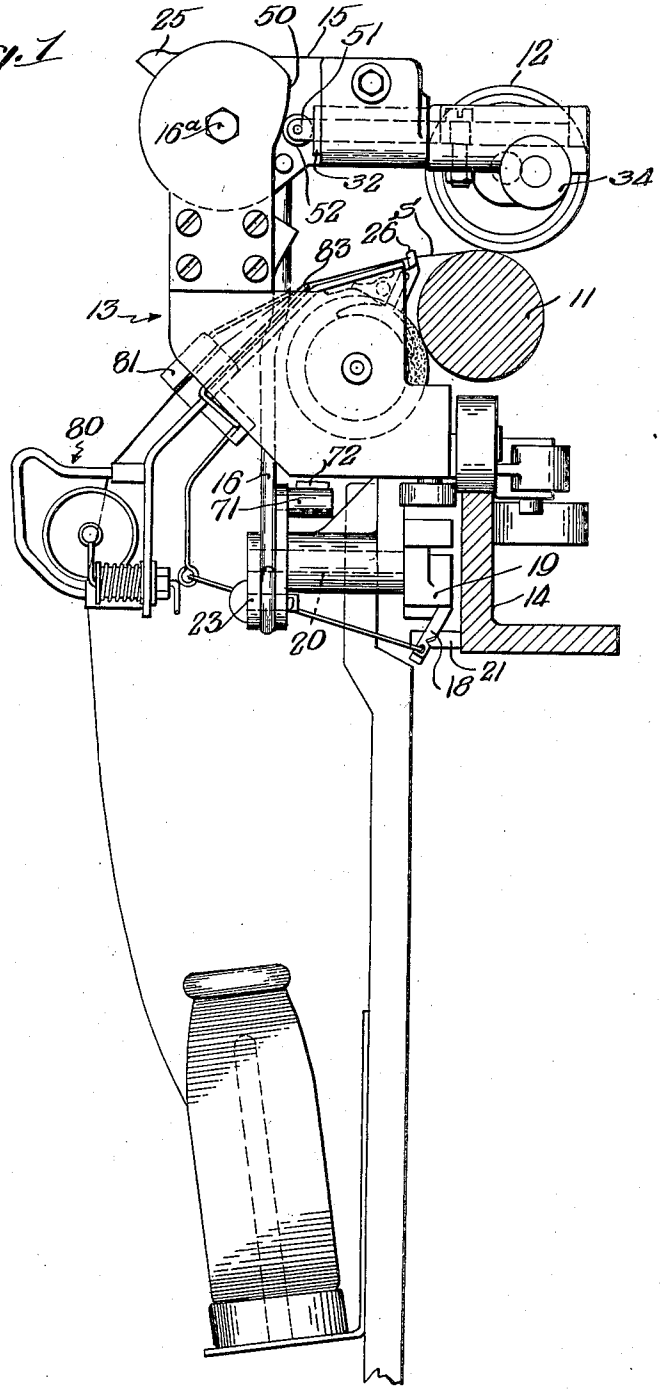
May 9, 1939. E. J. ABBOTT 2,157,105

WINDING MACHINE

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Fig. 1



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WINDING MACHINE

