Aug. 15, 1967 T. E. PITTS ET AL 3,335,476

METHOD AND APPARATUS FOR CONTROLLING DEFECTS

Filed June 27, 1966 3 Sheets-Sheet 1

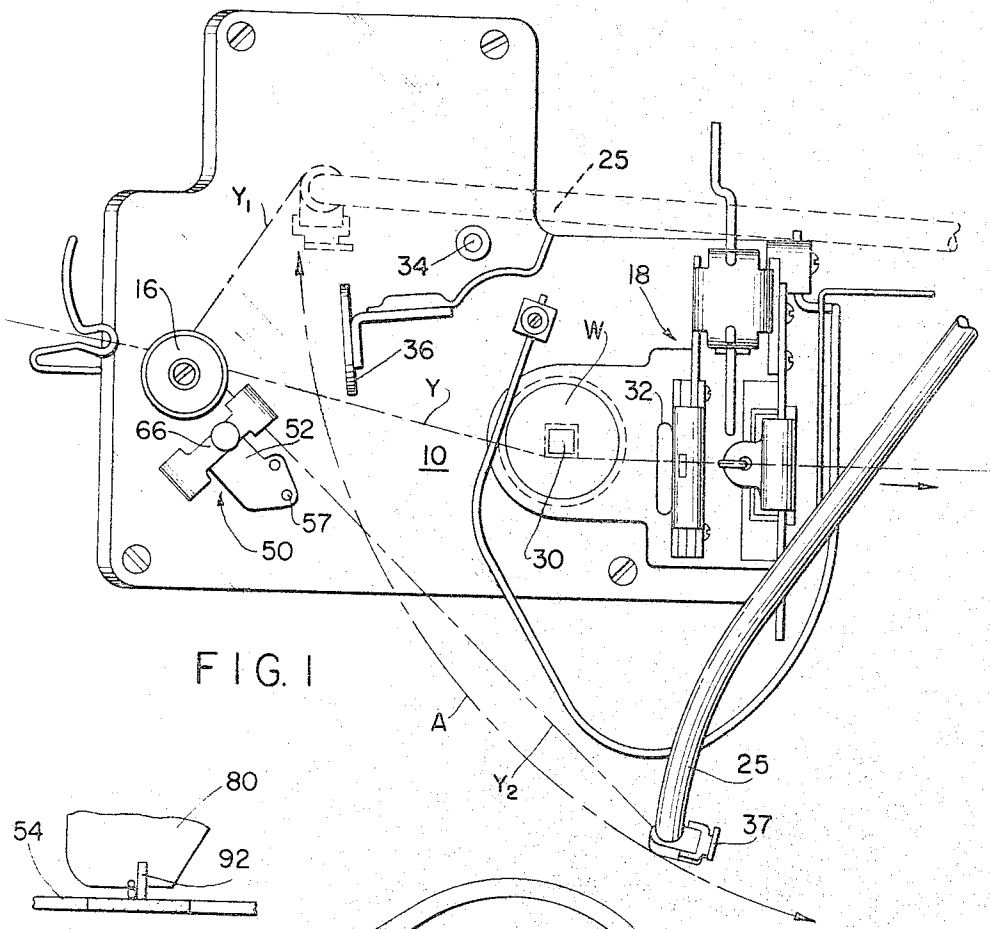


FIG. 1

FIG. 8

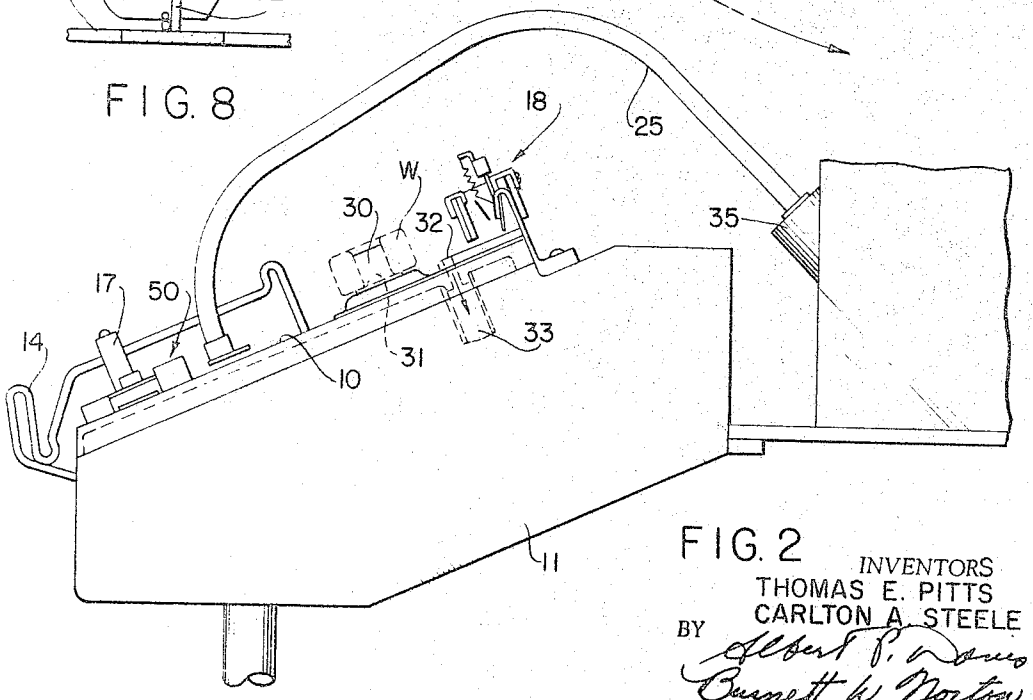


FIG. 2

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METHOD AND APPARATUS FOR CONTROLLING DEFECTS

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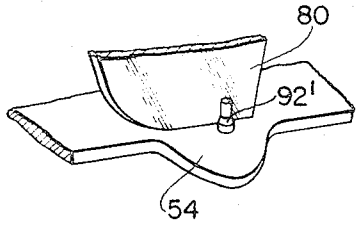


