March 13, 1934. E. C. LEWIS 1,950,855

WINDING MACHINE

Filed April 7, 1930 3 Sheets-Sheet 1

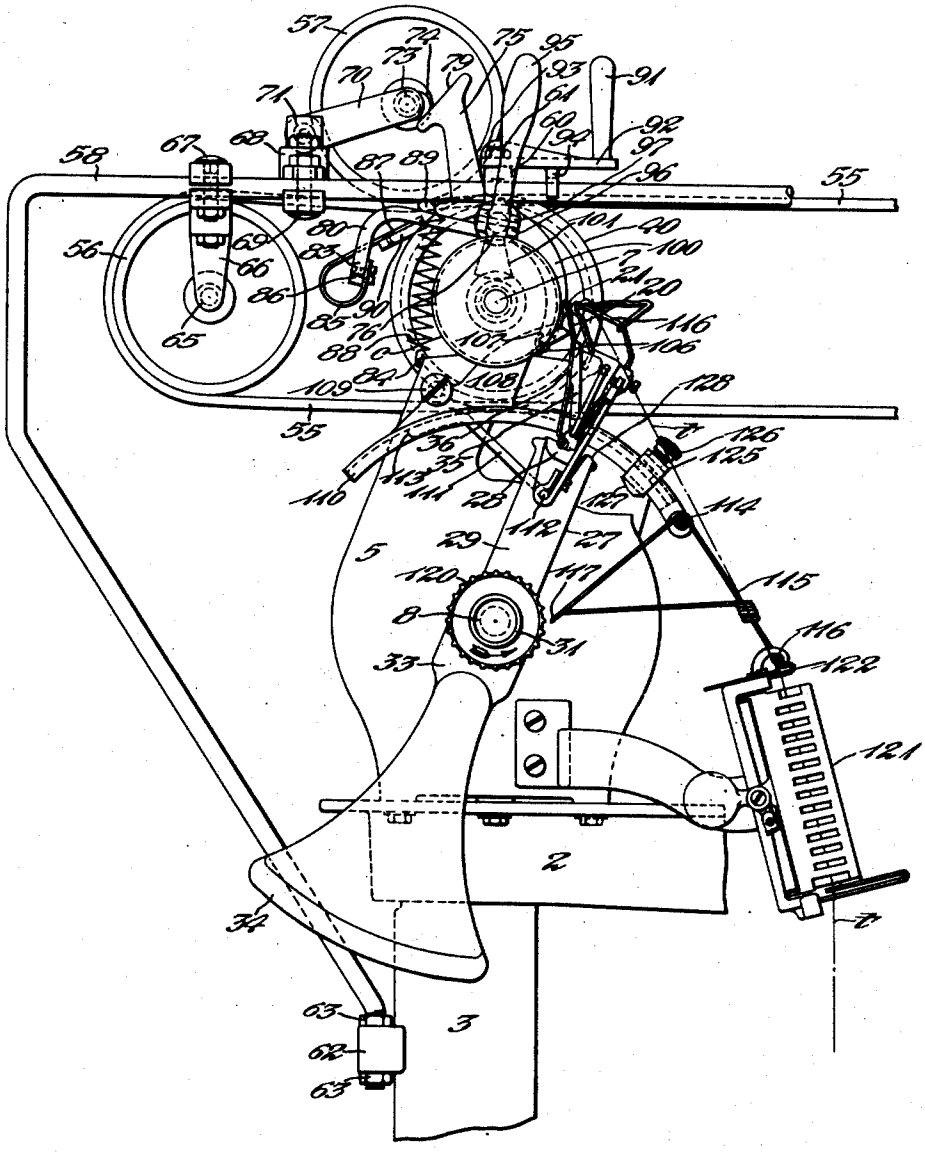


Fig. 1.

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Filed April 7, 1930 3 Sheets-Sheet 2

