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TRAVERSING MEANS FOR WINDING MACHINES

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2 Sheets-Sheet 1

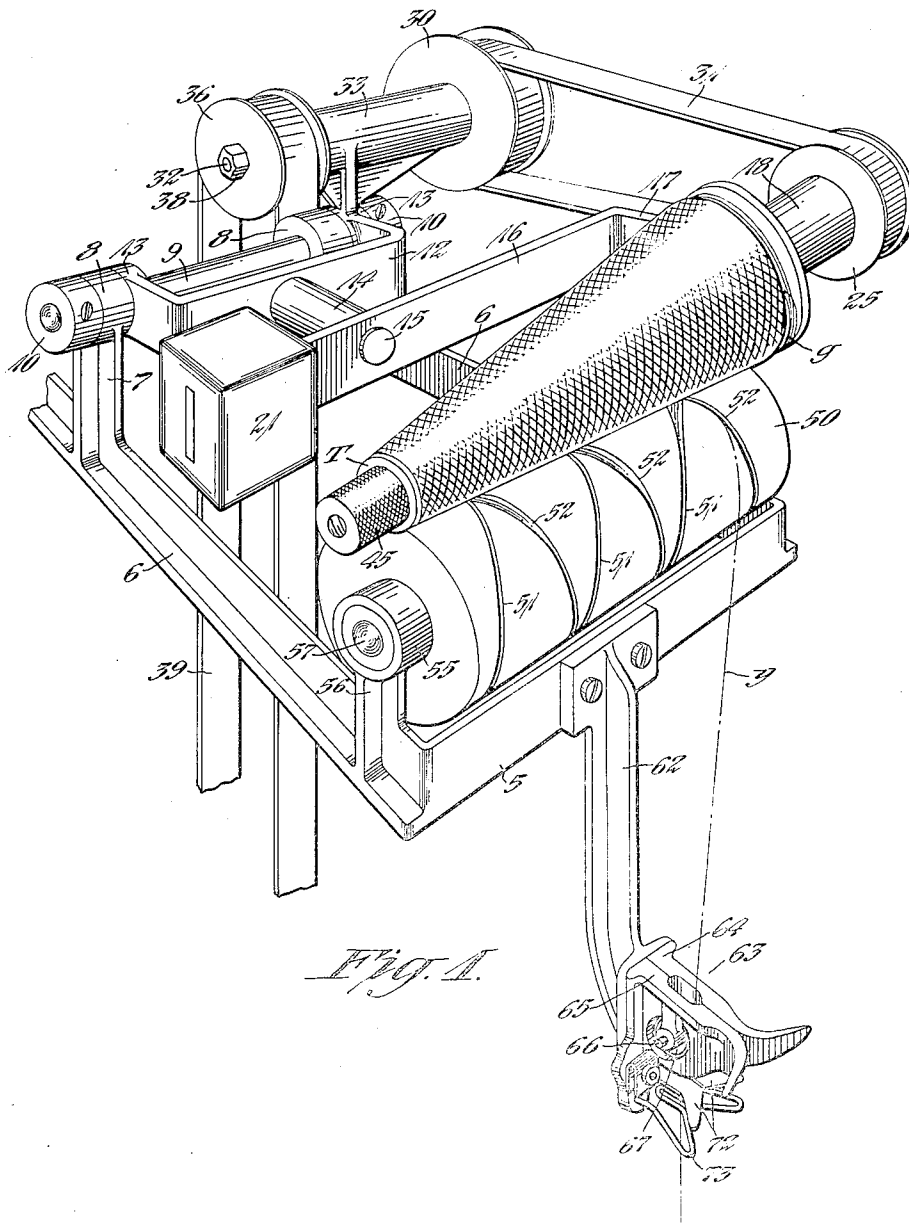


Fig. 1.