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Fig. 2

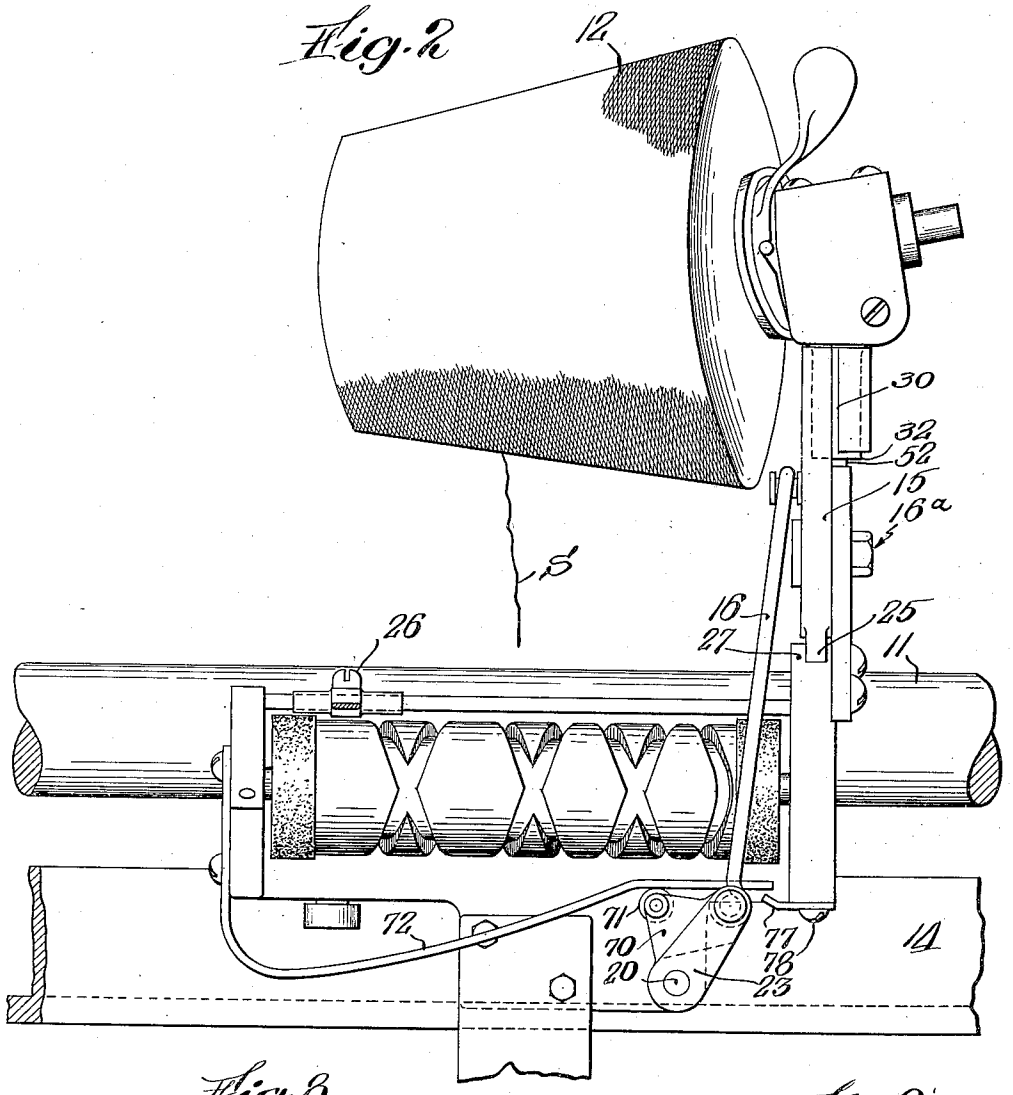


Fig. 8

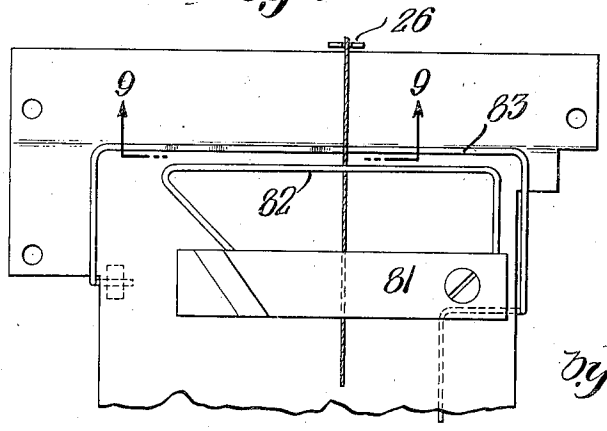
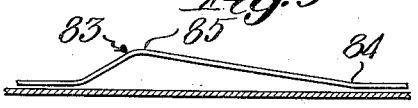


