

Nov. 28, 1967

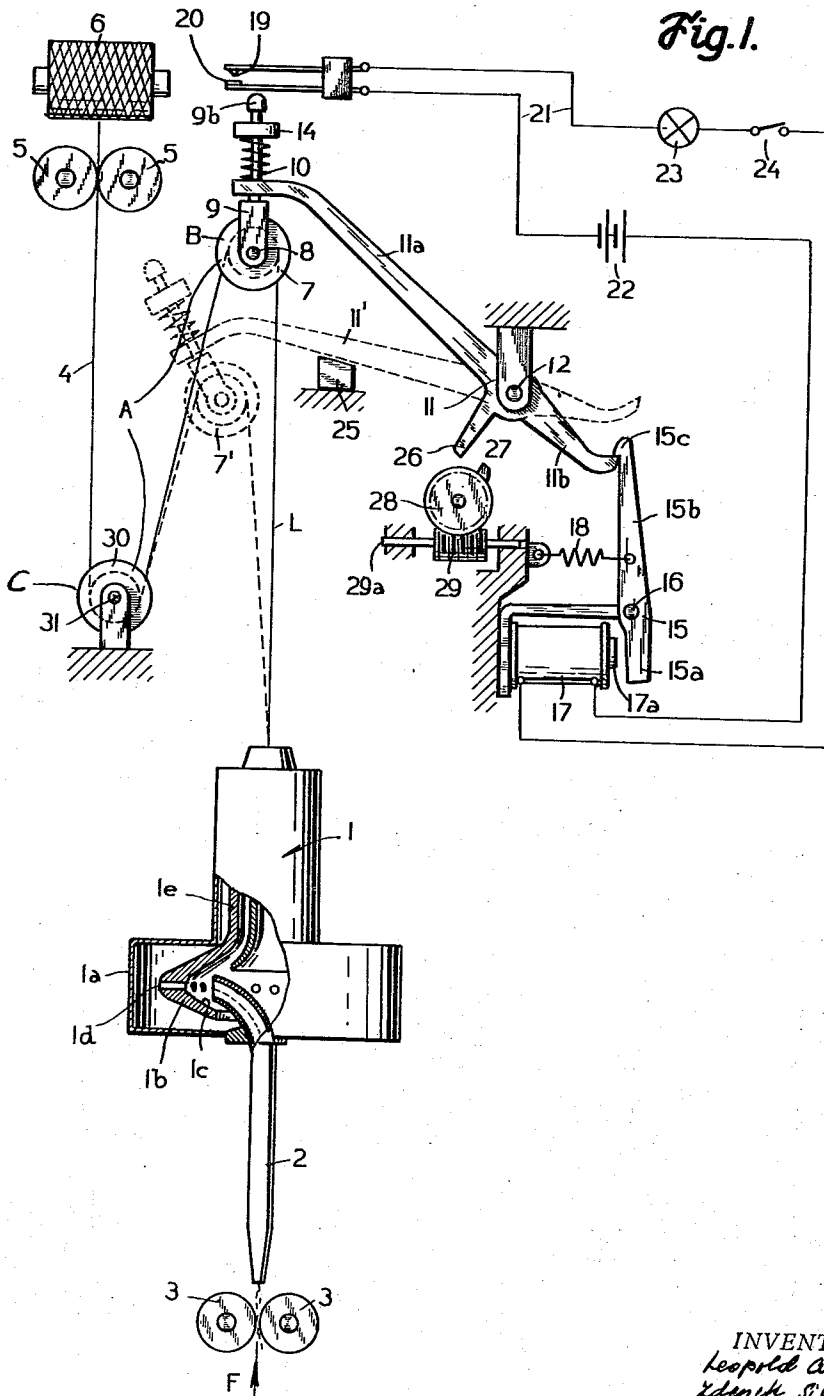
L. ČÍŽEK ET AL

3,354,627

YARN CONTROL APPARATUS

Filed Feb. 1, 1966

3 Sheets-Sheet 1



INVENTORS
 Leopold Čížek
 Zdeněk Štěr
 Miroslav Zoubek
 Jaromír Kubický
 Michael J. Striker
 Att'y

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L. ČÍŽEK ET AL

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3 Sheets-Sheet 2

Fig. 2.

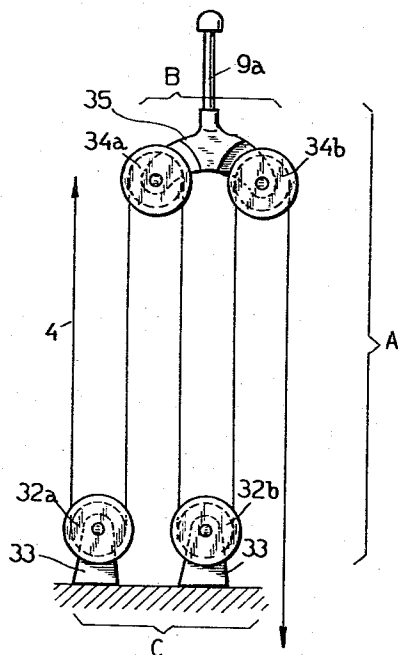


Fig. 3.

