No. 750,964. PATENTED FEB. 2, 1904.

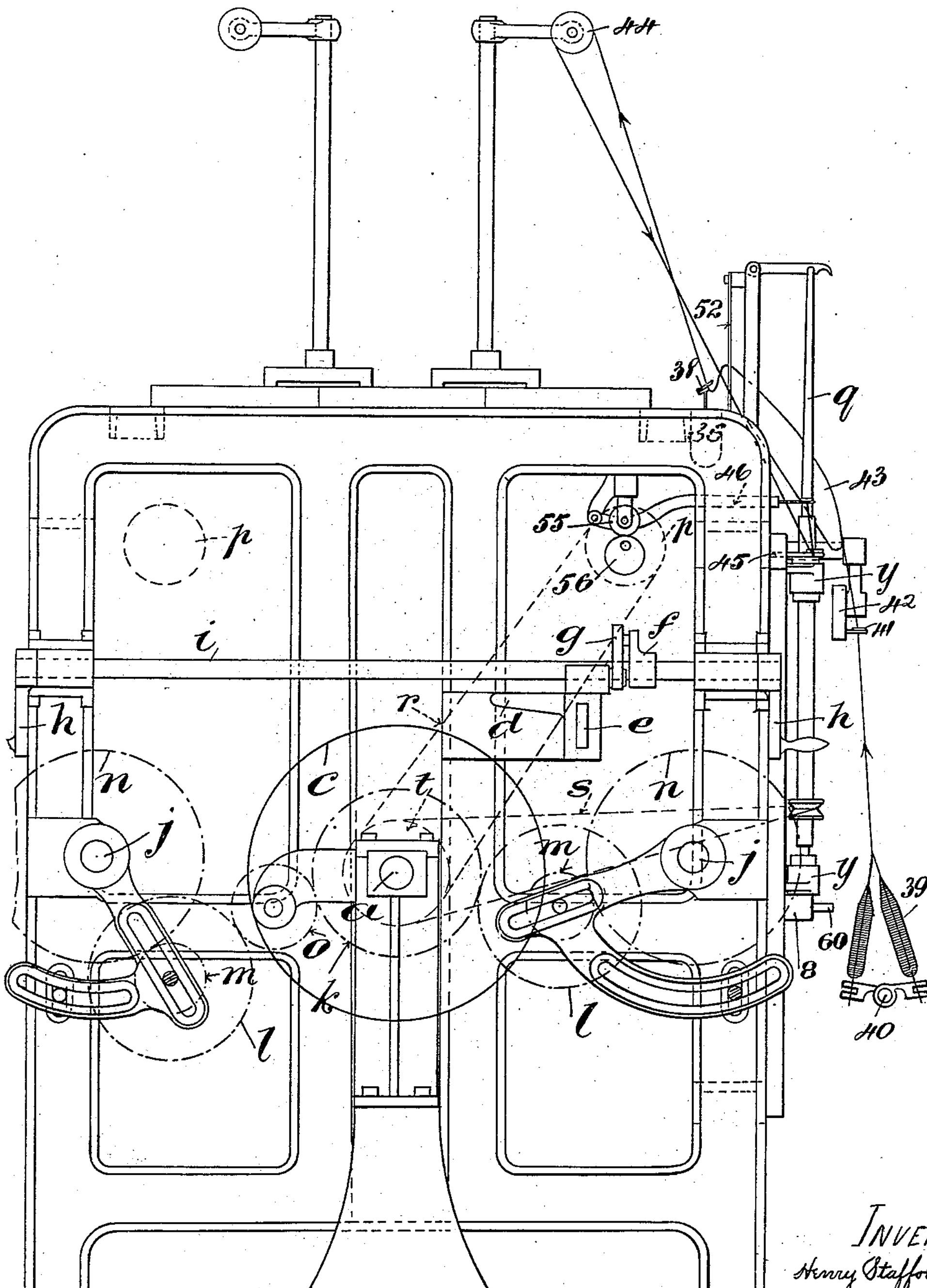
H. S. GOLLAND.

YARN WINDING MACHINE.

APPLICATION FILED MAY 13, 1902.

NO MODEL. 4 SHEETS—SHEET 1.

FIG. 1.



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NO MODEL. 4 SHEETS—SHEET 2.

FIG. 5.