Fig. 9



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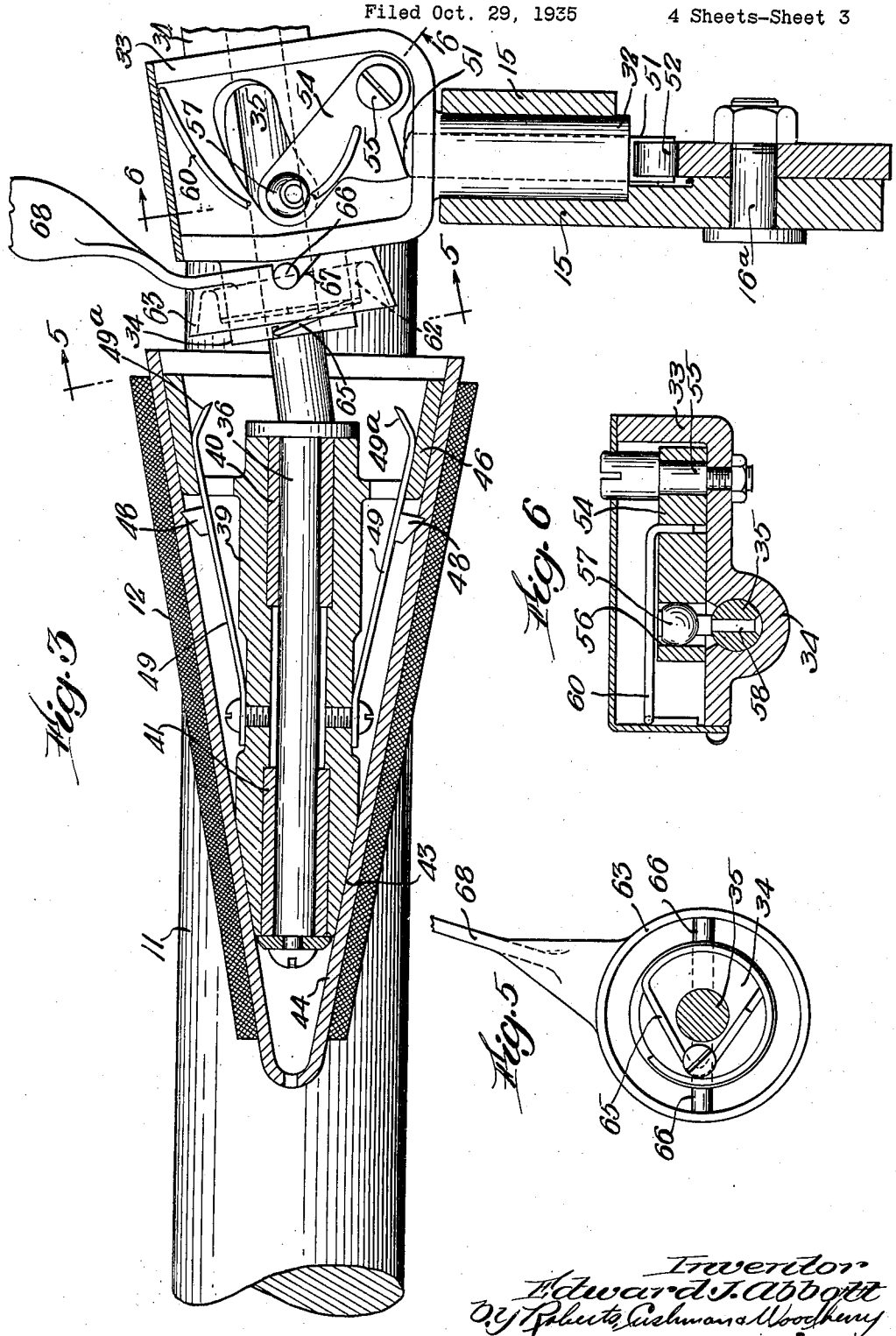


