April 23, 1957 S. A. PETERSEN ET AL 2,789,774

TEXTILE WINDING

Filed Nov. 10, 1953 3 Sheets-Sheet 1

FIG. 1.

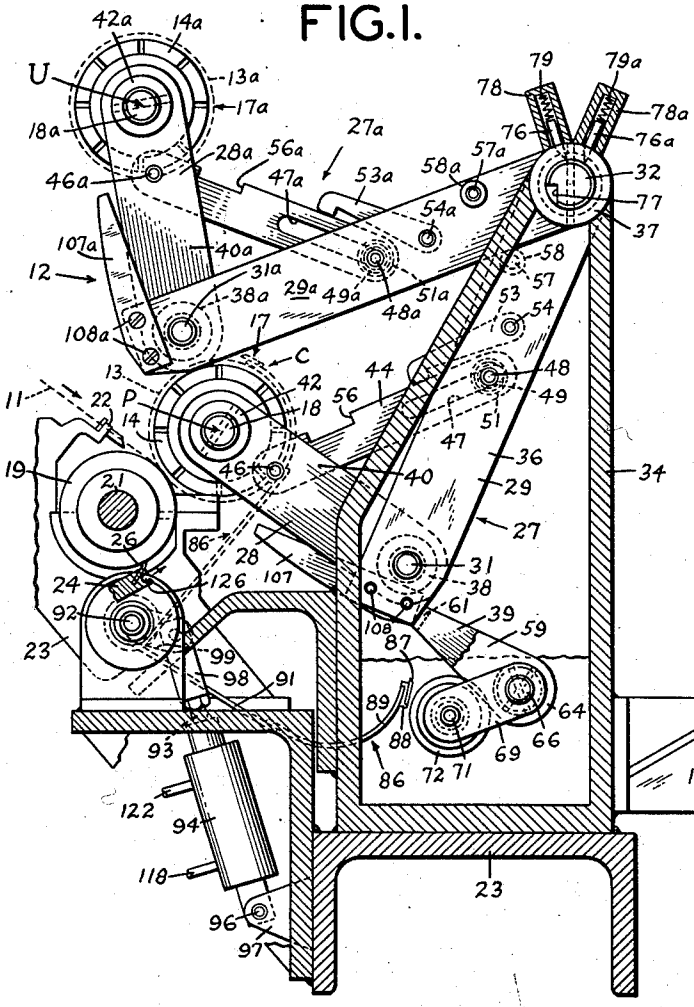
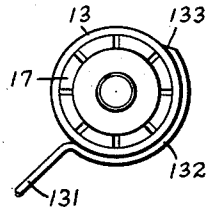


FIG. 6.



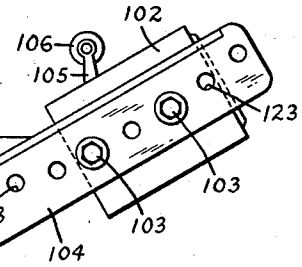
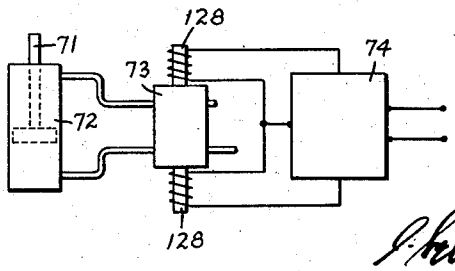


FIG. 4.



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TEXTILE WINDING

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FIG.2.

