April 24, 1934. E. R. SWANSON 1,955,778

WINDING MACHINE

Filed Feb. 14, 1933 4 Sheets-Sheet 1

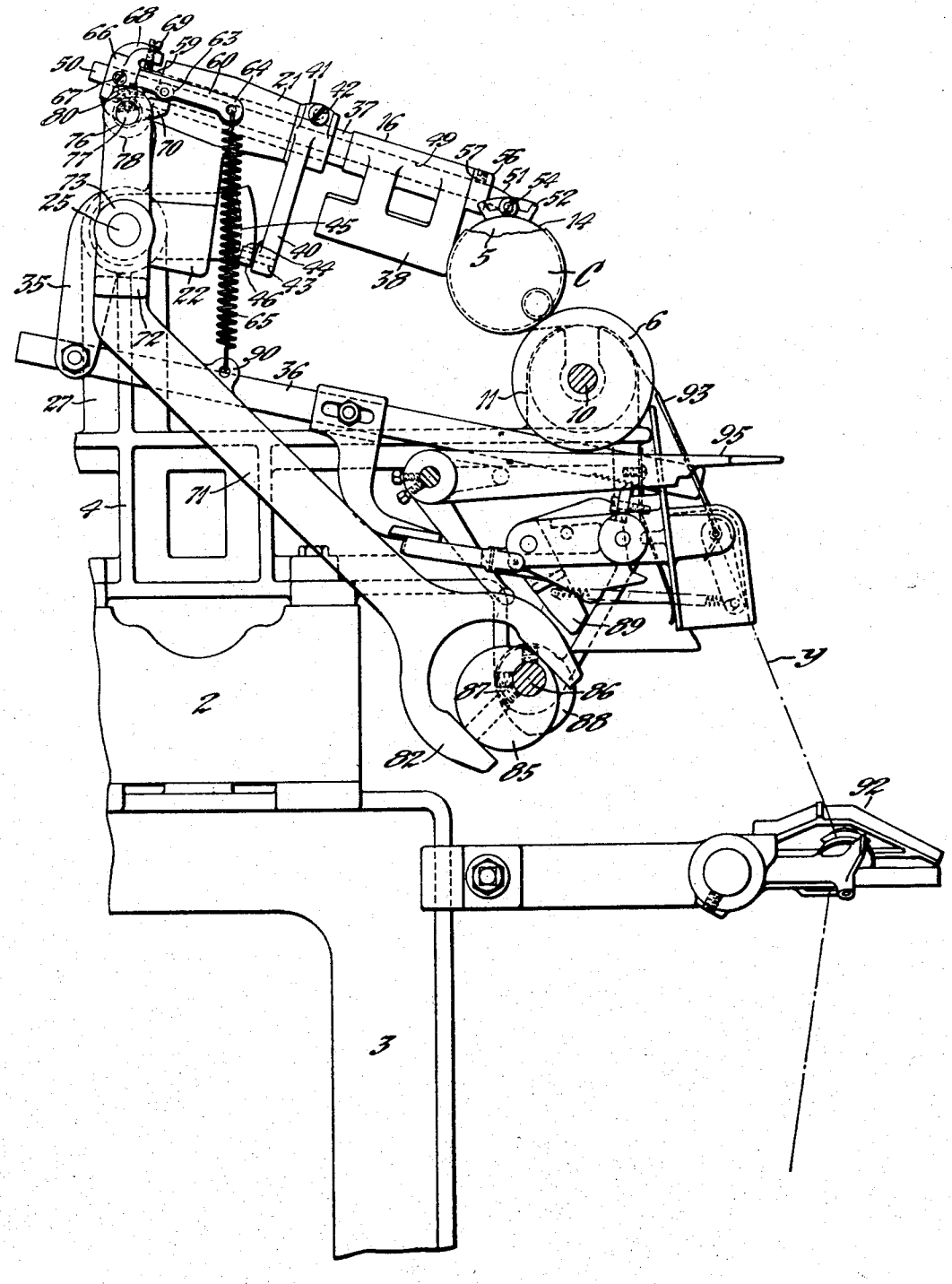

Fig. 1.

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WINDIN MACHINE

Filed Feb. 14, 1933 4 Sheets-Sheet 2

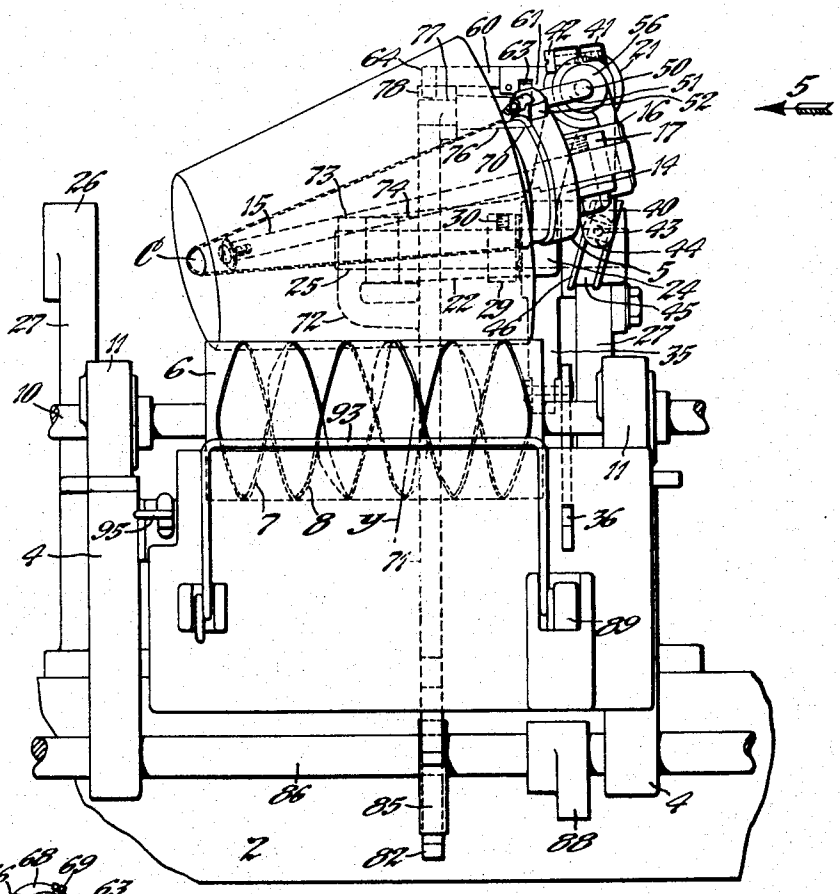

Fig. 2.

