No. 681,723. Patented Sept. 3, 1901.

J. O. McKEAN.

WINDING MACHINE.

(Application filed Mar. 12, 1901.)

(No Model.) 3 Sheets—Sheet 1.

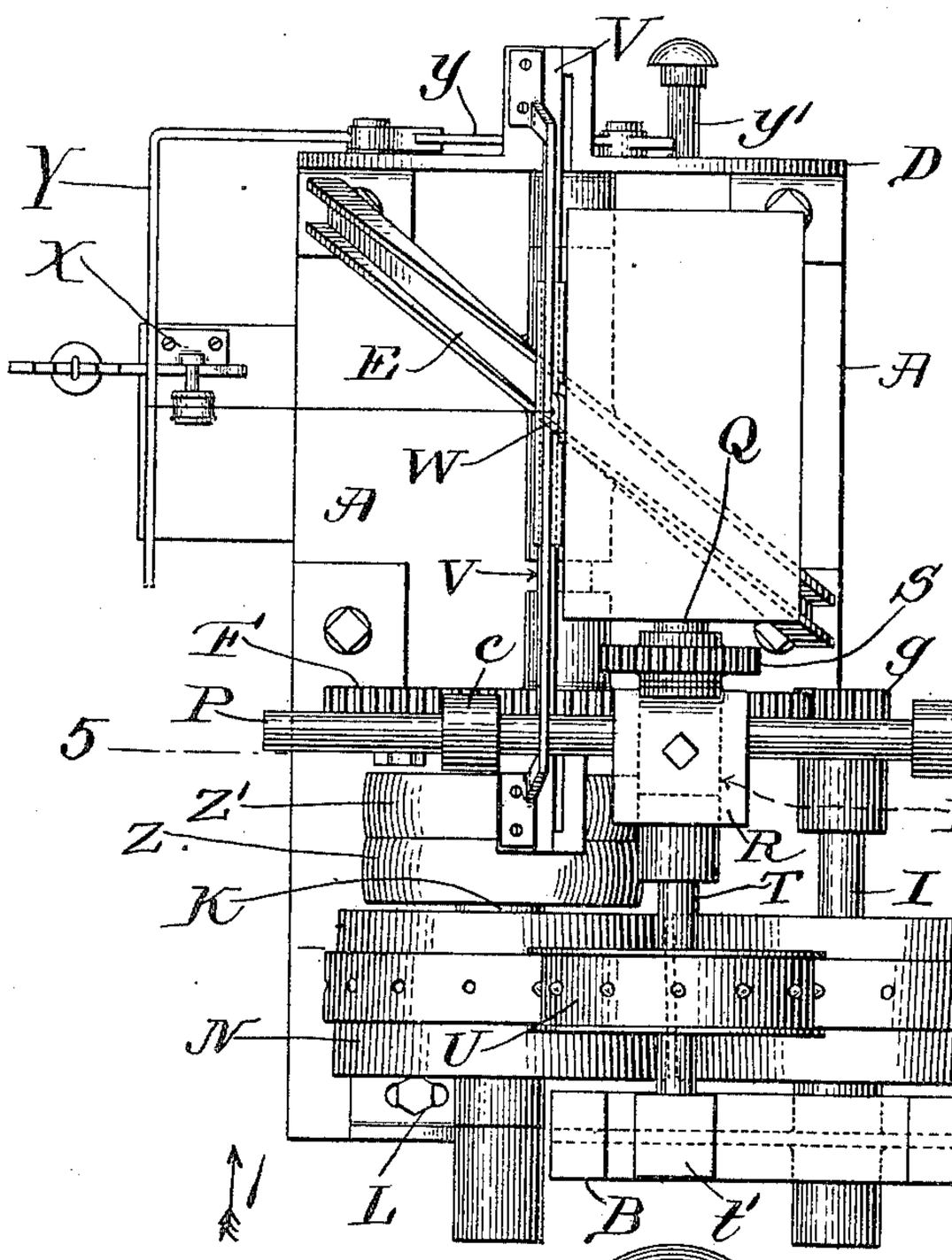

Fig. 1.