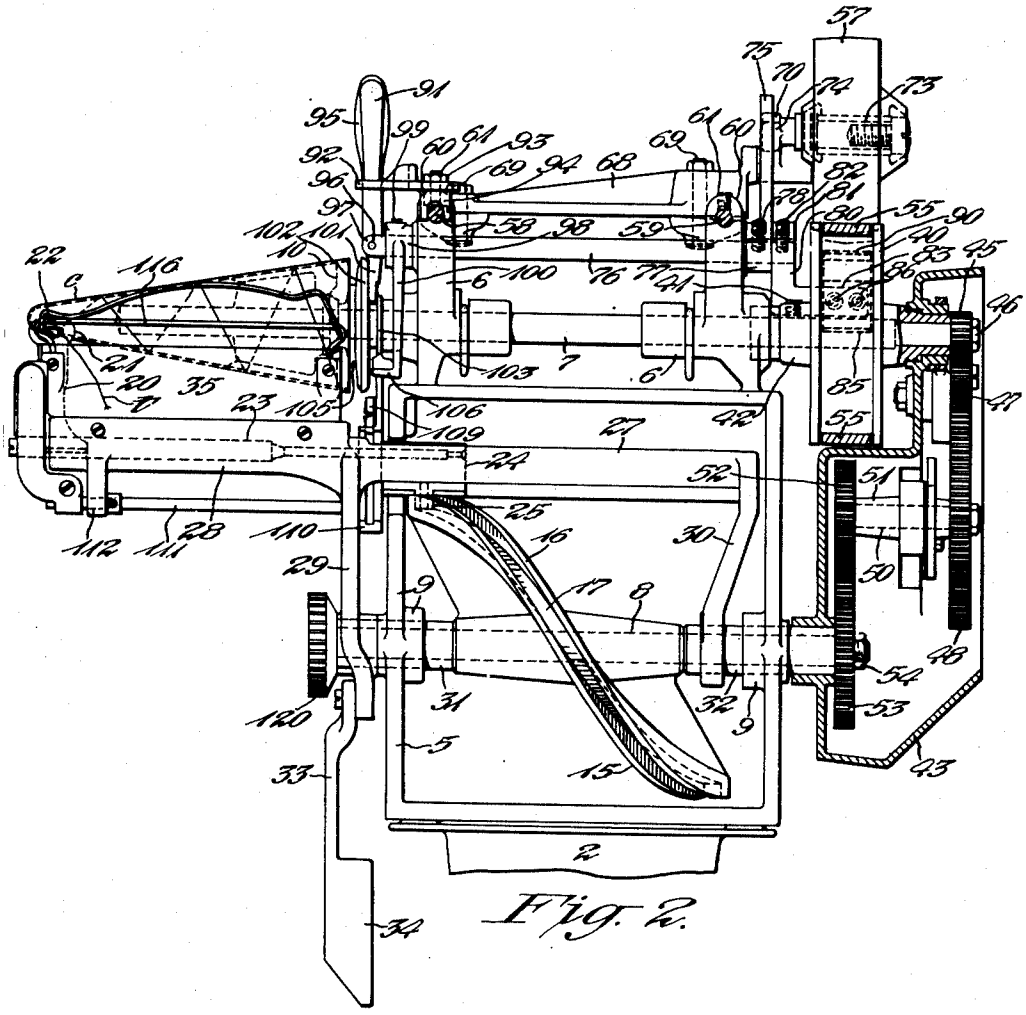


Fig. 2.

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March 13, 1934. E. C. LEWIS 1,950,855

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Filed April 7, 1930 3 Sheets-Sheet 3

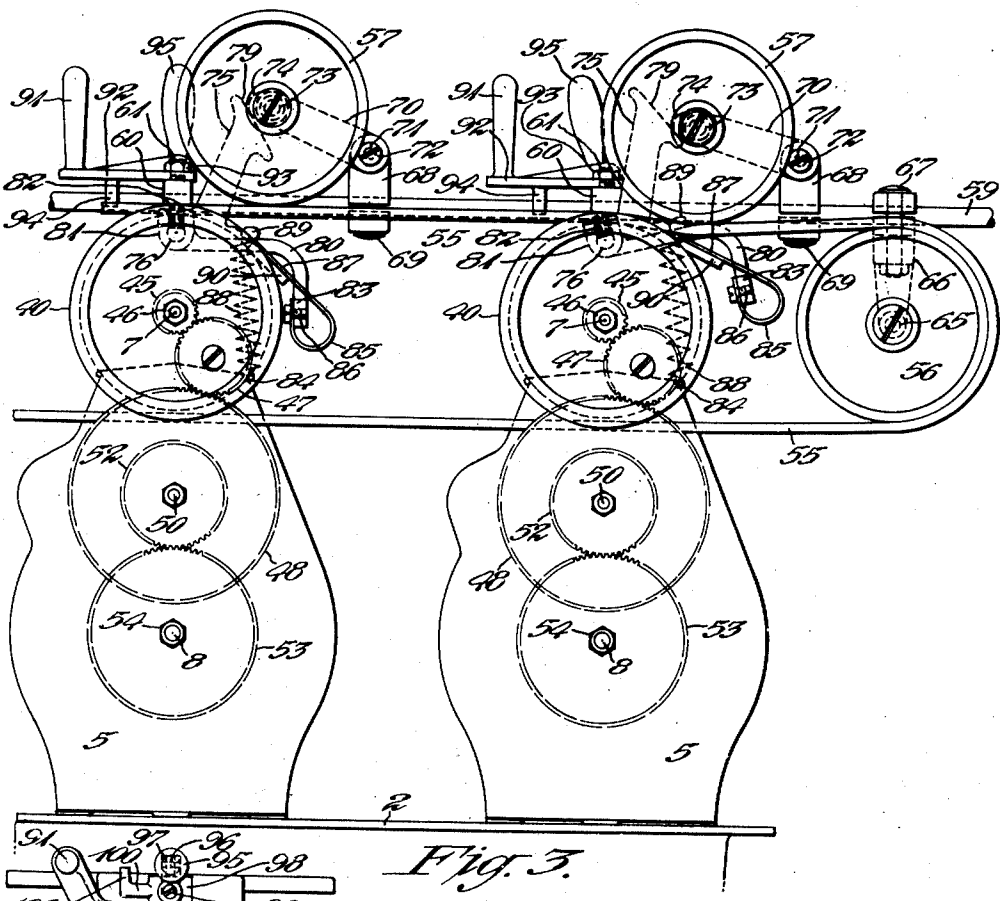


Fig. 3.