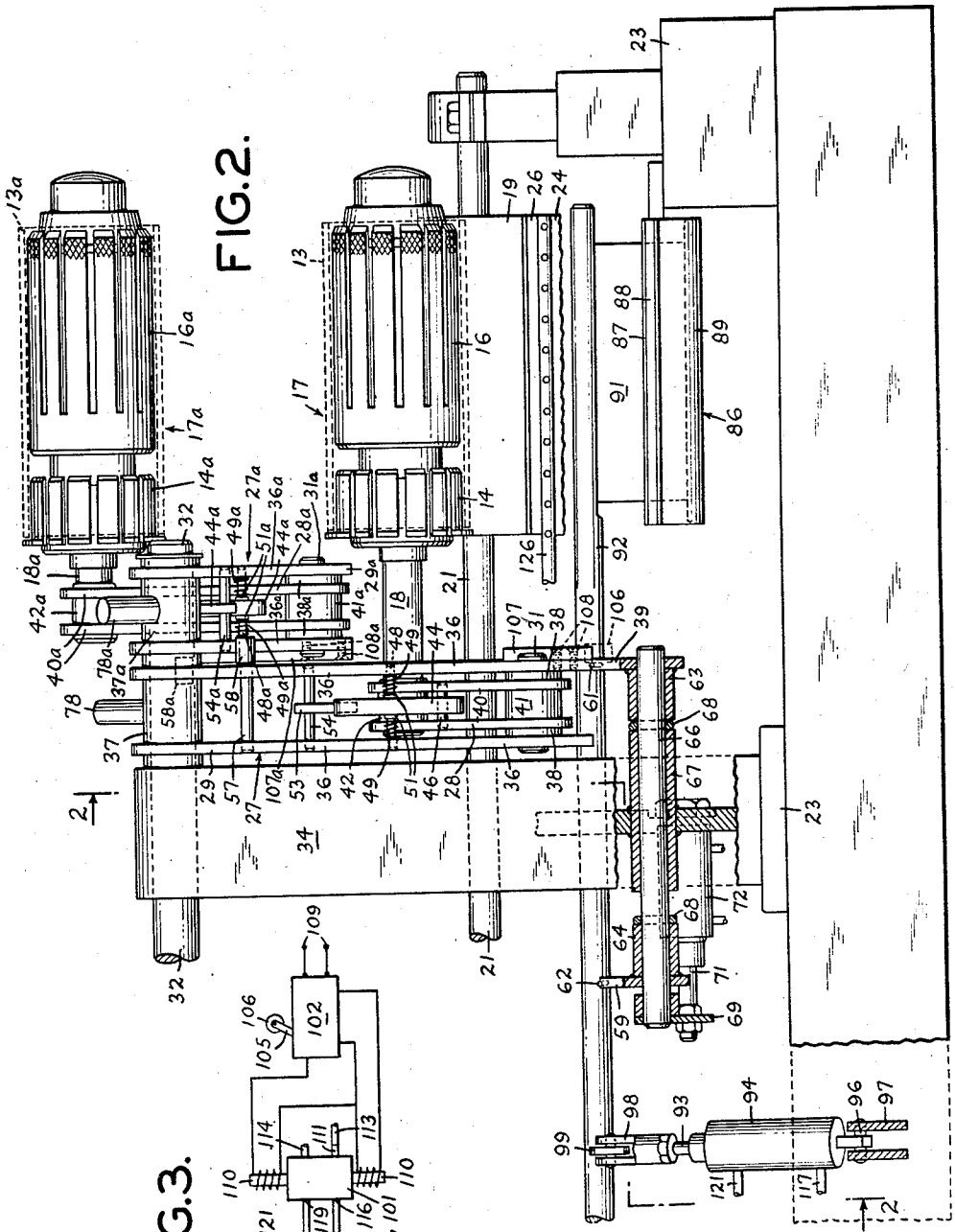

FIG.3.

