Feb. 26, 1946. L. M. COTCHETT 2,395,464

YARN WINDING MACHINE

Original Filed Jan. 19, 1943 5 Sheets-Sheet 1

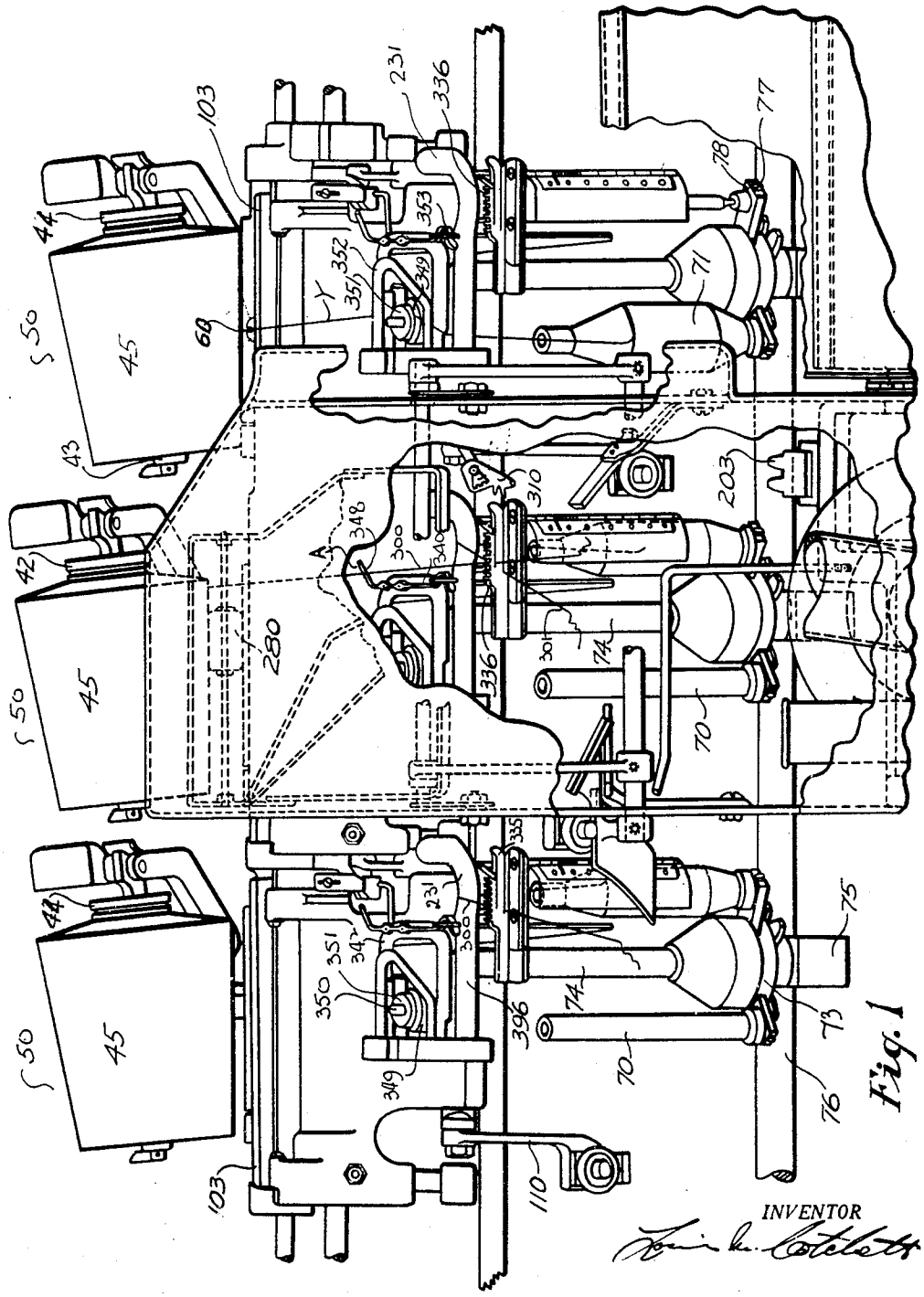


Fig. 1

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YARN WINDING MACHINE
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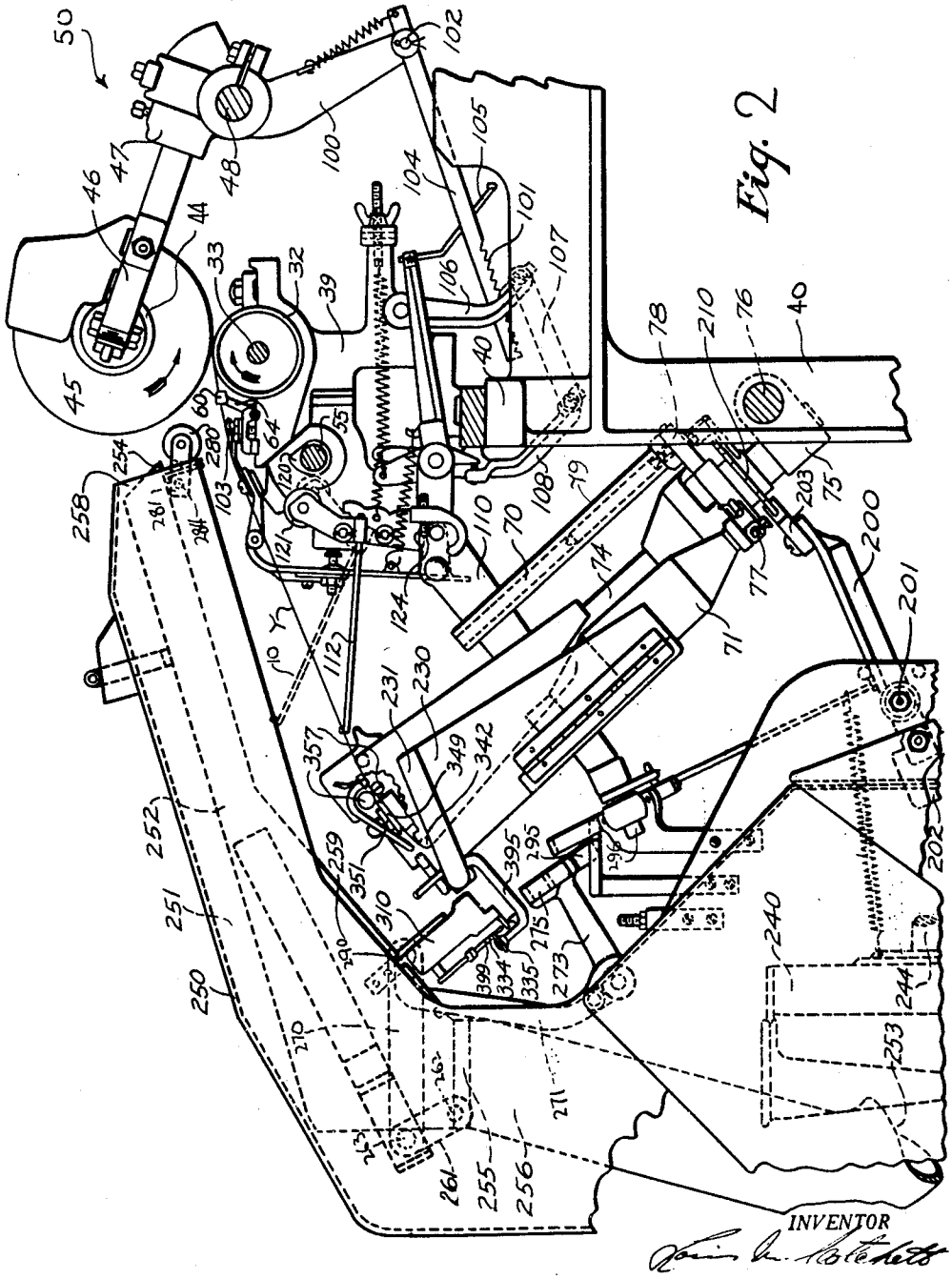