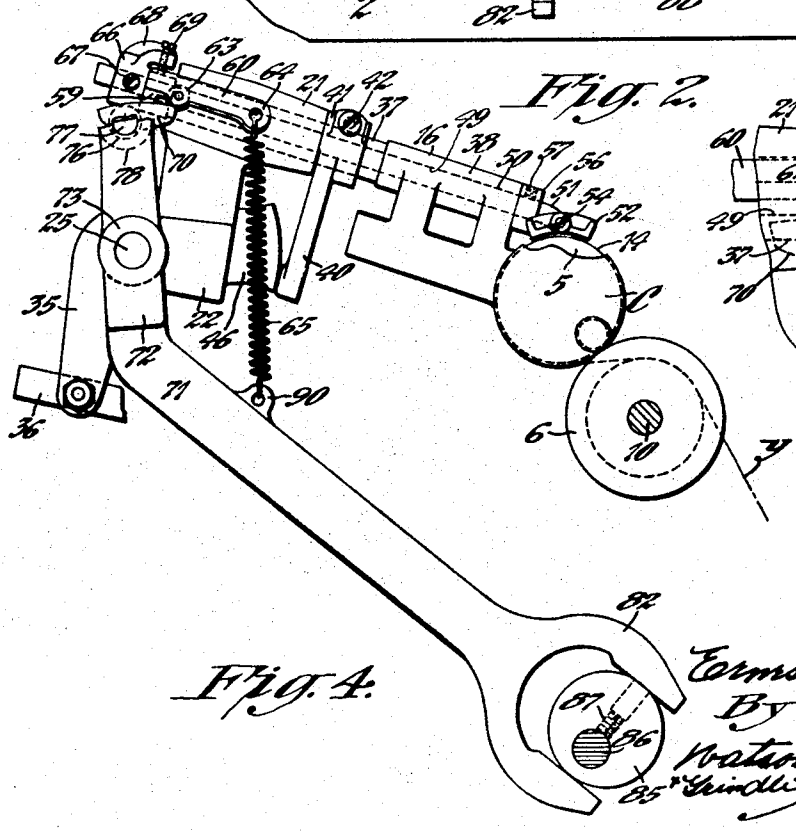

Fig. 4.

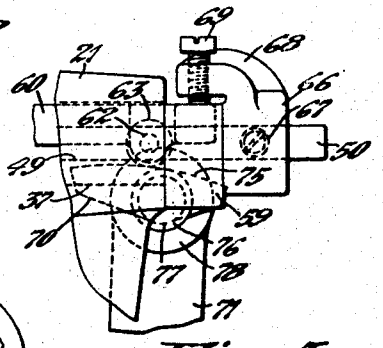

Fig. 5.

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April 24, 1934. E. R. SWANSON 1,955,778

WINDING MACHINE

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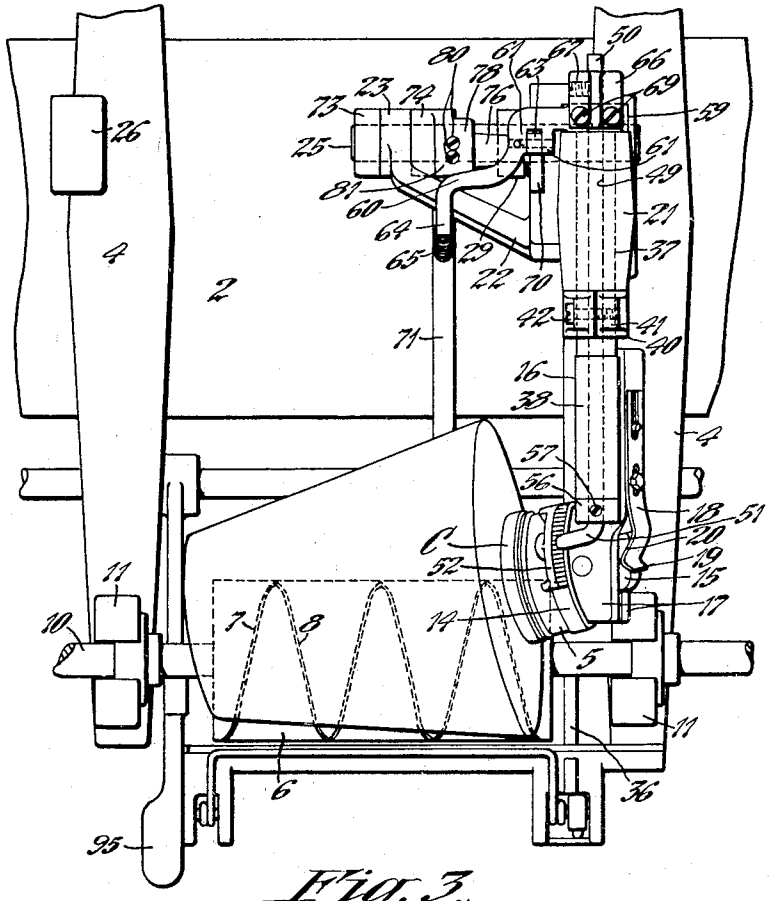

Fig. 3.

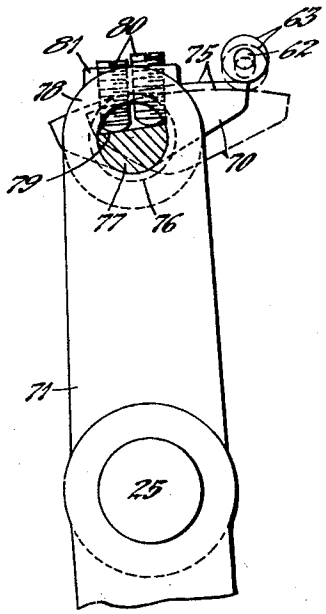

Fig. 6.