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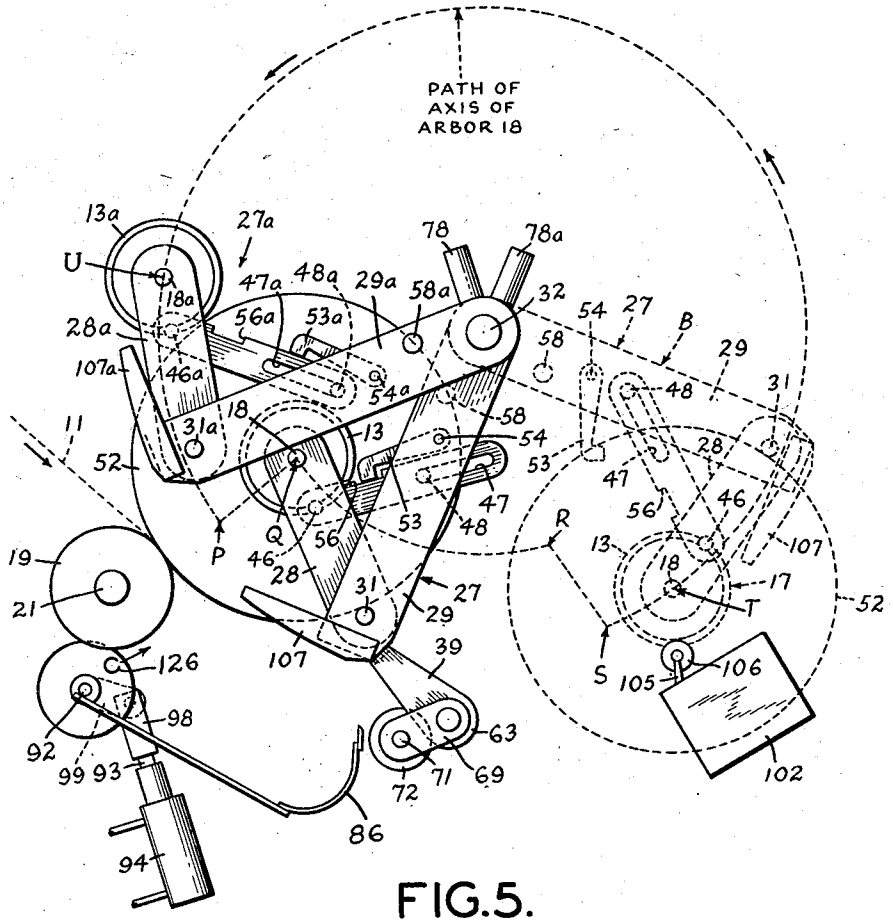

FIG.5.

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United States Patent Office 2,789,774 Patented Apr. 23, 1957

2,789,774

TEXTILE WINDING

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Application November 10, 1953, Serial No. 391,211

26 Claims. (Cl. 242—18)

This invention relates to a textile winding apparatus and relates more particularly to an automatic doffing apparatus for a yarn winding machine.

It is an object of this invention to provide an automatic doffing apparatus for a yarn winding machine, which apparatus will be especially simple in construction and efficient in operation.

A further object of this invention is the provision, on a yarn winding machine to which yarn is supplied continuously at a constant rate, of an automatic doffing apparatus which will prevent the wastage of yarn during the doffing period.

Another object of this invention is to provide a simple and efficient automatic doffing apparatus which utilizes gravitational force for the movement of the parts during the doffing operation.

Other objects of this invention will be apparent from the following detailed description and claims.

According to one embodiment of this invention, the apparatus comprises a pair of articulated arms pivotally mounted side by side on a common horizontal axis. At the end of each arm there is provided a mandrel for rotatably mounting a yarn package support, such as a cardboard yarn tube. At the beginning of the operation of the apparatus, one arm is supported, by a movable dog, in an operative position in which its yarn tube bears against a rotating drive roll, which roll frictionally engages the yarn tube to rotate the latter and wind yarn thereon. The second arm is in an inoperative position, supported above the first arm by any suitable means, such as a projecting pin, mounted on said first arm.

When the desired quantity of yarn has been wound on the yarn tube carried by the first arm, the dog supporting said arm is moved out of the path of the first arm and into the path of the second arm. Accordingly, the first arm drops and swings on its horizontal pivot to an inoperative position where its wound yarn tube is out of engagement with the drive roll, while the second arm moves downward until said second arm engages the dog. The dog now supports said second arm in an operative position where the empty yarn tube of said second arm bears against the drive roll. As a result of these movements a portion of the yarn which trails from the wound yarn tube is nipped between the empty yarn tube and the drive roll.

During its swinging movement the first arm, by engaging a switch which controls a piston connected to a curved cutter or knife, causes said knife to sever the trailing portion of yarn and bring the cut end of yarn into close proximity to the empty yarn tube. At the same time a stream of air is directed between the curved knife and the empty rotating yarn tube to cause the yarn to engage said tube and to maintain the yarn in contact with said tube to start the winding of the yarn on said tube.