FIG. 9

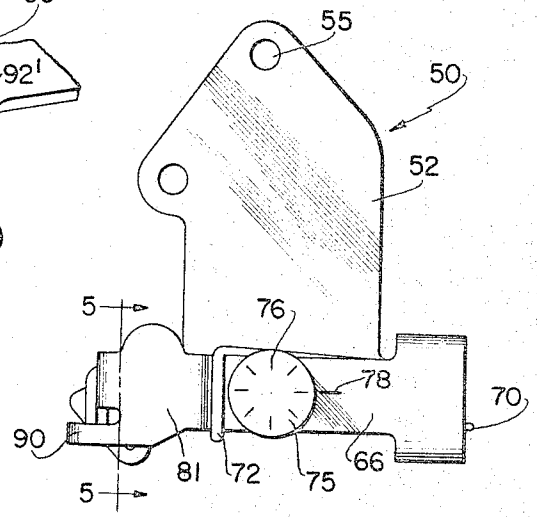


FIG. 3

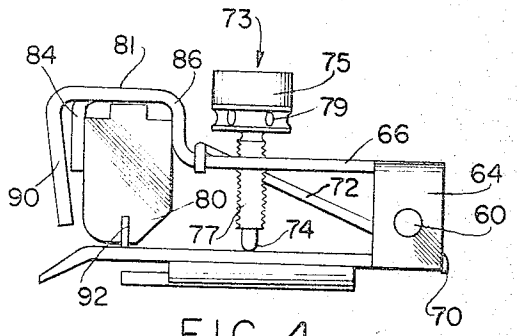


FIG. 4

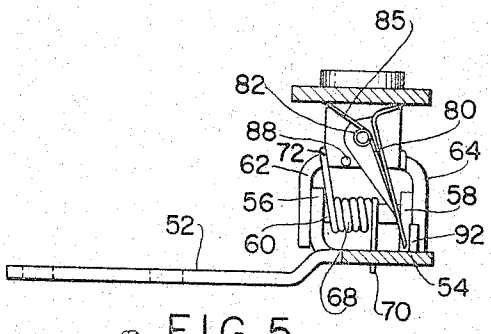


FIG. 5

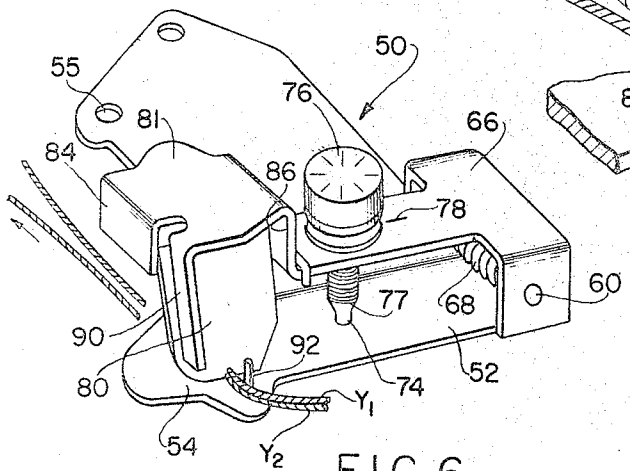


FIG. 6

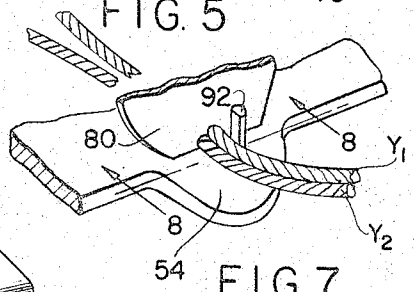


FIG. 7

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METHOD AND APPARATUS FOR CONTROLLING DEFECTS

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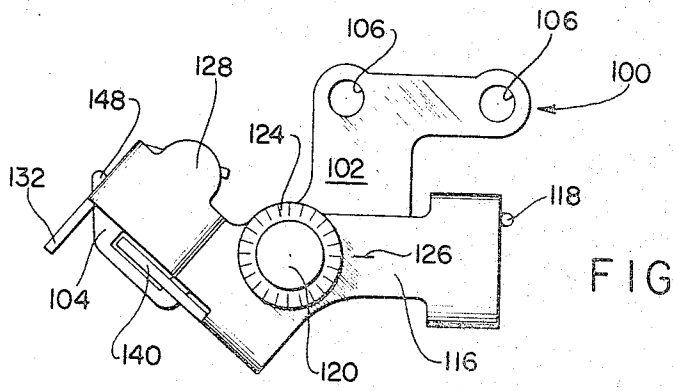