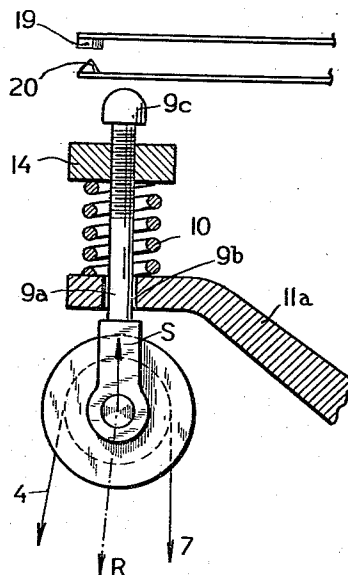
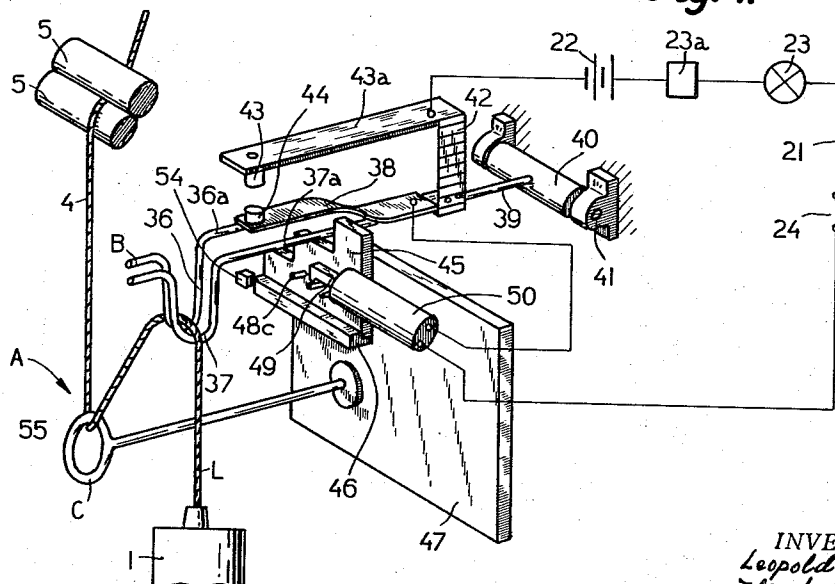


Fig. 4.



INVENTORS
 Leopold Čížek
 Zdeněk Šilar
 Miroslav Zoubek
 Jarmila Kubišková
 Michael S. Strick
 Att'y

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L. ČÍŽEK ET AL

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3 Sheets-Sheet 3

Fig. 5.

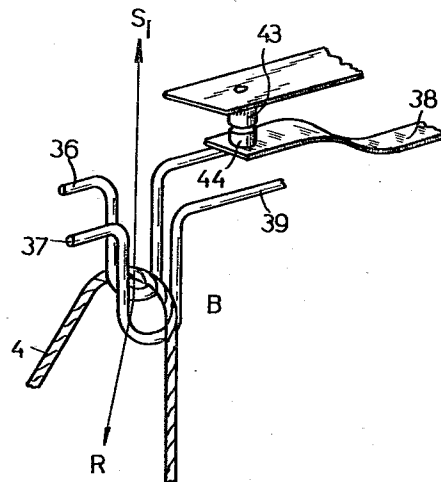
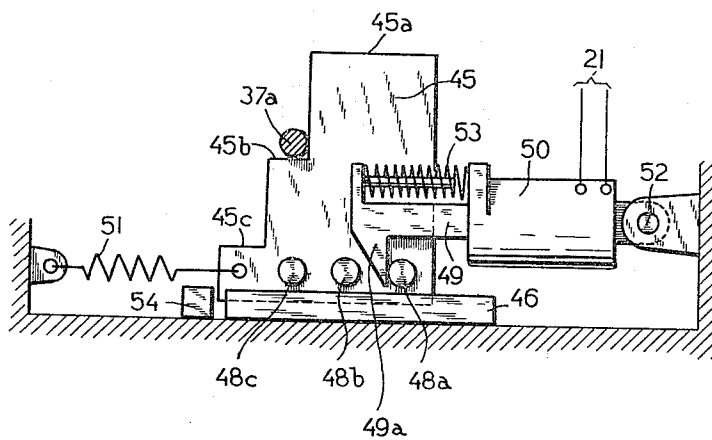


Fig. 6.



INVENTORS

INVENTORS
Leopold Cizak
Edinak Bilas
Miroslav Zoubela
Jarmila Knibickova
Michael S. Striker
att.