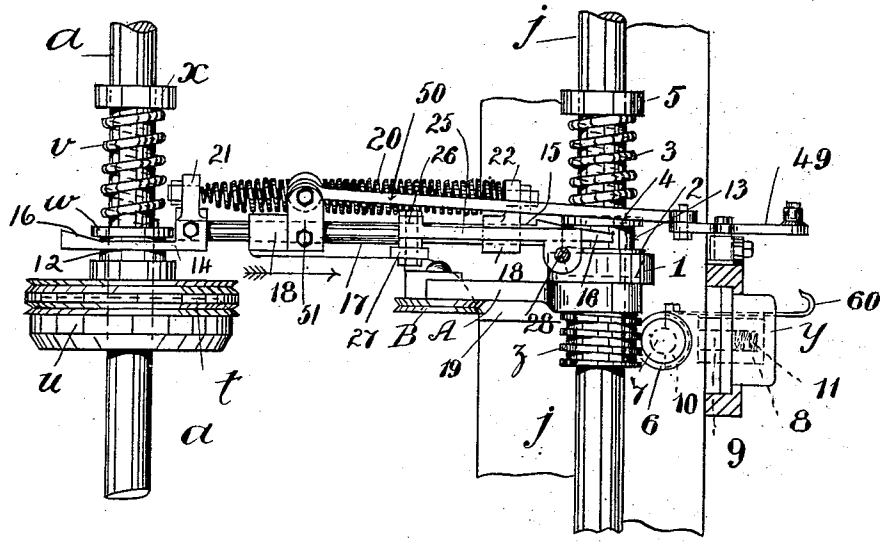
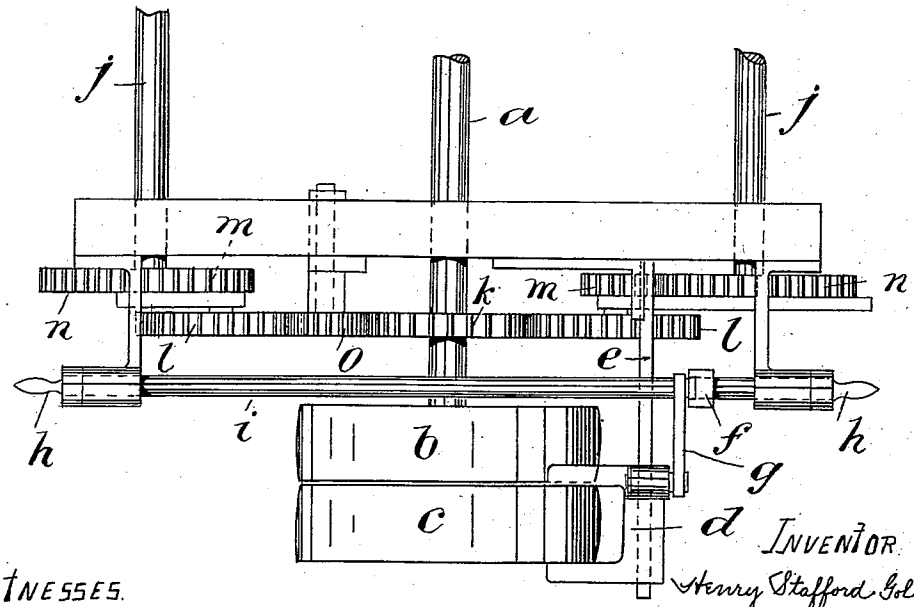


FIG. 2.



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NO MODEL. 4 SHEETS—SHEET 3.

FIG. 3.