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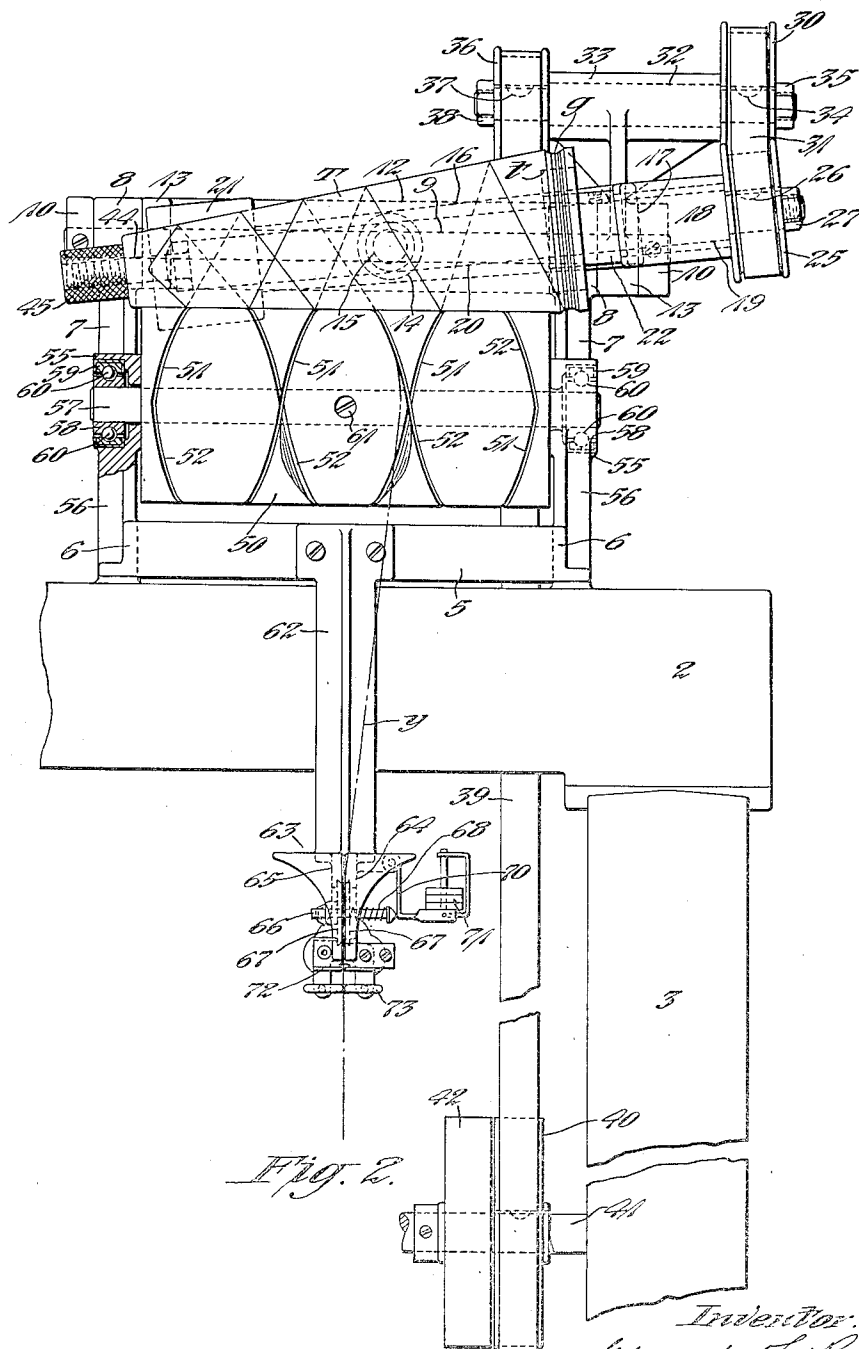
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2 Sheets-Sheet 2



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TRAVERSING-MEANS FOR WINDING MACHINES

Application filed April 13, 1931. Serial No. 529,827.

This invention relates to winding machines for winding thread, yarn, twine, cord and other strand materials into cops, cones, bobbins or other forms of packages.

In the present specification and claims the term "yarn" is employed in a general sense to indicate all varieties of strand material and the term "package" is intended to apply to any shape or form of wound yarn mass.

One object of the present invention is to provide a winding machine of the utmost simplicity, capable of being manufactured at low cost and proof against wear or deterioration of its parts.

Another object of the invention is to provide a winding mechanism having a free-running rotary traversing means for the yarn which is driven directly from the package being wound without the intermediary of belts, gearing or other transmission mechanism.

