

July 23, 1940.

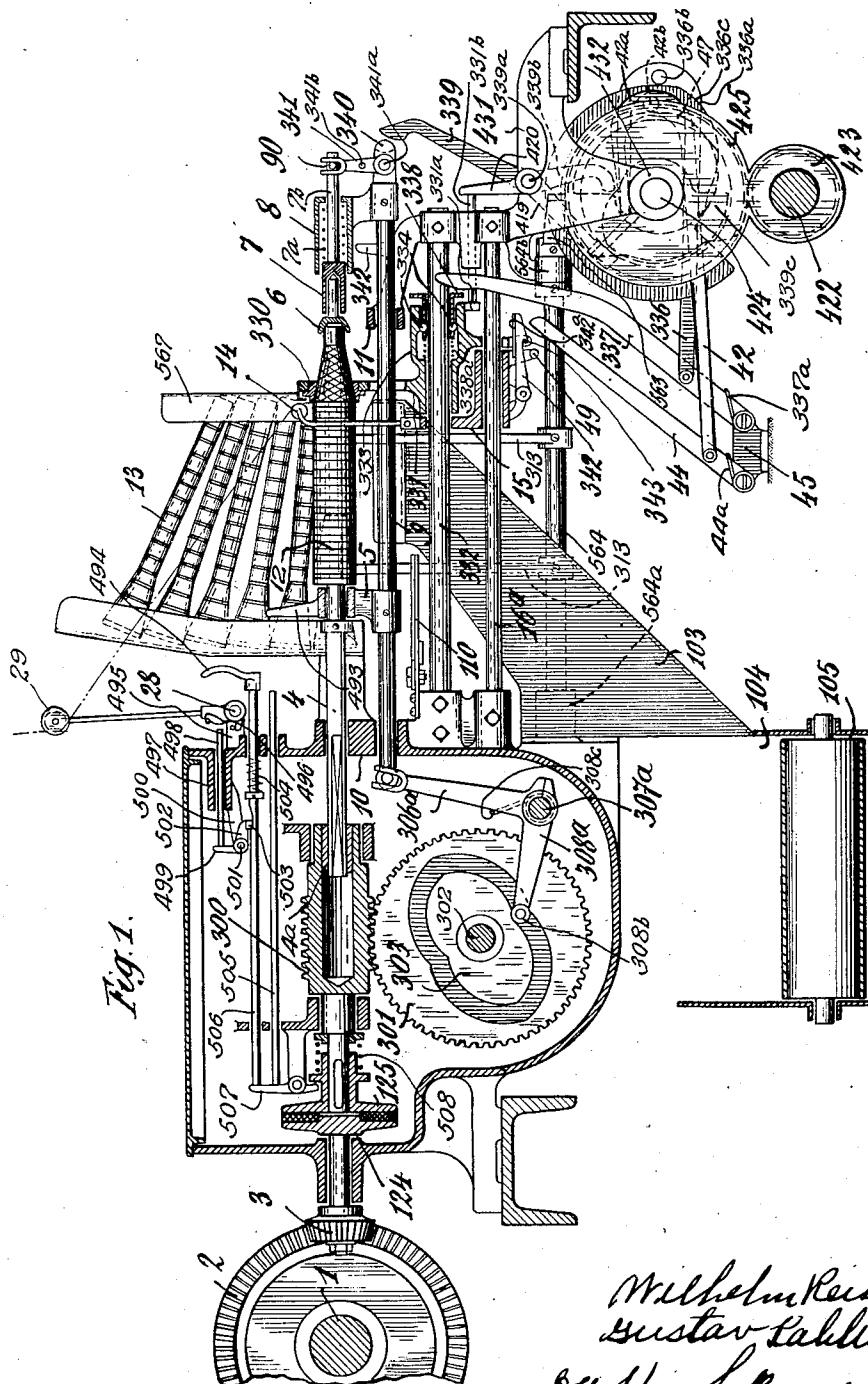
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2,209,207