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3,354,627

YARN CONTROL APPARATUS

Leopold Čížek, Usti nad Orlici, Zdeněk Šilar, Chocen, Miroslav Zoubele, Ceska Trebovz, and Jarmila Kubíčková, Usti nad Orlici, Czechoslovakia, assignors to Vyzkumny ustav bavlnarsky, Usti nad Orlici, Czechoslovakia

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19 Claims. (Cl. 57—81)

The present invention relates to a yarn control apparatus, and more particularly to apparatus for correcting yarn breakages in a yarn delivered by spinning apparatus.

It is known to spin and twist filaments in a centrifugal pot rotating at high speed and forming and delivering a yarn. The filaments are drawn through an inlet tube due to suction and negative pressure developed in the interior of the rotary pot, deposited on the inner rotating surface of the same in a spinning and twisting operation, and then delivered as a yarn through a delivering portion of the rotary pot. The delivered yarn is guided toward transporting rollers and take-up means which receive the yarn and pull the same out of the delivery portion of the rotary pot.

Spinning apparatus of this type is subject to frequent yarn breakages which occur due to various reasons. After a yarn breakage, the yarn is drawn out of the delivery portion of the spinning pot by the transporting rollers, and wound up. It is necessary to provide a breakage indicator, which is substantially a lever with the yarn guide at one end, and operating a switch when the yarn tension drops due to a breakage. The switch may energize an indicator device, or stop the feeding of the filaments into the rotary pot. In one construction according to the prior art, the filaments pass through a tube, and when a yarn breakage occurs, the tube is turned to a position in which the filaments are no longer guided into the rotary pot so that the spinning operation is interrupted.

The known apparatus for correcting thread breakages has the disadvantage that the breakage is indicated only after the end of the broken yarn has left the spinning pot. The take-up bobbin continues to rotate without winding up yarn. Repair of the breakage is carried out after the take-up bobbin has been stopped. The end of the broken yarn is found, a certain length of yarn is wound off the take-up bobbin, and the yarn end is manually introduced into the delivery portion of the rotary spinning pot so that it is urged by the centrifugal force against the inner surface of the rotating spinning pot where it is attached to the filaments on the same. At the same time, the inlet tube for the filaments, which was turned to an inoperative position up on the yarn breakage, as mentioned above, is returned to its normal position for delivering filaments so that a yarn is formed again connected with the reintroduced yarn end, so that it can be wound up on the take-up bobbin when rotation of the same is again started.

It is evident that the operations required for correction of a yarn breakage are time-consuming, and that consequently the efficiency of the spinning operation is detrimentally affected.

It is one object of the invention to overcome this disadvantage of known spinning apparatus, and to provide a yarn control apparatus which substantially reduces the time required for correcting yarn breakages.

Another object of the invention is to provide a spinning apparatus with means which automatically return a broken off yarn end into the delivering portion of the rotary spinning pot.

Another object of the invention is to provide a yarn control apparatus which will effect automatically repairs of several successive yarn breakages.

Another object of the invention is to increase the efficiency of spinning apparatus by reducing the time required for correcting yarn breakages.

Another object of the invention is to permit the negative pressure prevailing in the rotary spinning pot to draw a portion of the delivered thread back into the spinning pot for being connected with the filaments spun in the same.

With these objects in view, the present invention relates to a yarn control apparatus comprising yarn delivering means, for example, the delivery portion of a rotary spinning pot which spins and twists filaments to deliver a moving yarn, and receiving means, such as a take-up bobbin and transporting rollers for receiving the moving yarn.

In one embodiment of the invention, yarn guide means are located between the delivering means and the receiving means for forming a loop in the yarn portion between the same. The yarn guide means include a stationary yarn guide, and a yarn guide movable between an actuated position, a control position, and a normal intermediate position. Biasing means act on the movable yarn guide for holding the same in the normal position so that a certain tension is produced in the yarn. Operating means are provided for moving the movable yarn guide to the control position, and are actuated by the yarn guide in the actuated position of the same.

The biasing means urge the yarn guide to the actuated position, but as long as normal yarn tension prevails, the yarn guide is counterbalanced. However, if the yarn tension drops due to a breakage, the biasing means move the yarn guide to the actuated position forming a larger loop of the broken yarn. The operating means are actuated when the yarn guide arrives in the actuated position, and move the same immediately from the actuated position, past the normal position, to the control position so that the size of the yarn loop is reduced, and part of the yarn forming the loop is returned to the yarn delivering means, and more particularly into the spinning pot whose suction draws the broken yarn end into the spinning pot where it is automatically attached to the filaments forming the yarn so that a continuous yarn is again delivered over the yarn guide means to the take-up and receiving bobbin.