Further objects of the improvements are set forth in the following specification which describes one form of construction of the winding mechanism, by way of example, as illustrated by the accompanying drawings. In the drawings:

Fig. 1 is a perspective view showing the essential parts of the winding mechanism comprising a winding-spindle, a grooved traverse-roll for traversing the yarn on the package, and a usual form of tension-device for tensioning the yarn as it feeds to the package; and

Fig. 2 is a front view of the machine in elevation.

The present improved winding mechanism may be constructed as a single unit or, in accordance with the preferred practice, several units may be combined in a series to constitute a "gang" of winding heads. As shown in Fig. 2 of the present drawings the winding mechanism is constructed as a unit of a gang machine, being mounted on a horizontal bed or table 2 supported from legs 3. As all of the units may be of the same construction only one of them is herein illustrated. The frame of the machine may be continuous along the top of the bed 2 or may comprise suitable individual brackets or frame-members 5 screwed down to the top of the bed.

As herein shown the frame-member 5 is of generally rectangular shape, and arranged rearwardly of its sides 6 are a pair of upright arms 7 supporting hub-like bearings 8 for a horizontal rod or shaft 9.

The shaft 9 is held in the bearings 8 by means of collars 10 secured to its opposite ends. Mounted to pivot on the shaft 9 is a yoke-shaped frame or carriage 12 which serves as the means for supporting the winding-spindle on which the package is wound. The carriage 12 has hubs 13 pivoted on the shaft 9, and projecting forwardly from its forked portion is an arm or extension 14. At the end of the extension 14 is a stud 15 constituting a pivot for a rockable arm 16 which serves as the main support for the winding-spindle 20. The arm 16 has an elbow at one end projecting forwardly in an extension 17 with a hub or bearing 18 at its terminus. Journalled in the hub 18 is a shaft 19 which projects beyond the left-hand end of the bearing to constitute the winding-spindle 20 for supporting and rotating the package. A weight 21 is slidably mounted on the end of the arm 16 opposite from its elbow portion 17, the weight being adjustable along the arm to counterbalance the weight of the winding-spindle and other parts connected therewith.

A collar 22 is secured to the winding-spindle 20 abutting one end of the bearing hub 18 and at the opposite end of the hub is a flanged pulley 25 keyed to a reduced portion of the shaft 19 at 26 and held against its shoulder by means of a nut 27. The pulley 25 is adapted to be driven from an opposite pulley 30 through the means of a transmission-belt 31. The pulley 30 is secured fast to a stud-shaft 32 journalled in a bearing 33 surmounting the right-hand hub 13 of the carriage or frame 12. The pulley 30 is keyed to the reduced end portion of the shaft 32 at 34 and held against a shoulder on the shaft by means of a nut 35. At the opposite end of the shaft 32 is a flanged pulley 36 keyed to its reduced portion at 37 and held in place by a nut 38.

The pulley 36 is driven from a transmission-belt 39 which may be connected with any suitable source of power. Conveniently, the

belt 39 may be connected to a pulley 40 on a drive-shaft 41 extending horizontally between the legs 3 of the machine beneath the bed 2. The shaft 41 may be driven from an electric motor or any other suitable source of power. Power is transmitted from the drive-shaft 41 through the pulley 40 and belt 39 to the pulley 36 which drives the shaft 32. From the shaft 32 power is transmitted through the pulley 30, belt 31 and pulley 25 to rotate the winding-spindle 20. The drive may be disconnected to arrest the winding operation through the means of a clutch or other power-controlling mechanism. In other cases a loose pulley 42 may be provided on the drive-shaft 41, see Fig. 2, and suitable belt-shifting devices, not shown, employed to connect and disconnect the drive.

The winding-spindle 20 may be adapted to rotatively support any preferred type of cop-tube or yarn-receiver in accordance with the character of the package to be wound thereon. As herein illustrated the spindle 20 is designed to receive a frusto-conical, wooden or fiber tube T forming the axial core or support for a conically shaped package, generally designated a cone. The cone-tube T is bored axially to receive the spindle 20 and its base end is counterbored at *t* so that the fixed collar 22 on the spindle enters the recess thus formed and abuts the end of the counterbore to locate the tube longitudinally of the spindle. At its outer end the spindle 20 has a reduced extension or stem 44 which projects through the smaller bore at the end of the cop-tube T and is threaded to receive a knurled nut or collar 45. After the tube T has been placed on the spindle 20 the nut 45 is screwed onto the end of the spindle extension 44 to bind the base end of the tube against the side of the collar 22 and thereby secure the tube rotatively with the spindle. The above described arrangement provides for rotatively supporting the cop-tube T, and the yarn mass wound thereon, to adapt it to be positively rotated by the winding-spindle and also allows for a movement of the cop-tube bodily and laterally away from the traversing-means as the winding increases in diameter, all as more particularly described hereinafter.

