stop 24, thereby rotating crank-shaft 27 also in an opposite direction, thus again raising the fulcrum-pin 31 of lever L' to its normal position. Pulley 19 also rotates shaft 6 in a direction opposite to that indicated by the arrow thereon, thereby screwing itself into sleeve 13 and drawing the arm 14 of lever L toward the right, arm 15 of said lever moving toward the left, and with it the conical hub 17, to expand the pulley P to its normal extent, as will be readily understood. The entire mechanism is thus automatically restored to a normal condition without stopping the rotation of the winding-shaft 1, and to begin the winding of a fresh cop after the completed cop has been stripped off it is only necessary to couple shaft 6 to worm 5 and apply the thread end to the spindle s.

Practice has shown that by gradually increasing the stroke of the thread-guide from a minimum to a maximum and then maintaining the throw uniform until the completion of the cop the liability to crowd the first turns of thread on the spindle toward and beyond the center of reciprocation, and thereby produce loops and entanglements, is effectually prevented. On the other hand, by the described means for varying the speed of reciprocation of the thread-guide through the pulleys P 11, shaft 12, cam 38, lever L', and carrier 37 the number of reciprocations imparted

to said guide is proportioned to the varying surface speed of rotation of the cop being wound as it increases in bulk, so that the convolutions of thread of all the superposed layers of such are closely and compactly wound side by side, each thread in every layer of the cop being of substantially the same length, whereby the greatest possible length of thread can be wound into the form of a cop of given dimensions.

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

1. In a cop-winding machine, the combination with a revoluble spindle and a thread-guide adapted to reciprocate along said spindle; of means for automatically increasing the throw of said guide from a minimum at the beginning of the winding to a maximum, and for then maintaining the throw of the guide uniform until the cop is completed.

2. In a cop-winding machine, the combination with a revoluble spindle and a thread-guide adapted to reciprocate along said spindle; of means for automatically and gradually increasing the throw of said guide from a minimum at the beginning of the winding to a maximum, and for then maintaining the throw of the guide uniform until the cop is completed.

3. In a cop-winding machine, the combination with a revoluble spindle and a thread-guide adapted to reciprocate along said spindle; of means for automatically increasing the throw of said guide at each movement to the left and right of the center of the cop to be wound from a minimum at the beginning of the winding to a maximum, and then maintaining the throw of the guide uniform until the cop is completed.

4. In a cop-winding machine, the combination with a revoluble spindle and a thread-guide carrier parallel to said spindle; of means for reciprocating the carrier and varying its throw, comprising a lever connected at one end to the carrier, a revoluble cam acting on the opposite end of said lever to oscillate the same, a shiftable fulcrum intermediate said ends, and means automatically shifting said fulcrum during the revolution of the aforesaid spindle.

5. In a cop-winding machine, the combination with a revoluble spindle, and a thread-guide carrier parallel to said spindle; of a lever connected at one end to the carrier, a revoluble cam acting on the other end of said lever to oscillate the same, a rack-bar, a fulcrum for the lever secured to said bar and shiftable along said lever, a toothed sector in gear with the rack-bar, and means automatically imparting to the sector a definite angular movement to move the rack-bar and shift the lever-fulcrum to lengthen the lever-arm connected to the thread-guide carrier from a minimum to a maximum and then to stop the rotation of said sector and fix the lever-fulcrum.

6. In a cop-winding machine, the combination with a revoluble spindle, and a thread-guide carrier parallel to said spindle; of a lever connected at one end to the carrier, a revoluble cam acting on the other end of said lever to oscillate the same, a rack-bar, a fulcrum for the lever secured to said bar and shiftable along said lever, a toothed sector in gear with the rack-bar, and means automatically imparting to the sector a definite angular movement to move the rack-bar and shift the lever-fulcrum to lengthen the lever-arm connected to the thread-guide carrier from a minimum to a maximum and then to stop the rotation of said sector and fix the lever-fulcrum, and means for returning the lever-fulcrum to its starting-point.

7. In a cop-winding machine, the combination with a revoluble spindle, and a thread-guide carrier parallel to said spindle; of a lever connected at one end to the carrier, a revoluble cam acting on the other end of said lever to oscillate the same, a rack-bar, a fulcrum for the lever secured to said bar and shiftable along said lever, a toothed sector in gear with the rack-bar, and means automatically imparting to the sector a definite angular movement to move the rack-bar and shift the lever-fulcrum to lengthen the lever-arm connected to the thread-guide carrier from a minimum to a maximum and then to stop the rotation of said sector and fix the lever-fulcrum, and means automatically imparting to the sector a like definite angular movement to return the fulcrum-pin to its starting-point.