Fig. 2.

Witnesses:
Joseph T. Brennan.
Arthur D. Randall.

Inventor:
John O. McKean
by Oliver R. Mitchell,
Attorney.

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Fig. 4.

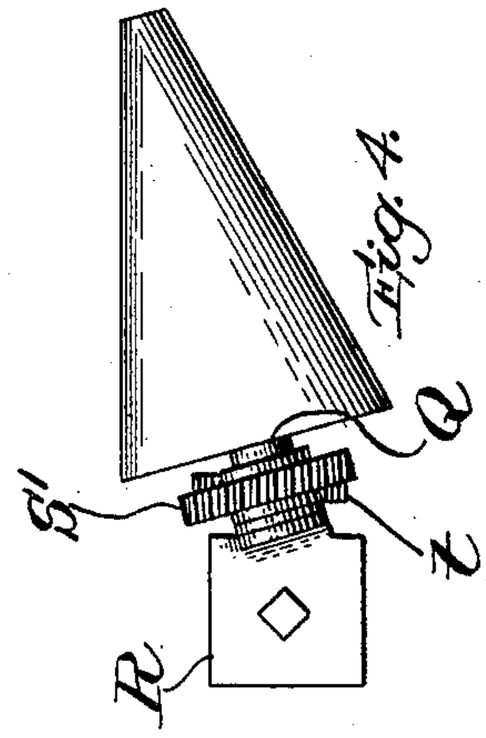
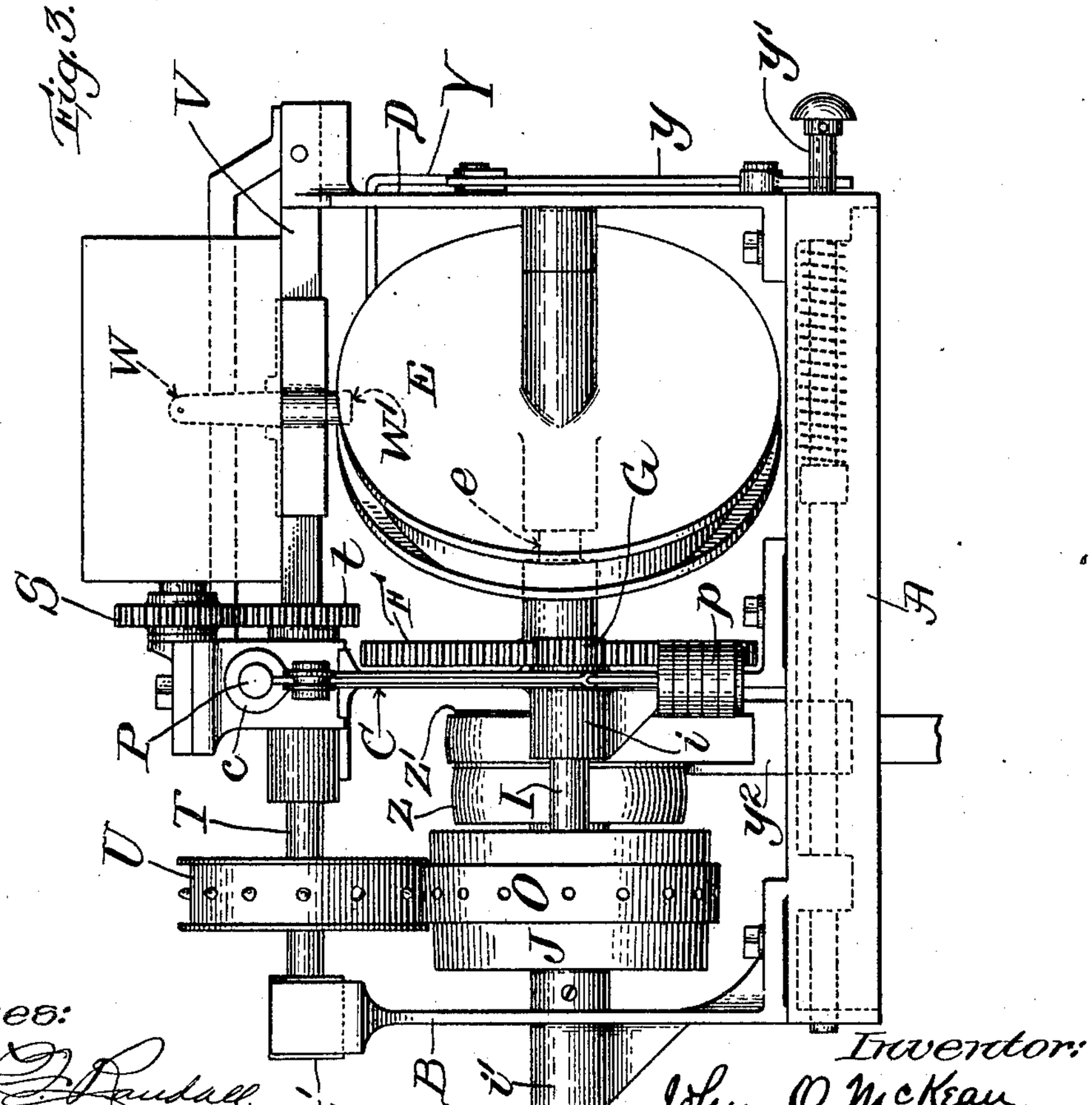