When the first articulated arm swings away from its operative position under the influence of gravity its momentum carries it to a new position above the point where

it would normally be suspended if it were at rest. The arm is maintained in this new position by any suitable means such as a one-way clutch or a pawl. While the arm is in this position the fully wound yarn tube may be removed from the mandrel on said arm and replaced by an empty tube by the operator of the machine. After the full tube has been replaced by an empty one the operator then moves the arm about its horizontal pivot, in the same direction as the earlier swinging movement of said arm, until said arm assumes the position originally held by the second articulated arm, i. e. it is supported above the second articulated arm by a pin, or other suitable means, projecting from said second arm. When the yarn tube carried by the second arm has been fully wound the dog moves again and the cycle is repeated.

The movement of the dog may be controlled in any suitable manner. Advantageously, it may be controlled by a timer, which is set to move the dog after a yarn tube has been driven by the drive roll for the period of time necessary to wind the desired amount of yarn thereon. Ordinarily, the speed of the drive roll is substantially constant so that the amount of yarn wound on the yarn tube is directly proportional to the time of winding. However, when speed of the drive roll is not substantially constant the dog may be controlled by a suitable counter which acts to move the dog when the drive roll has made the desired number of revolutions.

A preferred embodiment of our invention is illustrated in the accompanying drawings, wherein—

Fig. 1 is a side elevational view, partly in cross section, of the winding apparatus of this invention,

Fig. 2 is a front elevational view, taken from the right in Fig. 1, with portions omitted in the interest of clarity and with portions in cross section,

Fig. 3 is a schematic diagram of the arrangement for actuating the knife and for providing the stream of air to start the winding operation,

Fig. 4 is a schematic diagram of the arrangement for actuating the dog,

Fig. 5 is a schematic side elevation of the apparatus illustrating the movement of the parts during the doffing operation, and

Fig. 6 is a side elevational view of another form of knife, showing the knife in its raised position.

Referring now to the drawings, reference numeral **11** designates a yarn which is fed continuously, in the direction shown by the arrow at the left of Fig. 1, from any suitable source to a winder, generally indicated by reference numeral **12**, where it is wound in the form of a package on a cardboard yarn tube **13**, or other suitable yarn package support. The yarn tube **13** is firmly but removably mounted on a skirt **14** and an expansible sleeve **16** (Fig. 2) of a mandrel **17** rotatably supported on an arbor **18**. The mandrel **17** is preferably of the type disclosed in our application Serial No. 335,013, filed February 4, 1953, now Patent No. 2,733,874, issued February 7, 1956, which provides for easy donning and doffing of the yarn tube on said mandrel. In accordance with the usual practice yarn tube **13** is rotated to wind the yarn thereon by means of a rotating drive roll **19** mounted on a shaft **21**, which roll frictionally engages the outer surface of said tube, or of the yarn wound thereon, while the yarn is distributed along the length of said tube by the action of a reciprocating traversing guide **22**.

Both the guide **22** and the shaft **21** of the drive roll **19** are mounted on a machine frame **23**. Adjacent to the drive roll **19** and mounted on a bracket **24** fixed to the machine frame **23** is a sharp blade **26** which is spaced a short distance, e. g. 0.004 inch, from the surface of said drive roll and which extends the entire length of said roll and of the yarn tube **13**. This blade **26** serves to keep the drive roll **19** free of accumulations of lint, yarn and

dirt so that the surface of the drive roll is maintained clean and in even, uniform contact with the yarn tube or the yarn wound thereon.

The arbor 18 is mounted at one end of an articulated arm 27 which comprises a forearm 28 and an upper arm 29 pivotally connected by a pin 31, the upper arm 29 being pivotally mounted on a stationary shaft 32 supported at the top of a standard 34 of the machine frame 23. The upper arm 29 is made up of a pair of spaced parallel bars 36 (Fig. 2) integral at one end with a bearing 37 journalled on the shaft 32. At the other end the bars 36 are integral with a pair of spaced annular elements 38 which receive the pivot pin 31. In the position shown in Figs. 1 and 2 the lower portion of one of the bars 36 rests on a dog 39, which dog thus serves to support the upper arm 29. The construction of the forearm 28 is similar to that of the upper arm 29 in that said forearm 28 is made up of a pair of parallel bars 40 which bars are spaced closer to each other than the bars 36. These bars 40 are integral, at one end, with a bearing 41 for the pivot pin 31, and integral, at the other end, with a mounting 42 in which the arbor 18 is supported.