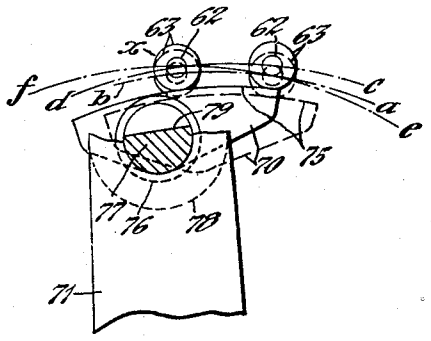

Fig. 7.

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WINDING MACHINE

Filed Feb. 14, 1933 4 Sheets-Sheet 4

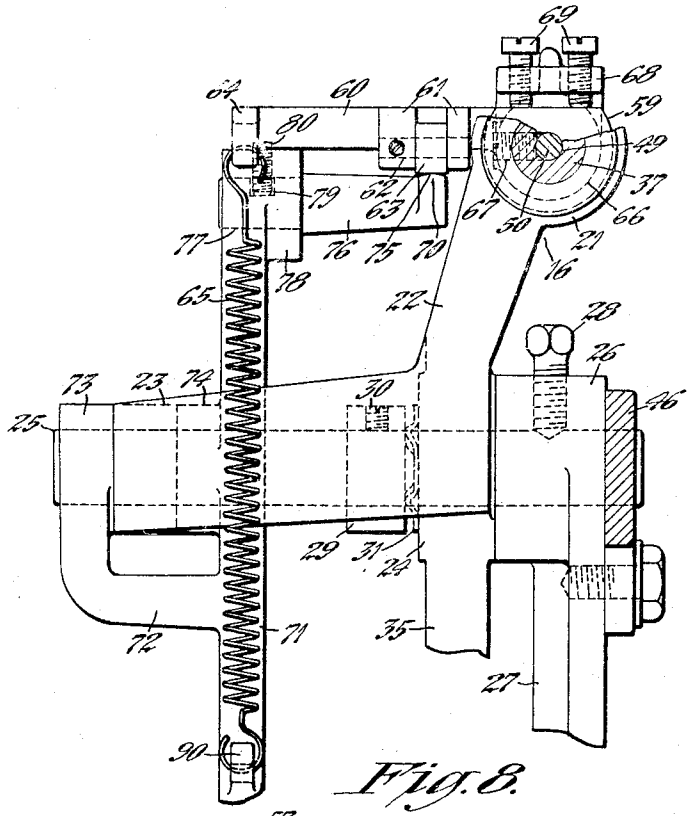

Fig. 8.

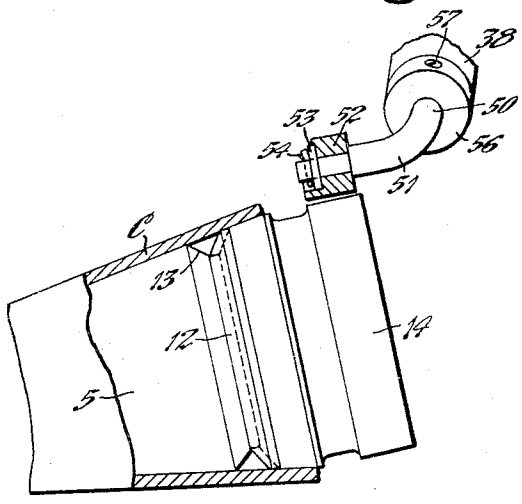

Fig. 9.

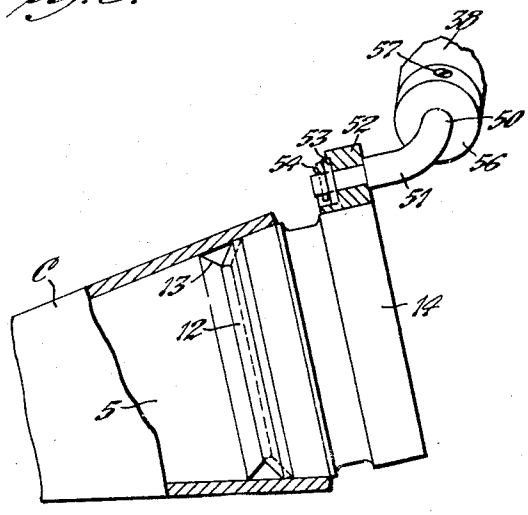

Fig. 10.

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Patented Apr. 24, 1934 1,955,778

UNITED STATES PATENT OFFICE

1,955,778

WINDING MACHINE

Ernest R. Swanson, Cranston, R. I., assignor to Universal Winding Company, Boston, Mass., a corporation of Massachusetts

Application February 14, 1933, Serial No. 656,729

26 Claims. (Cl. 242—18)

This invention relates to winding machines for winding cops, cones, cheeses and other forms of packages of thread, yarn, cord or similar strand material, hereinafter referred to generally by the term "yarn", and particularly to drum winders wherein the package is driven by surface contact with a rotating drum or drive-roll.

More specifically, the invention consists in a ribbon-breaker, so-called, which operates to disrupt the synchronism between the rotation of the package and the traverse of the yarn thereon whereby to control the disposition of the coils of winding to prevent the formation of bands or "ribbons" in which the yarn coils are crowded together or "piled".

One object of the invention is to provide a device for the purpose specified which is of simple construction, self-contained in the mechanism of the machine and efficient and reliable in operation.

Another object of the invention is to provide a device of the type specified which may be applied to machines of standard type without material alteration in the arrangement of the mechanism thereof.