FIG. 10

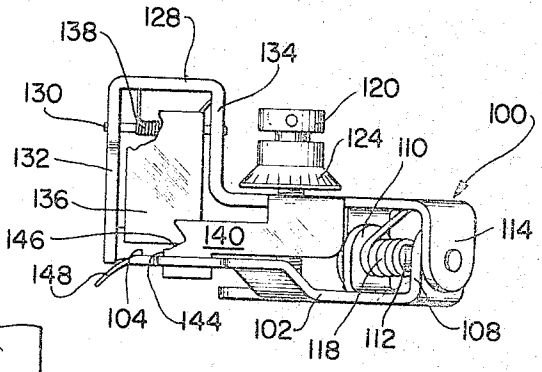


FIG. 11

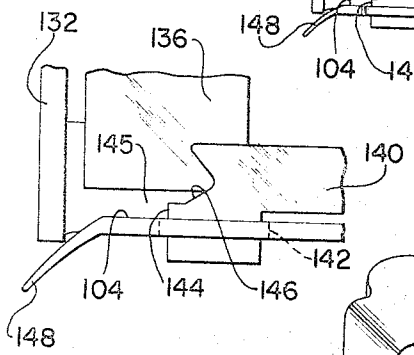


FIG. 13

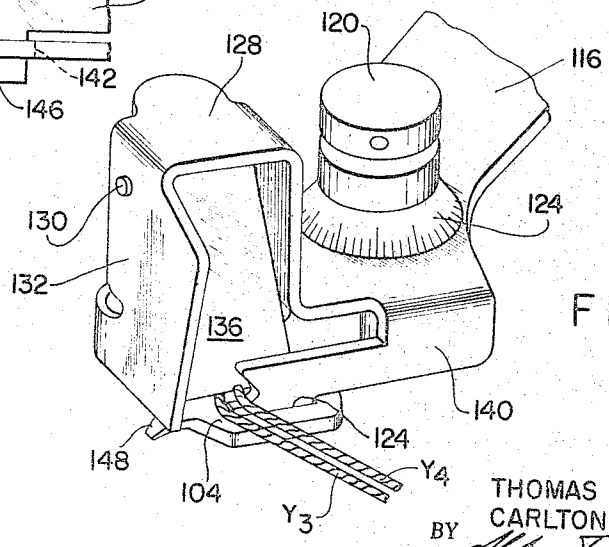


FIG. 12

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3,335,476

METHOD AND APPARATUS FOR CONTROLLING DEFECTS

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Filed June 27, 1966, Ser. No. 560,768
22 Claims. (Cl. 28—64)

This application is a continuation-in-part of copending application Ser. No. 481,164, filed Aug. 20, 1965, now abandoned.

This invention relates to improvements in an automatic winding machine and, more particularly, relates to the provision of means in an automatic winding machine for preventing the knotting of defective yarn, such as yarn having multiple ends, during the free end pick-up and tying cycle.

Throughout the present specification and claims, it is to be understood that whenever the word "bobbin" is used, its meaning will be construed to include other forms of weft-carriers such as cops, quills, and pirns. Likewise, the term "yarn" is used in a general sense to designate all types of attenuated materials and the term "package" is employed for convenience of description to apply to any usual form of wound mass.

In conventional automatic winding machines now commercially available as, for example, that disclosed and claimed in U.S. 2,764,362, issued Sept. 26, 1956 to W. V. Goodhue et al. yarn is wound from a supply bobbin to form a take-up package. In the machine of the cited patent, upon breakage or exhaustion of the supply yarn a fresh supply bobbin is introduced and, in sequence, its outer end is presented automatically to a yarn servicing assembly, the end seized by pick-up mechanism and transferred to knotter mechanism where it is joined with the outer end of yarn from the take-up package, and the winding cycle thereafter reinitiated.

During the foregoing movements of the fresh supply yarn end, which said movements may be conveniently thought of as constituting the "pick-up and tying cycle," the yarn is automatically threaded through one or more servicing elements on the servicing assembly. Such elements may include yarn guides, a yarn waxing attachment, mechanisms to sense the presence of supply yarn, and one or more slub catchers whose function is to mechanically inspect the supply yarn as it is wound and to exclude the passage of slubs to the package.

It has been recognized that the usual main slub catcher on an automatic winding machine may not suffice to inspect the supply yarn at all times. Especially, it is known that during the pick-up and tying cycle the fresh supply yarn may, at least for a portion of its length, escape inspection by the main slub catcher. To remedy this undesirable situation it has been proposed to provide an auxiliary slub catcher on the yarn servicing section of the winding machine closely adjacent to the yarn pick-up point.

One auxiliary slub catcher which has been so employed is that disclosed in U.S. Patent 3,142,451 of July 28, 1964 to Thomas E. Pitts. In said patent there is disclosed an auxiliary slub catcher which serves to detect and remove those slubs or snarls which form in the yarn between the tension mechanism and the primary slub catcher during the pick-up and tying cycle. However, the aforementioned slub catcher is not entirely successful when acting on multiple yarn ends. Multiple ends arise in a yarn strand when the yarn becomes doubled or looped on itself so as, in effect, to present several ends at the yarn servicing assembly and pick-up nozzle. Such condition frequently arises where, for example, the supply yarn is delivered to the yarn servicing assembly by

pneumatic means. This involves rather violent removal of the outer coils of yarn from the supply bobbin in the course of which the outer yarn end may become looped and entangled on itself. Should this occur, the several coils or loops, i.e., the multiple ends, will normally be seized by the pick-up nozzle. While it is true that the multiple ends may pass through the usual auxiliary slub catcher and be monitored thereby, yet, as just stated, these slub catchers are not generally effective to preclude the multiple ends. This is true since known slub catchers simply induce the several ends to lay in a side-by-side, horizontal relationship in the usual slub catcher slot. Assuming each of the ends, by itself, is of proper diameter to pass through the slub catcher slot the multiple ends escape detection. In the absence of some controlling means, the multiple ends will be knotted with the package yarn end. Should this occur, the wound yarn package would have snarled masses of yarn therein represented by the multiple ends. Consequently, the package would be unsuitable for further use in ensuing textile operations.