In order to limit the movement of the forearm 28 relative to the upper arm 29 a link or strap 44 is provided. This strap 44 is pivotally mounted at 46 on the forearm and has a slot 47 for receiving a pin 48 mounted on the upper arm 29 between the bars 36 of said upper arm. Disposed around the pin 48 and on opposite sides of the slotted end of the strap 44 are a pair of springs 49. These springs 49 are compressed between the bars 36 and washers 51, which washers are fitted around the pin 48 and frictionally engage opposite sides of the strap 44. In this manner the strap 44 is kept centered between the bars 36. Also, the arrangement of springs 49 and washers 51 provides a damping action which greatly reduces any vibrations of the strap 44 and of the connected forearm 28, mandrel 17 and yarn tube 13 during the winding operation.

The parts of the winding mechanism are so arranged that, when they are in the position shown in Figs. 1 and 2, the yarn tube 13 rests on the drive roll 19. In this position the strap 44 does not positively limit the motion of the forearm 28, since the pin 48 on the upper arm 29 is not at the end of the slot 47 in said strap. Accordingly, the weight of the forearm 28, the arbor 18 and the mandrel 17 acts on the yarn tube 13 to urge it against the drive roll 19 with some force. As the winding process continues the size of the yarn package 52 (see Fig. 5) on the mandrel 17 and arbor 18 increases, causing the axis of said arbor 18 to move away from the drive roll 19 and causing the forearm 28 to pivot, in a clockwise direction, in the view shown in Figs. 1 and 5, about the pivot pin 31. Thus, the axis of the arbor 18 moves from its original position P (Figs. 1 and 5) to a position Q (Fig. 5). During this movement the strap 44 is moved sufficiently to allow a latch 53, pivotally mounted at 54 on the upper arm 29, to drop into a notched portion 56 on said strap 44, so that counterclockwise movement of the forearm 28 to its original position relative to the upper arm 29 is prevented. The size and arrangement of the parts is such that during the movement of the axis of arbor 18 from position P to position Q the pressure exerted by the yarn package 52 on the surface of the drive roll 19 remains substantially constant despite the increased weight of said yarn package.

Another yarn tube 13*a* is carried by a second articulated arm 27*a*, which arm is also mounted on the stationary shaft 32 but spaced from the articulated arm 27. This second articulated arm 27*a* and the articulated arm 27, previously described, are identical. However, because of its position arbor 18*a* carried by articulated arm 27*a* is necessarily shorter than the arbor 18 of the arm 27 in order to bring the ends of the mandrels 17 and 17*a* of the two arms into alignment. All parts on the arm 27*a* are designated by the same reference numerals as

the parts of arm 27 except that the suffix *a* is added thereto. Thus, there are provided on the second articulated arm 27*a* a skirt 14*a*, an expansible sleeve 16*a*, a forearm 28*a*, an upper arm 29*a*, a pivot pin 31*a*, bars 36*a*, a bearing 37*a*, annular elements 38*a*, bars 40*a*, a bearing 41*a*, a mounting 42*a*, a strap 44*a*, a pivot 46*a*, a slot 47*a*, a pin 48*a*, springs 49*a*, washers 51*a*, a latch 53*a*, a pivot 54*a*, and a notched portion 56*a*.

The second articulated arm 27*a* is supported in its elevated position, shown in Figs. 1 and 2, by a pin 57 mounted on the upper arm 29 of the first articulated arm 27. The pin 57 has an enlarged head 58 projecting from one side of the upper arm 29 into the path of the second upper arm 29*a* so that a lower edge of said second upper arm 29*a* rests on said head 58. A similar pin 57*a* is provided on the second upper arm 29*a*, with the head 58*a* of said pin projecting in the opposite direction into the path of the first upper arm 29.