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 an end elevation of a portion of a winding frame or gang winder showing the essential elements of the winding mechanism of one unit thereof with the present invention applied to use therewith;

Fig. 2 is a front elevation of one of the winding units shown as adapted for winding conical packages and illustrating the present device which operates to control the rotative speed of the package;

Fig. 3 is a plan view of the winding mechanism showing the ribbon-breaking device in connection therewith;

Fig. 4 is a detailed view showing the ribbon-breaker mechanism as applied to the swinging arm or support for the package;

Fig. 5 is an enlarged detailed view of the cam-controlled braking mechanism of the ribbon-breaker looking in the direction indicated by the arrow in Fig. 2;

Fig. 6 is an enlarged detailed view of the adjusting means for the cam;

Fig. 7 is a further detailed view of the cam and its follower;

Fig. 8 is an enlarged detailed view of the cam-controlled mechanism for operating the brake which retards the rotation of the package;

Fig. 9 is an enlarged part-sectional view of the brake shown in connection with the cop-holder or winding mandrel; and

Fig. 10 is a similar view showing the brake as applied to the cop-holder.

As is well known to those versed in the art of winding, in drum winders the speed of rotation of the package varies inversely with its increase in diameter during the winding and this results in a change in the ratio between the angular velocity of the package and the rate of traverse of the yarn back and forth thereon. As a consequence thereof, the character of the winding on the surface of the package undergoes constant change throughout the winding. At the start of the winding the helical coils or turns of yarn may be spaced relatively far apart longitudinally of the package, but as the rotative speed of the latter decreases the coils will be laid closer together until they crowd and tend to "pile". Then as the winding proceeds the coils are disposed farther apart again and this closing and opening of the "wind" repeats at intervals.

If the lay of the yarn on the surface of the package is not controlled in some manner the close spacing of the coils will form bands or "ribbons" which render the package defective in that the yarn is stretched and strained by the piling of the coils and its delivery will be impeded in unwinding it from the package. It is therefore the usual practice to provide drum winders with "ribbon-breakers", such devices operating to disrupt the synchronism between the rotation of the package and the traverse of the yarn to prevent the occurrence of ribbon winding at intervals where the ratio between the rotation of the package and the traverse of the yarn causes the coils to be laid in close association.

A common form of ribbon-breaker consists in differential speed-changing mechanism for alternately increasing and diminishing the speed of one of the winding elements, either the package support or the traversing means which deposits the yarn in place on the package. Such mechanisms comprise extensive systems of gearing, cams, crank-motions and the like and it is one object of the present invention to avoid the use of such complicated structures in the winding mechanism.

In the present invention the disruption of synchronism between the rotative speed of the package and the traverse of the yarn is accomplished

simply and effectually by periodically effecting a braking action on the rotating cop-holder to retard the speed of the package. In brief, the present invention consists in automatically-operated means for periodically retarding the rotation of the package by applying a brake to its support or to some other element connected to rotate therewith. In its preferred form of construction as herein shown the brake is actuated from a rocker shaft or rod on the hinged arm on which the cop-holder or mandrel is supported, with the rod rocked from a cam whose motion is derived from a crank or eccentric on one of the rotating shafts of the machine.

The present improved ribbon-breaker is adapted for use with practically all types of drum-driven winding machines, the winder herein illustrated by way of example being of a standard type as next described. Referring to Figs. 1 and 2 of the drawings, the units of the gang winding machine herein shown are mounted on a horizontal bed or table 2 supported from the floor by legs or standards 3 and carrying a series of cross-frames or brackets 4. The several winding units, any number of which may be provided, are arranged along the opposite sides of the bed 2 with their mechanisms supported from the cross-frames 4. As all the winding units are of the same construction only one of them is herein illustrated and described.

In the machine herein illustrated the winding mechanism comprises two principal elements, namely, a rotatably winding mandrel or cop-holder 5 on which the cop-tube C is supported, and a continuously driven drive-roll 6 for rotating the package by surface contact therewith. Means are embodied in the drive-roll 6 for traversing the yarn to and fro longitudinally of the package being wound on the cop-tube C, the roll being formed for this purpose with connected helical grooves 7 and 8 extending in opposite directions and adapted to receive the strand of yarn to guide it back and forth between the ends of the package. This latter form of traverse-roll is fully shown and described in United States Letters Patent No. 1,749,355, dated March 4, 1930. The traverse-roll 6 is mounted fast on a horizontally extending shaft 10 common to all of the winding units of the series. The shaft 10 is journaled in bearings 11 in the cross-frames or brackets 4, being driven from a suitable source of power such as an electric motor, not herein shown, mounted at one end of the bed 2.

The winding-mandrel or cop-holder 5 may be of any suitable form in accordance with the shape of the package to be wound and the character of the cop-tube or yarn-receiver used as the central core or support for the windings. As herein shown the cop-holder 5 is of frusto-conical form to adapt it to receive a conical paper or fiber cop-tube C which fits closely about its periphery. In accordance with the invention shown in application for United States Letters Patent, Ser. No. 640,686, filed November 1, 1932, the cop-tube C is secured in place on the holder 5 by means of a flexible rubber ring or annulus 12 seated in a V-shaped groove 13 on the periphery of the holder or mandrel, see Figs. 9 and 10. It is to be noted from these latter views that the rearward or butt end of the holder 5 is shaped to a cylindrical contour to provide an annulus 14 to which the brake is applied for retarding the speed of rotation of the package in accordance with the object of the present invention.

Referring particularly to Figs. 1 and 2 of the drawings, the winding mandrel or cop-holder 5 is journaled on a dead spindle 15 carried at the end of a swinging arm 16. Preferably, the shank-end of the spindle 15 is swiveled between the opposite sides of a fork 17 at the end of the arm 16 to adapt the winding mandrel or cop-holder 5 to be swung outwardly with respect to the drive-roll 6 to facilitate the placing of the cop-tube C thereon and the doffing of the completed package therefrom. As shown in Fig. 3, a leaf-spring 18 secured to the side of the arm 16 is arranged with its V-shaped bent end 19 engaging a notch 20 in the end of the shank of the spindle 15 to normally retain the latter in operative position with respect to the drive- or traverse-roll 6. As herein shown the spindle 15 is normally held with its axis inclined at a slight angle to the vertical plane of the axis of the drive-roll 6 whereby to obtain the proper contact of the surface of the package on the periphery of the roll during the winding. As shown in Fig. 2 of the drawings, the spindle 15 is inclined downwardly at an angle to the horizontal plane of the axis of the drive-roll in accordance with the conical shape of the package to be wound. This latter inclination of the spindle 15 and the axis of the cop-holder 5 with respect to the drive-roll 6 is provided for by the swiveled arrangement of two connected sections of the arm 16 as next explained.

