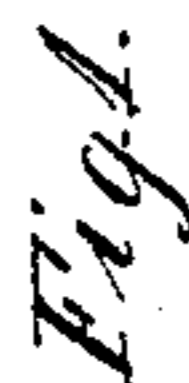


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## Spinning-Machines.

No. 145,322.

Patented Dec. 9, 1873.



ATTEST  
J. F. Sheets.  
W. E. Huestis

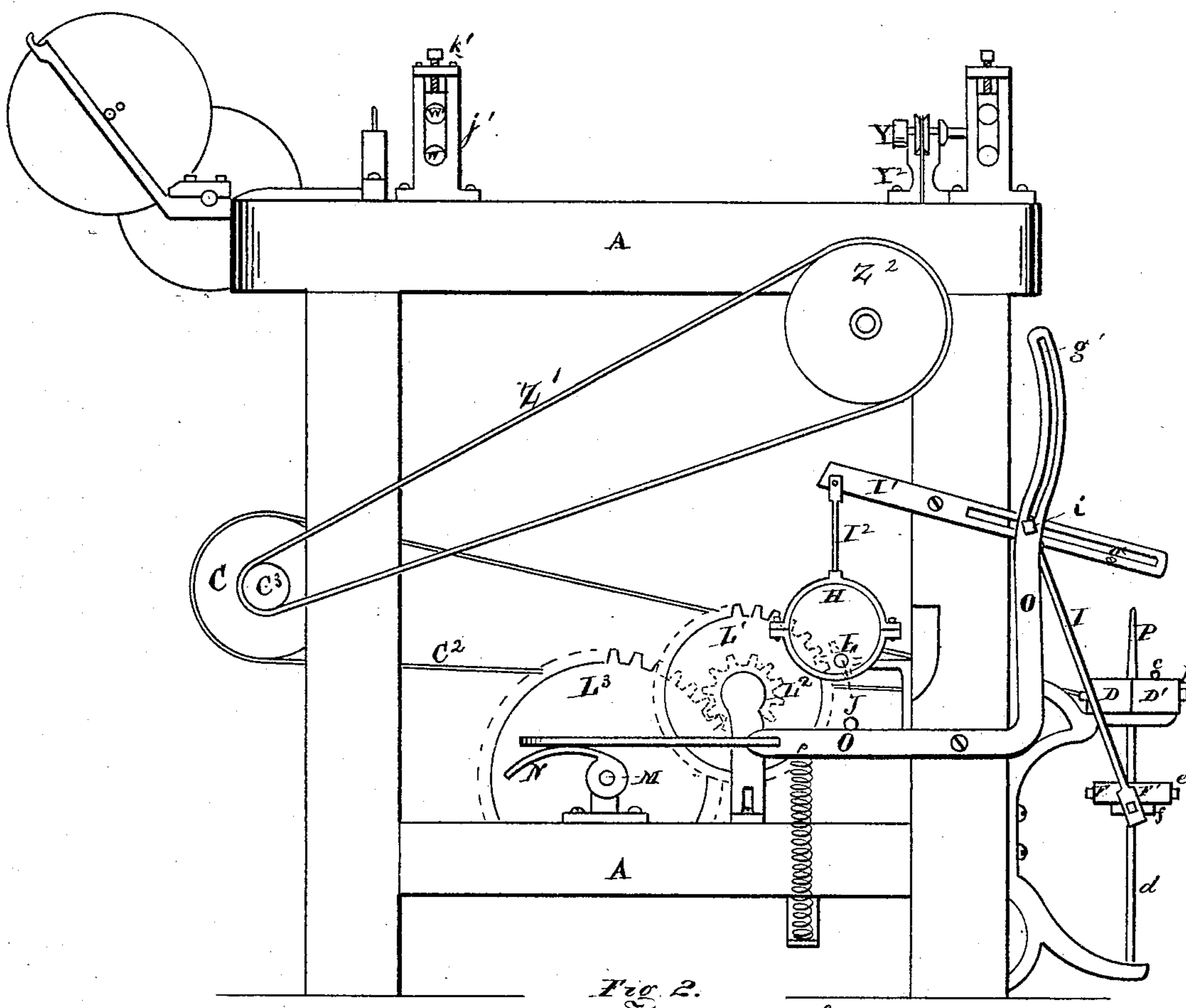
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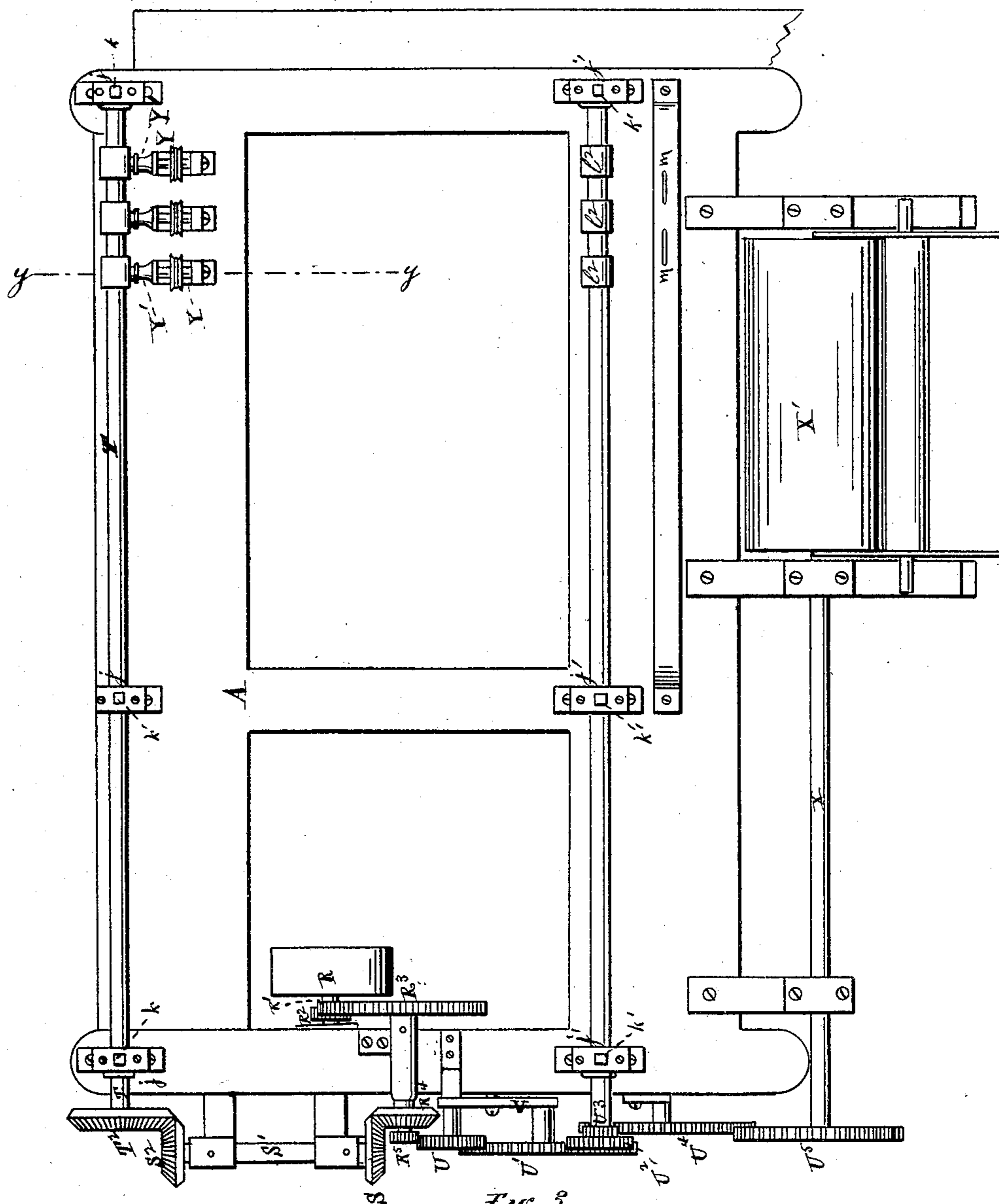


Fig. 3.