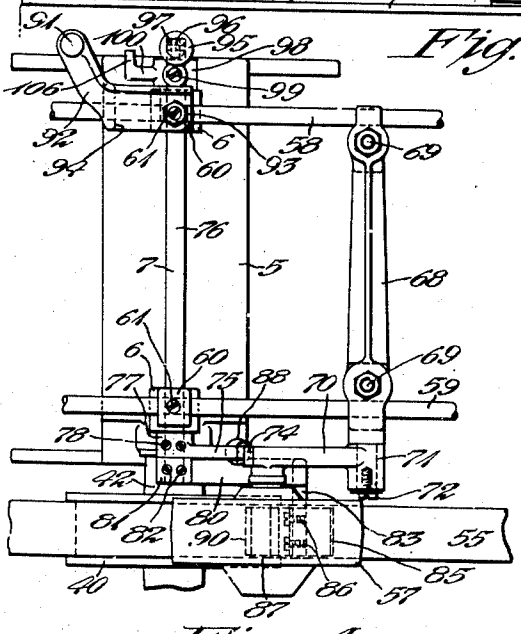


Fig. 4.

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UNITED STATES PATENT OFFICE

1,950,855

WINDING MACHINE

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Application April 7, 1930, Serial No. 442,418

10 Claims. (Cl. 242—18)

This invention relates to winding machines for winding thread, yarn, wire or other strand material into cops, cones, coils or other types of packages and consists particularly in an improved means for controlling the operation of the machine whereby to start the winding slowly with a gradually accelerated speed.

One object of the invention is to provide manually-operable means for applying the power gradually to start the winding machine slowly so as not to strain or break the fine and delicate strand material being wound.

Another object of the invention is to provide slow-starting means of the type specified which may be applied to use on standard types of winding machines without material change in the construction or arrangement thereof.

Another object of the invention is to provide means cooperating with the starting-mechanism to arrest the operation of the machine promptly to prevent overrunning of the cop or package being wound.

Another object of the invention is to provide slow-starting means of the type specified which operates without the use of friction-clutches or other like devices whereby to simplify the construction and economize in the cost of manufacture of the machine.

Further objects of the improvement are set forth in the following specification which describes a preferred form of construction of the invention, by way of example, as illustrated by the accompanying drawings. In the drawings:

Fig. 1 is a front elevation of a winding machine showing one head of a multiple unit gang and illustrating the present improved slow-starting means as applied to use thereon;

Fig. 2 is a side elevation of the single head or unit of the gang machine showing its driving mechanism and the slow-starting means which operates in conjunction therewith;

Fig. 3 is a rear view of two associated heads or units of the gang machine showing the drive therefor and the slow-starting means which operates in conjunction therewith; and

Fig. 4 is a plan view showing the arrangement of the drive and the slow-starting means.

The present drawings illustrate a well-known type of winding machine in which the cop, cone, coil or package of strand material is wound on a positively driven winding-spindle or mandrel and the strand traversed longitudinally thereof through the means of a reciprocating thread-guide. For convenience of description the material to be wound will hereinafter be referred to as thread and the wound mass or body produced on the machine as a package; and it is to be understood that these terms are to be construed broadly as designating any kind of strand material, whether textile or otherwise and any form of cop, cone, coil or package wound therefrom.

Referring particularly to Figs. 1 and 2 of the drawings, 2 designates a frame or bed supported on legs 3 and adapted to mount a plurality of winding units, only one of which is shown, arranged in gang form. Each winding unit or head comprises a box like frame 5 carrying bearings for the rotating shafts of the machine. As shown more particularly in Fig. 2, the frame 5 has upper, spaced bearings 6 in which the winding-spindle 7 is journaled, and arranged therebelow in parallel relation thereto is a cam-shaft 8 journaled in bearings 9. The winding-spindle 7 overhangs the forward side of the frame 3 and carries a suitable form of cop-holder 10, herein illustrated in the shape of a truncated cone, for receiving the paper cop-tube *c* on which the package is wound.

Fast on the cam-shaft 8 is a cam 15 formed with a cylindrical rim 16 in which is a helical groove 17. The cam 15 is connected to reciprocate the thread-guide 20 which is of usual construction having a head 21 formed with a groove or slot 22 through which the thread *t* feeds to direct it onto the package being wound. The thread-guide 20 is carried at the end of a horizontal rod or traverse-bar 23 which is connected to a slide or crosshead 24 having a bowl or roller 25 engaging in the helical groove 17 of the cam 15.

The thread-guide 20 and its reciprocable traverse-bar 23, together with the connected crosshead 24, are arranged to slide in a traverse-frame 27 supported from the cam-shaft 8. As shown in Fig. 2 of the drawings the traverse-frame 27 comprises a horizontally extending member 28 formed with suitable grooves or guideways for the cross-head 24 and traverse-bar 23 and provided with opposite legs 29 and 30 straddling the cam 15 and pivotally mounted on the cam-shaft 8. The legs 29 and 30 of the traverse-frame 27 have hubs at their ends surrounding bushings 31 and 32 which are held in the bearings 9 of the frame 5 of the machine to serve as journals for the cam-shaft 8. The outer leg 29 of the traverse-frame 27 is extended below its bearing hub, preferably in a separate arm 33 attached thereto and terminating in a counterweight 34 which tends to maintain the

frame in substantially erect position. Attached to the overhanging part of the traverse-frame 27 is a plate or back 35 against which the thread-guide 20 bears to direct it in a course parallel to the surface on which the winding is performed. In the present illustration of the machine the traverse-frame back 35 has its bearing face 36 inclined at an angle to the axis of the winding-spindle 7 in conformity with the taper of the cone-holder 10, while in other instances the back may extend parallel to the axis of the winding-spindle when a cylindrical package is to be wound on the machine.