Fig. 3.



Witnesses:
Arthur D. Rundell
Joseph T. Brennan

Inventor:
John O. McKean.
by Oliver R. Mitchell,
Attorney.

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J. O. McKEAN.

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Fig. 7.

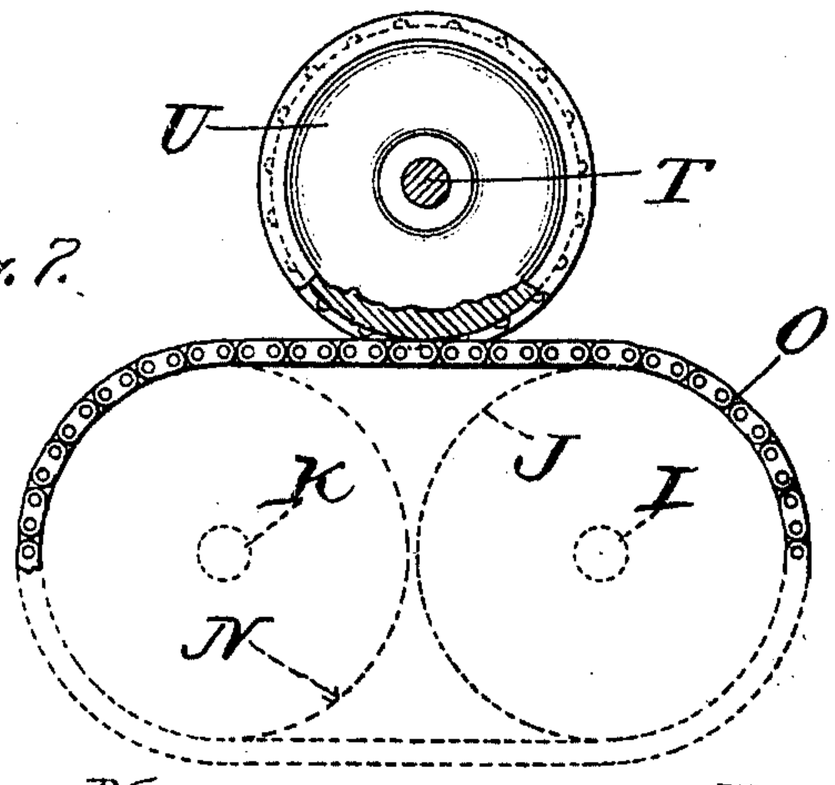


Fig. 6.