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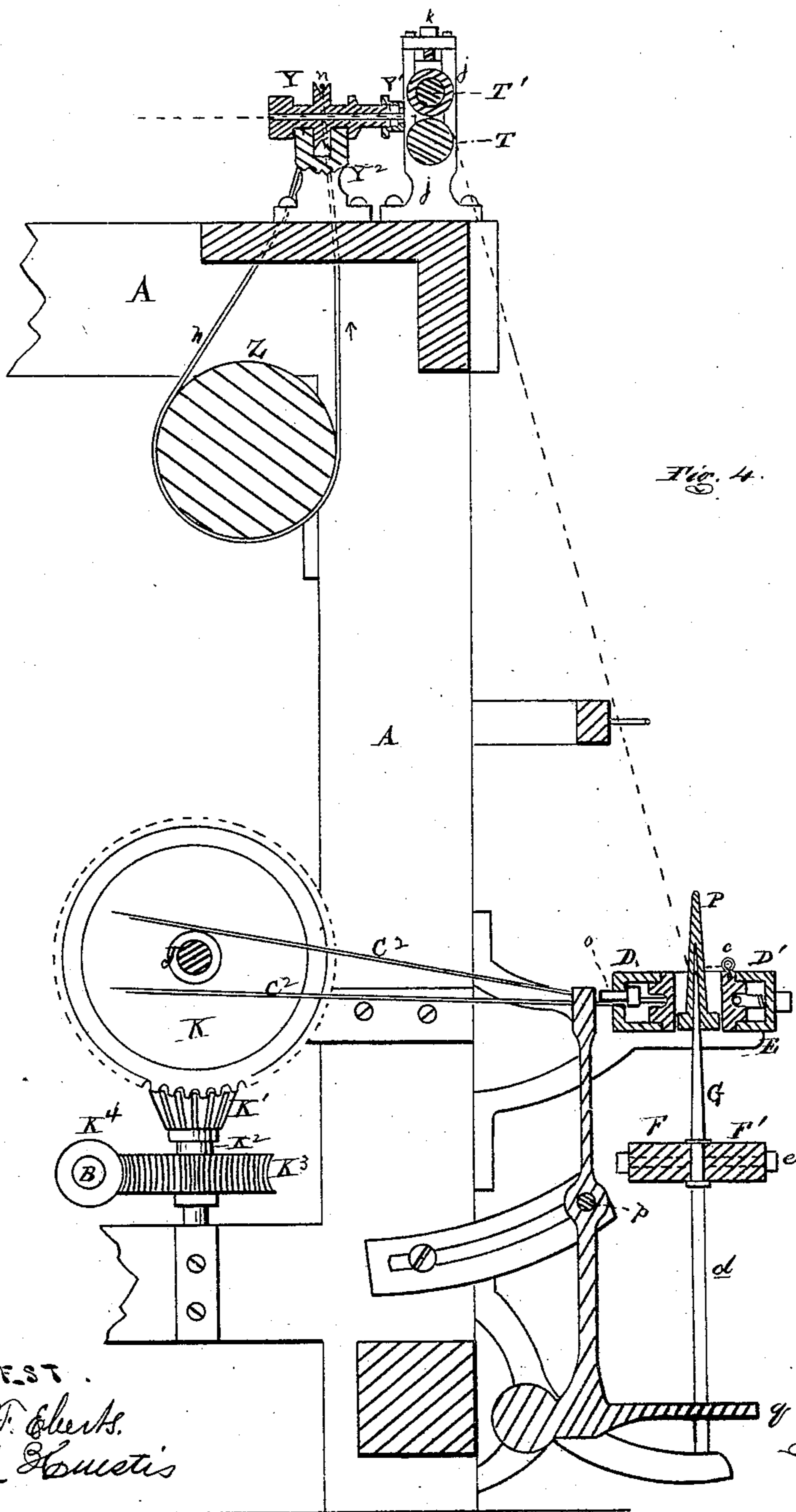
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