As above indicated the cop-holder supporting arm 16 is constructed in two parts, its main section consisting of a tubular bearing member 21 having a depending elbow-shaped arm 22 which is forked at the bottom and provided with opposite alining hubs 23 and 24, see Figs. 3 and 8. The hubs 23 and 24 are pivoted on a rod or stud-shaft 25 which has its end fixedly held in a hub 26 formed on an upright arm or extension 27 of the cross-frame or bracket 4, see Figs. 1 and 2. The stud-shaft 25 is held in the hub 26 by means of a set-screw 28, shown in Fig. 8, and a collar 29 secured to the shaft by means of a set-screw 30 is arranged to bear against a fluted spring-washer 31 to yieldingly hold the hub 24 in abutting relationship with the hub 26. Through this arrangement the bearing member 21 is allowed to rock on the axis of the stud-shaft 25 with the spring-collar 29 acting to frictionally resist such movement. Projecting downwardly from the hub 24 of the arm 22 is an extension or arm 35 pivotally connected to a rod or bar 36, shown in Fig. 1, which forms an element of the stopping mechanism of the machine. The bar or rod 36 is adapted to be slid longitudinally to rock the arm 35 and thereby swing the arm 16 upwardly on its pivot 25 to remove the package from contact with the drive-roll 6 whereby to arrest the winding operation. As the stopping mechanism of the machine is of usual construction and arrangement and not essential to the operation of the present invention it is not herein described in detail.

The swiveled section of the arm 16 which directly supports the mandrel or cop-holder 5 is constructed with a cylindrical rod-like portion 37 extending loosely through the bore of the tubular bearing member 21 to adapt it to rock therein. The forwardly projecting end of the section 37 of the arm 16 is formed with a depending double-armed support 38, the outer end of which is forked at 17, as previously noted, to adapt it to receive the shank of the spindle 5, see Figs. 1 and 3.

Projecting downwardly from the mid portion

of the rod-section 37 of the arm 16 is a rocker-arm 40. The arm 40 is formed with a split hub 41 encircling the rod-section 37 and clamped thereto by a screw 42. Journaled on a pin 43 held in the lower end of the arm 40 is a follower-block 44 which is adapted to slide in an inclined groove or cam-groove 45 formed in the end of an arcuate element or quadrant 46, see Figs. 1 and 2. The cam-groove 45 acts on the follower 44 to rock the arm 16 to positively tilt the cone-holder 5 during its movement away from the drive-roll as the package increases in diameter whereby to cause the cone to be built with a gradually increasing taper; this device and its method of operation being explained in detail in United States Letters Patent No. 1,658,400, dated February 7, 1928.

The rod-section 37 of the arm 16 is formed with an axial bore 49 which receives a rod or shaft 50 constituted as the operating means for the brake which is applied to the cop-holder to retard the rotation of the package at intervals of the winding operation. The forward end of the rod 50 is bent to form a crank-arm 51 to which a brake-shoe 52 is attached. As herein shown the brake-shoe 52 is pivotally mounted on the reduced end of the crank-arm 51 and held in place by a washer 53 fastened by a cotter-pin 54 inserted through a hole in the end of the arm. Through this arrangement the brake-shoe 52 is permitted to rock to accommodate itself to the periphery of the braking annulus 14. At the forward end of the brake-rod 50 is a collar 56 secured thereto by a set-screw 57 in abutting relationship with the end of the rod-section 37 of the arm 16. The collar 56 prevents longitudinal movement of the rod 50 in the bore of the arm 16 in one direction and the thrust in the opposite direction is taken through an arrangement of means as next described.

Loosely mounted on the brake-rod 50 abutting the rearward end of the bearing-member 21 is a hub 59 from which an elbow-shaped rocker-arm or lever 60 reaches laterally outward as best shown in Figs. 3 and 8. The arm 60 is formed on one side with a forked bearing 61 through which extends a pin 62 serving as the journal for a roller 63. At the outer crooked end of the arm 60 is a perforated ear 64 to which is connected a helical spring 65 employed for a purpose as later explained. The arm 60 is employed for rocking the brake-rod 50 under the control of a cam to be later described. It has been explained that the hub 59 of the rocker-arm 60 is loose on the rod 50 and its connection therewith is made through a hub or collar 66 secured fast to the rod by means of a set-screw 67. The hub 59 abuts the end of the bearing member 21 and the collar 66 abuts the outer face of the hub so that when the latter is secured to the rod 50 it cooperates with the collar 56, previously mentioned, to hold the rod from longitudinal movement. Referring to Fig. 5, the collar 66 has an arm or finger 68 reaching upwardly and overhanging the hub 59 which is flatted off on its top as shown in Fig. 8. A pair of set-screws 69 reach down through the end of the finger 68 and bear against the flatted side of the hub 59 to lock it rotatively with the rod 50. By releasing one of the set-screws 69 and tightening the other one the hub 59 may be adjusted angularly of the rod 50 to alter the relationship between the cam-roller 63 on the arm 60 and the brake-shoe 52.

The cam 70 which engages the roller 63 to rock the arm 60 and thereby oscillate the brake-rod 50 is carried at the upper end of a bell-crank lever 71. The bell-crank lever 71 is bifurcated at 72 and provided with two spaced hubs 73 and 74 which are pivotally mounted on the end of the rod or stud-shaft 25 which forms the pivot for the cop-holder carrying arm 16, see Figs. 2 and 3. The hubs 73 and 74 straddle the hub 23 of the arm 16 to retain them in place on the rod 25, the arm 16 being retained in place by the collar 29 and spring-washer 31 as previously described.