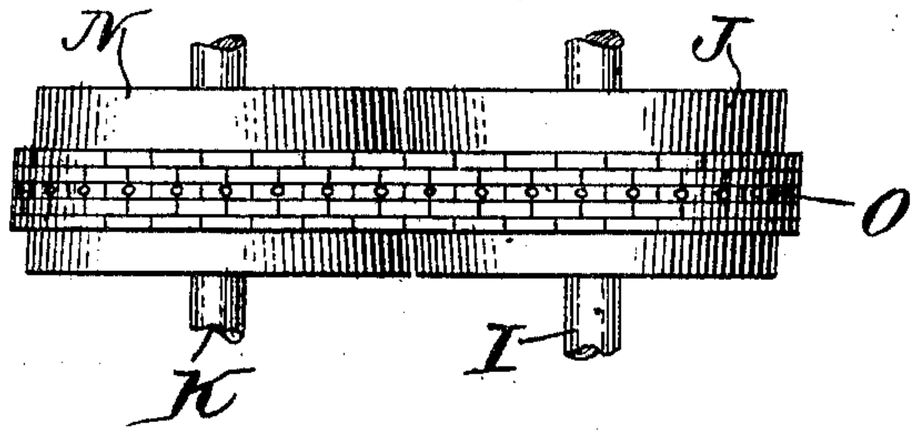
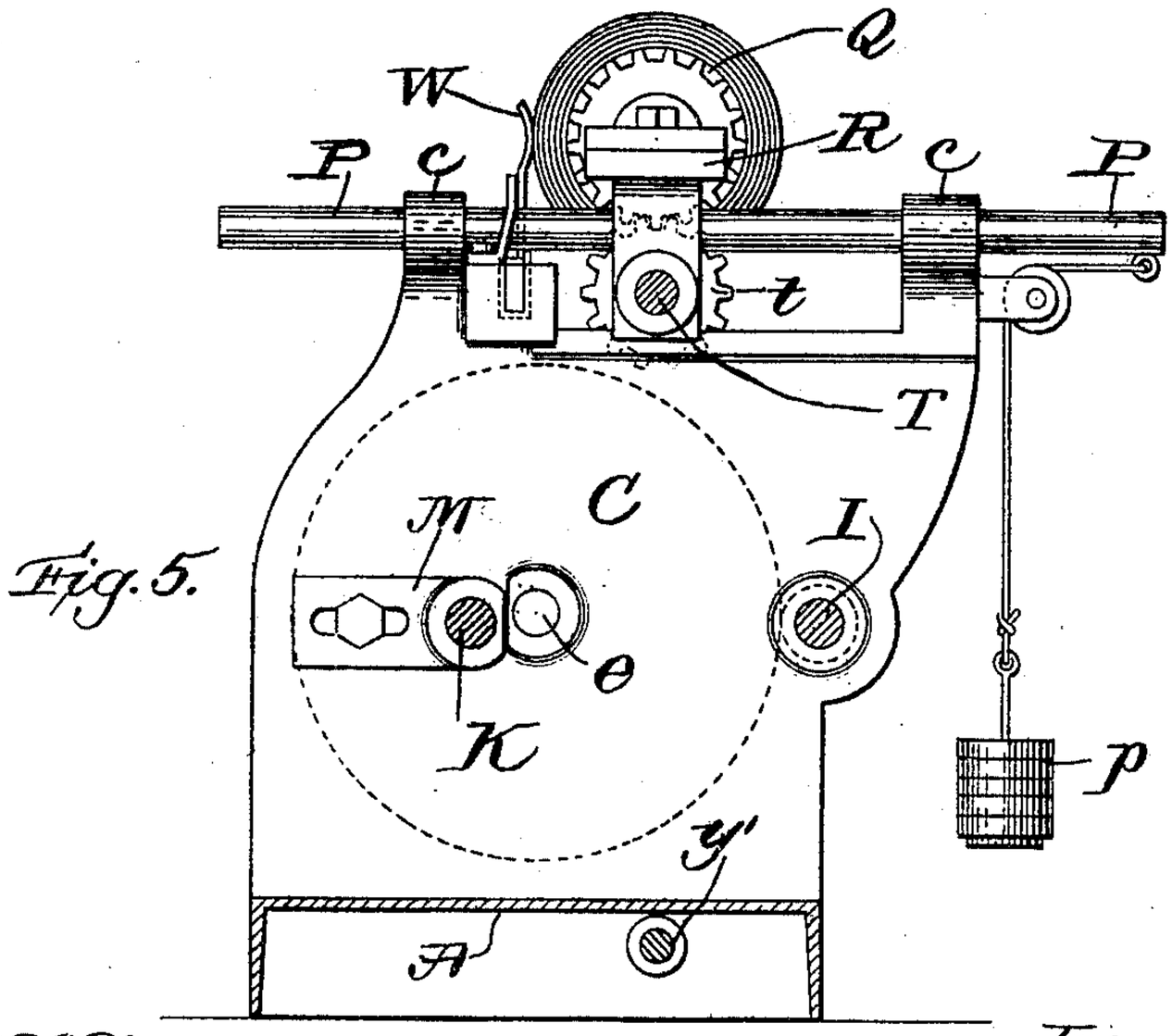