The present invention contemplates passing the supply yarn through the detecting and severing unit disclosed herein. The unit includes severing means, a longitudinal slot or passage adjacent thereto, and a guide pin for manipulating the yarn the axis of the guide pin being normal to the plane of the passage. The manipulating pin operates to engage the supply yarn as the yarn flows through the passage. By virtue thereof the yarn is arranged so that substantially the greatest cross-sectional dimension is situated transversely to the plane of the passage. Thus, assuming the supply yarn has slubs therein, these slubs are caused to "flatten out" against the side of the pin as the supply yarn flows past the pin in contact therewith. Since the pin is disposed transversely to the yarn passage of the detecting unit, the slubs enter the passage with generally their greatest cross-section exposed for measuring by the passage, which is of predetermined width. If slubs exceeding the width of the passage are present the yarn is severed. Similarly, in the event the supply yarn has multiple ends the several ends are vertically arranged one on top of another by virtue of these strands being pulled around the pin under tension. With the several strands of yarn stacked on each other, the total cross-sectional dimension of all the yarns can be monitored as the yarns flow through the passage. Normally, the width of the passage would be set to substantially the diameter of one strand of yarn. In the presence of multiple yarn ends the severing mechanism severs all ends upon their detection, treating the multiple ends similarly as slubs or snarls. The end result, therefore, of the invention disclosed herein is a device which will perform effectively to prevent passage of the usual slubs in yarn and, additionally, will serve to prevent the passage therethrough of multiple ends as they occur.

Accordingly, it is an object of the present invention to provide for use with an automatic winding machine, an improved device which will capture and remove multiple ends as well as sluff and snarls occuring in yarn.

It is a further object of this invention to provide an improved device for entrapping slubs, snarls, multiple yarn ends, and the like which may be readily incorporated into existing automatic winding machines.

It is another object to provide, in combination with a winding machine, a device for detecting multiple ends from a supply package of yarn by disposing or stacking said ends one on top of another as they pass through a monitoring passage of the device so that the greatest cross-sectional dimension of the yarns passing through the package is presented for monitoring.

It is yet a further object of this invention to provide a method of preventing a plurality of strands of yarn from passing into the knotter of a yarn winding machine.

Other and further objects of the invention will become more apparent upon a reading of the description which follows taken together with the accompanying drawings.

In the drawings:

FIG. 1 is a top plan view of a portion of an automatic winding machine incorporating the instant invention;

FIG. 2 is a side elevation view of the winding machine illustrated in FIG. 1;

FIG. 3 is a top plan view of the slub catcher of the instant invention;

FIG. 4 is a side elevation view of the slub catcher;

FIG. 5 is a front elevation view of the slub catcher, partly in cross section, taken along lines **5**—**5** of FIG. 3;

FIG. 6 is a view in perspective of the slub catcher showing the cutting blade acting upon a pair of multiple ends;

FIG. 7 is a detail view in perspective of the cutting structure of FIG. 6;

FIG. 8 is an elevation view, partly in cross section, taken along lines **8**—**8** of FIG. 7;

FIG. 9 is a view of a modified form of the present invention.

FIG. 10 is a top plan view of yet another modified form of the present invention;

FIG. 11 is a front elevation view of the embodiment of FIG. 10;

FIG. 12 is a detail showing, in perspective, of the embodiment of the invention illustrated in FIGS. 10 and 11; and

FIG. 13 is an elevation view showing in detail the yarn engaging surfaces of the modified embodiment.

Reference will now be made in detail to the accompanying drawings, in which like numbers refer to like elements throughout. The general organization of the elements and the elements themselves illustrated in FIGS. 1 and 2 are, for the most part conventional and, therefore, these views are primarily of a diagrammatic and general nature.

In the structure shown, the majority of the yarn servicing components are carried on a flat support or plate **10** constituting the cover plate of a housing **11** which encloses the various mechanisms and linkages of a conventional nature required to actuate certain of the components. However, since such mechanisms and breakages within the housing are of a conventional nature well known to those skilled in the art, and similar to the disclosures of U.S. Patent 2,764,362, they are not shown and described herein.

As mentioned above, the plate **10** and its associated housing **11** are interposed between a yarn supply source and a rotating yarn take-up package on which the yarn is wound by any conventional means while at the same time being axially traversed back and forth from end to end of the package in the usual manner. The yarn as thus normally disposed during the winding operation is designated by the broken line Y in FIGURE 1, it being apparent that the yarn is moving in the direction of the arrow in that figure incident to its travel across plate **10** and its winding onto the package. It will be seen that the yarn Y is guided over the supporting plate **10** through an eyelet **14** fixedly positioned at the forward edge of the plate, then passed between suitable tensioning discs generally designated by the reference character **16** in FIG. 1. In accordance with the usual practice there is slidably and axially disposed through these discs a yarn sensing pin **17** normally maintained in a raised position as long as the yarn is passing between the discs but which is permitted to drop by the action of gravity, and by its dropping action to trigger usual mechanism within the housing **11** for indexing the bobbin magazine, not shown, to bring a new bobbin into position following exhaustion of the yarn from an old bobbin.

From the tension discs **16**, the yarn Y extends through a usual main slub catcher designated **18**, this slub catcher being conventional in form. The main slub catcher **18** is adapted to intercept portions of the yarn of abnormally thick diameter, or knots, snarls, or the like, and arrest their movement toward the package whereby the force exerted by the winding action will tend to part the yarn.

Where it is desired to apply wax to the thread or yarn being wound, the thread may be passed through a usual waxing or wax applying device generally interposed between the tensioning discs **16** and the main slub catcher. In the instant case, the wax applying device assumes the form of a wax disc W having a generally square opening through its center, the wax disc being supported on and rotatably driven by a shaft having a square end portion **30** received in its central opening, rotation being imparted to the shaft by conventional mechanism within the housing **11**. It will be seen that the thread Y extends between the rotating wax disc W and a supporting platform **31** against which the disc is urged by gravity, the arrangement being such that the disc thus rests against the yarn and due to its rotary movement is worn away evenly incident to its application to the yarn.