WINDING OF COFS

Filed March 25, 1937

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3 Sheets-Sheet 2

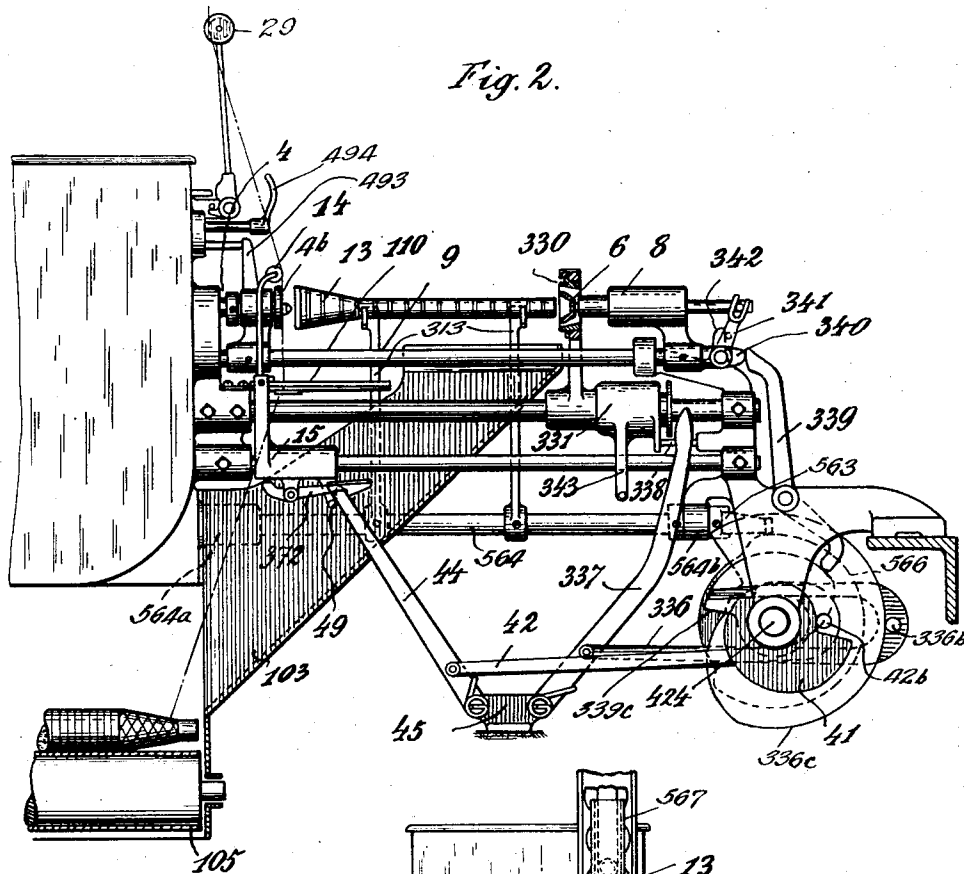
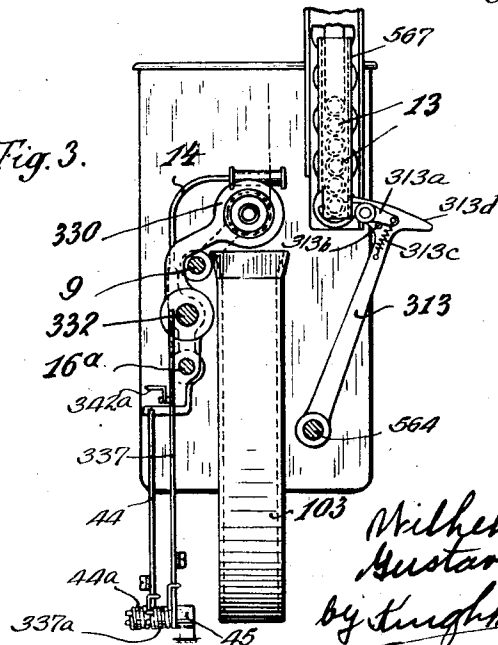


Fig. 3.