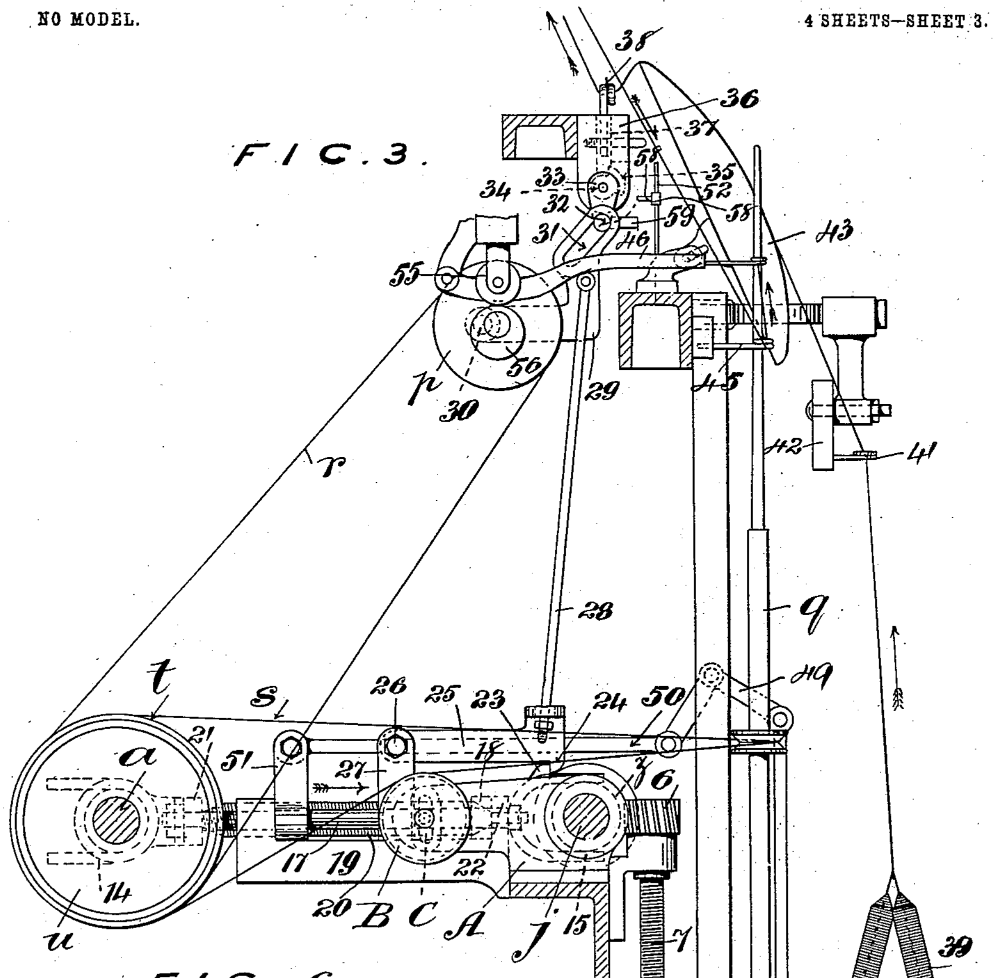
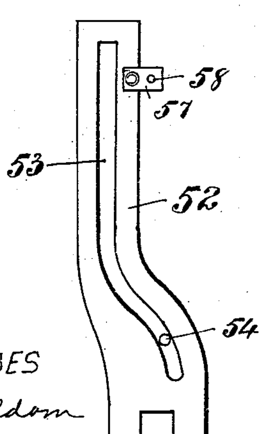


FIG. 6.



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No. 750,964. PATENTED FEB. 2, 1904.

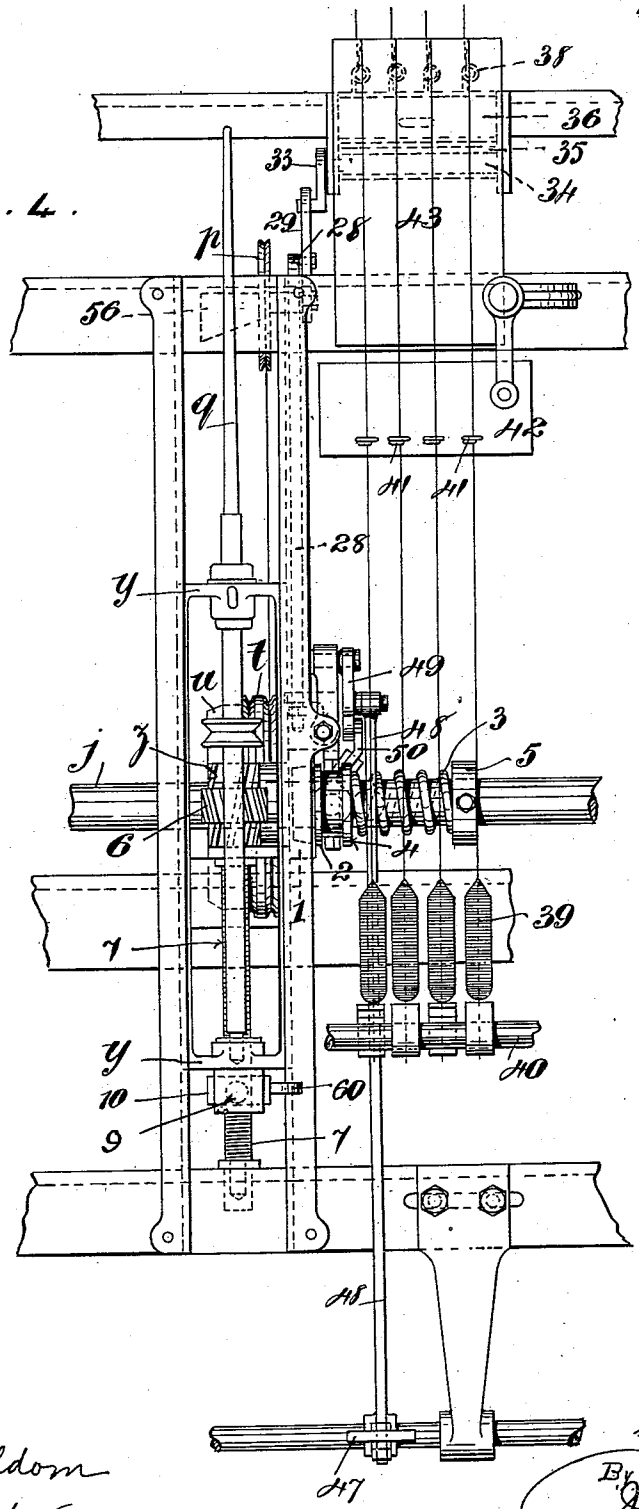
H. S. GOLLAND.