The main slub catcher **18** includes a triggering mechanism for initiating an operative yarn pick-up and tying cycle involving a yarn transfer arm **25** and an associated knotter (not shown). When the yarn is broken by actuation of the main slub catcher **18**, the free yarn end pick-up and tying cycle will be initiated. The break will have the free end from the supply of yarn extending between the tensioning discs **16** and the main slub catcher **18** pursued by the free end pick-up device or arm **25** in its operative movement. The free end portion from supply is thus accessible to be picked up by the transfer arm **25**, the free end of which moves in an arc just rearwardly of the tension discs and intersecting the generally longitudinally extending yarn Y in a direction generally transverse thereto. The position of the yarn at this time may be better maintained or supplemented by the action of a suction slot **32** communicating with a main suction pipe **33** shown fragmentarily in FIG. 2, whereby the free end of the yarn is drawn into the said slot automatically. This same slot serves also to clean the yarn during its passage toward the package onto which it is to be wound.

There is also shown a suction nozzle **34** positioned to hold the free end of a reserve bobbin (not illustrated) carried by a rotary magazine in accordance with conventional practice in such manner that when its magazine is indexed to bring the reserve bobbin into operative position, the free end portion of yarn normally extending to its suction nozzle **34** will be moved into the eyelet **14** to extend across the operative parts of the transfer arm **25** to be picked up thereby and carried to the knotter in the usual manner to replace the yarn from an exhausted bobbin.

The transfer arm **25** is exemplified as being in the form of a suction tube having one portion journaled in bearing **35** for rotation about a fixed axis spaced rearwardly of the housing **11**. The free end of arm **35** is swingable between the tensioning discs **16** and the usual cam plate **36** positioned to engage the follower **37** of a conventional cutter and clamp mechanism carried by the free end of the arm. When the free end swings across the path of the yarn Y and carries it generally to the position shown in broken line Y_1 in FIG. 1 before commencing its return movement, the cutter will be actuated by interengagement of the cam plate and follower to sever the portion of the yarn carrying the slub. The latter is sucked into the slot **32** for removal through the main suction pipe, leaving the newly cut end gripped in the cutter for movement with the free end of the transfer arm.

From the position shown in broken lines at FIG. 1 at the extremity of its advance stroke, the transfer arm **25** will then commence its retraction stroke through an arc generally designated by the line A in FIG. 1. During this motion the yarn will be carried laterally to the right-hand side of the slub catcher to a position such as at Y_2 in FIGURE 1, and a considerable portion thereof will be caused to completely bypass the main slub catcher **18** be-

fore it is moved back laterally thereinto by the continued arcuate movement of the arm incident to the laying of the free end of the yarn from the source of supply into the knotter (not shown). The knotter functions then to unite the supply yarn with the free end of yarn which will have been picked up previously and delivered into the knotter from the package being wound. It will be seen that although the yarn is guided into the confines of the main slub catcher during the latter stages of the swinging movement of the transfer arm, nevertheless after the transfer arm has laid the free end from supply into the knotter there will be a substantial length, in practice approximately 18 inches or so of the yarn, which will never have been acted upon by the main slub catcher. This particular portion has been found in practice to contain a somewhat higher than average incidence of slubs or snarls, the latter being caused to a large extent as an incident of breakage or parting of the yarn by the slub catcher and the ensuing recoil or whipping action of the tensioned yarn.

The foregoing features and elements together with the foregoing mode of operation are all in accordance with conventional practice, but have been described in detail in order to facilitate a better understanding of the present invention and the problems giving rise thereto. These problems are due in part to the afore-mentioned bypassing of the main slub catcher **18** by a portion of the yarn incident to the picking-up and tying cycle in such a conventional mechanism. However, this difficulty has been largely overcome by the auxiliary slub catcher of U.S. Patent No. 3,142,451 cited earlier. The problem giving rise to the instant invention was that prior art devices such as that of Pitts were not reliable in coping with multiple ends, as opposed to slubs. Advantageously, the unit **50** of this invention serves as an auxiliary slub catcher as well as a multiple end controller. However, it will be apparent to those skilled in the yarn winding art that the instant mechanism could be readily employed as the main slub catcher of a winding machine.

With particular reference now to FIGS. 3–8, the unit **50** of the present invention consists of a base plate **52** having an anvil portion indicated generally at **54**. The base plate is formed with clearance holes as at **55** which receive screws **57** therein for attachment to cover plate **10** of housing **11** (see FIGURE 1). A pair of upright ears **56, 58** integrally connected to the base plate **52** are formed with openings therein to receive a stub shaft **60**. The stub shaft **60** extends beyond each of the ears **56** and **58** for reception in a pair of projections **62** and **64** which extend downwardly from a bridge member **66**. A spring **68** is coiled around stub shaft **60** and has an end **70** engaging base plate **52** while the other end **72** engages bridge member **66** thereby urging the bridge member toward the base plate about shaft **60** as a fulcrum.

Midway between the ends of bridge member **66**, a tapped hole is provided which receives an adjusting screw **73** having a bearing surface **74** engaging base plate **52**. The head **75** of the screw has graduations engraved thereon, as at **76**, which are correlated with reference mark **78** engraved on the bridge member for puposes to be made more apparent hereafter.

At the end of bridge member **66** opposite the hinged portion is formed a head portion **81** which is of inverted U shape as can be best seen in FIG. 4. A shaft **82** is received at its ends and extends between the generally vertically disposed legs **84** and **86** of the head portion. A cutting blade **80** is rotatably received on shaft **82** and urged by means of spring **85** away from a position normal to the anvil **54**. Attached to and extending outwardly from leg **86** is a stop member **88** (FIG. 5) which acts to prevent rotation of blade **80** in the clockwise direction (as viewed in FIG. 5) beyond a vertical or normal disposition with respect to anvil **54**. Also, a part of head portion **81** is a downwardly extending guide member **90** which serves to direct the yarn into the confines or passage of the cutting apparatus as defined by the anvil **54**, the cutting blade **80**, and the directing pin **92**. The latter is fixed to the anvil and extends generally vertically therefrom, its purpose being to direct multiple yarn end beneath knife blade **80** in a manner which will be subsequently described. That side of the pin, as at **94**, across which the strands of yarn are received, is flattened for improved reception of the thread thereon.