Fig. 2

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2421 WINDING & REELING,
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YARN WINDING MACHINE

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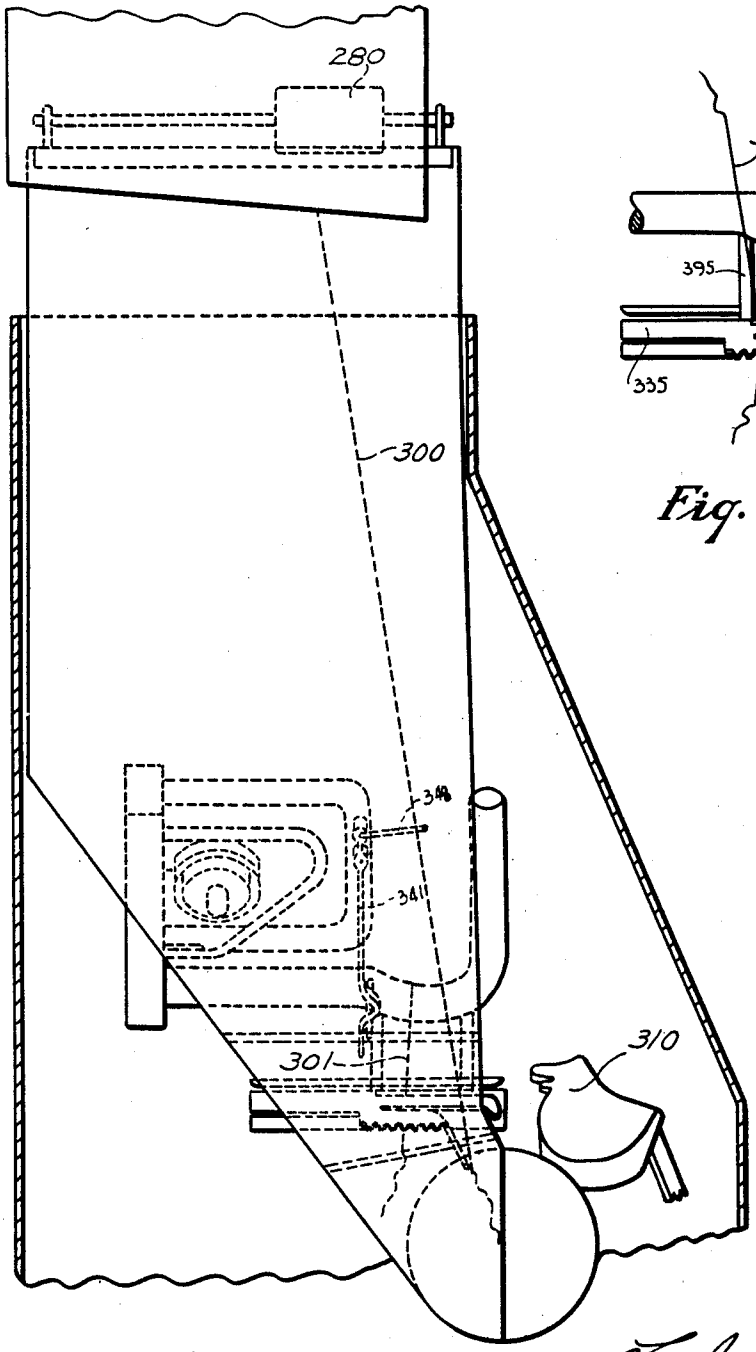