In one embodiment of the invention, the operating means include a lever carrying the movable yarn guide in the form of a roller, and electromagnetic means. When the yarn tension drops, a spring moves the yarn guiding roller away from the spinning pot and to a position for operating a switch in the circuit of the electromagnetic means which cause turning of the lever to a position in which the yarn guiding roller has been moved toward the spinning pot so that the size of the yarn loop is reduced, and the yarn end can be drawn into the spinning pot.

The normal position of the lever is either manually restored, or the lever may be automatically turned by rotary cam means to its normal position.

In a modified embodiment, the yarn guide means include two stationary yarn guiding rollers, and two movable yarn guiding rollers mounted on the lever of the operating means so that two open loops are formed in the yarn.

In another embodiment of the invention, the yarn guide means include first and second yarn guides mounted on a lever or other operating member of the operating means. The first yarn guide is biased to move from a normal position to an actuated position for closing a switch in the circuit of electromagnetic means. When ever the electromagnetic means is energized upon a yarn breakage, the operating lever turns to an operative position and

moves the second yarn guide toward the spinning pot and into a control position in which the size of the loop is reduced, and the broken yarn end can be drawn by suction into the spinning pot. A locking member has several stepped abutments, permitting the operating lever with the second yarn guide to assume several successive control positions, in each of which the size of the yarn loop is reduced to a greater extent, so that several yarn breakages can be automatically repaired without requiring resetting of the apparatus. When the electromagnetic means is energized it pulls the stepped locking member in a horizontal direction permitting the operating lever to drop to the next lower abutment of the locking member.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

FIG. 1 includes a fragmentary schematic side elevation, partially in section, of a first embodiment of the invention, and a schematic electric diagram;

FIG. 2 is a fragmentary schematic side elevation illustrating a modification of the embodiment of FIG. 1;

FIG. 3 is a fragmentary side view, partially in vertical section, illustrating a detail of the embodiment of FIG. 1;

FIG. 4 includes a fragmentary schematic perspective view illustrating a second embodiment of the invention, and a diagram illustrating the electric circuit thereof;

FIG. 5 is a fragmentary perspective view illustrating a detail of the embodiment of FIG. 4 on an enlarged scale; and

FIG. 6 is a fragmentary schematic front view illustrating a detail of the embodiment of FIG. 4 on a larger scale.

Referring now to the drawings, and more particularly to FIGS. 1 and 3, a rotary centrifugal spinning pot or box 1 includes a housing 1a, a rotary spinning member 1b having an inner surface 1c and outlet openings 1d. An inlet tube 2 is mounted on housing 1a and has a curved portion projecting into the interior of the rotary spinning member 1b so that filaments F fed by a pair of transporting rollers 3 into tube 2 are delivered toward the rotating inner surface 1c by the suction produced by the centrifugal expulsion of air in the rotary spinning member 1b. A yarn is spun and twisted in this manner, and delivered through the delivery portion 1e and a suitable outlet in housing 1a. A pair of transporting rollers 5 pulls the yarn portion 4 out of the delivery portion 1e whereupon the yarn is wound upon a take-up bobbin 6. Yarn guide means A are provided between the yarn delivering means 1 and the yarn receiving means 5, 6, and include stationary yarn guide means C and movable yarn guide means B. The stationary yarn guide means C comprises a support mounted on a frame part of the device, a journal shaft 31, and a roller 30 with a peripheral groove in which yarn portion 4 is guided. The movable yarn guide means B includes a guide roller 7 with a peripheral groove for the yarn portion 4, and a journal shaft 8 mounted on a fork-shaped support 9.

As best seen in FIG. 3, a bolt 9a is secured to support 9 and passes through an opening 9b in the arm 11a of a lever 11 mounted on a pivot means 12 which is secured to a fixed frame portion.

A spring 10 abuts lever arm 11 and a nut 14 mounted on a threaded portion of bolt 9a so that guide roller 7 is urged to move upward in the direction of the arrow S. However, such movement is opposed by the force R exerted on the roller by the open loop L formed in yarn portion 4 by rollers 7 and 30, and in the normal operational condition of the apparatus, the roller 7 is in a normal position in which the yarn tension is counter-

balanced by the force of biasing spring 10, which can be adjusted by turning abutment nut 14.

If the yarn tension drops due to breakage of the yarn and roller 7 moves upward to take up the slack, support 9 with bolt 9a and head portion 9c moves up to a control position in which head portion 9c moves the resilient contact 20 into engagement with another contact 20 of a switch located in the circuit of the winding 17 of an electromagnetic means which has a core cooperating with the arm 15a of a locking lever 15 which is mounted by a pivot means 16 on the stationary frame part. The other arm 15b of locking lever 15 has a locking projection 15c engaging the free end of the arm 11b of lever 11. A spring 18 is secured to a fixed frame portion and to arm 15b and holds locking lever 15 in the illustrated locking position in which lever arm 11a supports yarn guide means 7 for movement between the illustrated normal position and an actuated position in which switch 19, 20 is closed.