As previously explained, the height of the blade **80** above the anvil **54** is altered by means of adjusting screw **73**. The screw head **75** is distinct from the threaded portion **77** and has a blind hole formed therein which receives the uppermost part of element **77**. Set screws as at **79** unite head **75** to threaded portion **77** in any desired rotated position of the head with respect thereto. In practice, screw **73** is rotated until blade **80** just touches anvil **54**. Set screw **79** is then loosened and head **75** is rotated so that the zero graduation thereon is lined up with reference mark **78**. Thereupon set screw **69** is tightened and screw **73** is rotated until the desired clearance between the blade and the anvil is achieved, as can be determined by the graduations **76** on the screw head **75**. For the purpose of this disclosure, the clearance between blade and anvil will always be in excess of the thickness of one strand although it has been found through experimentation that it may still be operable to remove all multiple ends if the clearance is as great as three times the diameter of the strand. This result obtains since the yarn is pulled upward in the zone or passage beneath blade **80** as the yarn is moved to the knotter (not shown) by transfer arm **25**.

The bridge member **66** is spring biased to base plate **52** to permit adjustment of adjusting screw **73** and thereby the height of the blade **80** above anvil **54**. This construction also allows the head portion **81** of the bridge to be raised in order to clean the slub from the blade. When the head portion is once more returned to its usual position following the cleaning procedure, the stop member **88** prevents rotation of blade **80** in a clockwise direction (as viewed in FIG. 5) beyond a vertical or normal disposition with respect to anvil **52**. Were the stop member not employed, upon replacing the bridge to normal position, the tip end of blade **80** might be caused to bear upon the anvil **54** in a position left of center as viewed in FIGURE 5 rather than in the free swing position adjacent directing pin **92**.

In the overall operation of the mechanism above described, it will be apparent that the operation of the main slub catcher **18**, transfer arm **25**, and other elements will be in accordance with conventional practice and as heretofore described. Thus, during the winding of the yarn Y, the yarn will move through the main slub catcher **18** in the direction from front to rear as indicated by the arrow in FIGURE 1. Upon breakage of the yarn passing through the main slub catcher, or upon exhaustion of a supply spindle, suction transfer arm **25** will be triggered commencing an arcuate movement about its axis to initiate the free end pick-up and tying cycle. It will pass across the free end portion of the yarn extending between the tension discs **16** and the main slub catcher **18**, it being understood that at this time the broken or parted free end of this portion will normally be received and held in the suction slot **32** shown in FIGURE 1. As it moves across the yarn, the free end of the transfer arm will pick up the yarn closely adjacent the tension discs **16**, and sever it at the pick-up point by interengagament between the cam plate **36** and the knife actuating follower element **37**, while gripping and holding the new free end thus formed. The severed end portion containing the slub is then drawn into the slot **32**.

In the event the yarn has been merely exhausted from one bobbin, the ensuing action of the sensing pin **17** will have triggered the magazine to index same for positioning the new bobbin to bring its yarn into the eyelet **14** from whence its free end will be held in the nozzle aforemen-

tioned and thus will extend across the path of movement of the arm so that it will be picked up by the arm and returned therewith to the knotter. Thus, whether transfer arm **25** picks up the free end which has previously been parted by action of the main slub catcher or whether it picks up the new free end from the reverse bobbin, the said free end will in either event be carried by the transfer arm on its retraction movement back around and to the right-hand side of the main slub catcher as shown in FIGURE 1. Incidental to this by-passing action or movement, a considerable length of the yarn adjacent the free end will be caused to completely by-pass the main slub catcher.

The present invention is operable to remove slub during the free end pick-up and tying cycle. Accordingly, it will be apparent that substantially all of the free end portion will, as an incident to the lateral component of movement of the transfer arm be carried into and drawn into the unit **50**. Moreover, pin **92** advantageously induces slubs flowing through the passage beneath blade **80** to stand upright. That is to say, the greatest cross-sectional dimension of the slub is oriented transversely to the passage between the lower edge of blade **80** and the top of anvil **54**. Hence, a high degree of reliability is obtained with the instant invention in detecting and controlling slubs in yarn since these slubs enter the passage at the lower end of blade **80** in substantially their upright position.

The extreme free end portion which does not pass through unit **50** will in any event be carried past the knotter and severed from the remainder of the yarn incident to actuation of the knotter so that actually all of the yarn which is wound into the finished package will have been subjected to the action of one slub catcher or the other. It will be seen that during the latter half of the arcuate movement of the transfer arm **25**, the yarn will be moved back inwardly or laterally from unit **50** into the main slub catcher **18** as well as toward the knotter, whereby following completion of the tying cycle, the main slub catcher will act upon the yarn in the usual manner.

While the mechanism disclosed herein will act upon slubs or snarls in a manner similar to the devices of the prior art, it possesses the added feature of being adapted to act upon and remove multiple ends. As in the operation of slub removal, the instant device is operated during the free end pick-up and tying cycle.

Consider now, the instance in which the transfer arm **25**, during its arcuate movement passes across a pair of free ends (for simplicity, because more than two ends could also be considered). As the arm **25**, gripping the pair of free ends (indicated as Y′ and Y″ in FIGS. 6, 7 and 8) advances from the dotted line position of FIG. 1 toward the solid line position and beyond, the pair of ends are seen to pass through the eyelet **14**, between the tension discs **16**, thence through the jaws of unit **50**. Prior to their insertion within the jaws of the unit **50** the strands Y′ and Y″ are generaly horizontally disposed or in a plane roughly parallel to the plane of support plate **10**. However, the counterclockwise movement of transfer arm **25** (as seen in FIGURE 1) draws the pair of strands down against guide member **90** which directs the yarn into the jaws of the cutting passage which have been previously described as being defined by anvil **54**, cutting blade **80**, and directing pin **92**. Throughout this operation, it is understood that the passage is positioned generally at the level of the interface between tension discs **16**.