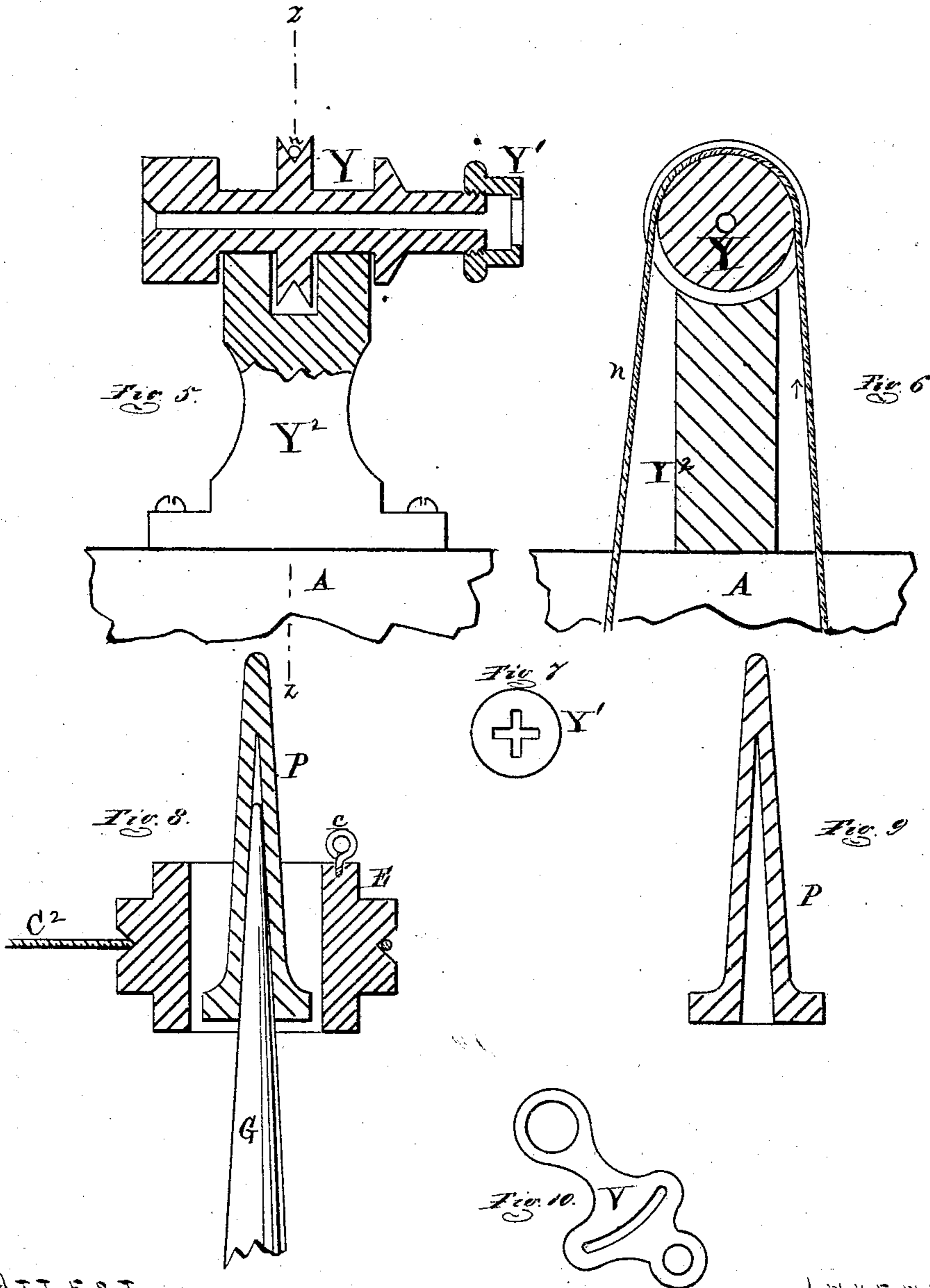
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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN SPINNING-MACHINES.