Fig. 3

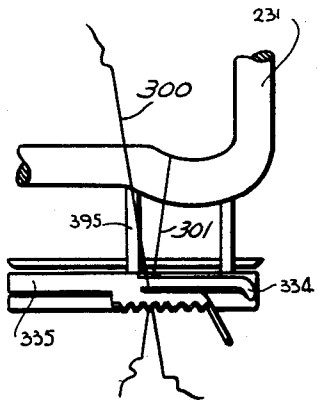


Fig. 4

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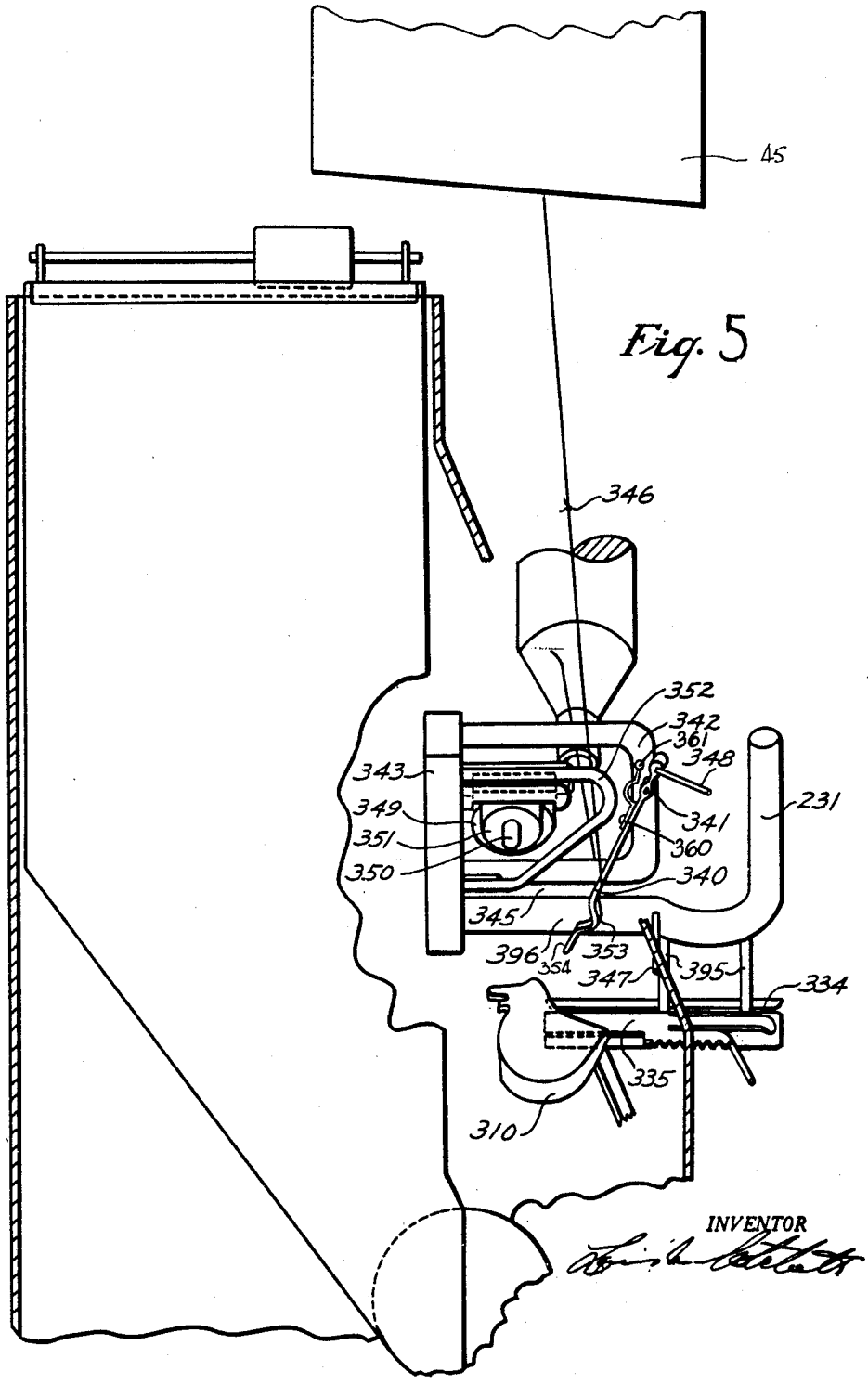


Fig. 5

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YARN WINDING MACHINE

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Fig. 7.

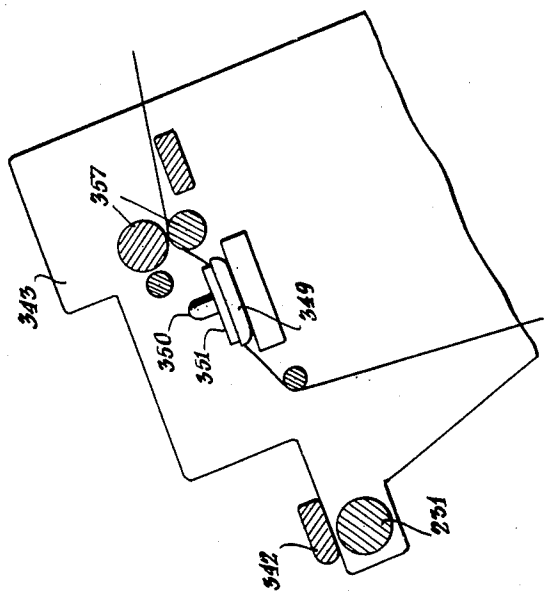
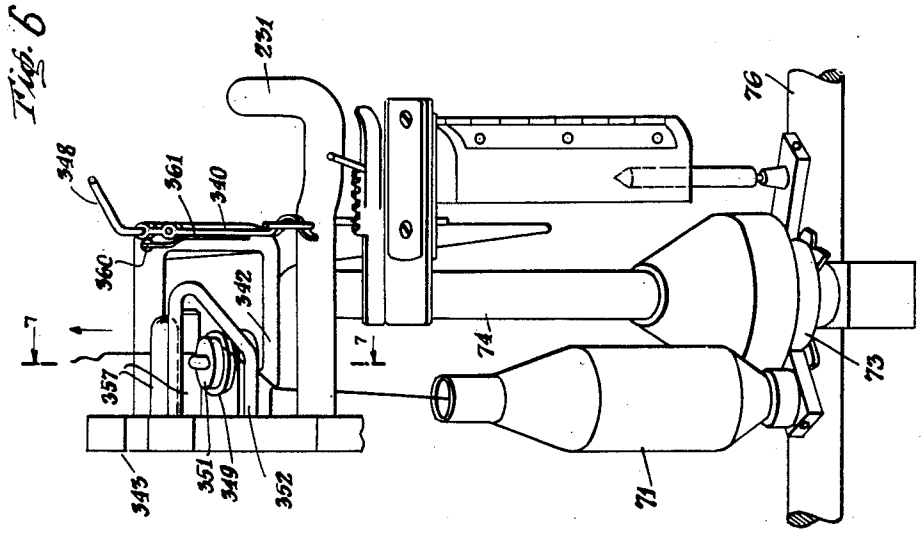