When electromagnetic means 17 is energized upon closure of switch 19, 20, locking lever 15 is turned in clockwise direction, and releases arm 11b of lever 11 so that the weight of arm 11a turns lever 11 in counterclockwise direction from the position illustrated in solid lines in FIG. 1, to the position illustrated in broken lines in which lever arm 11a abuts a stationary stop 25.

A shaft 29a carries a worm screw 29 meshing with a worm gear 28 to which a cam 27 is secured for rotation.

In the illustrated position of lever 11, an arm 26 of the same is located outwardly of the path of movement of cam 27, but when lever 11 is in the control position 11', arm 26 will be engaged by cam 27 moving in counterclockwise direction as indicated by the arrow S₁, and lever 11 will be turned in clockwise direction from the position 11' to the normal position illustrated in solid lines. While lever 11 is in its normal position, thread guiding roller means 7 can move between the illustrated normal position, and the actuating position closing switch 19, 20. In the lower position 11', the yarn tension acting on guide roller 7 is small since the size of the loop L is reduced, and spring 10 will be effective to move guide roller 7 toward lever arm 11a.

In the modification shown in FIG. 2, the thread guiding means B include a pair of guide rollers 34a and 34b mounted on a yoke 35 carried by bolt 9a. The stationary thread guiding means include two guide rollers 32a and 32b mounted on stationary support 33. The yarn portion 4 is guided over roller 32a, roller 34a, roller 32b and roller 34b to form a pair of open loops having the same effect as the single loop L described with reference to FIG. 1.

Bolt 9a is mounted on lever 11 and urged by a spring 10 to move guide rollers 34a, 34b to a higher actuated position for closing switch 19, 20, not shown in FIG. 2.

The embodiment illustrated in FIGS. 1 to 3 operates as follows:

A bundle of filaments F is fed by transporting rollers 3 into the inlet of a tube 2, and sucked by the negative pressure in the chamber of the rotary spinning member 1b toward the inner surface of the same where the filaments are spun and twisted and delivered as a yarn which is transported by transporting rollers 5 and wound up by take-up bobbin 6. The yarn portion L between spinning pot 1 and transporting rollers 5 is guided over yarn guide rollers 30 and 7 to form an open loop L in which a certain normal tension prevails during the continuous operation. Spring 10 is adjusted by nut 14 to counterbalance this yarn tension so that yarn guide roller 7 and support 9 with bolt 9b remain substantially in the same position in relation to lever 11 which is locked by locking means 15, 18.

If the formation of the yarn by spinning pot 1 is interrupted, or a yarn breakage occurs for any other reason, the tension of loop L is reduced, and the force of spring 10 is sufficient to move yarn guide roller 7 to an actuated

position in which head portion 9c engages contact 20 and closes switch 19, 20 so that a signal lamp 23 is illuminated, and electromagnetic means 17, 17a is energized to turn locking means 15 in clockwise direction to a position releasing lever arm 11b so that the heavier arm 11a turns lever 11 in counterclockwise direction to position 11' in which yarn guide roller 7 is in the control position 7' nearer to stationary guide roller 30 and spinning pot 1 so that the size of loop L is reduced, and the broken yarn end is moved toward spinning pot 1, permitting the negative pressure in the rotary spinning member 1b to draw the yarn end into the spinning pot where it is automatically attached to the filaments being twisted into a yarn.

The response to the reduction of the yarn tension, that is the release of lever 11 by locking means 15 and the movement of yarn guide roller 7 to position 7', is so rapid that the interrupted yarn end is still in the spinning pot 1 when the size of the loop L is reduced and part of yarn portion 4 is returned into the spinning pot by the suction produced in the spinning pot due to its rotation.

The length of yarn compensated by the movement of the thread guide roller 7 is consequently directly dependent on the speed of movement of yarn portion 4 obtained by transporting rollers 5, and on the time required for spinning and attaching the broken yarn in the spinning chamber to the filaments.

When the broken yarn end has been connected to the yarn produced in the spinning pot, lever 11 may be manually turned from position 11' to its normal position, and secured by locking means 15, 15'. Otherwise, arm 26 will be engaged by the rotating cam means 27, 28 so that lever 11 will be automatically turned to its normal position in which locking projection 15c snaps over the end portion of arm 11b under the action of spring 18. Electromagnetic means 17, 17a is not energized at this moment, since switch 19, 20 opens upon dropping of lever 11 to position 11'.

The modification of the embodiment of FIG. 1 shown in FIG. 2 operates in the same manner, the only difference being that the pair of guide rollers 34a, 34b forms two loops so that a greater length of yarn is returned toward the spinning pot 1 when lever 11 moves guide rollers 34a, 34b the same distance as it moves guide roller 7 in the embodiment of FIG. 1.