Specification forming part of Letters Patent No. **145,322**, dated December 9, 1873; application filed  
July 11, 1873.

*To all whom it may concern:*

Be it known that we, CHAUNCEY WILLIAMS, SAMUEL M. WILLIAMS, and HENRY M. WILLIAMS, of Coldwater, in the county of Branch and State of Michigan, have invented a new and useful Improvement in a Spinning-Machine; and we do declare that the following is a true and accurate description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, and being a part of this specification, in which—

Figure 1, Sheet 1, is a perspective view. Fig. 2, Sheet 2, is an elevation of the left-hand end of Fig. 1. Fig. 3, Sheet 3, is a plan of the top. Fig. 4, Sheet 4, is a cross-section on the line *xx* in Fig. 1. Fig. 5, Sheet 5, is an enlarged longitudinal section of a twisting-tube taken through the line *yy* in Fig. 3. Fig. 6 is a cross-section on *zz* in Fig. 5. Fig. 7 is an end view of the twisting-nut on the end of the tube. Fig. 8 is an enlarged vertical section of a spinning-ring and bobbin on its spindle. Fig. 9 is a similar section of the bobbin. Fig. 10 is a view of the slotted quadrant-arm which carries the change-wheel in the feed-train.

The nature of this invention relates to an improvement in machines in which woollen rovings may be spun into yarn and wound upon bobbins continuously; and it consists in the peculiar construction and arrangement of the mechanism for raising and lowering the platform which carries the bobbin-spindles; also, in the peculiar construction of said twisting-tubes, provided with changeable cross-slotted nuts, and in other arrangements of devices, as hereinafter described; the arrangement of the whole being such that the tubes twist the rovings sufficiently to give them the required strength to resist the tension put upon them while being subsequently spun, the twist so given being taken out and reversed by the spinning-rings, which wind them as fast as spun upon the bobbins.

In the drawings, A represents the frame of our spinner, in the lower right-hand end of which a driving-shaft, B, is journaled, which shaft, besides the usual fast and loose pulleys

*a a'*, is provided with a large cone-pulley, B<sup>1</sup>, from which motion is given to a drum, C, journaled across the back part of the frame, by a belt, B<sup>2</sup>, passing around a cone, C<sup>1</sup>, on the end of said drum. D is a spinning-ring bearing, preferably of metal, made in two parts, D D', resting horizontally upon brackets projecting from the front of the frame, to which the inner part, D, is permanently secured, the front half being secured to the part D by bolts *b* passing through both, with nuts on their front ends, by which the two parts may be brought together with any desired degree of compression. These parts are internally channeled, and in them are drilled vertical bearings, at regular distances, for the hollow spinning-rings E, Figs. 4 and 8, having journals turned down on their ends, which rotate in the bearings halved in the upper and lower sides of the parts D D'. The part D has an opening behind each bearing through which a cord, C<sup>2</sup>, passes with a quarter-turn around each ring, which is grooved around its middle to receive the said cord from the drum C, and each ring is provided with an eye *c*, at its top end, through which the yarn passes. Below the ring-bearing brackets, another pair of brackets projects from the lower part of the frame, which support the guides *d d*, whose tops are secured to the brackets above, and upon each slides a cross-head, *f*, Fig. 2, to which is secured a two-part spindle-bearing, F F', in which the lower ends of the bobbin-spindles G are journaled, the two parts F F' being secured together by three transverse bolts, *e*, whose nuts may be screwed up to impede the free rotation of the spindles, whose bearings may be of wood or metal, as preferred. P are the bobbins, each secured upon the tapering spindle, and playing freely through the opening in the spinning-ring E above, as the bearing F F' is raised or lowered, which is effected in the following manner: At the side of each cross-head *f* is pivoted the lower end of a connecting-rod, I, whose upper end is pivoted in a slot, *g*, of a lever, I', by a pin, *i*, the said lever being pivoted back of the slot to the side of one of the front posts of the frame.