Fig. 6



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242: WINDING & REELING,
35.6

Patented Feb. 26, 1946

2,395,464

UNITED STATES PATENT OFFICE

2,395,464

YARN WINDING MACHINE

Louis M. Cotchett, Hingham, Mass., assignor to Foster Machine Company, Westfield, Mass., a corporation of Massachusetts

Original application January 19, 1943, Serial No. 472,862. Divided and this application October 22, 1943, Serial No. 507,257

14 Claims. (Cl. 242—35.6)

The present invention relates to new and useful improvements in winding machines and more particularly to a novel and improved tensioning control mechanism for the yarn as it is wound on a package from a supply bobbin.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:

Fig. 1 is a side elevation of a winding machine having a plurality of units showing a specific form of the present invention;

Fig. 2 is a vertical section of one of the winding units of Fig. 1;

Fig. 3 is a plan view of one of the winding units of Fig. 1;

Fig. 4 is a fragmentary view of part of the apparatus of Fig. 1; and

Fig. 5 is a view similar to Fig. 3, but showing a different position of the mechanism.

Fig. 6 is a view similar to Fig. 5 showing a further position of the mechanism; and,

Figure 7 is a cross section on the lines 7—7 of Figure 6.

The present invention has for its object the provision of a novel and improved tension control mechanism for a winding machine where a minimum of attention on the part of the operative is necessary, particularly as concerns the retention of the running yarn in the tensioning mechanism. The invention further provides, in a winding machine, means for introducing a loop of yarn drawn between the supply bobbin and the package automatically into the tension mechanism so as to remove the necessity of constantly introducing such a loop manually into the tensioning mechanism whether this loop is caused by the breakage of the yarn and the subsequent tying of the ends, or the joining of the end of a new supply bobbin to the yarn end on the partly filled package.

Further objects of the invention are: to provide novel and improved tension control mechanism whereby any slack in the yarn between the package and the supply bobbin is taken up automatically at all times; to provide novel and improved tension control mechanism where a loop of yarn between the package and the supply bobbin is automatically directed toward the tensioning device proper and then accurately placed within the clamping parts thereof; and the provision of mechanism such that a knot formed by the joining of the yarn on the supply bobbin and the yarn on the package shall not be introduced into the tensioning mechanism but only that part of the yarn shall be introduced which is below the said knot.

In the preferred embodiment of the invention here disclosed, the invention is illustratively applied to a winding machine having several units arranged in a continuous series, each winding unit comprising a constantly rotating driving roll, a pivoted yarn carrying package, a core receiving spindle or shaft for said package which can be lowered to bring the core into driving relation to the driving roll so that the yarn or other filamentous material is wound on the package by rotation of the driving roll and core.

Usual yarn guide means are traversed back and forth across the surface of the package to wind the yarn properly on the core. The winding package normally rests upon and is driven by the driving roll but can be lifted and held away therefrom to an idle or non-driving position upon discontinuance of the flow of the yarn being wound under control of yarn detector or drop wire normally held in operative position by the running strand being wound.

Adjacent each of the winding units is provided a support for a yarn supply mass such as a bobbin and, as illustrated, a plurality of these bobbins may be provided. The yarn is supplied through tensioning mechanism to the package being wound and passes over the yarn detector mentioned above so as to normally keep the package in contact with its driving roll.

Associated with the yarn package rotating mechanism is a suction and blower apparatus including a suction nozzle which operates after the yarn has been exhausted from a supply bobbin to suck the loose yarn end on the package into the nozzle by a current of air. A blowing nozzle is also provided immediately next to the suction nozzle for the purpose of blowing free and releasing the end of the yarn on the package when this is found. Means are also provided for reversing the rotation of the package to permit the periphery thereof to be explored for the loose end and when found to be unwound through its re-

verse rotation. For this purpose an idle roll is mounted at the upper portion of an air duct carrying the suction nozzle said roll being closely adjacent to the suction nozzle, means being provided for moving the idle roll between the package and its driving roll.

When the drawn end of the yarn on the package is free, it is assembled with the leading end of a reserve yarn supply being positioned for tying either manually or by a mechanical knotter. While manual knotting would be satisfactory, in the instant invention automatic knotting is illustrated in the drawings. The knotter may be of conventional design and is mounted so as to receive, engage and tie the assembled yarn ends into a secure knot after which the surplus yarn beyond the end is trimmed in the usual manner.

A suitable starting lever is provided for each unit which is under control of the yarn detector and is adapted to remove the package from contact with its driving roll when no yarn strand is present between the supply bobbin and the package. After supply of yarn has been made continuous by knotting together the ends of the yarn supply on the bobbin and the yarn held on the package the starting lever is moved into operative position to cause rotation in winding direction of the package.

In accordance with the instant invention it is generally desired to wind the yarn with some tension and also to slub the yarn and a tension and slubbing device is therefor provided between the yarn supply and the winding package, means being provided for insuring that the assembled and tied yarns are correctly threaded through the tension and slubbing means automatically. These means also operate to pass the knot formed by the tying operation beyond the tension and slub catching device thereby preventing snagging of the knot and possible breakage of the yarn in the slubbing mechanism.

It will be understood that the foregoing general description and the following detailed description as well are exemplary and explanatory but are not restrictive of the invention.

Referring now in detail to the accompanying drawings which show the present preferred embodiment of the invention, there is provided, as particularly illustrated in Fig. 1, a winding machine having a plurality of units **50**, each unit being substantially identical with the others. These winding units are of substantially conventional construction and comprise a driving roller **32** driven by a shaft **33** mounted in journals **34** and adapted to be driven by a motor or similar prime mover (not shown). A common prime mover may drive all of shafts **33** through gearing or like driving means, if desired.