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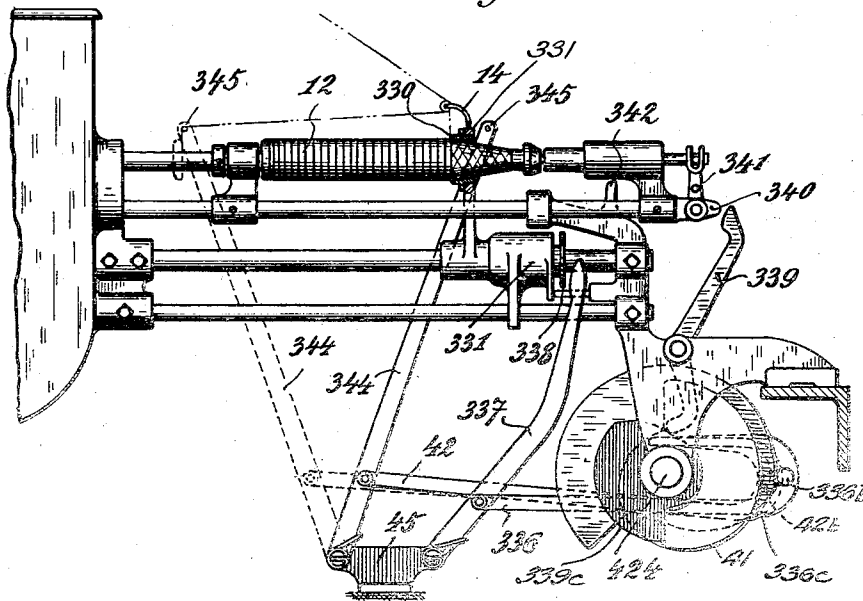
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Fig. 4



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UNITED STATES PATENT OFFICE

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WINDING OF COPS

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Application March 25, 1937, Serial No. 132,944
In Germany April 7, 1936

6 Claims. (Cl. 242—34)

The invention relates to a cop winding machine of the type in which all the spindles, or a whole group of spindles of a machine, are driven in unison, but the progress of the winding at each spindle is controlled quite independently of the others. The present invention is an improvement upon the cop winding machines shown in our copending application Serial No. 65,484, filed February 24, 1936, and upon the machines shown in Figs. 8 and 19-21 of our copending application Serial No. 71,266, filed March 27, 1936.

In the said copending applications the thread is required to follow the builder mechanism at all times and cannot be returned to the bottom of the cop, which is the end first wound, when the building of the cop is completed, without the builder mechanism. According to our present invention the thread itself can be returned to the bottom of the cop when the build-up of the cop is completed, either with or without the thread guide.

By this means it is, for example, possible to use a feed feeler device which engages the chase of the package in such a way that local friction in the outermost position is avoided and the compactness of the yarn is increased by the flat contact of the control member. In addition there is the advantage of considerable simplification of construction. In the embodiment shown in the said copending applications a feeler wheel is used, which cannot be released from the thread guide. To enable the thread to be returned to its original position by means of the thread guide, the feed feeler member must be swung out of operative position so that it can be moved past the cop at the side thereof without touching the package. According to our present invention, however, any desired feed feeler member (feeler wheel, the known hollow cone or feeler cone or the like) may remain in operative position, even when the yarn, with or without the thread guide co-operating with the feeler member is returned to its original position.

Embodiments of the invention are shown by way of example in the accompanying drawings, in which:

Fig. 1 is a side view showing one form of construction, partly in section;

Fig. 2 is a partial side view thereof, after a cop has been released, partly in section;

Fig. 3 is a partial front view;

Fig. 4 is a side elevation, partly in section, of another embodiment.

The machine may have any desired number of spindles 4 driven from a main drive shaft 1. The

drive for each spindle is taken off through bevel gears 2, 3, a clutch 124, 125, and a slide coupling 4a in which the spindle 4 is non-rotatably guided. A thread supporting device in the form of a cop tube 13 is held to spindle 4 by a tail stock comprising a socket 6 journaled in a bearing 7, which is slidably mounted in a bearing 8, under the influence of a compression spring 7a. The bearing 8 and a bearing 5 for spindle 4 are fixed upon a shaft 9 guided for longitudinal movement in bearings 10 and 11. The longitudinal movement of the shaft 9 provides the traverse movement and is derived from a bell crank 306a, 308a, rockably mounted upon a shaft 307a. The arm 308a has a roller 308b held against a cam 303 by a spring 308c. The cam is fixed upon a shaft 302 which is driven by a worm wheel 301 meshing with a worm 300 on slide coupling 4a.