To the rear end of each lever is pivoted a connecting-rod,  $I^2$ , whose lower end is strapped to an eccentric,  $H$ , at each end of a shaft,  $J$ , journaled in a bracket projecting up from one of the lower girts of the frame. This shaft  $J$  is slowly rotated by its bevel-pinion  $K$  meshing with a bevel-gear,  $K^1$ , mounted on a short vertical shaft,  $K^2$ , journaled in suitable bearings, and carrying a horizontal worm-gear,  $K^3$ , rotated by a worm,  $K^4$ , on the inner end of the driving-shaft  $B$ , whose rotation thus causes the rise and fall of the spindle-bearings. When the bobbins are empty, and to be wound, their bases are flush with the tops of the rings, through which they fall their own length, and rise again at each revolution of the eccentrics, which is sufficient to fill them with one layer of yarn. This would, however, wind them with yarn into the shape of cylinders; and, to give them the shape required, it is necessary that the bobbins should move slowly at mid-height, and faster at top and bottom, and to this end we employ the following mechanism: Near the left-hand end of the shaft  $J$  we key a pinion,  $L$ , which, through a train of spur-gears,  $L^1 L^2 L^3$ , communicates a slow motion to a shaft,  $M$ , journaled across the lower girts of the frame, carrying at each end a wiper-cam,  $N$ , upon which rests the horizontal arm of a bell-crank,  $O$ , pivoted to the side of a front post in the frame. The upper part of each bell-crank is a curve or segment, and has a slot,  $g'$ , into which one end of the pin  $i$  of the connecting-rod  $I$  projects. The wipers  $N$  are so timed with relation to the throw of the eccentrics that the pin  $i$  is thrown forward in the slots  $g$  to give it a greater radius, and consequently a more rapid vertical movement to the spindle-bearing, while approaching or receding from the ends of the bobbins to the middle, and a slower movement from the ends toward the middle of the bobbins, by reducing the radius of said pin in the slot  $g$ , thereby causing more yarn to be wound upon the middle, and less at the ends of the bobbins.

The feeding and drawing rolls are at the top of the machine, and to operate them we employ the following mechanism: On the shaft  $B$  there is a pulley,  $Q$ , one edge of which is seen in Fig. 1, from which a crossed belt,  $Q'$ , is carried around a pulley,  $R$ , mounted on a shaft,  $R^1$ , journaled in and projecting inwardly from the right top girt of the frame, and carrying a pinion,  $R^2$ , which meshes with and gives motion to a spur-gear,  $R^3$ , whose shaft is journaled in a bracket on top of said girt, with a bevel-pinion,  $R^4$ , and a spur-pinion,  $R^5$ , on its outer end. The pinion  $R^4$  gives motion to a bevel-gear,  $S$ , on the end of a transverse shaft,  $S^1$ , journaled in brackets, with a bevel-pinion,  $S^2$ , at its other end, which meshes with a pinion,  $T^2$ , at the end of the lower drawing-roll shaft  $T$ , journaled in the standards  $j$  at the top and front of the frame.  $T^1$  is the top roll-shaft, journaled in sliding boxes in said standards, which boxes may be screwed down by the set-screws  $k$  in the tops

thereof, whereby any desired pressure may be exerted by the elastic rollers  $l$  upon the upper roll-shaft on the metallic rollers  $l^1$  mounted on the lower roll-shaft, the yarn passing between and being drawn forward by the said rollers. The pinion  $R^5$  meshes with a change-pinion,  $U$ , mounted on a stud projecting from the slotted quadrant  $V$ , Fig. 10, bolted to the side of the top girt, and meshes with a change-wheel,  $U^1$ , mounted on a stud at the lower end of said quadrant, which in turn meshes with the pinion  $U^2$  on the end of the lower feed-roll shaft  $W$  journaled in the standards  $j'$ .  $W'$  is the top feed-roll shaft, journaled in boxes sliding in the same standards, and carries a series of elastic rollers,  $l^2$ , while the lower roll-shaft carries a series of inelastic rollers,  $l^3$ , upon which the rollers  $l^2$  may be caused to press by screwing down the cap-bearings of the upper roll through the set-screws  $k'$  in the standards  $j'$ . Near the end of the lower roll-shaft  $W$  is a pinion,  $U^3$ , which meshes with the gear  $U^4$ , which drives a spur-wheel,  $U^5$ , at the end of a shaft,  $X$ , which carries the roving-drum  $X^1$  at the back of the machine, against which rests the roving-spool with as many rovings wound upon it as there are spindles, the end of each roving being led between guides  $m$  to and between the rollers on the feed-roll shaft, thence across and between the rollers on the drawing-roll shaft, thence down between guides  $m'$  at the front of the machine, thence each through an eye,  $c$ , on the spinning-ring  $E$ , to the bobbin. Just before passing between the drawing-rolls the roving passes through a twisting-tube,  $Y$ , journaled in a pillar,  $Y^2$ , on the frame-top, and to which an axial rotation is imparted by a quarter-turn endless cord,  $n$ , from a drum,  $Z$ , journaled in brackets below, which drum is driven by a belt,  $Z^2$ , passing around a pulley,  $Z^2$ , on its end from a pulley,  $C^3$ , on the end of the drum  $C$ . The twisting-tubes may be either cylindrically bored and tapered at the rear end of the bore, as shown in Fig. 5, or be tapered from end to end, as preferred. In the end of each is screwed a nut,  $Y^1$ , having a cruciform slot through which the yarn must pass; these nuts may have different sizes of slots for twisting coarse and fine rovings. The feed-rolls have a slower movement than the drawing-rolls, while the spinning-rings have a higher speed than either. The relative speeds of the latter and of the twisting-tubes are unchangeable, but, by means of the quadrant  $V$  and changing the pinions  $U$  and  $U^1$ , the speed of the feed-rolls may be changed so as to put a greater or lesser tension on the rovings; the less speed given the feed-rolls the greater the tension will be, and vice versa. The speed of the machine, as a whole, may be varied by shifting the driving-belt  $B^2$  on the cone-pulleys. The ends of the rovings being passed between the feed-rolls, they are thence passed through the twisting-tubes, thence through the eyes  $c$  of the spinning-rings  $E$ , and tied to the bobbin-bases. The machine