While only two articulated arms, 27 and 27*a*, are shown in the drawing it is to be understood that a similar pair of arms may be provided at the other side of the standard 34, that is, to the left of Fig. 2. For this purpose, the shaft 21 of the drive roll 19 and the stationary shaft 32 may extend to the left of the standard 34 and a dog 59, similar to the dog 39, may be provided near the bottom of said standard 34, all as shown in Fig. 2. Each dog 39 and 59 is provided with an insert 61 and 62, respectively, preferably made of hard rubber or similar material, on which the corresponding upper arm is adapted to rest.

Each dog 39 and 59 has an integral cylindrical base 63 and 64, respectively, in the bore of which is held a rod 66 which is mounted for longitudinal sliding movement in a sleeve 67 mounted on the machine frame 23. The extent of the sliding movement of rod 66 is limited by the engagement of washers 68 at the ends of bases 63 and 64 with the ends of the sleeve 67. The rod 66 is connected by a plate 69 to a piston 71 operating in a pneumatic cylinder 72 bolted to the machine frame 23. When the piston 71 is moved to the right in Fig. 2 the dog 39 is moved to the right out of the path of the first upper arm 29; the reverse action takes place when the piston 71 is moved to the left. The piston 71 is actuated through an arrangement of a valve 73 and a timer 74, such as illustrated schematically in Fig. 4. By means of this arrangement, which will be described more fully below, the timer 74 acts to cause the piston 71 to move when yarn has been wound on tube 13 or 13*a* for a predetermined period of time.

When the parts are in the position shown in Fig. 5 and the piston 71 is actuated to move the dog 39 to the right (as viewed in Fig. 2) out of engagement with the upper arm 29, the articulated arm 27 is no longer supported and therefore drops, swinging counterclockwise (as viewed in Figs. 1 and 5) about the stationary shaft 32. The momentum of the swinging articulated arm 27 carries it to the position B shown in dotted lines in Fig. 5. The articulated arm 27 is held in its position B by the action of a pawl 76 which engages in a cut-out portion 77 in the stationary shaft 32. More particularly, the pawl 76 is mounted in a housing 78 integral with the bearing 37 of upper arm 29 and is urged in a direction toward the shaft 32 by a compression spring 79. The end of the pawl 76 is bevelled so that the pawl will allow the articulated arm 27 to move counterclockwise, but not clockwise, from its position B. A similar pawl 76*a*, together with a housing 78*a* and a spring 79*a*, is provided on the bearing 37*a* of the upper arm 29*a*.

When the dog 39 is moved and the articulated arm 27 swings toward its position B, the yarn package 52 moves easily out of engagement with the drive roll 19. During the greater portion of the swinging movement of articulated arm 27 to position B the latch 53 is engaged with a shoulder of the notch 56 in the strap 44 so that the forearm 28 carrying yarn package 52 is not free to swing

counterclockwise about pivot pin 31. Accordingly, the yarn package 52 is prevented from knocking against a curved knife 86, mounted in the lower portions of the apparatus and described more fully below. However, after the articulated arm 27 has swung part of the distance toward position B the latch 53 and strap 44 reach a point where the action of gravity on the latch causes the latch to swing out of engagement with the strap. Accordingly, the forearm 28 carrying the yarn package 52 drops and swings about pivot pin 31 until the end of the slot 47 of strap 44 comes into engagement with the pin 48 on the upper arm 29. It will be readily seen that when the articulated arm 27 swings to its position B the axis of the arbor 18 moves from the point Q to the point R, where the latch 53 is released, then to a point S and finally to a point T, as shown in Fig. 5.

As stated, the second articulated arm 27*a* is supported on the enlarged head 58 of the pin 57 mounted on upper arm 29 of the first articulated arm 27. Accordingly, when the first articulated arm 27 swings to position B the second articulated arm 27*a* drops until the lower portion of its upper arm 29*a* hits the dog 39, which is now in the path of said upper arm 29*a*. The impact of the arm 29*a* on the dog 39 is cushioned by the insert 61 at the top of said dog. Thus, the second articulated arm 27*a* is now in its operative position, replacing the first articulated arm 27. The yarn tube 13*a* is now bearing against, and rotated by, the drive roll 19 while an unwound portion of the yarn 11 coming from the traversing guide 22 passes between said yarn tube and drive roll and then to the full yarn package 52.