The clutch half 125 is pressed to the clutch half 124 by a spring 508 and can be retracted by 20 a lever 507 operated by either of two rods 506, 505. The rod 506 is urged to the left by a spring 504 and bears a lug 503 engaged by a bell crank pawl 502 pivoted at 501 on a bracket 500. The vertical arm 499 of the pawl is engaged by a rod 25 498 sliding in a bearing 497 and adapted to be operated by a cam 496 of a thread guide 29 pivoted at 28 on a bracket 495. When the thread guide is pulled to the right by the thread, which is indicated by a dot and dash line, the rod 506 30 can be pulled to the right by handle 494 to engage the lug 503 with pawl 502, thus releasing the clutch half 125 to the action of spring 508. When the thread breaks, the thread guide 29 falls to the left and cam 496 thrusts rod 498 against 35 pawl 499, 502, releasing rod 506 to the action of spring 504, which predominates over spring 508 and disengages the clutch. The rod 505 is operated to release the clutch by a lug 493 on bearing 5, when the spindle unit is moved to the left 40 beyond its normal traverse movement at the completion of a cop, in a manner to be described presently.

The machine is designed to doff the completed cops and to don the empty tubes and begin the 45 winding of the new cop automatically. These automatic operations are governed for each spindle independently by a separate group of cams (Figs. 1 and 2) 339c, 41, 566, and 338c. These cams form a rigid unit rotatably mounted upon 50 a shaft 424 which is held in bearings 432 on a bracket 431. The cam unit can be coupled for one revolution to a gear 425 driven by a gear 423 on a shaft 422, which may derive its power from the main drive shaft 1 by means not shown. The 55

one revolution clutch for coupling the cam unit to the gear 425 may be of the construction shown in Figs. 22-26a of our copending application Serial No. 71,266. In the present drawings we have only indicated a bell crank lever 419, 420 pivoted on a shaft 339a on bracket 431. The bell crank lever corresponds to the lever of the same number in the said copending application Serial No. 71,266 and is adapted to allow the clutch to become engaged when rocked in clockwise direction and to disengage the clutch when rocked back into the position shown in Fig. 1.

The completed cop is doffed by retracting socket 6 from spindle 4, by mechanism now to be described. On a shaft 7b of bearing 7 is a transverse pin 90 engaged by the forked end of a lever 341 pivoted at 341a on rod 9. The outer end 340 of rod 9 is engaged by the end of a lever 339, 339b pivoted on shaft 339a. The lower arm 20 339b is actuated by cam 339c to move the rod 9 to the left beyond its limit of leftward movement caused by the traverse mechanism. In this movement a pin 341b on lever 341 strikes a stop 342 and swings lever 341 back to retract socket 25 6. The cop falls from spindle 4 into a chute 103 which guides it onto a conveyor band 105 travelling in a box 104.

The new tube is supplied to the spindle from a magazine 567 by a mechanism now to be described. On a shaft 564 rockably mounted in bearings 564a and 564b are fixed carrier arms 313, provided at their upper ends with pivoted rests 313a (Fig. 3) normally held in the position shown in Fig. 3 against a pin 313b by a spring 313c. The bottom tube 13 in the magazine lies in these rests and upon movement of the carriers 313 to the left in Fig. 3 is conveyed to a position coaxial with the spindle 4 and socket 6, the surface 313d of the carriers 313 meanwhile holding up the other tubes in the magazine. The swinging of the carrier arms 313 is controlled by a lever 563 engaging cam 566 (Fig. 2). The swing to the left of the carrier arms 313 occurs just after the release of the completed cop and before the return of the rod 9 to the right, while the socket 6 is held retracted by the lever 341, as shown in Fig. 2. The carrier is held under the spindle until after the new tube has been engaged by the socket 6 and spindle 4 by the return of rod 9 to the right. Thereupon the carrier arms 313 are swung back, the rests 313a pivoting to release the donned cop tube and, upon return of the carrier arms to the position shown in Fig. 3, receiving the next cop tube from the magazine.