The cam 70 is mounted on the end of the upper arm of the bell-crank lever 71 by means adjustable to regulate the eccentricity of its working face with respect to the pivotal axis of the lever. As shown most clearly in Figs. 6 and 7 the cam 70 is formed with an upper arcuate face 75 adapted to ride against the roll 63 on the arm 60. Preferably, the working face 75 of the cam 70 is convexed or rounded across its top, see Fig. 8, to accommodate the lateral rocking motion of the roll 63 incident to its rise and fall and also due to its angular displacement as the axis of the cone-holder is tilted to an increasing extent during the growth of the package. The cam 70 is formed on the end of a hub or post 76 which is provided with a reduced bearing stud or trunnion 77 engaging a bore in a hub 78 on the upper arm of the lever 71, see Fig. 8. A slot 79 is cut through the center of the stud or trunnion 77, against the flat bottom of which engage a pair of set-screws 80 threaded down through a boss 81 on the hub 78 of the lever 71. By releasing one set-screw 80 and screwing down on the opposite one the trunnion bearing 77 may be adjusted angularly in the bore of the hub 78 whereby to change the eccentricity of the arcuate face 75 of the cam 70 with respect to the pivotal axis of the lever 71.

The lever 71 may receive its oscillating motion from any suitable means such as an eccentric or crank-motion connected with a going part of the winding machine. As herein shown the lower arm of the lever 71 has a fork 82 at its extremity, the sides of which straddle the periphery of an eccentric 85. The eccentric 85 is mounted fast on a shaft 86 by means of a set-screw 87. In the present embodiment of the invention the shaft 86 is constituted as a part of the stopping mechanism of the winding machine, being journaled in bearings in the frame-members 4 and extending longitudinally of the bed 2. The shaft 86 carries bunter-cams 88 which engage with dogs 89 to actuate the stopping mechanisms of the winding units, but as this mechanism has no relation to the present invention it will not be described in detail. Suffice it to state that the shaft 86 is rotated at a relatively slow rate of speed and the eccentric 85 is thus caused to slowly and continuously oscillate the bell-crank lever 71.

It will be noted by reference to Fig. 1 of the drawings that the spring 65 connected to the end of the arm 60 carrying the cam-roller 63 is anchored at its opposite end to an ear 90 on the lower arm of the lever 71. As the lever 71 is rocked to swing its upper arm in a clockwise direction, as viewed in Fig. 1, the cam 70 is moved forwardly to allow the arm 60 to be depressed; the downward movement of the lower arm of the lever 71 tending to stretch the spring 65 under this action.

The cam 70 is adjusted on the upper arm of the lever 70 with its forward or right-hand end, as viewed in Figs. 6 and 7, at the greatest distance from the pivotal axis of the lever. It will

thus be apparent that as the cam 70 is rocked forwardly from the position illustrated by full lines in Fig. 6 to that illustrated by dash lines in this view the roller 63 and the arm 60 will be carried downwardly by the force of the spring 65. This action causes the brake-rod 50 to be rocked in a contraclockwise direction, as viewed in Figs. 8, 9 and 10, whereby the brake-shoe 52 will be engaged with the periphery of the annulus 14 on the end of the cop-holder 5, see Fig. 10. On the other hand, when the cam 70 is rocked back in the opposite direction the eccentric face of the cam will ride under the roller to lift the latter whereby to rock the brake-rod 50 in a clockwise direction to raise the brake-shoe 52 off from the annulus 14 as shown in Fig. 9. The method of operation of the braking means is explained more fully hereinafter in connection with the operation of the complete machine.

To prepare the machine for winding, a suitable form of cop-tube C is placed on the mandrel or cop-holder 5 and the latter swung back into position with the detent-spring 18 engaging the notch in the end of the shank of the spindle 15. The machine is supplied with yarn from a bobbin or other source usually arranged below but not herein shown. The yarn *y* leads up from its source of supply through a tension-device 92, illustrated in Fig. 1, and thence draws across a thread-bail 93. In threading up the machine the yarn is laid across the periphery of the traverse-roll 6 and its end suitably secured to the cop-holder or tube C. The machine is started to operate by manipulating a suitable lever or handle, shown at 95 in Fig. 1 of the drawings, which is connected to reset the stopping mechanism and lower the arm 16 to place the surface of the cop-tube C in contact with the periphery of the drive- or traverse-roll 6.

The traverse-roll 6 is driven continuously and as soon as the cop-tube C makes contact with its periphery the tube and its holder 5 are rotated therefrom to wind on the yarn. As the rotation of the cop-tube C takes up the yarn it causes the strand *y* to enter one or the other of the crossing grooves 7 and 8 on the surface of the roll 6 whereby it is traversed back and forth longitudinally of the axis of the tube to deposit it thereon in helical coils which form the layers constituting the package.

The eccentric-shaft 86 is rotated continuously with the rotation of the roll shaft 10, being usually connected thereto by reduction gearing not herein shown. As the shaft 86 rotates the eccentric 85 the latter imparts a slow rocking movement to the bell-crank lever 71 and thereby the cam 70 is oscillated with a fore-and-aft motion as indicated by the full and dash lines in Figs. 6 and 7. Fig. 6 represents the parts in their relationship when the arm 16 is in lowermost position with the surface of the cop-tube C bearing on the traverse-roll 6 as shown in Fig. 1.

When the arm 16 is in this lowermost position with the upper arm of the bell-crank lever 71 rocked back to rearward position, as shown in Fig. 4 and by full lines in Fig. 6, the roll 63 will engage the eccentric face 75 of the cam 70 at the outermost or forward end thereof. As previously noted, the high point of the cam 70 is at its forward end and therefore as the cam moves to its rearward position, as shown by full lines in Fig. 6, the roll 63 will be elevated to rock the arm 60 upwardly. As the arm 60 is raised the brake-rod 50 is rocked to release the brake-shoe 52 from the annulus 14 on the cop-holder 5 as shown in Figs. 4 and 9. Now, as the winding proceeds, the lower arm of the bell-crank lever 71 is rocked downwardly, as shown in Fig. 1 of the drawings, whereby to move the upper arm of the lever forwardly to carry the cam 70 back to the position illustrated by dash lines in Fig. 6. As the cam 70 moves forwardly the roll 63 riding thereon is lowered under the force of the spring 65 acting on the arm 60 and thereby the rod 50 is rocked to apply the brake-shoe 52 to the annulus 14 as shown in Fig. 10. This action of the cam 70 on the roll 63 is continuous throughout the winding, the arm 60 being intermittently raised and lowered to oscillate the brake-rod 50 to release the brake-shoe 52 from the annulus 14 during certain periods and to alternately cause the application of the brake under the resilient force of the spring 65. During this intermittent application of the brake the rotative speed of the package is slightly retarded, but as the brake is released the package gains speed again so that there is a substantially constant variation in its angular velocity throughout the winding. Under this action the synchronism between the rotation of the package and the traverse of the yarn is disrupted which has the effect to prevent the close spacing of the coils and the tendency for them to crowd together, whereby to eliminate ribbon winding on the surface of the package. It will be understood that since the drive-roll 6 is driven at a constant rate of speed the deceleration in the speed of the package will result in a slight slippage of its surface on the periphery of the roll. This effect is not important, however, since the package contacts with the roll for only a small portion of its length where its axis crosses the vertical plane of the axis of the roll.