YARN WINDING MACHINE.

APPLICATION FILED MAY 13, 1902.

NO MODEL. 4 SHEETS—SHEET 4.

FIG. 4.



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No. 750,964. Patented February 2, 1904.

UNITED STATES PATENT OFFICE.

HENRY STAFFORD GOLLAND, OF WORSLEY, ENGLAND.

YARN-WINDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 750,964, dated February 2, 1904.

Application filed May 13, 1902. Serial No. 107,100. (No model.)

To all whom it may concern:

Be it known that I, HENRY STAFFORD GOLLAND, merchant, a subject of the King of Great Britain and Ireland, residing at The Gables, Broad Oak Park, Worsley, in the county of Lancaster, England, have invented certain new and useful Improvements in Yarn-Winding Machines, (for which I have made application in Great Britain, No. 21,788, dated October 30, 1901,) of which the following is a specification.

This invention relates to yarn-winding machines for cross-winding single or multiple threads into cops, and has reference to improvements in machinery for which Letters Patent No. 586,279, of 1897, No. 605,984, of 1898, and No. 641,420, of 1900, have been granted to John Dempster Whyte.

In constructing a machine in accordance with my invention I employ vertical spindles, which are lowered as the winding proceeds, and yarn-guides vibrated by cone-cams, as described in the specifications of the above patents, to which I refer the reader for particulars as to construction and method of operation.

My invention relates, essentially, to the means for driving the cone-cams and spindles and lowering the spindle-carriage and to an improved stop-motion for stopping the revolution of the cone-cams and spindles and for arresting the downward movement of the spindle-carriage. To attain success, it is of the highest importance that stopping and starting of all these moving parts should absolutely synchronize; otherwise it is impossible to produce well-formed cops.

The following description and accompanying drawings relate to one spindle only, it being understood that a frame could be provided with any desired number of spindles arranged at both sides of the frame or at one side only, the method of working being the same for all the spindles.

In the drawings, Figure 1 shows an end view of a winding-frame to indicate the method of driving the cone-cams and spindles and counter-shafts for lowering the spindle-carriage. Fig. 2 is a plan of the same. Fig. 3 shows in end elevation, on an enlarged scale, my improved method of driving the cone-cams and spindles and for lowering the spindle-carriage and the stop-motion therefor. Fig. 4 is a front elevation thereof. Fig. 5 is a plan with some of the upper parts removed, and Fig. 6 a detail view.

Referring in the first place to Figs. 1 and 2, the winding-frame is provided with a main driving-shaft *a*, having fast and loose pulleys *b c*, respectively, power being obtained from any suitable source. For starting and stopping the machine a belt-shifting fork *d* is provided, which is slid on a bar *e* by means of a crank *f* and connecting-rod *g*, operated by a handle *h* from either end of a cross-shaft *i*. Counter-shafts *j* are mounted in suitable bearings on opposite sides of the main driving-shaft *a*. These counter-shafts are driven at a reduced speed by means of a gear-wheel *k*, mounted on the driving-shaft *a*. The gear-wheel *k* meshes on one side (the right of Fig. 1) with a gear-wheel *l* and on the opposite side with a gear-wheel *o*, which in its turn meshes with a second and similar wheel *l*. On the shafts of the wheels *l* are gear or spur wheels *m*, which mesh with the spur-wheels *n* on the counter-shafts *j*. To secure uniformity in the direction of rotation of the side shafts a carrier-pinion *o* is provided at one side of the main driving-shaft *a*. The spur-wheels *l l* are made changeable to vary, as desired, the speed of the side shafts *j*, according to the varying counts of yarn being wound into cops.