Fig. 3

Fig. 6

Fig. 5

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WINDING MACHINE

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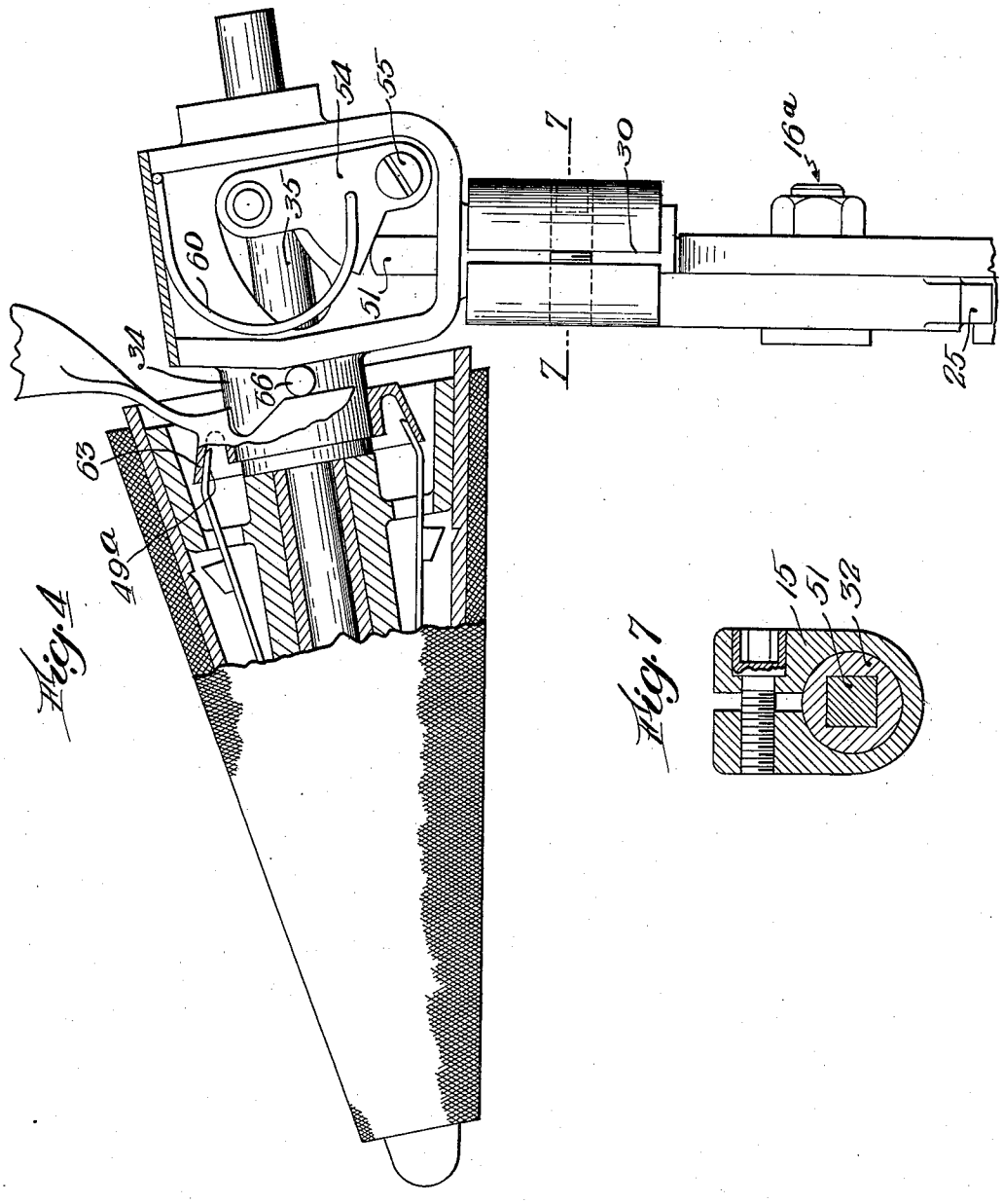


Fig. 4

Fig. 7

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UNITED STATES PATENT OFFICE

2,157,105

WINDING MACHINE

Edward J. Abbott, Wilton, N. H., assignor to Abbott Machine Company, Wilton, N. H., a corporation of New Hampshire