A thread guide 14 is mounted upon a carrier 15, which is slidable upon a rod 16a fixedly mounted in the frame of the machine. The carrier 15 is also stabilized by a second rod 332 likewise fixed in the frame of the machine. The builder mechanism comprises a cone 330 adapted to bear against the nose of the cop and supported upon a holder 331. The holder is slidably mounted upon shaft 352 and stabilized by shaft 16a. The holder 331 is provided with a sleeve 333 forming a chamber which contains clutch balls 334. The clutch balls are held in a bushing 338 which is pressed to the right by a spring 338a to wedge the balls 334 against a conically reduced portion of the inner surface of sleeve 333. The holder 331 is thus free to move to the right during the building motion, but can only move to the left when bushing 338 is pressed in. The thread guide carrier 15 and the builder cone holder 331 are coupled together during the winding operation by a catch 342 on the carrier 15 engaging a pin 343 of holder 331.

In accordance with the invention means are provided for disconnecting the thread guide from the builder cone and returning it to the bottom of the cop independently. For this purpose a lever 44 is pivotally mounted upon a bracket 45 and is normally urged toward the left by a spring 44a. A pitman 42 connected to lever 44 has a hook-shaped end 42a by which it is guided in a groove of the cam unit and this end bears a pin 42b which rests against cam 41. Shortly after the cam unit begins to revolve the link 42 is released by cam 41 and lever 44 is swung to the left by spring 44a. It first encounters a flange 342a of catch 342 and raises the catch from pin 343. Immediately thereafter it engages a pin 49 of carrier 15 and swings the carrier to the position shown in Fig. 2, thus bringing the thread against flange 4b of the spindle in position to be clamped by the butt of the new tube 13. The thread trailing from the completed cop is also brought by this movement between the jaws of a pair of shears 110, which are actuated by carrier arms 313 to cut off the thread as the new tube is brought into position. Meanwhile, the builder cone 330 remains in the position it had reached when the winding of the cop was completed. As shown in Fig. 2, in this position the builder cone leaves a clear path for the new tube to be moved over to the spindle and is ready to be pushed over the new tube by a mechanism now to be described. A lever 337 is pivoted on bracket 45 and is normally urged to the left by spring 337a. A pitman 336 connected to lever 337 has a hook-shaped end 336a by which it is guided in a groove of the cam unit, this end being provided with a pin 336b riding upon a cam 336c. The end of lever 337 reaches up to engage bushing 338 when the lever swings to the left, which it does near the close of the donning operation, when cam 336c releases it to the action of spring 337a. The lever 337 thereupon releases clutch balls 334 and slides the builder cone holder 331 to the left, until the latter comes up against thread guide carrier 15. As the holder 331 moves into this position pin 343 lifts catch 342 and becomes reengaged thereby. Meanwhile, the winding of the new cop was begun the moment rod 9 moved far enough to the right to release rod 505 and allow clutch 124, 125 to become reengaged, which occurred just after the new tube was clamped between the tail stock and the spindle and the carrier arms 313 were retracted.

The cam unit for the automatic doffing and donning operations is set in operation by the builder mechanism when the latter reaches the limit corresponding to the desired size of the cop. For this purpose the builder cone holder 331 bears a lug 331a which comes to abut against a rod 331b slidably mounted in the frame of the machine and engaging at its outer end the upper arm of bell crank lever 420, 419, which controls the engagement of the cam unit clutch.

The machine described operates in the following manner:

A cop tube 13 is set up between the spindle 4 and socket 6 and the thread is drawn down under thread detector roller 29 and over thread guide roller 14 and clamped between the butt of the cop tube and the flange 4b of the spindle. The magazine 567 is filled with empty cop tubes. The rod 506, which has been standing in its left end position (Fig. 1) holding out the clutch disk 125 is pulled forward by handle 494 until the dog 502 drops into place behind lug 503. This throws in the clutch disk 125 and the spindle

begins to rotate. At this time the thread guide is in its left end position shown in Fig. 2 and the thread begins to wind upon the bottom end of the cop tube. The spindle 4 is reciprocated by cam 303, causing the thread to be laid upon the cop tube in a cross winding of about the extent of the conical bottom of the cop tube. The builder cone support 331 has the position relative to the thread guide support 15 shown in Fig. 1, the two supports being connected by the hook 342. They are, however, in a position more to the left than that shown in Fig. 1, opposite the bottom of the cop tube. As the thread begins to accumulate on the cop tube it touches the builder cone 330 at the extreme right end of the traversing movement of the spindle and pushes the builder cone slightly to the right, this being the direction in which the builder cone support is free to move on shaft 332. The thread guide 14 is moved to the right with the builder cone and thus the field of traverse progresses along the cop tube, building the winding into a cop. The winding proceeds until lug 331a on the builder cone support strikes rod 331b and rocks the bell crank lever 420, 419 counterclockwise to throw in the clutch which drives the cam unit 339c, 41, 566, and 336c.