The tension on the yarn causes the strands to slide across the anvil plate **54**, thence into engagement with pin **92** such that the strands are caused to become vertically disposed, one to the other, as illustrated in FIGURE 8. The flattened portion **94** of the directing pin enables the strands of yarn to "ride up" into vertical disposition more easily, retaining them in that disposition during the cutting process. In this vertical disposition, the greatest total cross-sectional dimension of the several strands is seen to be transverse to the yarn passage of unit **50**. The yarn is drawn in the direction of the arrows, as seen in FIGS. 6 and 7. The uppermost strand Y′ moves into contact with the cutting blade **80**, which by the friction induced between the blade and the strand, is drawn down about its pivot or shaft **82** into engagement with the strand, severing it. Because of the close proximity of strand Y″ to Y′ the frictional forces induced between them are sufficient to cause breakage of Y″ as well, thereby removing the multiple ends before they have travelled to the knotting mechanism. The severed ends of strands Y′ and Y″ which have been engaged by transfer arm **25** will be drawn into the suction nozzle formed at the free end thereof.

It will be appreciated by those skilled in the art that the yarn directing pin may have a variety of shapes other than that already described. No attempt will be made to illustrate and describe all possible variations along these lines as most of them will be more or less apparent to those skilled in the art. There is shown, however, in FIG. 9 for purposes of illustarating the general directions in which these variations may proceed, a modification of more than routine interest. In the arrangement of FIG. 9 yarn directing pin **92′** is illustrated as being chamfered so as to taper or bevel inwardly as the pin extends upwardly. In consequence thereof, as the yarn flows over anvil **54** and beneath blade **80** the multiple yarn ends will stack one on top of the other, as with the earlier described embodiment, and furthermore, will tend to ride up the incline provided by the chamber under the pull of tension in the yarn to be severed by blade **80** coacting with anvil **54**.

Still another modified embodiment of the invention is illustrated in FIGS. 10 to 13 wherein it is generally referenced by numeral **100**. The modified auxiliary slub catcher **100** consists of a base plate **102** having an anvil portion indicated at **104**. Base plate **102** is formed with clearance holes **106** which, like the plate **52**, receive screws therein for attachment to cover plate **10** of housing **11** (see FIG. 1). A pair of upright ears **108**, **110**, bent upwards from the base plate **102**, are formed with openings therein to receive a stub shaft **112**. The stub shaft **112** extends beyond each of the ears **108** and **110** for reception in a pair of projections **114** which extend downwardly from a bridge member **116**. A torsion spring **118** is coiled around stub shaft **112** and has one end engaging base plate **102** while the other end engages bridge member **116** thereby urging the bridge member toward the base plate about shaft **112** as a fulcrum.

Midway between the ends of bridge member **116**, a tapped hole is provided which receives an adjusting screw **120** having a bearing surface engaging base plate **102** in a manner similar to the earlier embodiment described above. The head of the screw **120** has a flared skirt **124** with graduations engraved thereon which are correlated with reference mark **126** engaged on the bridge member.

A head portion **128** is formed at the end of bridge member **116** opposite the hinged portion. Said portion **128** is of inverted U shape as can best be seen in FIG. 11. A shaft **130** is received at its ends between the generally vertically disposed legs **132** and **134** of the head portion. A cutting blade **136** is rotatably received on shaft **130** and is urged by means of a spring **138** away from a position normal to the anvil **104**.

A down-turned leg **140** of bridge member **116** extends across anvil **104**, a portion thereof passing through a slot **142** formed in the anvil. With particular reference to FIG. 13; it will be seen that the portion of leg **140** passing through slot **142** (see FIG. 12) has a substantially vertically disposed blunt edge or surface **144** which serves to engage yarn as it advances through the passage **145** of the cutting apparatus as defined by the anvil **104**, cutting blade **136**, and the surface **144** itself. A second yarn engaging surface **146** is formed on leg **140** and is inclined,

extending upwardly and rightwardly from surface **144** (see FIG. 13).

The operation of the auxiliary slub catcher **100** is in all respects similar to the above-disclosed embodiment except as is described differently below. An advancing strand of yarn Y_3 (FIG. 12) engages surface **144** as it follows the path governed by tensioning discs **16** and transfer arm **25** (see FIG. 1). Said yarn strand Y_3 is aided by a down-turned lip **148** which directs it into the passage **145**. The height to which surface **144** extends above anvil **104** is adjustable by means of screw **120** which similarly adjusts the clearance between cutting blade **136** and anvil **104**.

The height of surface **144** above anvil **104** is desirably chosen to be slightly greater than the mean diameter of the yarn being wound, i.e., about one and one-half times said diameter being satisfactory. It will be appreciated that the cutting blade **136** and surface **144** are fixed. A turn of screw **120** adjusts the distance of the top of surface **144** above anvil **104**. Cutting blade **136** and surface **146** are relatively so positioned that slubs or irregularities of a predetermined size will be caused to engage said blade and thus sever the yarn.

Hence, as the yarn is moved through passage **145** it is drawn against surface **144**. If the yarn develops a condition of multiple ends as seen in FIG. 12, the strand or strands Y which represent the additional yarn ends beyond the one normally provided will move into engagement with the inclined surface **146**. As yarn strand Y_4 moves up the inclined surface **146**, it moves into contact with the cutting edge of blade **136** which, by the friction induced between the blade and the strand, is drawn down about its shaft **130** into engagement with the strand, severing it. Because of the close proximity of strand Y_3 to Y_4, the frictional forces induced between them are sufficient to cause breakage of Y_3 as well, thereby removing the multiple ends before they have travelled to the knotting mechanism. As was explained with regard to the previous embodiment, the several ends Y_3 and Y_4 which had earlier been engaged by transfer arm **25** will be drawn into the suction nozzle formed at the free end thereof.