8. The combination with the lever L', the rack-bar 28 and the lever-fulcrum carried by said bar; of the shaft 27 its crank having pin 25, sector 26, the weighted pulley 19 having the irregular groove 20, 21, into which the aforesaid crank-pin 25 projects, the stop 23 on said pulley and the fixed stop 24, substantially as and for the purposes set forth.

9. In a cop-winding machine, the combination with the winding-shaft and its spindle, means for rotating said shaft, a thread-guide carrier parallel thereto, a two-armed lever connected to the carrier a cam-shaft and a cam thereon for oscillating the lever; of means for rotating said cam at a variable speed comprising an expansible and contractible driving-pulley belted to a driven pulley on the cam-shaft, said driving-pulley driven by the winding-shaft and means controlled by the rotation of said winding-shaft to cause said driving-pulley to automatically contract.

10. In a cop-winding machine, the combination with the winding shaft and its spindle, means for rotating said shaft, a thread-guide carrier parallel thereto, a two-armed lever connected to the carrier a cam-shaft and a cam thereon for oscillating the lever; of means for rotating said cam at a variable speed comprising an expansible and contractible driving-pulley belted to a driven pulley on the

cam-shaft, said driving-pulley driven by the winding-shaft, means controlled by the rotation of said winding-shaft to cause said driving-pulley to automatically contract, and means not controlled by the winding-shaft for expanding said pulley.

11. In a cop-winding machine, the combination with the winding-shaft and its spindle, means for rotating said shaft, a thread-guide carrier parallel thereto, a two-armed lever connected to the carrier and a cam for oscillating the lever; of means for rotating said cam at a variable speed comprising a pulley having a split spring-rim, a web secured to the winding-shaft, spokes connected to the rim and sliding in said web and a conical hub loosely mounted on said shaft, a lever connected to said hub and to an element controlled by the rotation of the winding-shaft for moving the hub lengthwise of said shaft and causing the spokes to move toward the same to allow the spring pulley-rim to contract.

12. In a cop-winding machine, the combination with the winding-shaft and its spindle, means for rotating said shaft, a thread-guide carrier parallel thereto, a two-armed lever connected to the carrier and a cam for oscillating the lever; of means for rotating said cam at a variable speed comprising a pulley having a split spring-rim, a web secured to the winding-shaft, spokes connected to the rim and sliding in said web and a conical hub loosely mounted on said shaft, a lever connected to said hub and to an element controlled by the rotation of the winding-shaft for moving the hub lengthwise of said shaft and causing the spokes to move toward the same to allow the spring pulley-rim to contract, and means acting on said element to cause the lever to move the hub in an opposite direction to again expand the pulley.

13. The combination with the winding-shaft and its spindle, means to rotate the shaft, the thread-guide carrier, a lever to reciprocate the same, a cam to oscillate the lever, the cam-shaft, a driving-pulley thereon and an expansible pulley on the winding-shaft comprising a web secured to said winding-shaft, a split spring-rim, a conical hub slidable on the winding-shaft and spokes sliding in said web and having bearing on said hub, said pulley belted to the cam-shaft pulley; of an auxiliary shaft geared to the winding-shaft to rotate slowly and having one end screw-threaded, a correspondingly-threaded sleeve thereon and a lever having one of its arms connected to said sleeve and the other to the aforesaid conical hub, for the purpose set forth.

14. The combination with the winding-shaft, the expansible pulley P thereon having a conical hub 17 slidable on said shaft and the cam-shaft 12 carrying belt-pulley 11; of the shaft 6, screw-threaded at one end and carrying the weighted pulley 19, the worm-gearing

3, 3', 4, and 5, gearing shaft 6 to the winding-shaft, said gear 5 loose on said shaft 6, and means for coupling them, the sleeve 13 screwed to shaft 6, and the lever L connected to said sleeve and to the aforesaid conical hub 17, for the purpose set forth.

15. A cop-winding machine comprising a revoluble winding-shaft and spindle, a thread-guide carrier, a lever connected to said carrier, means for automatically oscillating the lever, a shiftable fulcrum for said lever and means for automatically shifting said fulcrum and lengthening the lever-arm connected to the thread-guide carrier from a minimum at the beginning of the winding to a maximum and then maintaining the length of the lever-arm constant; in combination with mechanism for automatically returning the parts to their starting-point.

20 16. A cop-winding machine comprising a revoluble winding-shaft and spindle, a thread-

guide carrier, a lever connected to said carrier, means for automatically oscillating the lever, a shiftable fulcrum for said lever and means for automatically shifting said fulcrum and lengthening the lever-arm connected to the thread-guide carrier from a minimum at the beginning of the winding to a maximum, and then maintaining the length of the lever-arm constant, and means for automatically decreasing the speed of oscillation of the lever in accordance with the increase in bulk of the cop being formed; in combination with mechanism for automatically returning the parts to their starting-point.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CARL MORIGGL.

Witnesses:

HERNANDO DE SOTO,
CARL KAUFMANN.