As the winding proceeds and the package increases in diameter with the addition of more layers the arm 16 is swung upwardly on its pivot on the rod 25 to accommodate the growth. During this upward movement of the arm 16 the roll 63 will be displaced rearwardly along the arcuate face 75 of the cam 70, but as the working face of the cam is disposed eccentric to the axis about which the lever 71 oscillates the rise and fall of the roll 63 will continue as long as the cam is oscillated. It has been explained that as the cop-holder 5 rises away from the drive-roll 6 it is tilted on its pivot on the arm 16 by the action of the cam-track 45 on the roller 44, the purpose of this arrangement being to increase the inclination of the axis of the package to the roll to form the package with a steeper pitch or taper. Under this action the brake-annulus 14 on the cop-holder 5 tends to recede from the brake-shoe 52, but this is compensated for by the eccentric shape of the cam 70. In Fig. 7 of the drawings the path of the roll 63 when in lowered position with the brake active is plotted on the line *a—b* and its course with the brake released is represented by the line *c—d*; as compared with a concentric course about the pivotal axis of the arm 16 as delineated by the line *e—f*. It will be seen therefore that notwithstanding the change in the position of the roll 63 with respect to the pivotal axis of the arm 16 during the tilting movement of the cop-holder 5 on the arm the engagement of the roll with the cam 70 will always result in a rise and fall of the arm 60 and thereby the alternate application and release of the brake.

It has been found expedient to adjust the cam 70 to such position that its lowering of the roll

63 as the lever 71 rocks forward will cause a progressively longer dwell of the brake-shoe 52 on the annulus 14 as the winding proceeds. Such an adjustment is illustrated in Fig. 7 where it will be seen that after the roll 63 has been moved back to the position indicated at x under the rising action of the arm 16, the forward movement of the cam into the position illustrated by dash lines entirely relieves its face 75 from contact with the roll 63. At this juncture, therefore, the arm 60 will be free to rock downwardly to apply the brake with the maximum force of the spring 65 and there will be a dwell of the brake-shoe 52 on the annulus 14; while, on the other hand, at the start of the winding, the interval of contact of the brake-shoe on the annulus will be much shorter. In this way the cam may be adjusted to obtain the maximum braking effect on the cop-holder when the package assumes its largest bulk tending to increase its momentum over that at the start of the winding when the package is relatively small.

From the foregoing it will be observed that the present invention provides a particularly simple yet efficient means for controlling the disposition of the coils of winding on drum-wound packages whereby to prevent ribbon winding.

The controlling means acts directly on the cop- or package-holder to retard its speed of rotation without requiring the use of differential gearing or other complicated mechanism for varying the speed of rotation of the drive-roll or the rate of operation of the yarn-traversing means.

The device may be applied to standard types of winding machines by the addition of only a few elements thereto and its automatic operation accomplished by transmitting motion to the brake-actuating means from any suitable going part of the winding unit.

While the device is herein described and illustrated as embodied in a preferred form of construction, it is to be understood that various modifications may be made in the form and arrangement of the parts of its mechanism without departing from the spirit or scope of the invention. Moreover, the invention is applicable to other types of winding machines having different forms of traversing means, such, for example, as reciprocating traverse guides. Therefore, without limiting myself to the exact embodiment of the invention as herein shown and described, I claim:

1. In a winding machine, the combination of means for rotating a package, means for traversing yarn on the package, and an automatically-operated brake for periodically retarding the speed of the package to disrupt the synchronism between its rotation and the traverse of the yarn to prevent ribbon winding.

2. In a winding machine, the combination of means for rotating a package, means for traversing yarn on the package, and a brake for acting intermittently on the package to retard its speed to disrupt the synchronism between the rotation of the package and the traverse of the yarn thereon.

3. In a winding machine, the combination of means for rotating a package, means for traversing yarn on the package, retarding means for the package independent of the rotating means, and means for periodically actuating the retarding means to disrupt the synchronism between the rotation of the package and the traverse of the yarn to prevent ribbon winding.

4. In a winding machine, the combination of means for rotating a package, means for traversing yarn on the package, a brake for retarding the rotation of the package, and means for applying the brake at intervals of the winding to disrupt the synchronism between the rotation of the package and the traverse of the yarn to prevent ribbon winding.

5. In a winding machine, the combination of means for rotating a package, means for traversing yarn on the package, a brake for retarding the rotation of the package, and automatically-operated means for periodically actuating the brake to disrupt the synchronism between the rotation of the package and the traverse of the yarn thereon to prevent ribbon winding.

6. In a winding machine, the combination of a rotating cop-holder, means for traversing yarn to wind a package on the holder, a brake for retarding the rotation of the cop-holder, and means for actuating the brake at intervals of the winding to disrupt the synchronism between the rotation of the package and the traverse of the yarn thereon.

7. In a winding machine, the combination of a rotating yarn-receiver, means for traversing yarn to wind a package on the yarn-receiver, a brake for retarding the rotation of the yarn-receiver, and automatically-operated means for actuating the brake at intervals of the winding to disrupt the synchronism between the rotation of the package and the traverse of the yarn thereon.

8. In a winding machine, the combination of a rotatable cop-holder, a roll for rotating the cop-holder by contact with the yarn wound thereon, means for traversing the yarn longitudinally of the cop-holder to wind a package, a brake for retarding the rotation of said cop holder, and means for actuating the brake at intervals in the winding to disrupt the synchronism between the rotation of the package and the traverse of the yarn thereon.