The machine may be driven from a motor or any other source of power and a belt drive is usually employed with the power transmitted through a suitable pulley on one of the shafts of the machine. As herein shown the drive-pulley 40 is of the flanged type secured fast on the rearward end of the winding-spindle 7 by a set-screw 41 in its hub 42, or through any other suitable means. The rearward end of the hub 42 of the pulley 40 extends through the side of a gear-casing 43, and abutting thereagainst is a pinion 45 secured fast to the end of the winding-spindle 7 by a nut 46. The pinion 45 meshes with a gear 47 which, in turn, meshes with a larger gear 48 secured fast to the end of a countershaft 50. The countershaft 50 is journaled in a bearing 51 which is adjustable on the side of the gear-casing 43 to provide for changing the gears in the train to alter the speed ratio between the winding-spindle 7 and cam-shaft 8. The shaft 50 carries a gear 52 at its inner end meshing with a gear 53 secured fast to the end of the cam-shaft 8 by means of a nut 54. It will thus be seen that the rotation of the winding-spindle 7 is transmitted through the gears 45, 47, 48, 52 and 53 to turn the cam 15 at a greatly reduced rate of speed, the speed ratio being adjustable as required by different conditions of winding, that is for materials of different size or thickness, by substituting gears of different diameter in the train.

It is a common practice in machines of the present type to drive a plurality of the heads or units of the gang machine from a single transmission belt passing over pulleys on the several winding-spindles. An endless belt may be used for this purpose extending continuously from the pulley on the motor or line-shaft to pass over all of the pulleys on the spindles of the several heads, with suitable idlers pressing against the belt to maintain a driving contact. With this previously used arrangement of the belt drive loose pulleys are employed on the winding-spindles with clutches for connecting them therewith. To start the winding operation of an individual unit the pulley is clutched to the winding-spindle under the control of manually-operated means and to arrest the winding operation the pulley is declutched by the actuation of automatic stopping-mechanism. In the present improved construction all clutches or the like are dispensed with and the drive connected and disconnected by engaging the belt with or releasing it from contact on the pulleys 40 on the winding-spindles 7. As shown in Fig. 3 of the present drawings the driving-belt 55 passes across the top of the several pulleys 40 on the winding units and travels around an idler 56 at the end of the gang with its slack length leading back in the opposite direction on the underside of the pulleys. The belt 55 may be arranged to drive any desired number of winding heads, being connected to the source of power at one end of the gang in the usual manner. The driving contact of the belt 55 is preferably made on top of the pulleys 40 and is maintained under the action of shiftable idler-pulleys 57.

Referring to Fig. 4 of the drawings the several idler-pulleys 57, one for each head, are supported from a pair of horizontal rods 58 and 59 which pass through lugs 60 rising from the top of the machine frames 5 and held in place therein by set-screws 61, see Fig. 2. The rods 58 and 59 are bent downwardly at the end of the gang and then carried inwardly to pass through lugs 62 on the sides of the legs 3, being secured thereto by means of nuts 63 as illustrated in Fig. 1 of the drawings. The end idler-pulley 56 for the belt 55 is journaled on a stud 65 carried by a two-part bracket 66 clamped across the rods 58 and 59 by means of bolts 67. Similar two-part brackets 68 are clamped to the rods 58 and 59 by bolts 69 to serve as mountings for pivoted arms 70 which carry the idler- or presser-pulleys 57. As shown in Fig. 4 the arms 70 are pivoted on studs 71 projecting from the ends of the brackets 68 and held in place by screws 72. At the free ends of the arms 70 are studs 73 on which the pulleys 57 are journaled with their axes parallel with and slightly to one side of the axes of the winding-spindles 7. The presser-pulleys 57 are thus mounted to adapt them to swing down against the upper length of the belt 55 to press the latter into driving contact with the pulleys 40. The presser-pulleys 57 are normally controlled by the action of gravity to maintain the belt 55 against the pulleys 40, being lifted to release the pressure under the action of rockable cam-levers 75 which are either manually or automatically operated from the controlling mechanism of each machine unit in the manner as later explained.