A suitable core for the package to be wound is shown at **44**, package **45** being mounted thereon and being freely rotatable on the spindle **43** thereof. Spindle **43** is supported at the end of an arm **46** which is rotatably mounted by means of a collar **47** on a shaft **48** which may extend from one end of the machine to the other and thus serve to mount several of the arms **46**. Arm **46** for each unit holds the spindle **43** at such an angle that substantially full contact may be established between the package core **44** and the driving roll **32**, thereby rotating the package core **44** and the package **45** thereon by frictional contact.

A thread guide **60** is provided for each of the units, this being of conventional construction and being adapted to reciprocate in a controlled varied time relation to the rotation of shaft **33** by means of the well known cam groove and cam connections. The thread guide **60** is mounted on an arm **64** adapted to be carried by the reciprocating means referred to. Thus as the package **45** is rotated by the driving roll **32** the yarn being supplied from the supply bobbin is traversed back and forth along the length of the package core **44** by the thread guide **60** to lay it on the package in uniform layers.

The yarn supply is illustratively carried on bobbins **70** which may be tubular and have a mass of yarn **71** thereon, being illustrated as the type of bobbin which would be produced by conventional spinning machines. If desired several of these bobbins may be supported on a movable bobbin support for each unit, as shown in Figs. 1 and 2. The bobbin support comprises a base **73** which can be rotated on its supporting shaft **74**, this shaft **74** projecting in a generally upward direction from a bracket **75** fixed to and supported by a rod **76** extending along the lower part of the main machine frame **40**. Base **73** is provided with three equally spaced radially extending pins **77**, each of which is pivotally mounted on a plate **78** and from which extends upwardly bobbin receiving pins **79**, these pins **79** loosely projecting into the tubular portion **70** of the bobbin **71**.

Suitable means may be provided for bringing one bobbin into operative position by rotating the base **73** which can be done by having a sprocket **210** adapted to be engaged by a rack **203** which is adapted to be periodically operated to engage the teeth of sprocket **210** to cause rotation of the base **73** in a predetermined cycle for each of the units. The means provided for moving a fresh or reserve bobbin into winding off position, as shown in Figs. 1 and 2, comprise an arm **200** pivotally mounted about a horizontal axis. Arm **200** projects toward the bobbin support **73**, being mounted on a pivot pin **201** and has at the forward end a counterweight **202** while at the other end which is nearer to the bobbin support there is secured the short rack section **203** which is adapted to operate the gear **210** to rotate support **73** one-third of a revolution, when three bobbin pins are provided on the support.

As the yarn is drawn from the active bobbin it passes upwardly over a guide bar **342** between the tension washer **351** and the bottom washer **349** of a conventional tensioning device and thereafter passes over a thread guide bar **103** after which it is guided onto the package **45** by the traversing guide **60**. It is desired that the package being wound shall be taken out of driving contact with its driving roll **32** when the yarn breaks or the supply bobbin is exhausted and such stop motion may be a substantial duplicate of that shown in the prior patent to McKean, 1,992,757, except for the starting handle **110** and associated mechanism to be now described.

In the present illustrated embodiment, movement of this starting handle **110** is pivotally mounted and when swung is adapted to cause a rack **104** to move a pawl **106** over teeth **101** on rack **104** thus lifting the package **45** out of contact with the driving roll **32** through the medium of the link **100** pivoted at **102** to the rack **104**, and a rack lifter **105** adapted to move correspondingly. The pawl **106** is pivoted on the frame **39** which also rotatably supports driving roll **32**, and is connected by a link **107** to the lower end of an arm **108** which depends from the starting lever **110** so that when the starting lever **110** is automatically raised upon exhaustion of the yarn

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or breakage, as will be hereinafter described, said rack 104 will move to the left, as viewed in Fig. 2, to raise package 45 into an inoperative position.

Action of the starting lever 110 to raise it on exhaustion of the yarn between the supply bobbin and package is caused by the movement of the detector finger or drop wire 112.

In Fig. 2 there is illustrated the position of the parts after release of the starting handle 110 and while the machine is in operation for winding. It will be noted that the thread bar 103 has been lowered so that the thread now runs correctly in the guide 60 while the drop wire 112 is held in the lowered position by the tension of the yarn strand Y, this position being shown in full lines in Fig. 2.

When the yarn Y breaks or the yarn is exhausted on the supply bobbin, the yarn detector 112 moves to the dotted line position 10, shown in Fig. 2, by the force of gravity causing the weighted counterbalanced end to be lowered. Raising of the yarn detector 112 to the position 10 causes a roller 121 attached thereto engage a cam 120 thereby releasing latch 124 and allowing handle 110 to be raised to stop position carrying with it arm 108 which moves latch pawl 106 forward about its pivot while it is in engagement with the teeth 101 of rack 104 thereby swinging a package 45 upwardly and away from its driving roll 32 regardless of the diameter of the package 45.

The winding mechanism may be restarted as soon as a new yarn has been joined to the end of the yarn on the package, as hereinafter described, and the starting is accomplished by restoring the parts to operative position generally as shown in Fig. 2.

When the operative replenishes the bobbin supply by placing a new bobbin upon one of the bobbin pins the operative keeps hold of the free end of the yarn on the new bobbin, takes it over a hook guide 231 and clips this yarn end in a slot 334 in a hook 335 also supported on the upper end of shaft 74 by means of a U-shaped bar 395, thereby holding the free end of the yarn for the assembling and knotting operations later to be performed.

Pneumatic means are provided for loosening the free end of the yarn from the package 45 being wound and for drawing a length of this yarn to be associated with the yarn end of the supply bobbin located in slot 334 for tying. For this purpose there is provided a centrifugal blower 240 which is driven by a suitable motor (not shown), the speed of the blower being chosen to be sufficient to develop a rather high velocity of air. A metal air conductor 250 is arranged to extend upwardly and toward the package 45 being wound, this conductor comprising a pressure duct 251 and a suction duct 252, the pressure duct peripherally surrounding the suction duct in the illustrated form. The suction duct 252 at its lower end 253 is connected to the intake of the centrifugal blower 240 while at the other end the suction duct terminates in a suction slot 254 preferably extending lengthwise of the package 45.