In accordance with one feature of the present invention the yarn is traversed longitudinally of the winding-spindle through the means of a rotary grooved roll 50 of the type shown and described in United States Letters Patent No. 1,749,355 dated March 4, 1930. In this form of rotary traverse device the periphery of the roll is provided with oppositely-extending helical grooves 51 and 52 which are connected at their ends and cross each other at points intermediate thereof on opposite sides of the roll. The two grooves 51 and 52 are preferably of different depth at their crossing points and so formed as to pre-

vent the yarn being diverted from the groove in which it is being traversed into the reversely extending groove at the crossover. The arrangement of the grooves for this purpose is particularly described in the Letters Patent above referred to and therefore needs no further explanation herein. Suffice it to state that during the rotation of the roll 50 the yarn or other strand material is received in and guided by one or the other of the grooves 51 and 52 and is thereby caused to be traversed longitudinally of the roll to distribute it on the package being wound in a series of helical turns or coils which build up the layers forming the yarn body.

In the patent to Reece, No. 1,749,355, above referred to, the traverse-roll is rotated positively and it is proposed to drive the package by contact of its surface with the traverse-roll or, in other cases, by peripheral contact with a separate drive-roll or drum. It has been found that in certain cases it is desirable to rotate the package positively at a constant rate of speed as is the case in certain types of winding machines. In this type of machine the winding-spindle is connected to the source of power, and the traversing-means, which usually comprises a rotating cam and a traversing thread-guide reciprocated therefrom, is connected to be driven from the spindle through a train of gearing. The present invention contemplates the elimination of all such gearing or power-transmitting mechanism between the winding-spindle and the traversing-means, this object being accomplished by driving the traverse-roll 50 by peripheral contact of the package therewith.

The traverse-roll 50 is preferably journaled in roller- or ball-bearings to adapt it to rotate freely without friction and undue wear, such a form of bearing being shown in Fig. 2 of the present drawings. Bearing hubs 55 are provided on the frame 5 of the machine surmounting the upright arms 56. A shaft 57 carrying the roll 50 projects through the hubs 55 and carries annular ball races 58 at its ends. The inner races 58 cooperate with outer races 59, with balls 60 revolvable therebetween. The roll 50 is fast on the shaft 57 being keyed thereto by any suitable means such as a set-screw 61 shown in Fig. 2. The roll 50 constitutes the single element of the traversing mechanism and, as above described, is adapted to be rotated by and with the rotation of the winding-spindle without the intermediary of gearing, belts or other power-transmission elements.

To wind a firm stable package it is usually necessary to apply tension to the yarn feeding to the winding and for this purpose any suitable type of tension-device may be employed. As shown in the present drawings, an arm or bracket 62 is bolted to the front of the frame 5, and extending downwardly

beyond the bed or table 2 it supports the tension-device at its lower end. The tension-device, indicated generally at 63, comprises a two-part frame 64 and 65 having bearings 5 for mounting a cross-pin 66, on which are rotatively held two opposite tension-disks 67. The pin 66 has a head at one end which presses against a spring 68 to maintain the latter bearing against the side of one of the tension-disks 67. A pivoted lever 70 is 10 weighted at 71 to adapt its end to bear against the end of the pin 66, and by changing the weights on the lever the degree of tension may be adjusted as required.