The cam-lever 75 of each individual unit of the machine is carried on a rocker-shaft or rod 76 extending through bearings in the lugs 60 which project from the top of the frame 5. The rocker-shaft or rod 76 is common to machines of the present type as providing an element for controlling the clutch previously used to connect and disconnect the drive. The lever 75 as its hub 77 secured fast on the rearward end of the rocker-shaft 76 by means of set-screws 78, see Fig. 4, and arranged outwardly therebeyond is a brake-lever 80 having its hub 81 secured fast to the rocker-shaft 76 by means of set-screws 82. The brake-lever 80 extends horizontally and is continued downwardly in an elbow-shaped extension 83 reaching out across the periphery of the drive-pulley 40, see Figs. 3 and 4. Attached to the end of the elbow portion 83 of the lever 80 is a flat spring 85 secured in place by screws 86. The spring 85 is bent into a loop with its end extending back towards the periphery of the pulley 40. The free end of the extension 87 of the spring 85 carries a pad or shoe 90, constructed of leather or other friction-producing material to adapt it to be pressed against the periphery of the pulley 40 between its flanges to effect a braking action thereon. The brake-shoe 90 is carried into engagement with the periphery of the pulley 40 when the brake-lever 80 is rocked downwardly to the position shown at the left in Fig. 3, a spring 88 being employed for this purpose. The spring 88 has its upper end hooked around an arm 89 on the side of the cam-lever 75 with its lower end an-

chored to the machine frame 5 at 84. Concurrently with the action of the brake-lever 80 the cam-lever 75 is thrown into engagement with the arm 70 which supports the presser-pulley 57 to lift the latter away from the driving belt 55. For this latter purpose the cam-lever 75 is provided with an inclined face 79 which engages a rounded protuberance 74 on the end of the pivoted arm 70; the method of operation of these parts being hereinafter more fully explained.

The control-rod 76 is rocked manually through the means of a handle 95, termed a starting-lever, as usually provided at its forward end. The starting-lever 95 is pivotally mounted on a pin 96 extending between lugs 97 which project from the hub 98 of a detent-lever 100 secured fast to the rod or shaft 76 by means of a set-screw 99. The starting-lever 95 has a lower extension 101 which engages between flanges 102 and 103 on a sliding sleeve 105, see Fig. 2, which operates expansion means on the cop-holder 10 to secure the cop-tube *c* thereto. The construction of these parts is in accordance with the usual arrangement whereby the starting-lever 95 serves the additional purpose of operating the cop-holder to engage and release the cop-tube in preparing the machine for winding and in doffing the completed cone or package therefrom.

In order to render the manual operation of the starting-lever 95 more convenient, and to provide for moving it slowly in starting the drive an auxiliary stationary handle 91 is provided as a rest for the operator's hand. The handle 91 extends vertically from an elbow-shaped arm 92, see Fig. 4, fastened to one of the lugs 60 on the machine frame 5, the set-screw 61 projecting upwardly through the arm with a nut 93 on its end. The arm 92 is braced by a foot 94 resting across the rod 58. The handle 91 is disposed in alinement with the starting-lever 95 at a short distance to one side thereof so that it may be grasped in the palm of the operator's hand with the fingers gripped around the starting-lever to rock it toward the handle.

The arrangement of the detent-means for holding the starting-lever in position to maintain the drive operative is also in accordance with the usual practice as shown and described in U. S. Letters Patent No. 801,941 dated October 17, 1905. The automatic stopping mechanism of the present machine is also substantially the same as that disclosed in the aforementioned patent and therefore will herein be described only briefly.

As shown in Fig. 1, the detent-lever 100 is of arcurate shape with its lower end reaching downwardly below the winding-spindle and formed with a shouldered lug or catch 106 adapted to engage a latch 107 on a latching-lever 108. The latching-lever 108 is of generally arcuate form with its end pivoted on a screw 109 held in the side of the machine frame 5. The arcuate portion 110 of the latching-lever 108 extends concentrically of the axis on which the traverse-frame 27 swings and serves as a track for a dog 111 carried by the frame. The dog 111 is pivoted to the traverse-frame at 112 with its free end formed with a shoe 113 sliding in a groove in the quadrant 110, this arrangement being well-known in the art as employed for controlling the swinging movement of the traverse-frame as the thread-guide recedes from the winding-spindle with the growth in the winding whereby to prevent retrogressive movement thereof.

Pivoted on a stud 114 at the forward end of the quadrant 110 of the latching-lever 108 is a wire breakage-lever 115 which serves as the means for initiating the operation of the stopping-mechanism of the machine when the thread *t* breaks or its supply is exhausted. The breakage-lever 115 is of generally triangular shape, being provided with a cross-bar or bail 116 under which the thread *t* draws and having its rearward end 117 adapted to swing into engagement with the toothed periphery of a rotating disk or wheel 120 fast on the end of the cam-shaft 8. When the breakage-lever 115 is released by failure of the thread *t* its end 117 engages with the wheel 120 and the latter acts through the lever to lift the forward end of the quadrant 110, thereby releasing the latch 107 on the latching-lever 108 from the catch 106 on the detent-lever 100 to allow the starting-lever 95 to be rocked to arrest the operation of the machine in the manner as later more fully explained.

In the present drawings the machine is illustrated as operating on a thread drawing off from a supply arranged below, but not herein shown. The thread *t* draws upwardly through a tension-device 121 of any suitable construction, thence through a slug-catcher 122 and leads across the wire bail 116 on the breakage-lever 115 to the thread-guide 20. The thread is passed through the slot 22 in the guide 20 and its end secured to the cop-tube or carrier on which it is to be wound so that the reciprocation of the guide causes it to be traversed longitudinally of the axis of the winding-spindle to deposit in helical coils which build up in layers to form the package.