being in motion, the tubes twist the rovings sufficiently to enable them to stand the tension put on them by the drawing-rolls, their diameters being correspondingly reduced. The twist put in the rovings is taken out by the spinning-rings, which rotate in the opposite directions, winding the yarn spun upon the bobbins, the spindles being slowly rotated with the bobbins by being cramped in their bearings to such an extent that about two-thirds of the tension is put in by the drawing-rolls, while the remainder of the tension is put in by the spindle-bearings. Each rotation of a spinning-ring puts a twist in the yarn and lays a coil around the bobbin, while each time the eccentrics rotate to raise and lower the bobbins a layer is wound upon them. One rotation of the wiper-cams is sufficient to fill the bobbins and give them the necessary swell at the middle. When a spool of rovings is run off, another one, filled and lying in the sockets at the top of the spool-bracket, replaces the empty one. The ends of the rovings, being connected with those passing through the feed-rolls, are continuous. When a bobbin is wound full the motion of its spinning-ring E is arrested by a brake until it can be removed and replaced in the following manner: *o* is a brake-block, sliding in an opening through the rear side of the bearing D at the back of each ring E. *p* is a shaft, secured in brackets projecting from the frame below and behind the bearing D, and on this shaft are hung the bell-crank treadles *q*, each of which may be depressed by the foot, when its top end will force the brake block inward against the ring E to arrest its motion.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination and arrangement of the shaft B, pulleys Q R, pinions R<sup>2</sup> R<sup>3</sup> R<sup>4</sup> R<sup>5</sup> S S<sup>2</sup> T<sup>2</sup>, shafts R<sup>1</sup> and S<sup>1</sup>, and train of gears U U<sup>1</sup> U<sup>2</sup> U<sup>3</sup> U<sup>4</sup> U<sup>5</sup> for operating the drawing-roll shafts T T<sup>1</sup>, feed-roll shafts W W', and roving-drum shaft X, substantially as and for the purpose set forth.

2. The twisting-tube Y, in combination with the removable nut Y<sup>1</sup>, having the cruciform slot, as described.

3. The combination of the bearings D D<sup>1</sup> and the spinning-rings with the brake *o* and treadles, as described.

4. In combination with rings E and bearing D, the reciprocating spindle-bearings F F', the guides *d d*, brake-block *o*, shaft *p*, bolts *e*, and treadles *q*, substantially as and for the purpose specified.

5. The combination, with the spindle-bearing F, of the cross-heads *f*, connecting-rod I, lever I<sup>1</sup>, pin *i* for pivoting the said rod I in the slot *g* of said lever, the eccentric-rods I<sup>2</sup>, eccentrics H, shaft J, bevel-pinion K, gear K<sup>1</sup>, shaft K<sup>2</sup>, worm-wheel K<sup>3</sup>, and the worm K<sup>4</sup> on the shaft B, the gears L L<sup>1</sup> L<sup>2</sup> L<sup>3</sup>, shaft M, wipers N, and bell-cranks O, having the pins *i* engaged with their slots *g'*, for reciprocating the spindle-bearing F, in the manner described.

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