Having explained the method of driving the side shafts *j* from the main driving-shaft *a*, I will now refer to Figs. 3 to 5. The driving of the cone-cam pulley *p* and the slidable wharve of the spindle *q* is effected by means of bands *r s*, respectively, from a double-grooved pulley *t*, mounted loosely on the shaft *a*. To regulate the tension of the band *s*, I provide a bracket A, carrying a pulley B, which may be raised or lowered, as required, in the slot C. The double-grooved pulley *t* is driven by means of a friction-disk *u*, keyed on the shaft *a*. The driving-pulley *t* is maintained in engagement with the friction-disk *u* by means of a spring *v*, confined between a collar *w* on the boss of the driving-pulley and a fixed collar or

abutment x on the shaft a. The method of disengaging the pulley t from the friction-disk u will be described later. To effect the requisite slow downward movement of the spindle-carriage y to obtain the building of the cops, I provide a worm z, mounted loosely on the shaft j. To drive the worm, it is formed with a friction-nut 1, which is driven by a friction-disk 2, slidably mounted on the shaft j and driven thereby by a feather or the like. The friction-disk 2 is thrust into engagement by means of a spring 3, confined between a collar 4, carried by the slidable friction-disk 2, and a fixed collar 5 on the shaft j. The worm z gears with a worm-wheel 6, carried on the top of a screwed spindle 7, which is mounted to revolve in suitable bearings in the frame of the machine. To the bottom or any other suitable part of the spindle-carriage y I secure a housing 8, carrying spindle 9, having at its protruding end a half-nut 10, engaging with the screwed spindle 7. The half-nut is thrust into gear with the screw-threaded spindle by means of a spring 11. It will be apparent that as the screw-threaded spindle is revolved by the worm-gearing in the required direction the spindle-carriage will be slowly lowered. An essentially important feature in this arrangement of means for lowering the spindle-carriage is that the worm-gearing and screw-threaded spindle and nut positively lock the spindle-carriage, so that on the stoppage of the worm z the spindle-carriage remains immovable. By these means the winding must necessarily be always recommenced at the exact point on the spindle where it left off. Irregular winding of cops is therefore obviated.

I will now describe the means for simultaneously stopping the driving-pulley t and worm z, whereby the stoppage of the cone-cam, spindle, and spindle-carriage are synchronized.

Embracing an annular groove 12, formed in the boss of the double driving-pulley t, and a similar groove 13 of the slidable friction-disk 2 are forks 14 and 15, respectively. These forks are formed with oppositely-arranged inclines or cam-surfaces 16. The forks 14 and 15 are secured to each end of a rod 17, which is capable of sliding in bearings 18, carried by a bracket 19. A strong spiral spring 20 is secured at one end to an extension 21 of the fork 14, the other end of the spring being secured to the bracket 19 at 22. When the forks 14 and 15 are in the position shown in Fig. 5 and the clutches on the shafts a and j are engaged, the spring 20 is in tension. To maintain the forks in this position, one of them (see Fig. 3) is provided with a tooth or abutment 23, bearing against a corresponding tooth 24, carried by a detent-lever 25, which is pivoted at 26 to a pillar 27, secured to or formed on the bracket 19. When the detent-lever is raised, the strong spiral spring immediately slides the rod 17 in the direction of the arrow, Figs. 3 and 5. The inclines 16 on the forks 14 and 15 then act as wedges and simultaneously force out of gear the driving-pulley t, with the friction-disk u, and the slidable driving friction-disk 2, with the worm friction-disk 1, thus bringing about the synchronous stoppage of the pulley t and worm z and cessation from motion of the cone-cam pulley p, spindle q, and spindle-carriage y. This raising of the detent-lever is effected on the breakage of a thread in the following manner: The detent-lever 25 is connected, by means of a rod 28, to a lever 29, which is mounted on a pin 30, carried eccentrically on the cone-cam driving-pulley p. The other end of the lever 29 is formed with a slot 31 and is suspended from a pin 32, carried by a crank 33. The crank is mounted on a spindle 34, provided with a cam 35, arranged in a "catch-box" 36. This catch-box is in itself not novel and is provided, as usual, with a slot 37, having a number of looped needles 38 held suspended by the yarns being wound. Normally the eccentrically-mounted lever 29 causes the crank 33 to oscillate, as indicated in the dotted lines in Fig. 3, the cam 35 also rocking below the suspended needles 38. The lower end of the rod 28 is allowed a little free play, so that any movement imparted to the rod 28 by the oscillation of the lever 29 will not affect the detent-lever 25. On the breakage of a thread, however, the needle previously held up thereby falls in the slot 37 and offers a barrier to the oscillation of the cam 35, which also locks the crank 33. The lever 29 thus being unable to rock the crank 33 rides upward on the pin 32, the slot 31 permitting this, the upward movement of the lever raising also the rod 28 and lifting the detent-lever 25 out of engagement with the abutment 23 and enabling the clutches to be disengaged by the spring 20, as described.