Application October 29, 1935, Serial No. 47,247

9 Claims. (Cl. 242—18)

This invention relates to machines for winding strand material, such as yarn, or other filaments, into conical packages. Principal objects of the invention are to provide for accelerating the taper of the winding package as it grows, to provide for maintaining the proper relation between the axis of the winding package and the axis of its friction drive roll, during growth of the package, and to provide for displacing the winding package with respect to the yarn traversing mechanism in such manner as to increase the concavity at the tip and convexity at the base of the cone, and to accomplish these results with the aid of a single swinging package-supporting arm which is located at one end only of the cone. The accomplishment of this is particularly desirable since it permits the package-carrying arm to be located in relation to the drive roll and yarn supply in the manner shown in the patent application of Edward J. Abbott, Serial No. 476,776, filed August 21, 1930, that is, so disposed that without interfering with the yarn supply it can swing out away from the drive roll and toward the operator. Most prior cone-winding machines in which these various motions have been imparted to the package have involved a pivot for the package-carrying arm on the opposite side of the drive roll from the operator and yarn supply.

A further object is to provide a simplification of structure such that the spindle itself, by virtue of its shape, is enabled to aid in obtaining the desired motions of the package without any complication of the connection between the package-carrying arm and the winding unit or machine. This is particularly desirable in machines in which a swinging arm is both raised and lowered automaticaly, such for example as in said application Serial No. 476,776.

Other objects of invention and features of advantage and utility will be apparent from this specification and its drawings in which the invention is explained by reference to a preferred embodiment thereof.

In the drawings:

Fig. 1 is a vertical section through one side of a multiple winding machine, showing one of its winding units in side elevation;

Fig. 2 is a front elevation of the unit of Fig. 1, with the package in its raised position, and with certain parts removed for clarity of illustration;

Fig. 3 is a partial plan view of the mechanism of Fig. 1 with the cone in the position indicated in Fig. 1, with the cover plate for the connection between the cone holder and the swinging arm removed, and with both of these latter parts shown in section;

Fig. 4 shows the cone-holder and swinging arm of the device in their extreme positions of movement away from the drive roll, and also shows the cone released from but still on its holder;

Fig. 5 is a section on the line 5—5 of Fig. 3;

Fig. 6 is a section on the line 6—6 of Fig. 3;

Fig. 7 is a section on the line 7—7 of Fig. 4;

Fig. 8 is a plan view of the cover of the winding unit of Fig. 1; and

Fig. 9 is a section on line 9—9 of Fig. 8.

The invention is shown by way of example as applied to a multiple winding machine of the type disclosed in United States Patent No. 1,911,047, in which a plurality of winding packages are moved in a circulatory path, a preferred form of package-driving means comprising the drive roll 11 shown in Figs. 1, 2 and 3. Each winding package 12 is carried by a unit indicated generally by the reference numeral 13 (Fig. 1) adapted to travel along the upper rail 14 of the machine frame. The general construction of this unit is the same as a unit of the machine of said Letters Patent and will not here be described in detail except to point out that the units of the machine illustrated herewith have been altered so as to adapt them to travel in a clockwise direction around the machine, thus to move past the operator from right to left. This involves pivotally mounting the package-carrying arm 15 at the point 16a at the right-hand side of the traveling unit 13, and corresponding change in position of the lifter-rod 16 and its associated stop mechanism.

The package-carrying arm 15 swings about its pivot 16a as the package grows, and swings still further about its pivot to carry the package out of contact with the drive roll 11 to stop winding and position the package for attention by the operator. Means for causing this latter motion of the package-carrying arm may, for example, include a dog 18, carried in an enlarged head 19 of a horizontal shaft 20, and adapted to strike in passing and be rotated by a long pin 21 extending from the rail 14, thus to turn the shaft 20 and a crank 23 to raise the lifter-rod 16. Such rise of the lifter-rod results in swinging the package-carrying arm 15 counterclockwise in Fig. 1 until the stop 25 strikes the portion 27 of the unit frame, as indicated in Fig. 2. Before reaching the long pin 21, the packages of some of the units may have already been raised into this same position by the lifter-rod 16 being similarly actuated by the breakage and exhaus-