The first cam of the cam unit to act is the cam 339c, which rocks the bell crank lever 339, 339b counterclockwise and thrusts the rod 9 to the left. This overcomes the effect of the traversing cam 303, the motion of which is now entirely taken up by spring 308c. During the leftward movement of the bar 9 the finger 493 strikes rod 505 and throws the clutch disk 125 out of engagement, stopping the rotation of the spindle. Also, pin 341b strikes stop 342 and turns lever 341 in clockwise direction about pivot 341a, thus retracting the socket 6 from the end of the cop tube and releasing the cop from the spindle.

The next cam to take effect is the cam 41, which releases the pin 42b of pitman 42 and allows spring 44a to throw lever 44 to the left. This lever first strikes hook 342 and disconnects the thread guide support from the builder cone support. Then it strikes pin 49 and throws the thread guide support to the left until it reaches the position shown in Fig. 2, leaving the builder cone at the last wound end of the cop. The released cop slides down chute 103 on to conveyor 105, its trailing thread being guided by the return movement of the thread guide 14 into the position shown in Fig. 2, where it lies against the flange 4b of the spindle 4. In this movement the thread passes between the blades of the shears 110, ready to be severed by the shears when they are actuated presently.

The next cam to take effect is cam 566 (Fig. 2), which rocks the transfer device 313. The transfer device carries an empty cop tube from the magazine 567 into position between the spindle 4 and socket 6 and also actuates the shears 110 to sever the trailing end of thread. Thereafter the bell crank lever 339, 339b is released by cam 339c and the rod 9 is restored by spring 308c to the position in which pin 341 is removed from stop 342. The socket 6 is thrown against the end of cop tube 13 by spring 7a and throws the cop tube against the flange 4b, clamping the thread. The transfer device 313 is then rocked to the right (Fig. 3) and another empty cop tube settles into its tube holders 313a.

The release of rod 9 by bell crank lever 339, 339b allows finger 493 to move to the right sufficiently to release rod 505 and allow spring 508 to reengage clutch disk 125. This starts the

winding of the new cop. Shortly after the transfer device 313 has been restored to normal position the cam 336c releases the pin 336b of pitman 336 and allows spring 337a to throw lever 337 to the left. The lever 337 first strikes bushing 338 and pushes the latter in against the action of spring 338a, thus releasing the balls 334 from shaft 332. Further travel of the lever 337 slides the builder cone support 331 to the left, the builder cone 330 moving over the newly positioned cop tube 13. When the builder cone support 331 reaches the thread guide support 15 the hook 342 passes over pin 343 and locks the two supports together again. The levers 44 and 337 are restored to the position shown in Fig. 1 by their respective cams 41 and 336c. The winding thus proceeds automatically and will continue as long as new cop tubes are supplied to the magazine 567.

Instead of making the thread guide and the builder mechanism separable, so that the thread guide can be returned to the base of the cop independently of the builder mechanism, we may simply move the thread itself back to the base of the cop without changing the position of the thread guide. In this case the thread guide and builder mechanism may constitute an inseparable unit. An example of such a machine is shown in Fig. 4. The separate thread guide carrier 15 of Fig. 1 is eliminated and the thread guide 14 is mounted directly on the builder cone holder 331. In place of the lever 44 of Fig. 1 for restoring the thread guide, a lever 344 is provided, which bears a pin 345 adapted to engage the thread between the thread guide 14 and the cop 12. The lever 344 is operated by a pitman 42 controlled by a cam 41, as in Fig. 1. The machine is otherwise the same as the one first described.