15 Beneath the tension-disks 67 is a slub-catcher 72 taking the form of a slitted blade or plate, and below the slub-catcher is a wire thread-guide 73 having a reentrant mouth for guiding the yarn into the slub-catcher and directing it into place between the tension-disks. 20

The yarn may be taken from any suitable source of supply such as a cop or bobbin arranged beneath the tension-device, but not 25 herein shown. Suffice it to state that during the winding operation the yarn *y* draws off from the supply and feeds up through the slub-catcher 72 and between the tension-disks 67 where it encounters resistance to its draft to apply the required degree of tension. 30 From the tension-device 63 the yarn *y* leads up across the surface of the traverse-roll 50 and is received in the grooves thereof to be guided back and forth thereby in its traverse longitudinally of the winding-spindle. 35 The method of operation of the complete machine is as follows:

The yarn is led up from its source of supply through the guide 73 and slub-catcher 72 40 and carried through the tension-device 63 between the opposite faces of the tension-disks 67. From the tension-device the yarn *y* is drawn up across the surface of the roll 50 and its end attached to the cop-tube or yarn-receiver T, for example by winding it 45 in the groove *g* at the base end thereof. Assuming that the drive for the spindle 20 has been connected, the frame or carriage 12 is lowered to bring the surface of the cop-tube 50 T into contact with the periphery of the traverse-roll 50 as illustrated in the drawings. 50 The rotation of the spindle 20 drives the cop-tube T secured fast thereon and the surface contact between the tube and the roll 50 starts rotation of the latter. As the yarn is 55 wound onto the surface of the cop-tube T it will be drawn across the face of the roll 50 and the rotation of the latter will cause the strand to be entered into one of the grooves 51 and 52 on the periphery of the roll. 60

65 Immediately the yarn is picked up in one of the grooves 51 and 52 of the roll 50 it will be traversed thereby in one direction or the other and upon reaching the end of one

groove its direction of traverse is reversed to carry it back in the opposite direction. In this manner the yarn is traversed back and forth longitudinally of the cop-tube T to distribute it in helical coils which form layers 70 to build up the yarn mass.

It is to be noted that the spindle 20, and thereby the cop-tube T, are rotated at a constant rate of speed and the traverse-roll 50 will therefore be driven at a gradually accelerated rate of speed due to the progressive increase in the diameter of the wound mass of yarn. In other words, the speed of the roll 50 will be in ratio with the surface speed 80 of the package being wound and consequently the yarn will be traversed with a progressively varying number of turns or convolutions in each traverse.

A slight amount of slippage occurs between the surface of the wound mass and the roll 50 and this results in the disruption of the synchrony of movement between the rotating package and the traverse of the yarn so that the tendency for the coils of yarn to close up and crowd, to cause what is termed 85 a "ribbon wind", is eliminated. The roll 50 may be made of fiber or like material or, when constituted of metal it may be hollow, so as to reduce its weight and render it capable of rotating at high speed with very little power consumption. 95 The ball-bearings for the shaft 57 reduce the friction and resistance to rotation of the roll to further economize in the power required to operate the winding mechanism. 100

As the package builds up on the cop-tube T the spindle 20 rises away from the roll 50 with the carriage 12 pivoting on the shaft or rod 9 to permit this action. In winding tapered or conically shaped packages it is desirable that the winding-spindle 20 be permitted to tilt or alter its angular relation 105 with respect to the surface of the roll 50 to increase the taper of the package and this is accomplished through the rocking action of the arm 16 which pivots on the stud 15. That is to say, as the package builds up on the cop-tube T it is desirable to increase the taper on the surface of the cone and the adjustment of the angularity of the winding-spindle 20 during this change in the form 110 of the package is provided for by the rocking action of the arm 16. As before explained, the weight 21 on the free end of the arm 16 counterbalances the weight of the spindle 120 and the parts carried thereby, being adjusted to insure that there will at all times be sufficient pressure to hold the surface of the package against the periphery of the traverse-roll 50. 125

Suitable instrumentalities are usually provided for arresting the winding operation when the yarn breaks, its supply is exhausted, or upon completion of the package to the desired size. As the stopping-mechanism of the 130

machine forms no part of the present invention, however, it is not herein shown or described.

It will be observed from the foregoing that my invention provides a particularly simple and compact winding mechanism, adapted to be manufactured at low cost and having a minimum of moving parts less subject to wear and deterioration than in previous machines of the present type. The only power-driven element of the winding mechanism is the winding-spindle which serves as the means for driving the traversing-device constituted by the rotary element or grooved roll 50. As before noted, the traverse-mechanism of the machine is thus operated without the intervention of gearing, belts or other power-transmission elements and being light running and free of all reciprocating or oscillating parts it requires very little power to drive it. In fact, the power consumption of the whole machine is very small compared with other types of winding mechanisms having heavy drums or bulky cams with reciprocating traverse-guides connected to be operated therefrom. Such forms of traverse mechanisms require a reversal in the direction of movement of the reciprocating parts which not only consumes more power, but results in shock and jar and consequent wear and deterioration of the running parts.