9. In a winding machine, the combination of a rotary drive-roll, a rotary winding mandrel for supporting a package in surface contact with the roll, means for traversing the yarn axially of the mandrel to wind a package thereon, means for retarding the speed of said rotary winding mandrel only, and means for actuating the retarding means during the winding to disrupt the synchronism between the rotation of the package and the traverse of the yarn thereon.

10. In a winding machine, the combination of a drive-roll, means for rotatably supporting a package in surface contact with the drive-roll, means for traversing yarn on the package, a brake for retarding the rotation of the package, and automatically-operated means for alternately applying and releasing the brake.

11. In a winding machine, the combination of means for rotating a package, means for traversing yarn on the package, an annulus rotatable with the package, a brake engageable with the annulus to resist the rotation of the package, and means for alternately applying and releasing the brake to periodically decelerate the speed of rotation of the package.

12. In a winding machine, the combination of a rotating drive-roll, a cop-holder for supporting a package in surface contact with the drive-roll, means for traversing yarn longitudinally of the cop-holder, an annulus rotatable with the cop-holder, a brake engageable with said annulus, an arm for actuating the brake, and means for con-

tinuously oscillating said arm to alternately apply and release the brake during the winding of a package on the cop-holder.

13. In a winding machine, the combination of a rotating drive-roll, means for rotatably supporting a package in surface contact with the drive-roll, means for traversing yarn on the package, a brake annulus rotatable with the package, a brake engageable with said annulus, and a cam for periodicly actuating the brake.

14. In a winding machine, the combination of a drive-roll, means for rotatably supporting a package in surface contact with the drive-roll, means for traversing yarn on the package, an annulus rotatable with the package, a brake engageable with the annulus, a rod for actuating the brake, and means for continuously oscillating said rod to alternately apply and release the brake.

15. In a winding machine, the combination of a drive-roll, means for rotatably supporting a package in surface contact with the drive-roll, means for traversing yarn on the package, an annulus rotatable with the package, a brake-shoe engageable with the annulus, an arm for actuating the brake-shoe, and a cam for oscillating said arm.

16. In a winding machine, the combination of a drive-roll, means for rotatably supporting a package in surface contact with the drive-roll, means for traversing yarn on the package, an annulus rotatable with the package, a brakeshoe engageable with the annulus to retard the rotation of the package, a rocker-arm for actuating the brake, a follower carried by said arm, a cam engaging the follower, and means to oscillate the cam to rock the arm to alternately apply and release the brake.

17. In a winding machine, the combination of a drive-roll, means for rotatably supporting a package in surface contact with the drive-roll, means for traversing yarn on the package, an annulus rotatable with the package, a brake-shoe engageable with the annulus, an arm for actuating the brake-shoe, a follower carried by said arm, a cam engageable with the follower to rock the arm, a lever for moving the cam, and means to oscillate said lever.

18. In a winding machine, the combination of a drive-roll, means for rotatably supporting a package in surface contact with the roll, means for traversing yarn on the package, an annulus rotatable with the package, a brake-shoe engageable with the annulus, a rockable rod for actuating the brake-shoe, an arm connected with said rod, a follower carried by the arm, an oscillatable lever, means for oscillating said lever, and a cam carried by said lever and engaging the follower to rock the arm to alternately apply and release the brake.

19. In a winding machine, the combination of a rotary drive-roll, a rotary cop-holder, means for traversing yarn to wind a package on the holder, a swinging arm for supporting the cop-holder in contact with the drive-roll while adapting it to move away therefrom as the package increases in diameter, an annulus rotatable with the cop-holder, a brake engageable with said annulus, a rod extending longitudinally of the swinging arm and connected to actuate the brake, and means for continuously oscillating the rod to alternately apply and release the brake during the winding of the package on the cop-holder.

20. In a winding machine, the combination of a drive-roll, a cop-holder for rotatably supporting a package in contact with the drive-roll, means for traversing yarn on the cop-holder, a pivoted arm for supporting the cop-holder to adapt it to move away from the drive-roll during the growth of the package, an annulus rotatable with the cop-holder, a brake engageable with the annulus, a rod extending longitudinally of the arm and connected to actuate the brake, a rocker-arm connected to the rod, a follower carried by said rocker-arm, a lever pivoted on an axis coincident with the axis of the cop-holder supporting arm, a cam on said lever having an arcuate face arranged eccentric to the axis of the lever and engageable with the follower on the rocker-arm, and means to rock said lever to move the cam to oscillate the rocker-arm to actuate the brake.

21. In a winding machine, the combination of a drive-roll, means for rotatably supporting a package in surface contact with the drive-roll, means for traversing yarn on the package, an annulus rotatable with the package, a brake engageable with the annulus, resilient means for actuating the brake to engage it with the annulus, and automatically operated means for periodically releasing the brake in opposition to the force of the spring.

22. In a winding machine, the combination of means for rotating a package, means for traversing yarn on the package, a brake for retarding the rotation of the package, resilient means for applying the brake, and automatically-operated means for periodically releasing the brake.

23. In a winding machine, the combination of means for rotating a package, means for traversing yarn on the package, a brake for retarding the rotation of the package, means for alternately applying and releasing the brake, and means for regulating the duration of application of the brake.

24. In a winding machine, the combination of means for rotating a package, means for traversing yarn on the package, an annulus rotatable with the package, a brake engageable with the annulus to retard the rotation of the package, means for alternately applying and releasing the brake, and adjustable means for regulating the length of dwell of the brake during its engagement with the annulus.

25. In a winding machine, the combination of means for rotating a package, means for traversing yarn on the package, a brake for retarding the rotation of the package, means for alternately applying and releasing the brake, and means for progressively augmenting the braking action as the package increases in diameter.

26. In a winding machine, the combination of means for rotating a package, means for traversing yarn on the package, an annulus rotatable with the package, a brake engageable with the annulus, means for alternately applying and releasing the brake, and means for progressively increasing the duration of application of the brake as the package increases in diameter.

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