We claim:

1. In a cop winder, a rotary supporting device on which to wind thread, a thread guide device adjacent said supporting device, means for reciprocating one of said devices with respect to the other, builder means connected with said thread guide device adapted to feel the accumulating windings of thread on said supporting device and to cause a progressive movement of said thread guide device with respect to said supporting device in a direction parallel to the axis of rotation of said supporting device, said movement conforming to, and being controlled by, the rate of accumulation of windings of thread on said supporting device and being adapted to build the winding body into a cop; and means acting automatically upon the attainment of a given length by the cop to return the thread to the first-wound end of the cop while said builder means remains at the last-wound end of the cop.

2. In a cop winder, a rotary supporting device on which to wind thread, a thread guide device adjacent said supporting device, means for reciprocating one of said devices with respect to the other, builder means connected with said thread guide device adapted to feel the accumulating windings of thread on said supporting device and to cause a progressive movement of said thread guide device with respect to said supporting device in a direction parallel to the axis of rotation of said supporting device; said movement conforming to, and being controlled by, the rate of accumulation of windings of thread on said supporting device and being adapted to build the winding body into a cop; and means acting automatically upon the attainment of a given length by the cop to detach said thread guide device

from said builder means and to return said thread guide device to the first-wound end of the cop, while said builder means remains at the last-wound end of the cop.

5 3. In a cop winder, a rotary supporting device on which to wind thread, a thread guide device adjacent said supporting device, means for reciprocating one of said devices with respect to the other, builder means connected with said
10 thread guide device adapted to feel the accumulating windings of thread on said supporting device and to cause a progressive movement of said thread guide device with respect to said supporting device in a direction parallel to the axis of
15 rotation of said supporting device, said movement conforming to, and being controlled by, the rate of accumulation of windings of thread on said supporting device and being adapted to build the winding body into a cop; and means acting auto-
20 matically upon the attainment of a given length by the cop to engage the thread at a point between said thread guide and the cop to return the thread to the first-wound end of the cop while said builder means remains at the last-wound end
25 of the cop.

4. In a cop winder, a rotary supporting device on which to wind thread, a thread guide device adjacent said supporting device, means for reciprocating one of said devices with respect to the other, builder means detachably connected to said
30 thread guide device, said thread guide device and said builder means being mounted so as to be independently slidable parallel to the axis of said supporting device, said builder means being
35 adapted to feel the accumulating windings of thread on said supporting device and to cause a progressive movement of said thread guide device with respect to said supporting device in a direction parallel to the axis of rotation of said
40 supporting device, said movement conforming to, and being controlled by, the rate of accumulation of windings of thread on said supporting device and being adapted to build the winding body into a cop; a control lever; and means acting auto-
45 matically upon the attainment of a given length by the cop to move said control lever to disengage the connection between said thread guide device and said builder means and to return said thread guide device to the first-wound end of the cop
50 while said builder means remains at the last-wound end of the cop.

5. In a cop winder, a rotary supporting device on which to wind thread, a thread guide device adjacent said supporting device, means for reciprocating one of said devices with respect to the other, builder means adapted to feel the accumulating windings of thread of said supporting device, a snap hook detachably connecting said
5 builder means to said thread guide device, said builder means being adapted to move said thread guide device progressively with respect to said supporting device in a direction parallel to the axis of rotation of said supporting device, in accordance with the rate of accumulation of windings of thread on said supporting device, to build the winding body into a cop; means acting auto-
10 matically upon the attainment of a given length by the cop to disengage said snap hook and to return said thread guide device to the first-wound end of the cop while said builder means remains at the last-wound end of the cop; and means acting
15 subsequently to move said builder means back to said thread guide device and to reengage said snap hook.

6. In a cop winder, a spindle device, a tail stock for holding a cop tube to said spindle device, means for rotating said spindle device, a thread
25 guide device adjacent said spindle device, means for reciprocating one of said devices with respect to the other, builder means connected with said thread guide device including a builder cone adapted to feel the windings of thread accumulating on the cop tube and to cause a progressive movement of said thread guide device from said
30 spindle device toward said tail stock, said movement conforming to, and being controlled by, the rate of accumulation of windings of thread on the tube and being adapted to build the winding body into a cop; means acting automatically upon the attainment of a given length by the cop to return the thread to said spindle while said builder
35 means remains near said tail stock, means acting automatically to move said tail stock to release the wound cop, means acting automatically to insert a new tube between said spindle device and said tail stock, and means acting automatically to move said builder cone over the new
40 tube into proximity to said spindle device.

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