In the embodiment illustrated in FIGS. 4, 5, and 6, the yarn portion 4 between the spinning pot 1 and transporting rollers 5 is guided over yarn guide means A to form an open loop L. Yarn guide means A includes stationary yarn guide means C in the form of a guiding eye 55 mounted on a stationary wall 47, and movable yarn guide means B which include two U-shaped yarn guides 36 and 37 formed in wires 36a and 37a. Wire 37a is secured to a lever 39 which has a hub portion 40 turnable on a stationary shaft 41 so that yarn guide 37 moves down when lever 39, 40 turns in counterclockwise direction. Wire 36a is secured by a screw 44 to a leaf spring 38 which it is attached to lever 39. Screw 44 constitutes a contact cooperating with the contact 43 on a contact spring 43a secured to an insulating plate 42 carried by lever 39.

Lever 39 with wire 37a normally rests on one of the abutments 45a, 45b, 45c of a locking means 45 which is guided on guide rails 46 for movement in horizontal direction, as best seen in FIG. 6. A spring 51 urges locking member 45 to move to the left, but such movement is blocked by a hook portion 49a of a movable armature 49 of an electromagnetic operating means 50 since hook portion 49a engages one of three projecting pins 48a, 48b, 48c. A stop 54 limits movement of locking member 45 when hook portion 49a moves away from one of pins 48a, 48b, 48c. A spring 53 urges armature 49 toward the left, as viewed in FIG. 6, and when electromagnetic means 50 is energized, the armature 49 is pulled to the right for shifting locking member 45 one step corresponding to the horizontal spacing of abutments 45a, 45b, 45c.

Circuit 21 includes, in addition to switch 43, 44 and electromagnetic means 50, a source of voltage 22, a signal lamp 23, a manually operated switch 24 and an impulse counter 23a.

Electromagnetic means 50, 49 is mounted for pivotal movement on a pivot means 52 secured to a stationary frame portion of the apparatus so that upon engagement of the slanted front face of hook portion 49a with one of the pins 48a, 48b, 48c, the electromagnetic means 50, 49 is raised, permitting hook portion 49a to pass over the respective pin.

In a first normal position of the apparatus, lever 39, 37a rests on the highest abutment 45a. When electromagnetic means 50, 49 is energized, hook portion 49a shifts locking member 45 so that lever 39, 37a drops to a position resting on abutment 45b, as shown in the drawing. During consecutive actuations, locking member 45 is shifted so that the lever rests on abutment 45c and then on stop 54. When electromagnetic means 50, 49 is raised so that hook portion 49a releases pin 48c, spring 51 pulls locking means 45 to the left into engagement with stop 54 so that hook 49a can again engage pin 48a.

Spring 38 urges yarn guide 36 to a position in which contact 44 engages contact 43. The normal tension of loop portion L holds yarn guide 36 in a position in which contact 44 is spaced from contact 43, as illustrated in FIG. 4. However, if the yarn tension drops due to an interruption in the forming of the yarn by the spinning pot 1, the spring force S_1 is greater than the force R_1 exerted by the yarn portion 4, so that the contacts 44, 43 engage each other, as shown, in FIG. 5.

The embodiment illustrated in FIGS. 4, 5 and 6 operates in the following manner:

As shown in FIG. 1, filaments F fed by transporting rollers 3 into tube 2 are drawn by the negative pressure into the spinning pot and deposited on surface 1c to form a yarn which is transported by rollers 5 and wound up on a receiving take-up bobbin 6, not shown in FIG. 4. Loop portion 4 is guided through eye 55 and over yarn guides 36 and 37 which are spaced from each other in horizontal direction. At the beginning of an operation, lever 39, 37a rests on the highest abutment 45a of locking member 45, and yarn guide 36 is held by the thread tension in a normal position in which contact 44 is spaced from contact 43.

If the delivery of yarn from spinning pot 1 is interrupted, the spring force of spring 38 is sufficient to raise yarn guide 36 with wire 36a to a position in which contact 44 engages contact 43 so that the circuit of electromagnetic means 50 is closed, armature 49 attracted against the action of spring 53 so that hook portion 49a, acting on pin 48a, shifts locking means 45 one step to the right so that lever 39, 37a drops off abutment 45a and onto abutment 45b, as shown in FIG. 6. Due to the movement of yarn guide 37 toward the spinning pot 1, the yarn end is returned into the spinning pot by the negative suction pressure prevailing in the same, and attached to the filaments. The yarn is again transported by transporting rollers 55, so that normal tension develops in yarn portion 4 and urges yarn guide 36 down to a position in which contact 44 separates from contact 43 so that electromagnetic means 50 is deenergized, permitting spring 53 to move armature 49 to the left as viewed in FIG. 6 while pin 48b, sliding on the slanted face of hook portion 49a, raises the hook portion by pivoting electromagnetic means 50 about pivot pin 52. When hook portion 49a has passed fully over pin 48b, it drops behind the same to a position corresponding to the position of hook portion 49a in relation to pin 48a in FIG. 6. The initial conditions are restored, with the difference that lever 39, 37a rests on locking means 45 in a lower position, and that yarn guide 37 is in a corresponding lower position.