As the blower is driven, a relatively strong blast of air issues from the forward end 258 of the air conductor, this being directed against the surface of the package 45 and tending to loosen and dislodge the end of yarn sufficiently to free it immediately from the layers of yarn on the wound package, thereby allowing the loosened end to be picked up more readily and drawn into the slot 254 of the suction duct 252.

The suction duct 252 is adapted to be periodically projected toward the package 45 being wound so as to enhance and render more effective the suction operation through slot 254, and to this end the suction duct 252 is mounted on links 261, said links being pivoted on a pivot pin 262. The links 261 having their upper ends pivotally mounted on a rod 263 attached to either side of the suction duct 252.

Also connected to the shaft 263 is a link 270 having its forward end connected to the upper end of a bell crank 271 provided with a forwardly extending arm 273 to the forward end of which is attached a cam member 275. Cam member 275 engages with a hub 296 at the adjacent end of starting lever 110 so as to depress arm 273 thereby rocking the bell crank 271 to project the suction duct 252 forward until its slot 254 is closely adjacent the package 45 when the starting lever is in knock-off position due to the raising of yarn detector 112 to position 10.

At the forward end of the suction duct and immediately below the slot 254 is mounted a roller 280 rotatable in a bracket 281 which is pivotally mounted on the air duct 250 as at 284. Roller 280 moves forward with the suction duct 252 as it is projected toward the package and forms a reversing idler between the partially wound package 45 and its driving roll 32. Furthermore, roll 280 causes reverse rotation of the package 45 and the finding of the free end of the yarn is facilitated thereby. As the package 45 is thus reversely rotated yarn is paid off from it into the suction duct 252 and is laid along the bottom wall thereof and across a slot 290 therein.

Suction duct 252 is restored to its original position by the positive action of the cam 295 operating on the hub 296 when starting handle 110 is returned to winding position, and the suction duct remains in this position until it is needed for further operation.

The hook 335, already referred to, is adapted to move through the slot 290 to pick up the free end of the drawn yarn lying in duct 252 and associate it with the free end of the yarn from the supply bobbin which is already associated with the hook 335, since the operative has manually placed it there over hook guide 231.

In Figs. 3, 4 and 5, the two lengths of yarn are more specifically identified, yarn from the package being shown as 300 and yarn from the supply bobbin being shown as 301. The free end of the yarn 300 is now assembled by the action of the mechanism just referred to on the side of the hook 335 away from the package and the yarn 301 is also assembled on the same hook 335 as shown with respect to the middle unit of Fig. 1, and these are now ready for tying or knotting operation. This knotting may be provided manually or with a manually actuated mechanical knotter or the knotter may be actuated automatically. To this end, as illustrated, a knotter 310 is arranged on the housing duct 251 of the machine in a position to engage the yarns 300 and 301 and suitable means are provided for actuating the knotter to cause completion of the knotting operation. As illustratively shown, the knotter may be of the conventional type manufactured and sold by Mills Devices Company and is adapted to tie a weaver's knot.

Supporting means for the knotter are provided on the relatively stationary housing duct 251, as shown in Fig. 2, a suitable bracket 259 being provided to hold said knotter. The yarn ends 300 and 301 are passed through the knotter which is

operatively contacted by movement of the suction duct 252 whereby the conventional knot is tied in the two yarns as shown at 346 in Fig. 5. Cam means may cam the knotter into position to be actuated by a rack and toothed segment after which the knotter can be then cammed out of position to be ready for the next operation.

After the trailing end of the yarn 300 has thus been joined to the leading end of the yarn 301 the winding of the package 45 may be restarted and accordingly the starting arm 110 may be moved to restarting position as previously defined.

In accordance with the present invention, it is generally desirable that the yarn be wound under tension and that automatic means be provided for placing the yarn in the tensioning mechanism whenever there is a slack. To this end and as particularly shown in Figs. 3, 4 and 5, means are provided not only for tensioning the yarn as it is wound and also for introducing the tied strand formed of yarn end 300 and yarn end 301 into the tensioning mechanism and correctly threading this so as to require no separate manual operation. Due to the tying of the knot 346 in the yarn 300 and 301 a loop has been formed which will normally hang below and to one side of the tensioning device 349, 350, 351 as soon as the united yarns have been released by the knotter 310.

As specifically embodied, a pivoted finger 340 is mounted by its pivot on a U-shaped bar 342 which extends rearwardly from the support bracket 343 mounted suitably on the main frame of the machine, which support bracket mounts the tension device proper 349, 350, 351. The finger 340 is pivoted near one of its ends and the long end of the finger is positioned over the bar 396. Bar 342 is spaced from bar 396 to provide a passageway 345 therebetween and pivoted finger 340 extends in a downward position from its pivot 341 and is normally held by gravity in its lowermost position while any counter-clockwise rotation thereof is limited by a stop pin 347. A suitable spring such as a leaf spring 360 may bear against a part of lever 340 and be fixed by a pin 361 on member 342 to keep the loop formed by the joined yarns taut and to assist in maintaining the finger 340 in a normally downward direction. The shorter end of finger 340 which is the one proximate to the supply bobbin, is provided with an arm 348 extending substantially at right angles to the finger but in a slightly upward direction and this arm is adapted to guide the united yarn 300, 301 onto the finger 340 under the tension of winding, when this is resumed. Thus the loop formed in the united yarn 300, 301 will overlie arm 348 and as the loop is shortened under the continued rotation of yarn package 45 the loop will tighten up on arm 348 and slide inwardly thereof toward the tensioning mechanism. As previously defined, this tension mechanism itself comprises a base washer 349 having a central pin 350 over which is fitted the weight or tensioning cup washer 351 between which and the base washer 349 the yarn passes.

After the knot 346 has been tied by the knotter 310 the loop of yarn follows so as to overlie the inclined arm 348 as shown at A in Fig. 1 with respect to the central unit.