From the foregoing it will be appreciated that the present invention affords a unique and efficient means for controlling defects in yarn or similar material.

Although the invention herein has been described in a preferred embodiment, it is to be understood that it is capable of other and different embodiments and details thereof without departing from the scope of the invention as defined in the appended claims which follow.

What is claimed is:

1. A device for controlling defects in material being wound on a textile machine comprising, interrupting means, a longitudinal passage adjacent said interrupting means through which the material is moved, and manipulating means positioned proximate to said passage, said manipulating means being operable to arrange said material for movement through said passage with substantially the greatest cross-sectional dimension of the material positioned transversely to said passage, said interrupting means acting to sever said material when said cross-sectional dimension exceeds a predetermined value.

2. The combination as set forth in claim **1** wherein said interrupting means includes a blade, and an anvil cooperable with said blade.

3. The combination as set forth in claim **2** including means for pivotally mounting said blade, and first resilient means biasing the blade away from said anvil.

4. The combination as set forth in claim **2** including means for adjusting the distance between said blade and said anvil, and second resilient means biasing said blade toward said anvil.

5. The combination set forth in claim **2** wherein said manipulating means comprises a pin mounted on said anvil, the axis of said pin being transversely situated to said passage.

6. The combination as set forth in claim **5** wherein said pin is flattened on one side thereof for receiving the material thereon.

7. The combination as set forth in claim **5** wherein said pin has a beveled surface thereon for guiding the material to said blade.

8. The combination as set forth in claim **1** wherein said manipulating means comprises a first material engaging surface positioned proximate to said passage, said first surface arranged to engage a single end of said material, and a second material engaging surface arranged to receive at least one additional end of said material, said second surface being operable to guide each said additional end into said interrupting means to sever said material.

9. The combination set forth in claim **8** wherein said first surface is vertically disposed and said second surface is inclined relative to said first surface.

10. The combination set forth in claim **8** wherein said interrupting means includes a blade, an anvil cooperable with said blade, said blade being pivotally mounted, and first resilient means biasing said blade away from said anvil.

11. The combination set forth in claim **10** including means for adjusting the distance between said blade and said anvil, and second resilient means biasing said blade toward said anvil.

12. A device for controlling defects in material being wound on a textile machine comprising, a base plate including an anvil, means connecting said base plate to said machine, bridge means mounted to said base plate for rotation thereon, interrupting means supported on said bridge adjacent said anvil, first resilient means biasing said interrupting means away from said anvil, second resilient means biasing said bridge means toward said base plate, means attached to said bridge means for adjusting the distance of said interrupting means from said anvil to define a passage therebetween, and manipulating means for directing the material through said passage with substantially the greatest cross-sectional dimension of the material positioned transversely to said passage, said interrupting means acting to interrupt said material when said cross-sectional dimension exceeds a predetermined value.

13. The combination set forth in claim **12** wherein said manipulating means comprises a generally cylindrical shaped pin mounted on said anvil the axis of said pin being transversely situated to said passage.

14. The combination as set forth in claim **13** wherein said pin is flattened on one side thereof for receiving the material thereon.

15. The combination as set forth in claim **13** wherein said pin has a beveled surface thereon for guiding the material to said blade.

16. The combination as set forth in claim **12** wherein said manipulating means is formed on said bridge and comprises a first material engaging surface positioned proximate to said passage, said first surface arranged to engage a single end of said material, and a second material engaging surface arranged to engage at least one additional end of said material, said second surface operable to direct each said additional end into engagement with said interrupting means to sever said material.

17. In a yarn winding machine, a main slub catcher supported on said machine and arranged for reception of strandular material from one lateral direction, an auxiliary unit on said machine spaced longitudinally from said main slub catcher and arranged for reception of material, and a transfer element movable between said slub catcher and said unit, said element having both longitudinal and lateral components of movement whereby to carry the material laterally from said unit to said slub catcher, said unit including a base plate having anvil means there-

on, means connecting said base plate to said machine, bridge means mounted to said base plate for rotation thereon, interrupting means pivotally supported on said bridge adjacent said anvil, first resilient means biasing said interrupting means away from said anvil, second resilient means biasing said bridge means toward said base plate, means attached to said bridge means for adjusting the distance of said interrupting means from said anvil to define a passage therebetween, and manipulating means for directing the material through said passage with substantially the greatest cross-sectional dimension of the material positioned transverse to said passage, said interrupting means acting to interrupt said material when said cross-sectional dimension exceeds a predetermined value.

18. The combination as set forth in claim **17** wherein said manipulating member is a pin supported in said base plate adjacent said passage, said pin being in the line of advance of said material being carried by said transfer element, whereby the material during its advance to said slub catcher is caused to wrap partially about said pin.

19. The combination as set forth in claim **18** wherein said pin is flattened on one side thereof for receiving the material thereon.

20. The combination as set forth in claim **18** wherein said pin has a beveled surface thereon for guiding the material to said blade.

21. In a yarn winding machine, a main slub catcher supported on said machine and arranged for reception of yarn; an auxiliary slub catcher on said machine spaced from said main slub catcher and arranged for reception of yarn, said auxiliary slub catcher including interrupting means, means for directing multiple strands of yarn through said interrupting means in vertically disposed alignment whereby all strands passing through said auxiliary slub catcher are interrupted by said interrupting means; and a yarn transfer element movable between said slub catchers to carry yarn from one slub catcher to the other.

22. The method of preventing a plurality of strands of yarn from advancing in parallel paths along a winding machine comprising: advancing the plurality of strands of yarn through a longitudinal passage of predetermined width, providing interrupting means adjacent said passage, moving said plurality of strands of yarn through said passage, manipulating the plurality of strands to a generally vertical relationship; and interrupting all strands when the total cross-section dimension of all the strands exceeds the width of said passage.

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