If another interruption or breakage of the yarn takes place, the yarn tension is again reduced, and yarn guide

36 is moved upward by spring 38 to close switch 43, 44 whereby electromagnetic means 50 is energized and pulls locking means 45 another step to the right until lever 39, 37a drops onto abutment 45c in which it remains until the next thread breakage, while the increased tension of the repaired yarn pulls yarn guide 36 down to interrupt switch 43, 44. During a following yarn breakage, lever 39, 37a drops onto the abutment of stop 54, releasing again sufficient yarn to permit the suction in the spinning pot to draw the yarn end onto the rotating surface 1c where it is connected with and attached to the filaments.

The impulses produced by the closed switch 43, 44 are counted by counter 23a which causes illumination of the indicator lamp 23 after three breakages have occurred, so that the operator is aware that further breakages cannot be automatically repaired by the machine. The operator raises armature 49 by turning electromagnetic means 50 about pivot 52 in clockwise direction so that spring 51 pulls locking means 45 to the initial position. The operator also raises lever 39, 37a, and places the same on the highest abutment 45a.

It will be seen that in all embodiments of the invention, a yarn guide means 7, or 36, 37 is movable between a normal position, an actuated position for closing switch 19, 20, or 43, 44, and a control position in which the length of the loop L is reduced. Operating means 17, 15, 11 cause the movement of yarn guide 7 to the control position 7' in the embodiment of FIG. 1, whereas in the embodiment of FIG. 4, operating means 50, 49, 45 place yarn guide means 36, 37 in the control position for reducing the length of the loop, after being actuated by the closed switch 43, 44 in the actuated position of yarn guide means 36, 37 in which yarn guide 36 has been raised by biasing spring 38.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of yarn breakage indicators differing from the types described above.

While the invention has been illustrated and described as embodied in a yarn guide means operable for moving a broken yarn end toward a spinning pot so that the yarn end is drawn by suction into the spinning pot and automatically attached to the filaments spun in the same, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. Yarn control apparatus comprising, in combination, yarn delivering means for delivering a moving yarn; receiving means for receiving the moving yarn; yarn guide means located between said delivering means and said receiving means for forming a loop in the yarn portion between the same, said yarn guide means having an actuated position for forming a larger loop in said yarn portion, a control position for forming a smaller loop, and a normal intermediate position for forming a loop of intermediate size; biasing means acting on said yarn guide means for holding the same in said normal position while a normal tension prevails in said yarn portion, and for moving said yarn guide means to said actuated position when the yarn tension drops; and operating means for causing movement of said yarn guide means to said control position and being actuated by said yarn guide

means in said actuated position so that when the yarn tension drops due to an interruption of the yarn delivery, and said yarn guide means assumes said actuated position, said operating means causes movement of said yarn guide means to said control position whereby the size of the loop is reduced and part of said yarn portion is returned to said yarn delivering means for connection with the yarn being delivered by the same.

2. Yarn control apparatus according to claim 1 wherein said operating means include an operating member having a normal position for supporting said yarn guide means for movement between said normal position and said actuated position, and being movable to an operative position supporting said yarn guide means in said control position.

3. Yarn control apparatus according to claim 1 wherein said operating means include an operating member having a normal position for supporting said yarn guide means for movement between said normal position and said actuated position, and being movable to an operative position supporting said yarn guide means in said control position, a switch operated by said yarn guide means in said actuated position, and electromagnetic means energized by said switch for causing movement of said operating member to said operative position.

4. Yarn control apparatus according to claim 1 wherein said operating means include an operating member having a normal position for supporting said yarn guide means for movement between said normal position and said actuated position, and tending to move to an operative position supporting said yarn guide means in said control position, locking means for holding said operating member in said normal position, a switch operated by said yarn guide means in said actuated position, and electromagnetic means energized by said switch for moving said locking means to a position releasing said operating member so that the same moves to said operative position.

5. Yarn control apparatus according to claim 1 wherein said operating means include an operating member having a normal position for supporting said yarn guide means for movement between said normal position and said actuated position, and tending to move to an operative position supporting said yarn guide means in said control position, locking means having a locking position for holding said operating member in said normal position, a switch operated by said yarn guide means in said actuated position, electromagnetic means energized by said switch for moving said locking means to a position releasing said operating member so that the same moves to said operative position, spring means for urging said locking means to said locking position, and rotary means for engaging said operating member in said operative position for moving the same back to said normal position after said yarn portion has been returned to said yarn delivering means and connected to yarn delivered by the same.

6. Yarn control apparatus according to claim 1 wherein said operating means include a switch operated by said yarn guide means in said actuated position, and electromagnetic means energized by said switch.