In other instances the thread may be taken from a reel or swift arranged above the machine, this being the usual manner of delivering silk, rayon and like materials from skeins, but with such an arrangement the method of operation of the machine is substantially the same so that failure of the thread will cause the latching-lever 108 to be lifted to release the detent-lever 100.

The method of operation of the complete machine is as next explained. With the machine threaded up in the manner as above explained the winding operation is started by rocking the starting-lever 95 to the right, as viewed in Fig. 1. The palm of the hand is pressed against the handle 91 with the fingers grasped around the starting-lever 95 to rock it toward the handle. Through this arrangement the starting-lever may be given a slow movement to rock the shaft or rod 76 in the same direction, thereby swinging the cam-lever 75 clockwise to slide its cam-face 79 across the projection 74 on the arm 70 which supports the presser-pulley 57. The presser-pulley is thereby allowed to drop by gravity onto the upper length of the belt 55 whereby to press the belt into driving contact with the pulley 40 on the winding-spindle 7 as shown at the right in Fig. 3. In most cases the weight of the presser-pulley 57 is sufficient to maintain the driving contact of the belt 55 on the pulley 40, but if desired a spring may be employed for augmenting the pressure of the pulley. As the cam-lever 75 is rocked to lower the presser-pulley 57 against the belt 55 the brake-lever 80 is swung outwardly away from the driving pulley 40 to release the brake-shoe 90 therefrom. Due to the resilient action of the spring 85, however, the

braking action is relieved gradually so as to initially retard the rotation of the pulley 40 and the winding-spindle 7. Stated briefly, the brake-shoe 90 will continue to act frictionally against the pulley 40 under the force of the spring 85 while the brake-lever 80 is being rocked from the handle 95. Due to this action the driving-pulley 40 is started to rotate slowly and its speed gradually accelerated until the brake is finally entirely released to permit rotation at maximum speed. It will thus be observed that the winding-spindle is started to rotate slowly so as not to strain or break the thread, a particularly important consideration when the material is unwound from swifts, spools or other rotating supplies requiring that the inertia be overcome before the strand will deliver freely therefrom.

As the starting lever 95 is rocked in the manner as above explained the detent-lever 100 is swung down to engage its catch 106 with the latch 107 on the latching-lever 108. The latching-lever 108 is maintained in engagement with the detent-lever 100 under its own weight and with the parts thus connected the machine will be driven continuously from the belt 55. The pulley 40 is fast on the winding-spindle 7 whereby it positively rotates the cop-holder 10, and the cam-shaft 8 is driven from the spindle through the means of a train of gearing 46, 47, 48, 52 and 53. The cam 15 is thus rotated to cause it to reciprocate the traverse-slide 23 and thereby the thread-guide 20 connected thereto. With the drive connected the machine will continue to operate to traverse the thread *t* on the cop-tube *c* or other form of cop-carrier with the strand laid in crossing coils which build up in concentric layers to form a package with self-supporting ends.

When the thread breaks or its supply is exhausted the breakage-lever 115 is released, and due to the balance of the latter its thread-bail 116 will swing down to raise its rearward end 117 into engagement with the teeth on the rotating wheel 120 which turns in the direction indicated by the arrow in Fig. 1 of the drawings. The engagement of the breakage-lever 115 with the periphery of the wheel 120 acts to pry the forward end of the latching-lever 108 upwardly to release its latch 107 from the catch 106 on the detent-lever 100. Immediately upon the release of the detents the spring 88 will be energized to rock the cam-lever 75 carried on the rearward end of the rocker-shaft or rod 76. As the lever 75 is rocked in a contra-clockwise direction, as viewed in Fig. 1, its inclined cam-face 79 rides under the rounded end 74 of the arm 70 to swing the arm upwardly in the manner as illustrated at the left in Fig. 3 of the drawings. The presser-pulley 57 is thereby lifted off from the belt 55 which is thus allowed to run free across the top of the driving-pulley 40 without driving contact therewith. Concurrently with the last described action of the cam-lever 75 the brake-lever 80 is rocked downwardly to bring the brake-shoe 90 against the periphery of the driving-pulley 40 to promptly arrest its rotation. The spring 85 allows the brake-shoe 90 to adjust itself to the surface of the pulley 40 while maintaining a firm pressure of the brake thereon. The operation of the complete machine is thus arrested to provide for piecing up the end of the thread or replenishing the supply.

The operation of the machine may also be automatically arrested when the package being wound reaches a predetermined diameter, a sizing stop being provided for this purpose. As shown in Fig. 1 of the drawings, the sizing stop comprises a member 125 which is slidable along the quadrant 110 of the latching-lever 108 to adjust it in position to be engaged by the traverse-frame 27 when the latter has been swung outwardly to an extent determined by the required diameter of the package being wound. The sizing element 125 is held in place by a thumb-screw 126 and has a lower inclined face 127 engaged by a corresponding wedge-shaped face 128 on the traverse-frame 27.