Fig. 5.



Witnesses:
Luther C. Fondall.
Joseph T. Brennan.

Inventor:
John O. McKean
by Olwin R. Mitchell,
Attorney.

UNITED STATES PATENT OFFICE.

JOHN O. McKEAN, OF WESTFIELD, MASSACHUSETTS, ASSIGNOR TO FOSTER MACHINE COMPANY, OF SAME PLACE.

WINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 681,723, dated September 3, 1901.

Application filed March 12, 1901. Serial No. 50,844. (No model.)

To all whom it may concern:

Be it known that I, JOHN O. McKEAN, of Westfield, in the county of Hampden and State of Massachusetts, have invented a new and Improved Winding-Machine, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a plan view of my improved winding-machine. Fig. 2 is an elevation looking in the direction of the arrow 1, Fig. 1, and showing in dotted lines the main pulley mechanism and also the stop-motion, which is at the other end of the machine. Fig. 3 is a side elevation looking in the direction of arrow 2, Fig. 1. Fig. 4 is a detail showing in plan the conical cop, its skew-gear, and platform, and the driving spur-gear on the driving-shaft. Fig. 5 is a sectional elevation on line 5 5 of Fig. 1. Fig. 6 is a plan view of the conical pulleys, showing a flexible rack. Fig. 7 is a sketch elevation, partly in section, of the main driving mechanism.

My invention is an improved and simplified winding-machine in which the spindle is carried upon a carriage traveling on bearings in the frame of the machine, the movement of the said carriage allowing for the necessary separation of the axis of the cop from the thread-guide as the cop grows during the process of winding, and my new machine embodies as a principal feature a new means for giving continuous actuation to the spindle while it is carried upon a carriage which is itself in motion.

In its main features—that is to say, the relations of the cam-drum to the thread-guide, the spindle, and the sliding carriage which carries the spindle—the machine hereinafter described, and shown in the drawings, does not differ materially from the machine which I have heretofore described and shown in an application now pending in the Patent Office, Serial No. 27,118, filed August 17, 1900.