7. Yarn control apparatus according to claim 1 wherein said operating means include a switch operated by said yarn guide means in said actuated position, locking means for holding said yarn guide means in said normal position, and electromagnetic means energized by said switch to move said locking means to a position releasing said yarn guide means, said yarn guide means tending to move to said control position and moving to the same after release by said locking means.

8. Yarn control apparatus according to claim 1 wherein said operating means include an operating lever having an opening; and wherein said yarn guide means include a support having a bolt passing through said opening, an abutment on said bolt, said biasing means being a spring abutting said abutment and said lever, and a guide roller

carried by said support and supporting said loop; and wherein said operating lever supports said support of said yarn guide means for movement from said normal to said actuated position under the action of said spring when the yarn tension drops, and moves to an operative position in which said yarn guide means is in said control position when said operating means is actuated in said actuated position of said yarn guide means.

9. Yarn control apparatus according to claim 8 wherein said operating means includes locking means for locking said lever, a switch actuated by said yarn guide means in said actuated position, electromagnetic means energized by said actuated switch to release said locking means, and means for moving said lever with said yarn guide means to said operative position.

10. Yarn control apparatus according to claim 1 wherein said yarn guide means include a first yarn guide and a second yarn guide adjacent said first yarn guide, said loop passing through both said first and second yarn guides; and wherein said operating means include an operating member for carrying said second yarn guide and supporting said first yarn guide for movement between said normal and actuated positions, and means for moving said operating member to a position in which said second yarn guide is in said control position.

11. Yarn control apparatus according to claim 1 wherein said yarn guide means include a first yarn guide and a second yarn guide adjacent said first yarn guide, said loop passing through both said first and second yarn guides; and wherein said operating means include an operating member for carrying said second yarn guide and supporting said first yarn guide for movement between said normal and actuated positions, a switch operated by said first yarn guide in said actuated position, and electromagnetic means energized by said switch for causing movement of said operating member to a position in which said second yarn guide is in said control position.

12. Yarn control apparatus according to claim 1 wherein said yarn guide means include a first yarn guide and a second yarn guide adjacent said first yarn guide, said loop passing through both said first and second yarn guides; and wherein said operating means include an operating member for carrying said second yarn guide and supporting said first yarn guide for movement between said normal and actuated position, a switch operated by said first yarn guide in said actuated position, locking means locking said operating member, and electromagnetic means energized by said switch for releasing said locking means so that said operating member moves with said second yarn guide means to said control position.

13. Yarn control apparatus according to claim 12 wherein said operating member is an operating lever, and wherein said biasing means is a spring supporting said first yarn guide on said operating lever in said normal position at normal yarn tension, and moving said first yarn guide to said actuated position when the yarn tension drops due to a yarn breakage.

14. Yarn control apparatus according to claim 13 wherein said locking means include a locking member having a plurality of abutments for supporting said operating lever with said first and second guides and said spring; and wherein said electromagnetic means, when

energized by said switch, move said locking member successively to positions in which successive abutments support said operating lever.

15. Yarn control apparatus according to claim 14 wherein said locking member has a plurality of projections, and wherein said electromagnetic means include a movable armature having a hook successively engaging said projections upon successive energizations of said electromagnetic means.

16. Yarn control apparatus according to claim 15 including an impulse counter connected with said switch for counting actuations of the same, and an indicator lamp illuminated under the control of said impulse counter after a number of switch actuations corresponding to the number of said abutments of said locking member.

17. Yarn control apparatus according to claim 13 wherein said switch includes a first contact mounted on said first yarn guide means and a second contact mounted on said operating lever.

18. Yarn control apparatus comprising, in combination, means for spinning and twisting filaments into a yarn, and producing suction; take-up means for winding up the yarn; yarn guiding means located between said rotary means and said take-up means for forming a loop in the yarn portion between the same, and including a stationary yarn guide and movable yarn guide means, said movable yarn guide means having an actuated position farther spaced from said rotary means for forming a larger loop, and a normal position for forming a loop of selected size; an operating member having a normal position supporting said yarn guide means for movement between said positions, and having an operative position supporting said yarn guide means in a control position closer to said rotary means for forming a loop smaller than said selected size; biasing means supported on said operating member for urging said yarn guide means to said actuated position; electromagnetic means for causing movement of said operating member from said normal position to said operative position; and a switch for energizing said electromagnetic means and being operated by said yarn guide means in said actuated position so that when the yarn tension drops and said yarn guide means moves to said actuated position, said electromagnetic means causes movement of said operating member to said operative position whereby said yarn guide means assumes said control position, the size of the loop is reduced, and part of said yarn portion can be drawn by suction into said rotary means for connection with the yarn spun by the same.

19. Yarn control apparatus according to claim 18 including means urging said operating member to said operative position, locking means for locking said operating member in said normal position; and wherein said electromagnetic means, when energized by said switch in said actuated position, release said locking means to cause movement of said operating member to said operative position.

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JOHN PETRAKES, *Primary Examiner.*