It will be observed from the foregoing that the present invention provides a particularly simple yet efficient device for connecting and disconnecting the drive of the winding machine to start or arrest its operation. The usual friction-clutch which is subject to wear and slippage is dispensed with and the driving-pulley connected directly with the winding-spindle or shaft from which the machine is operated. The driving connectons are thus much cheaper to manufacture and with the present arrangement the device provides for starting the machine slowly as is of great advantage in winding fine threads and yarns or other delicate strand material. The presser-pulley 57 is operated from the starting-handle 95 of the machine to carry the driving-belt 55 into contact with the pulley 40 and due to the delayed action of the brake and the inertia of the parts the belt will initially have a certain amount of slippage as it is pressed into contact with the pulley. Finally, however, the brake is released and the weight of the pulley 57 maintains a firm contact of the belt on the pulley 40 so that the rotation of the latter is gradually accelerated until it reaches the predetermined speed at which it is thereafter continuously driven.

It is further to be noted that the several parts of the device are of such construction as to minimize wear, the driving engagement between the belt 55 and the pulley 40 being maintained under the action of the presser-pulley 57 which is subject to very little thrust.

As a further advantage of the present invention, the slow-speed starting device may be applied to winding machines of a type now in general use without material change in the construction or arrangement thereof. The invention is thus of great utility and due to its simplicity of construction is much more durable than previous devices employed for like purposes.

While the invention is herein shown and described as embodied in a preferred form of construction and as applied to a certain type of winding machine, it is to be understood that modifications may be made in the structure and arrangement of its mechanism and in its method of application without departing from the spirit or scope of the invention. Therefore, without limiting myself in this respect, I claim:

1. In a slow-speed starting-device for winding machines, the combination with the winding-mechanism thereof, of a pulley for driving said mechanism, a belt arranged to travel in a straight course transversely of the axis of the pulley, means to maintain the belt under tension to prevent its contact with the driving-pulley, an idler-pulley arranged on the opposite side of the belt from the driving-pulley, means for normally pressing said idler-pulley against the belt to hold it in driving contact with the driving-pulley, means for removing

said idler-pulley from contact with the belt whereby the latter is automatically released from the driving-pulley, a brake, means to actuate the brake to arrest the rotation of the driving-pulley when the idler-pulley is removed from the belt, manually-operable means for causing the idler-pulley to engage the belt, and resiliently-operated means between the brake and its actuating means arranged to delay the release of the brake when the idler-pulley is engaged with the belt whereby to retard the rotation of the driving-pulley to cause the winding-mechanism to be started slowly with a gradually accelerated speed.

2. In a winding machine, the combination with the winding-mechanism thereof, of a pulley for driving said mechanism, a belt arranged to travel transversely of the axis of the driving-pulley, means for maintaining said belt under tension to cause it to travel in a path free from driving contact with the periphery of the driving-pulley, an idler-pulley journaled on a movable axis to adapt it to be pressed against the belt to maintain it in contact with the periphery of the driving-pulley, a lever for shifting the idler-pulley to remove it from contact with the belt whereby the latter is released from contact with the driving-pulley, a brake actuated from said lever to arrest the operation of the driving-pulley, and resilient means between the lever and the brake arranged to delay the release of the latter when the lever is shifted to cause the idler-pulley to effect contact of the belt with the driving-pulley whereby to retard the rotation of the latter to start the winding-mechanism slowly with a gradually accelerated speed.

3. In a slow-speed starting-device for winding machines, the combination with the winding-mechanism thereof, of a shaft for driving said mechanism, a driving-pulley for rotating said shaft, a belt extending transversely of the axis of the driving-pulley, means for maintaining said belt under tension to direct it in a course free from contact with the periphery of the driving-pulley, an idler-pulley, a journal for the idler-pulley movable to press the latter into contact with the belt to maintain the belt in driving contact with the driving-pulley, a manually-operable lever for shifting said idler-pulley to release its pressure on the belt to cause the latter to be released from the driving-pulley, a brake for arresting the operation of the driving-pulley, an arm connected to the lever for actuating the brake, and resilient means connecting said arm with the brake, said resilient means arranged to delay the release of the brake when the manually-operable lever is moved to cause the idler-pulley to press the belt against the driving-pulley whereby to effect the starting of the winding-mechanism slowly with a gradually accelerated speed.

4. In a winding machine, the combination of a plurality of winding units arranged in series, a driving-pulley connected to drive each winding unit, an idler-pulley at the end of the series of winding units, a belt passing around the idler-pulley and maintained under tension to cause it to follow a course free from contact with the driving-pulleys of the winding units, a presser-pulley for each winding unit arranged on the opposite side of the belt from the driving-pulleys, means for maintaining said presser-pulleys pressing against the belt to hold it in driving contact with the driving pulleys, a manually-operable starting-lever for each winding unit, means operated from said levers to release the presser-pulleys from the belt to cause the latter to be released from contact with the associated driving-pulleys, brakes for arresting the rotation of the driving-pulleys, means movable from the manually-operable levers to severally actuate the brakes, and resiliently-operated means between the brakes and their actuating means arranged to delay the release of the brakes when the presser-pulleys are moved to press the belt against the driving-pulleys whereby to start each winding unit slowly with a gradually accelerated speed.