tion detector which is constructed and operates as described in the said patent application Serial No. 476,776. Swinging of the package to its elevated position out of contact with the drive roll 11, removes the winding strand S from the reciprocating eye 26 of the traverse device and leaves the strand hanging down from the raised package in convenient position to be taken by the operator. The raised package is, moreover, conveniently situated for the operator to find a broken or exhausted end of strand which has been wound thereon. The front of the unit, that is, the left side of the unit in Fig. 1, is nearest the operator, who usually is seated at one end of the elongated closed path of travel of the units; and the outward swing of the package-carrying arm 15 and package 12 is relied upon to bring the package and strand into convenient reach of the operator. This manner of swinging the package outwardly about a pivot 16a which is on the side from which the strand approaches the drive roll 11 involves disposing the package-carrying arm 15 wholly at one end of the package, keeping the space in front of the lowered winding position of the package clear for the winding strand which is reciprocated by the traverse eye 26, and keeping the space below the raised inactive position of the package clear for access to a strand extending up to the raised package.

Referring to Figs. 1, 2 and 3, the package-carrying arm 15 is slotted at 30 (Fig. 2) and bored to receive and clamp a sleeve 32 which is integral with a box-like casing member 33. This casing member 33 includes an integral sleeve 34 in which an extension 35 of the spindle 36 is adapted to slide and to turn. The casing member 33 and its associated parts thus constitutes the connection between the spindle proper 36 and the swinging package-carrying arm 15.

The spindle 36 serves as a support for any suitable form of rotatable cone holder, herein shown as formed of a hub 39 turning on bushings 40, 41, tapered at 43 to receive the small end of the cone 44 and provided with a tapered rim 46 to receive the large base of the cone. Means for locking the cone on the holder may comprise a pair of prongs 48 pressed outwardly into the cone by springs 49.

In the initial driving position in which the cone is bare of any winding, a common plane passes through the axis of the drive roll 11 and the axis of the spindle 36 and associated cone-holder, this latter axis converging with the axis of the drive roll at half the angle of taper of the bare cone. In order that the swinging of the package-carrying arm and spindle during growth of the package will not change the relation of the axes of the spindle and drive roll to a skewed relation with consequent loss of taper of the winding package and loss of proper contact with the drive roll, the invention provides for altering the relation between the spindle and swinging package-carrying arm in such manner as to compensate for this tendency. As will hereinafter appear, this alteration of relation between spindle and swinging arm also provides for progressively increasing the taper of the package. Moreover, this alteration of relation between spindle and swinging arm is most conveniently attained by means which simultaneously shift the package with respect to the traverse device so as to increase the concavity of the tip end of the package and increase the convexity of the base end.

In aid of accomplishing these functions, the extension 35 of the spindle 36 is disposed at a slight angle to the axis of spindle 36 proper, herein shown as approximately 8° 30′, the axis about which the spindle extension turns with respect to the package-carrying arm is such that in the starting position the spindle 36 lies in a plane passing through the axis of the drive roll, and means is provided for causing the extension 35 to rotate sufficiently during upward swinging of the arm 15 to cause the axis of the spindle 36 to lie in successive radial planes passing through the axis of the drive roll. This latter means is herein shown as including a cam 50 fast on the support for the pivot 16a of the package-carrying arm, a plunger 51 sliding in the sleeve 32 and carrying a cam-follower roller 52 adapted to contact with the cam 50, the plunger 51 being suitably connected to turn the inclined extension 35 of the spindle 36 in accordance with the upward swinging movement of the arm 15 to maintain the desired alignment of the spindle and drive roll.

Preferably this means for turning the spindle is adapted also to provide the desired retraction of the spindle in the direction of the base of the cone, with relation to the range of traverse. For this purpose the connection between the plunger 51 and extension 35 is shown as comprising a dog 54, pivoted at 55 to the casing 33, and having a hole 56 to receive a ball 57 which is held fast on extension 35 by a pin 58. This connection between plunger 51 and extension 35 thus rotates the extension 35 about its axis and simultaneously displaces the extension 35 endwise as the plunger 51 is forced out by the upward swing of the package-carrying arm 15.