Mounted upon the bed-plate A of the machine are three frames B, C, and D, which support the moving parts of the machine. Between the frames C and D and mounted in suitable bearings therein is the cam-drum E, mounted upon a shaft *e*, which shaft carries at one end next to the frame C a spur-gear F of suitable size as to the number of teeth to give the requisite speed to the cam-drum. This gear F meshes with a smaller gear G, mounted upon one end of the shaft I, which is carried in bearings *i i'* in the frames C and B, respectively. This shaft I carries a cone-pulley J. Parallel with and opposite to the shaft I is a shaft K, one end of which is carried by an independent bearing-frame L, the other end being carried in an adjustable bearing M in the frame C. The bearing L is secured to the base-plate A of the machine by a slotted connection, and the bearing M has also a slotted connection with the frame C, so that both ends of the shaft K may be moved toward or from the shaft I within a limited range and secured in any position required. The object of this construction is to afford means to tighten the belt which runs between the cone-pulley J on the shaft I and a cone-pulley N on shaft K. Around these two cone-pulleys runs the belt O. The upper side of frame C has two projections *c*, which are bored to receive a sliding bar P, forming part of a carriage for carrying the spindle Q. This bar P carries at about its middle a body R, the lower portion of which depends and being suitably slotted embraces the upper edge of the frame C to prevent rotation of the shaft P upon its axis in its bearings *c*. The body R has a projecting stud to receive the spindle Q, and it may be well to state here that when the cone to be wound is of a conical shape the upper section of the body R is removed and replaced by another section carrying this stud at a suitable angle, so that a skew-gear S′, fast to the spindle, may be used. (See Fig. 4.) When the cop to be wound is cylindrical in form, an ordinary spur-gear S is used. (See Fig. 3.) Mounted in a suitable bearing in the body R is a shaft T, carrying at one end and directly beneath the spindle-gear S or S′, as the case may be, a gear *t* in mesh with the spindle-gear and carrying at its other end a wheel U, which engages the belt O. The outer end of this shaft T is supported by a bearing *t'*, which slides as the shaft T moves with the sliding carriage in a way formed for it upon the upper side of the frame B. The sliding carriage is continually pressed toward the thread-guide by a weight *p*. (See Fig. 2.) Mount-

ed over the cam-drum is a raceway V for the thread-guide W, the thread-guide having, as is customary, a tang W′ depending below the raceway and engaging the slot in the cam-drum E.

X indicates a tension mechanism of similar construction to that shown in my previous application, Serial No. 27,118; but obviously any suitable tension device may be employed, while Y y y' y^2 indicate the various members of a stop-motion which will be more particularly described hereinafter. The driving-pulleys Z Z′ are mounted upon the shaft K. (See Figs. 2 and 3.) In Fig. 3 the driving-belt is shown on the fast pulley Z′.

In the drawings I have shown in Fig. 2 a belt O of the ordinary construction, while in Figs. 1 and 3 I have shown a belt in which is a series of perforations, while in Figs. 6 and 7 I have shown a belt which is made up of a multiplicity of links of any suitable material, but preferably, so far as I know, of leather, and this link belt may be either slotted or grooved transversely at suitable intervals upon its outer surface, or may, as is shown in Fig. 6, have a series of holes formed in its outer surface. The object of these slots or holes is to receive corresponding bosses upon the face of the pulley U to give that absolute positive movement without slip which is so desirable in a winding-machine, in order that all the moving parts may be perfectly synchronized in their movements, thus permitting perfect adjustment of the machine with corresponding perfection of product. This positive engagement by means of a wheel having a series of projections and a belt having a corresponding series of depressions to receive the projections upon the wheel constitutes in effect a flexible rack-and-pinion driving mechanism.

The mode of operation is as follows: The shipper-rod y' (see Fig. 3) is pressed to the right, forcing the driving-belt running on loose pulley Z upon the fast pulley Z′. The shipper-rod y' is held in this operative position against the force of a spiral spring mounted upon that rod (see Fig. 3) by the engagement of the short arm of lever y with a slot cut in the surface of the shipper-rod y'. Motion of the shaft K, driven by the driving-pulley, revolves the cone-pulley N and through the belt or flexible rack O the cone-pulley J on shaft I, and this in turn, through spur-gear G, revolves spur-gear F, mounted on shaft e, and thus rotates the cam E, causing the thread-guide W, which is in engagement with the slot of the cam, to be reciprocated in the raceway V at each revolution of the cam. The motion of the belt or flexible rack O is also transmitted to the wheel U on the shaft T, carried by the sliding carriage, made up of the parts P R, and rotation of the shaft T through the spur-gear t, and the spindle-gear, which is in mesh with the spur-gear t, rotates the spindle carried by the carriage P R. The thread is led to the thread-guide and thence to the spindle through the tension mechanism X, and between the tension mechanism and the thread-guide the thread supports one end of lever Y, pivoted on the frame D of the machine, the short end of lever Y supporting the long end of lever y, the short end of which lever y is in engagement with the slot in the surface of the shipper-rod y' and serves as a detent to hold that shipper-rod in operative position. Should the thread break, the lever Y falls, throwing up the lever y and throwing the lower end of the lever y out of engagement with the shipper-bar y', which being released is immediately thrown to the left, Fig. 3, by the spring mounted thereon, carrying the driving-belt from fast pulley Z′ to the loose pulley Z on the shaft K by means of the shipper-arms y^2, (see Fig. 2,) which embrace the main driving-belt. The wheel U, being in engagement with the belt O, is continuously rotated, and this without regard to the position of the carriage on and with which the wheel U travels, for, as will be plain, the wheel U will always maintain proper relation to the belt O during all periods of the growth of the cop until the cop attains the full size designed, that belt being parallel with the plane of movement of the axis of the wheel U throughout its entire movement.