5. In a winding machine, the combination of a plurality of alined winding units, a driving-pulley for each unit, a framework extending longitudinally of the series of winding units, an idler-pulley supported from said framework at the end of the series of units, a belt extending transversely of the axes of the driving-pulleys and around the idler-pulley to maintain it stretched under tension with its opposite lengths free from contact with the driving-pulleys, a plurality of arms pivoted to the framework, a plurality of presser-pulleys journaled on said arms to adapt them to press against the free length of the belt to maintain the latter in contact with the driving-pulleys, a manually-operated starting-lever for each winding unit, means movable from the starting-levers to lift the presser-pulleys away from the driving-belt to free the latter from the driving-pulleys, brakes for arresting the operation of the driving-pulleys, means connected with the manually-operable levers to actuate the brakes, and resilient means arranged between the brakes and their actuating means and operating to delay the release of the brakes when the manually-operable levers are moved to cause the presser-pulleys to press the belt into driving contact with the driving-pulleys.

6. In a winding machine, the combination of a drive-shaft, a driving-pulley for rotating said shaft, a belt extending transversely of the axis of the driving-pulley, means to maintain said belt under tension to cause it to travel in a path free from contact with the driving-pulley, a presser-pulley, a movable bearing for the presser-pulley adapted to cause the latter to press against the belt to maintain it in contact with the driving-pulley, a cam operative on the bearing for the presser-pulley to move said pulley away from the belt to release the latter from the driving-pulley, a starting-handle for actuating said cam, a brake for arresting the rotation of the driving-pulley, a lever movable with the starting-handle, and a spring-arm connecting said lever to the brake and arranged to act to delay the release of the brake when the cam is moved to cause the presser-pulley to press the belt against the driving-pulley whereby the latter will be started to rotate slowly with a gradually accelerated speed.

7. In a winding machine, the combination of a drive-shaft, a driving-pulley for rotating said shaft, a belt for rotating the driving-pulley, means for maintaining the belt under tension to cause it to travel in a path normally free from contact with the driving-pulley, a pivoted arm, a presser-pulley journaled on said arm to adapt it to bear against the belt to press it into contact with the driving-pulley, a cam for actuating the pivoted arm to remove the presser-pulley from contact with the belt, a handle for actuat-

ing said cam, a brake for arresting the rotation of the driving-pulley, a lever connected to the handle to actuate the brake, and resilient means between the brake-lever and the brake acting to retard the release of the brake whereby to cause the driving-pulley to be started slowly when the belt is engaged therewith.

8. In a winding machine, the combination with the winding-mechanism, of a drive-shaft therefor, a driving-pulley for rotating the drive-shaft, a belt extending transversely of the axis of the driving-pulley, means to maintain said belt under tension to cause it to travel in a course free from contact with the driving-pulley, a presser-pulley normally held in contact with the belt on the opposite side from the driving-pulley to maintain the belt in driving contact with the latter, means for shifting the presser-pulley to release the belt from contact with the driving-pulley, manually-operable means for actuating said shifting means to cause the belt to be pressed into contact with the driving-pulley, detent-means for locking the shifting means in position with the presser-pulley active, means actuated upon breakage or exhaustion of the yarn leading to the winding-mechanism to release the detent-means, a brake for arresting the operation of the drive-shaft, means for actuating the brake when the presser-pulley is removed from contact with the belt, and resilient means between the brake and its actuating means acting to delay the release of the brake when the manually-operable means is shifted to start the operation of the winding-mechanism.

9. In a winding machine, the combination of a winding-spindle, means for traversing yarn to wind a package on said spindle, a driving-pulley for rotating the winding-spindle and operating the traversing-means, a power-transmission belt extending transversely of the axis of the driving-pulley, means for maintaining the belt under tension traveling in a path free from contact with the driving-pulley, a presser-pulley for pressing the belt into contact with the driving-pulley, stopping-mechanism for moving the presser-pulley to release the belt from contact with the driving-pulley, manually-operable means for shifting the presser-pulley to cause it to press the belt into contact with the driving-pulley, detent-means for normally maintaining the stopping-mechanism inoperative, means operated automatically upon breakage or exhaustion of the yarn leading to the package to release the detent-means to effect operation of the stopping-mechanism, a brake actuated by the stopping-mechanism to arrest the rotation of the driving-pulley, and resilient means connecting the brake to be moved by the manually-operable means and acting to delay release of the brake whereby to retard the rotation of the driving-pulley when the belt is first caused to contact therewith.

10. In a winding machine, the combination of a winding-spindle, means for traversing yarn to wind a package on the spindle, a driving-pulley for rotating the winding-spindle and actuating the traversing-means, a belt extending transversely of the axis of the driving-pulley, a presser-pulley for pressing said belt into contact with the driving-pulley to effect rotation of the latter, means for moving the presser-pulley to release it from contact with the belt to cause the latter to be removed from the driving-pulley, stopping-mechanism for actuating said last-named means, means operative upon breakage or exhaustion of the yarn leading to the winding-spindle to cause action of the stopping-mechanism, a handle for re-setting the stopping-mechanism to release the presser-pulley to cause it to press the belt into contact with the driving-pulley, a brake for arresting the rotation of the driving-pulley, a lever actuated from the stopping-mechanism to actuate the brake, and a resilient connection between the brake and its lever acting to delay release of the brake whereby to start the winding-pulley slowly with a gradually accelerated speed.

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