The rotation of extension 35 in a direction such as to maintain the axis of spindle 36 in planes passing through the axis of drive roll 11 simultaneously provides an increasing inclination of these axes, so that the taper of the package is gradually increased. Thus by the time the plunger 51 has been fully forced out by the upward movement of the arm 15 due to growth of the package the taper of the package will have been very materially increased. A light spring 60 is preferably positioned in the casing 33 to act on the dog 54 for the purpose of yieldingly urging the associated parts toward their starting positions.

Preferably means for unlocking the cone 44 from its holder is provided, this means preferably normally being free of the cone holder. As indicated in Figs. 3 and 4, there is provided on the end portion of sleeve 34 a hub 62 having an integral outer conical rim 63 adapted to be engaged as in Fig. 4 with the outer faces of the slightly inturned ends 49a of locking springs 49 on the cone receiver, to cam these springs and their prongs 48 inward and release the cone.

As will be noted from Fig. 3, the rim 63 is normally away from these spring ends 49a, which are brought close to it by the retracting movement of the spindle and cone holder. It will be observed that the cone holder, when in the position of starting winding, cannot have its cone-locking elements 48 held inoperative. The final engagement of the element 63 and spring ends 49a is caused by an outward camming of this element 63 away from the casing 33. As indicated in Fig. 3, a spring 65 on the sleeve 34 normally holds the hub 62 and rim 63 close to the casing 33. A pin 66, extending from sleeve 34, is adapted to lie in a cam slot 67 in the rim 63, but by rotating a handle 68 which is integral with this rim 63, the hub 62 and rim 63 are forced to the left by the action of pin 66 in slot 67. This

movement, which will normally be made when the package has been swung up to the position of Fig. 4, then engages rim 63 with spring ends 69a to unlock the cone.

It is preferred to provide for applying to the package, during winding, an additional pressure other than resulting from the mere weight of the arm 15 and its associated parts, and finally when the package is sufficiently far from the drive roll, to restrain the package in its upward and outward position. For these purposes, the invention provides on the crank 23 of the lifter mechanism an extension 70 carrying a rearwardly extending roller 71 adapted to engage under a downwardly pressing strip spring 72 which is mounted on the frame of the winding unit. When the package is raised from the roll by the stop mechanism, the further movement of the crank 23 carries the roller 71 past a vertical dead center, so that the spring 72 then restrains the package against returning to the drive roll. In this position the package is thus steadied so that it can conveniently be unlocked by turning the handle 68 without any likelihood of its being accidentally swung back to the winding position. To enable the spring pressure to be dispensed with when desired during winding, and to be employed only for the purpose of restraining the raised inactive package, the frame of the winding unit is preferably provided with a latch for the spring, adapted to be set to hold the spring in an elevated position such that it will engage the roller 71 only when the package has been raised. In Fig. 2 such latch is indicated in the form of a short strip of steel 77 mounted on the frame by a single scew 78. In the position indicated in Fig. 2, this latch 77 renders the spring 72 inoperative in the winding positions of the package, but by turning the latch 77 90° about the axis of the screw 78, the spring is enabled to act on the roller 71 in all positions of the package, for example in the position indicated in Fig. 1.

A further preferred feature of the machine is the provision of a higher winding tension at the top of the cone than at the base of the cone. In the illustrated machine this is accomplished by the use of friction elements acting on yarn of the fan-shaped figure formed between the tension device 80 and the quick-traverse guide eye 26. As particularly shown in Figs. 1 and 8, the yarn in approaching this guide eye 26 runs through the slot of a wide blade slub-catcher 81. From the upper blade of this slub-catcher there extends a stationary wire 82 forming a friction element under which the oscillating fan of yarn passes. The cooperating friction element is preferably the pivoted wire detector bail 83 which is held down by the running yarn over it, and which in rising initiates the actuation of the stop mechanism. As indicated in Fig. 9, this wire is suitably bent so as to slope upwardly approximately uniformly from a low point 84 to a high point 85. The fan-shaped figure of yarn oscillates within a range of travel including these low and high points of the wire 83, and in so doing is subjected to variable friction by the wires 82 and 83, dependent in amount upon the instantaneous position of the oscillating yarn, small at the base of the cone where the wire 83 is low, and relatively large at the tip of the cone where the wire 83 is high. This variable tensioning effect can be applied alone or in addition to a tension applied in a uniform manner by the tension device 80.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

I claim:

1. A winding machine having therein a rotatable roll on which the winding package rests, a swinging arm, a winding package holder, a connection between said swinging arm and the package holder permitting approximately endwise movement of the package holder bodily toward and away from the swinging arm to shift the package along the roll, and means operated by swinging of the arm for causing said movement.