It will be seen that the mechanism I have described possesses the advantage of having no bevel or miter gears, and, on the contrary, the transmission of power is comparatively simple and direct. So far as I know the driving mechanism by which the spindle upon the moving carriage is continuously rotated is absolutely new, and in my experience and opinion this system of actuation of a rotating member traveling upon and with a moving member is of distinct utility.

I claim—

1. In a winding-machine, a thread-guide, adapted to reciprocate in a raceway; that raceway; a cam mounted with its axis parallel to the raceway and having a groove with which the thread-guide engages, to actuate the thread-guide; a shaft mounted in line with the axis of the cam; a wheel mounted upon that shaft; a second shaft parallel with the first-mentioned shaft; a wheel mounted upon that second shaft; a driving-belt between the two wheels; a carriage mounted in ways in the frame of the machine at a right angle to the axis of the shafts and carrying a spindle; that spindle; a third shaft carried by the carriage and carrying a wheel in tangential engagement with the belt; that wheel; means to connect the third shaft and the spindle; all organized to cause the wheel on the third shaft to be continuously rotated by the belt as the carriage moves back actuated by the growing cop.

2. In a winding-machine, a thread-guide, adapted to reciprocate in a raceway; that raceway; a cam mounted with its axis parallel to the raceway and having a groove with

which the thread-guide engages, to actuate the thread-guide; a shaft mounted in line with the axis of the cam; a wheel mounted upon that shaft; a second shaft parallel with the first-mentioned shaft; a wheel mounted upon that second shaft; a flexible rack running between the two wheels; a carriage mounted in ways in the frame of the machine at a right angle to the axis of the shafts and carrying a spindle; that spindle; a third shaft carried by the carriage and carrying a pinion in engagement with the flexible rack; that pinion; and means to connect the third shaft and the spindle; all organized to cause the pinion on the third shaft to be continuously rotated by the flexible rack as the carriage moves back actuated by the growing cop.

3. In a winding-machine, a driving and a driven shaft; a wheel on each shaft; a flexible rack connecting the two wheels; a carriage sliding in bearings in the frame of the machine across the axial line of the shafts; a pinion carried by that carriage and in engagement with the flexible rack; all organized to cause the pinion to be continuously rotated by the flexible rack, as the carriage slides in its bearings.

4. In a winding-machine, a driving and a driven shaft; a wheel on each shaft; a belt connecting the two wheels; a carriage sliding in bearings in the frame of the machine across the axial line of the shafts; a wheel carried by that carriage and in tangential engagement with the belt; all organized to cause the wheel carried by the carriage to be continuously rotated by the belt as the carriage slides in its bearings.

5. In a winding-machine, a carriage carrying a spindle; a pair of parallel shafts, whose axes are across the line of travel of the carriage; a wheel on each of the shafts; a belt running on the wheels; a driven wheel mounted on the carriage and in tangential engagement with the belt; and means fast to the driven wheel to transmit its motion to the spindle; all organized to permit the driven wheel to be continuously rotated without regard to the motion of the carriage.

6. The power-transmitting device above described, consisting of a pair of wheels; a belt running on said wheels; a carriage moving in a path across the axes of the wheels; a driven wheel carried by that carriage and in tangential engagement with the belt; all organized to permit the driven wheel to be continuously rotated without regard to the motion of the carriage.

JOHN O. McKEAN.

Witnesses:
A. F. LILLEY,
E. T. FOWLER.