As the winding is resumed there will be an oblique pull on the strand of yarn which will cause the yarn to move slowly to the left taking up the slack therein and further winding pulls the yarn down onto the finger 340 as will be obvious from an examination of Fig. 5. Continued winding will rotate finger 340 on its pivot 341 in a clockwise direction and the oblique pull will continue to cause the loop of yarn to slide inwardly toward the tensioning mechanism proper, this being a direction to the left in the view shown in Fig. 5. Ultimately the yarn on finger 340 will also be introduced into the slit 345 upon the extreme movement of finger 340. Thus the yarn is carried directly between the tension washer guard 352 and the U-shaped rod 342, this guard 352 also being carried by bracket 343. The U-shaped bar 342 is arranged so that the arms have their upper faces substantially aligned with the space between base washer 349 and washer 351. Further pull on the arm as the winding proceeds causes the united yarn to be positioned between the base washer 349 and the top washer 351, inasmuch as the axis of the supply bobbin is positioned slightly to the left of pin 350 when viewed from the position of Fig. 1.

In Fig. 5 there is shown an intermediate position of the yarn transfer, after the knot has been tied as at 346 and after the reunited strand is being positioned beneath the washer guard 352 to enter the tensioning mechanism. As soon as the yarn has run off the abutment 353 of finger 340, and has been delivered directly to the tension device by lip 354, the finger 340 is free to return to the position shown in Fig. 5, after which the winding proceeds until the yarn has been exhausted from the supply mass or until a break occurs by reason of the slack.

A standard form of slub catcher 357 is also mounted on the bracket 343, its gap being aligned with the normal run of the yarn.

By reason of the slack existing in the yarn, that is, the loop drawn after knotting between the package 45 and the supply bobbin 71, and the delay between the resumption of winding of the package and the transfer of the yarn to a position beneath the washer 352 which is caused by the swinging of the finger 340, the knot 346 which has been tied in the yarn will be in a position above the tensioning device and slub catcher in the position shown in Fig. 5 and therefore this knot will pass to the package without entering the tension and slubbing devices so that there will be no danger of the knot being snagged by the tension device or the slub catcher.

The various positions of the tying and tensioning are clearly seen in Fig. 1 of the drawings wherein each of the three units have a different operation being carried out thereon. In the extreme left hand unit, it will be seen that the yarn 300 is overlying the hook guide 231 and is engaged in the member 335 ready for the action of the knotter when yarn 301 is assembled therewith, yarn 301 having its end wound on package 45 in this position. In the center unit the knotter 310 is shown in a position to actually tie the two yarn ends 300 and 301 since now yarn 301 has been drawn down by suction and is associated with hook 335 while in the right hand section the yarn is shown operatively engaged by the tensioning device, as a continuous strand Y. In the center section referred to, it will be seen that the yarn 300 is already overlying the arm 348 ready to act upon this as soon as the tying has been accomplished by the knotter 310. The actual tension caused by rotation of package 45 pulls the tied yarn ends out of the knotter 310 and this same tension thereafter causes the swinging of the arm 348 and its finger 340 to associate the loop of yarn with the tension mem-

bers 349 and 351 of the tension device as hereinbefore described.

This application is a division of co-pending application Serial No. 472,862, filed January 19, 1943.

In the said co-pending application Serial No. 472,862, there is disclosed and claimed an automatic tender or similar travelling carriage which successively passed by a plurality of units of a multi-unit winding machine, the tender being adapted to carry out automatically certain specified operations on each unit. The apparatus of the present invention is particularly adaptable for automatic actuating by such a travelling tender but equally the operations and apparatus herein defined and claimed may be actuated either manually, or semi-automatically or as specifically described in connection with the illustrated embodiment.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What is claimed is:

1. In a winding machine, the combination of a yarn package, means for supporting and rotating said yarn package, a supply bobbin from which yarn is wound on said package, tensioning means for tensioning the yarn during its passage from said supply bobbin to said package, knotting means for uniting the end of the yarn on said package with the end of the yarn on said supply bobbin, and means progressively pivotally movable under tension of the united yarn to direct the loop of united yarn bodily toward said tensioning means and into operative engagement therewith, said movable means being operated automatically upon rotation of said package in winding direction.

2. In a winding machine, the combination of a yarn package, means for supporting and rotating said yarn package, a supply bobbin from which yarn is wound on said package, tensioning means for tensioning the yarn during its passage from said supply bobbin to said package, knotting means for uniting the end of the yarn on said package with the end of the yarn on said supply bobbin, means acting under tension applied to the united yarn by rotation of said package, to direct the loop of the united yarn bodily progressively toward said tensioning means and to position said yarn within said tensioning means only after the knot formed by said knotting means has passed to a position beyond engagement by said tensioning means.

3. In a winding machine, the combination of means for supporting and rotating a yarn package, a supply bobbin from which yarn is wound on said package, a tensioning device for tensioning the yarn as it is supplied to said package from said supply bobbin, knotting means for uniting the end of the yarn on said package with the end of the yarn on said supply bobbin, and a member normally out of the path of the yarn as it is wound on said package but having sliding engagement with the slack in the united yarn remaining after said knotting means have operated, said member being movable toward said tensioning device under the pull of the united yarn as it is wound on said package, and being adapted to carry that portion of the united yarn having sliding engagement therewith toward and ultimately into operating contact with said tensioning device.

4. In a winding machine, the combination of means for supporting and rotating a yarn package, a supply bobbin from which yarn is wound on said package, a tensioning device for tensioning the yarn as it is supplied to said package from said supply bobbin, knotting means for uniting the end of the yarn on said package with the end of the yarn on said supply bobbin, and a member normally out of the path of the yarn as it is wound on said package but having sliding engagement with the slack in the united yarn remaining after said knotting means have operated, said member being movable toward said tensioning device under the pull of the united yarn as it is wound on said package, and being adapted to carry that portion of the united yarn having sliding engagement therewith toward and ultimately into operating contact with said tensioning device, means being provided to resiliently urge said member normally out of the path of said yarn as it is wound onto said package.