2. A winding machine having therein a rotatable roll on which the winding package rests, a swinging arm, a winding package holder, a connection between said swinging arm and the package holder permitting approximately endwise movement of the package holder bodily toward and away from the swinging arm to shift the package along the roll, a cam, and means carried by the swinging arm and cooperating with the cam as the arm swings for causing approximately endwise movement of the package holder.

3. A winding machine having therein a rotatable friction drive element on which the winding package rests, a swinging arm, a winding package spindle inclined to the friction drive element, an extension of the spindle nearly in prolongation thereof, the axis of the extension being slightly inclined to the spindle axis, the said extension being carried by the swinging arm, and means operative as the arm swings upward during growth of the winding package for rotating the spindle and its extension about the axis of the said extension in a direction to increase the angularity of the spindle to the drive element.

4. A winding machine having therein a rotatable friction drive element on which the winding package rests, a swinging arm, a rotatable cone-holder having its axis inclined to the friction drive element, a support for the rotatable cone-holder including a part having its axis inclined at a slight angle to the axis of rotation of the cone-holder and rotatably associated with the swinging arm, and means operative as the arm swings upward during growth of the winding package for causing the support for the cone holder to turn with relation to the swinging arm about the slightly inclined axis of said inclined part in a direction to increase the angularity of the cone holder to the drive element.

5. A winding machine having therein a rotatable friction drive element on which the winding package rests, a swinging arm, a rotatable cone holder having its axis inclined to the friction drive element, a support for the rotatable cone holder including a part having its axis inclined at a slight angle to the axis of rotation of the cone holder and rotatably associated with the swinging arm, and means for causing the support for the cone holder to turn with relation to the swinging arm about the slightly inclined axis of said inclined part at a rate such as to maintain the axis of the cone holder in planar relation to the axis of the rotatable drive element as the cone holder and arm swing away from the drive element during growth of the winding package.

6. A winding machine having therein a rotatable friction drive element on which the winding package rests, a swinging arm, a rotatable

cone holder having its axis inclined to the friction drive element, a support for the rotatable cone holder including a part inclined to the axis of rotation of the cone holder and associated arm, and means for simultaneously shifting the support for the cone holder along the axis of said inclined part and turning said support on the same axis during said shifting.

7. A winding machine having therein a rotatable friction drive element on which the winding package rests, a swinging arm, a rotatable cone holder having its axis inclined to the friction drive element, a support for the rotatable cone holder including a part having its axis inclined at a slight angle to the axis of rotation of the cone holder, the said part being rotatably associated with the swinging arm, a cam, and means including a cam follower moved over the cam by the swinging of said arm for transmitting a turning movement to the said inclined part as the arm swings.

8. A winding machine having therein a rotatable friction drive element on which the winding package rests, a swinging arm, a rotatable cone holder having its axis inclined to the friction drive element, a support for the rotatable cone holder including a part inclined to the axis of rotation of the cone holder and associated arm, a cam, a plunger on the swinging arm adapted to cooperate with the cam, and a connection between the plunger and the said inclined part adapted upon upward swinging of the arm to simultaneously turn and longitudinally shift said inclined part with relation to the arm.

9. A winding machine having therein a rotatable friction drive element, a rotatable cone holder adapted to hold a winding conical package in contact with said drive element, means for retracting the cone holder in the direction of the base of the cone during movement of the cone holder away from the drive element, mechanism associated with the cone holder for locking a cone in place thereon, manually operable means for rendering said locking mechanism inoperative, said manually operable means being positioned out of cooperative relation to the locking mechanism when the cone holder is in position for the start of winding, and the said retracting movement of the cone holder being adapted to bring the locking means of the cone holder into position to be unlocked by the said manually operable means.

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