In the drawings four threads are being wound on the spindle; but it will be understood that this number may be varied from one to any practicable number.

In order to secure a long end on the breakage of a thread to facilitate "piecing," the cops 39 are mounted on a side rod or rail 40, and the threads are passed through antiballooning eyes 41, carried by a board 42, then over a tension-board 43, through the needles 38 in the catch-box, around a pulley or glass rod 44, through eyes 45, and from thence to the yarn-guide 46. (See Fig. 1.) This method, however, forms no essential feature of my invention and may be varied. To restart winding after "piecing up" has been effected, I provide a pivoted treadle-plate 47, to which is secured a rod 48, connected to a bell-crank lever 49. The other arm of the bell-crank lever is connected to a rod 50, which is also secured to a bracket 51, fixed to the sliding rod 17. By depressing the treadle-plate 47 the parts are returned to the positions shown in

Figs. 3 to 5. I also provide means for automatically stopping the winding on a predetermined length of cop being attained.

The copping-plate 52 (see Fig. 6) is, as usual, provided with a slot 53, within which works the pin 54 of the bell-crank lever, which actuates the bowl 55 of the yarn-guide 46. The curved portion of the slot 53 serves to gradually shift the bowl 55 of the yarn-guide from the smallest diameter of the cone-cam 56 to the largest diameter, as explained in the specifications of the said former patents, No. 586,279, of 1897, and No. 605,984, of 1898. The pin 54 occupies the straight portion of the slot 53 after the cop-bottom has been formed, as will be understood, the length of the slot being equal to the maximum length of the cops required.

To stop the apparatus when the desired length of cops has been attained, I provide an adjustable clip 57, having a pin 58, and I secure an extension 59 on the crank-pin 32. (See Fig. 3.) The extension 59 comes into contact with the pin 58 when the copping-plate 52 has been lowered sufficiently to form the desired length of cop and the oscillation of the crank 33 is arrested, so as to bring the stop-motion into action in the manner already described.

To raise the spindle-carriage to commence the winding of another cop, the half-nut 10 is provided with a hooked handle 60, by means of which the half-nut can be withdrawn into the housing 8, compressing the spring 11, and thus disengaging the nut from the screw-threaded spindle 7 and enabling the spindle-carriage to be returned to its initial starting-point.

Although I have particularly instanced the yarn-guide and means for operating same described in the specifications of the said prior patents, No. 586,279, of 1897, and No. 605,984, of 1898, my improvements may be used with any suitable yarn-guide.

I declare that what I claim is—

1. In combination in a yarn-winding machine, a vertically-movable spindle-carriage, a half-nut secured thereto, a screw-threaded spindle engaging said half-nut, means for disengaging the half-nut from the screw-spindle when desired, worm-gearing for operating said spindle and stop mechanism whereby the rotation of said screw-threaded spindle is stopped on the breakage of a thread and the spindle-carriage positively locked against movement, substantially as described.

2. In a yarn-winding machine, the combination with the main driving-shaft, a double-grooved pulley loosely mounted thereon, a yarn-guide and a spindle operated from said double-grooved pulley, a counter-shaft driven from said main shaft, a vertical screw-threaded spindle, a spindle-carriage, a spring-pressed half-nut on the spindle-carriage engaging said spindle, with means for disengaging it therefrom, operating connections between said screw-threaded spindle and the counter-shaft, a clutch included in said connections, a clutch for clutching the double-grooved pulley to the main shaft, connected sliding forks having inclines for operating both said clutches, a spring tending to force said forks into position to disengage the clutches, a detent for holding said forks normally inoperative, an oscillating lever for operating said detent, and a catch-box for controlling the action of said operating-lever, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

HENRY STAFFORD GOLLAND.

Witnesses:
JOSHUA ENTWISLE,
ALFRED YATES.