5. In a winding machine, the combination of means for supporting and rotating a yarn package, a supply bobbin from which yarn is wound on said package, a tensioning device for tensioning the yarn as it is supplied to said package from said supply bobbin, knotting means for uniting the end of the yarn on said package with the end of the yarn on said supply bobbin, and a member normally out of the path of the yarn as it is wound on said package but having sliding engagement with the slack in the united yarn remaining after said knotting means have operated, said member being pivoted at one end to permit the free end to swing toward said tensioning device under the pull of the united yarn as it is wound on said package, and being adapted to carry that portion of the united yarn having sliding engagement therewith toward and ultimately into operating contact with said tensioning device.

6. In a winding machine, the combination of a yarn package, means for supporting and rotating said yarn package, a supply bobbin from which yarn is wound on said package, tensioning means for tensioning the yarn during its passage from said supply bobbin to said package, knotting means for uniting the end of the yarn on said package with the end of the yarn on said supply bobbin, and a pivoted guide adapted to engage a slack loop portion of the united yarn and change the direction of extension of said loop toward and ultimately into said tensioning means by swinging around its pivot under the progressive pull of the united yarn as it is wound upon said package, said loop sliding down the length of said guide during its swinging.

7. In a winding machine, the combination of means for supporting and rotating a yarn package, a supply bobbin from which yarn is wound on said package, a tensioning device for tensioning the yarn as it is supplied to said package from said supply bobbin, and a pivoted member adapted to automatically be engaged by slack loop portion of the yarn whenever this occurs as it passes from said supply bobbin to said package, said member pivoting to change the direction of said loop and to permit said loop to progressively slide down its length toward and into operative contact with said tensioning device, under

control of the tension applied to said loop of yarn by rotation of said package.

8. In a winding machine, the combination of a yarn package, means for supporting and rotating said yarn package, a supply bobbin from which yarn is wound on said package, tensioning means for tensioning the yarn during its passage from said supply bobbin to said package, knotting means for uniting the end of the yarn on said package with the end of the yarn on said supply bobbin, and a pivoted guide adapted to engage a slack loop portion of the united yarn and change the direction of extension of said loop toward and ultimately into said tensioning means by swinging around its pivot under the progressive pull of the united yarn as it is wound upon said package, said loop sliding down the length of said guide during its swinging, said guide having an abutment at its free extremity terminating in a lip to assist directing the loop of yarn sliding down said guide into the tensioning device.

9. In a winding machine, the combination of means for supporting and rotating a yarn package, a supply bobbin from which yarn is wound on said package, a tensioning device for tensioning the yarn as it is supplied to said package from said supply bobbin, and a pivoted member adapted to automatically be engaged by slack loop portion of the yarn whenever this occurs as it passes from said supply bobbin to said package, said member pivoting to change the direction of said loop and to permit said loop to progressively slide down its length toward and into operative contact with said tensioning device, under control of the tension applied to said loop of yarn by rotation of said package, said pivoted member having an abutment at one end adapted to check the sliding motion of the loop and then pass the loop to a lip at the tip end of the member, which lip delivers the yarn loop to a point within the tensioning parts of the tension device.

10. In a winding machine, the combination of a yarn package, means for supporting and rotating said yarn package, a supply bobbin from which yarn is wound on said package, tensioning means for tensioning the yarn during its passage from said supply bobbin to said package, knotting means for uniting the end of the yarn on said package with the end of the yarn on said supply bobbin, means for drawing an end length of yarn from said package and means to draw an end length from said supply bobbin, means to assemble said two end lengths together for tying by said knotting means to form a knot in a slack loop of yarn formed from said end lengths, means actuated by increasing pull exerted on a side of said loop under rotation of said package to engage part of said loop and progressively move said loop toward said tensioning means for ultimate entry therein, and means to prevent said knot from entering said tensioning means.

11. In a winding machine having a rotating yarn package, a supply bobbin supplying yarn to said package and tensioning means to tension the yarn therebetween, means to automatically tie and re-tension the yarn ends of said package and supply bobbin on breakage of yarn or on replenishment comprising means to assemble the two yarn ends together, means to automatically knot them together and form a slack loop of the two ends, a projecting member normally out of contact with the yarn between said package and supply bobbin but engaged by said slack loop under continued pull caused by winding of said package and a pivoted guide attached to said projecting member adapted to swing toward said tensioning means under urge of said winding pull carrying said loop with it, and placing said loop into a position to be fed into said tensioning means on further pull exerted under winding.

12. In a winding machine having a rotating yarn package, a supply bobbin supplying yarn to said package and tensioning means to tension the yarn therebetween, means to automatically tie and re-tension the yarn ends of said package and supply bobbin on breakage of yarn or on replenishment comprising means to assemble the two yarn ends together, means to knot them together and form a slack loop of the two ends, a projecting member normally out of contact with the yarn between said package and supply bobbin but engaged by said slack loop under continued pull caused by winding of said package, and a pivoted guide attached to said projecting member adapted to swing toward said tensioning means under urge of said winding pull carrying said loop with it and projecting said loop into a position to be fed into said tensioning means on further pull exerted under winding, said projecting member extending substantially normal to the length of said guide and having a sliding surface upon which said loop slides into operative contact with said guide.

13. In a winding machine, the combination of means for supporting and rotating a yarn package, a supply bobbin from which yarn is wound on said package, a tensioning device for tensioning the yarn as it is supplied to said package from said supply bobbin, knotting means for uniting the end of the yarn on said package with the end of the yarn on said supply bobbin, and a member pivoted to swing normally out of the path of the yarn as it is wound on said package, but having sliding engagement with the slack in the united yarn remaining after said knotting means have operated, said member being swung toward said tensioning device under the pull of the united yarn as it is wound on said package, and being adapted to carry that portion of the united yarn having sliding engagement therewith toward and ultimately into operating contact with said tensioning device under an oblique pull caused by the relationship between said supply bobbin and said tensioning device.

14. In a winding machine, the combination of means for supporting and rotating a yarn package, a supply bobbin from which yarn is wound on said package, a tensioning device for tensioning the yarn as it is supplied to said package from said supply bobbin, and means pivotally movable by the increasing tension of a slack in the yarn to progressively direct the yarn toward and into operative relation with said tensioning device, said pivotally movable means operating automatically under control of rotation of said yarn package.

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