The present form of construction of the winding mechanism represents the uttermost simplicity, both as regards its operating parts and the drive therefor, yet it is of great efficiency for the winding of various forms of yarn packages. The machine may be adapted for winding parallel-sided or cylindrically-shaped packages and the parts embodied therein also applied to the winding of cops and bobbins of other forms.

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

1. In a winding machine, the combination of means for rotating a package, and means for traversing yarn on the package, said traversing means comprising a rotary element having a yarn-receiving and -guiding groove extending helically of its circumference and arranged to be rotated by peripheral contact with the surface of the package.

2. In a winding machine, the combination of a winding-spindle, means for positively rotating the winding-spindle, and a traverse-roll rotated by peripheral contact with the yarn wound on the spindle and provided with a helical yarn-receiving and -guiding groove

on its surface for traversing the yarn longitudinally of the spindle.

3. In a winding machine, the combination of a rotatable package-support, means for rotating said support to wind yarn thereon, and a traverse-roll rotated by peripheral contact with the yarn wound on the support and provided with a yarn-receiving and -guiding groove extending helically of its circumference for traversing the yarn longitudinally of the support.

4. In a winding machine, the combination of means for rotating a package, means for traversing the yarn longitudinally of the package comprising a rotary element having a helical yarn-receiving and -guiding groove on its periphery, and means for maintaining the package in contact with the periphery of the traversing element to rotate the latter while adapting its axis to recede therefrom during the growth in the winding.

5. In a winding machine, the combination of a rotatable package-support, means for rotating said support to wind yarn thereon, a traverse-roll rotated by peripheral contact with the yarn wound on the support and provided with a yarn-receiving and -guiding groove extended helically of its circumference, and means for movably mounting the package-support to adapt it to recede from the traverse-roll as the yarn builds up on the support.

6. In a winding machine, the combination of means for rotatably supporting the package being wound, means for positively rotating the package, a traverse-roll provided with a yarn-receiving and -guiding groove extending helically of its circumference for traversing the yarn on the package, and means for maintaining the package in surface contact with the traverse-roll to drive the latter therefrom while permitting a relative receding movement between the axes of the package and roll as the winding increases in diameter.

7. In a winding machine, the combination of a winding-spindle, a traverse-roll provided with a yarn-receiving and -guiding groove extending helically in opposite directions on its surface, means for mounting the winding-spindle and traverse-roll to adapt them to recede one from the other during the growth in the winding, and means for positively rotating the winding-spindle to cause it to transmit rotation to the traverse-roll through contact of the package therewith.

8. In a winding machine, the combination of a freely rotatable traverse-roll provided with a yarn-receiving and -guiding groove extending in opposite directions helically of its periphery, a winding-spindle for supporting the yarn-package, means for mounting the winding-spindle to adapt it to recede from the traverse-roll during the growth in the winding, and means for positively driv-

ing the winding-spindle to rotate the package and transmit rotation to the drive-roll through peripheral contact of the package therewith.

9. In a winding machine, the combination of a frame, a traverse-roll journaled in friction-reducing bearings on the frame and provided with a yarn-receiving and -guiding groove on its surface extending helically in opposite directions, a winding-spindle, a movable frame for supporting the winding-spindle to adapt it to move toward and away from the traverse-roll, means for positively driving the winding-spindle, and means acting on the movable frame to maintain the package in peripheral contact with the traverse-roll to cause it to rotate the latter to traverse the yarn longitudinally of the winding-spindle.

10. In a winding machine, the combination of a freely rotatable traverse-roll provided with a helical yarn-receiving and -guiding groove extending in opposite directions on its periphery, a winding-spindle arranged with its axis substantially in alinement with the axis of the traverse-roll, a movable frame for supporting the winding-spindle to adapt it to recede from the traverse-roll as the package is built up on the spindle, means for rotating the winding-spindle, and means for maintaining the surface of the package in contact with the periphery of the traverse-roll to cause it to drive the roll to traverse the yarn on the package.

In testimony whereof I hereunto affix my signature.

EDWARD F. PARKS.

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