The portion of yarn between empty yarn tube 13*a* and the full yarn package 52 is cut by the action of the knife 86 and caused to begin to wind around said tube. The knife 86 is made up of a blade 87 mounted in a holder 88 at the end of a curved plate 89 fixed to a straight arm 91, which arm 91 is in turn mounted on a rocking shaft 92 supported on the machine frame 23. The blade 87, the holder 88 and the plate 89 extend the full width of the yarn tube (see Fig. 2) while the arm 91 is slightly narrower. The rocking shaft 92, and the knife 86 carried thereby, are actuated by a piston 93 working in a pneumatic cylinder 94 pivotally supported at 96 by a bracket 97 on the machine frame 23, the piston 93 being connected to said rocking shaft 92 by a clevis 98 pinned to a crank arm 99 of said shaft.

The admission of air to the cylinder 94 to actuate the knife 86 is controlled through a four-way valve 101 and a microswitch 102, illustrated in Fig. 3 and described more fully below. The microswitch 102 (Fig. 1) is mounted, as by means of screws 103, on a forwardly extending bracket 104 on the machine frame 23 and is provided with an operating lever 105 having at its end a roller 106, the operating lever 105 being biased so that said roller is normally in a raised position. The roller 106 is adapted to be engaged and depressed, when an articulated arm 27 or 27*a* swings past it to position B (Fig. 5), by a cam plate 107 or 107*a* mounted on an upper arm 29 or 29*a*, respectively. One cam plate 107 is fixed, as by means of screws 108, to one side of a bar 36 of the upper arm 29. The other cam plate 107*a* is attached, as by means of screws 108*a*, to a bar 36*a* of the second upper arm 29*a*, the two cam plates 107, 107*a* and the roller 106 being located in substantially the same vertical plane so that said roller may be engaged and depressed by the curved lower surface of either of said cam plates. Accordingly, when the articulated arm 27 swings to position B (Fig. 5) the lever 105 of microswitch 102 is first depressed and then allowed to rise as the end of the cam plate 107 moves past the roller 106.

The microswitch 102 is electrically connected to a source of electricity 109 and to the four-way air valve 101 (Fig. 3) said valve being of the well-known type having a pair of solenoids 110 for operating its valve rod (not shown). The valve 101 is provided with four ports: port 111 communicating with a source of compressed air 113, port 114 which is open to the atmosphere, port 116 communicating through pipe 117 with an opening 118 at the lower end of the cylinder 94 and port 119 communicating through pipe 121 with an opening 122 at the upper end of the cylinder 94. Thus, when the valve rod is in one position compressed air is admitted below the piston 93 while the opposite side of said piston is subjected to atmospheric pressure, forcing said piston and the connected knife 86 upwards. When the valve rod is moved to its other position the connections are reversed and the piston 98 and knife 86 are forced downwards.

As stated, the movement of the valve rod of the valve 101 is effected by a pair of solenoids 110. These solenoids 110 are connected to the source of electricity 109 through the microswitch 102. When the operating lever 105 of the microswitch 102 is depressed one solenoid is energized, moving the valve rod to a position where compressed air is admitted below the piston 93. Similarly, when the operating lever 105 is in its normal raised position only the other solenoid is energized so that the valve rod is moved to a position where the compressed air is admitted above the piston 93. It will be seen that the length of time during which the piston 93 and knife 86 are being urged upwardly may be predetermined by the length of the cam plate 107. The longer the cam plate 107, the longer the period of time the lever 105 will be depressed during the swinging movement of the articulated arm 27 to its position B.

The timing of the vertical movement of the knife 86 may be regulated by changing the position of the microswitch 102 on the bracket 104. To this end the bracket 104 is constructed so as to provide a plurality of alternative positions for mounting the microswitch, there being in said bracket a plurality of holes 123 for receiving the screws 103 holding the microswitch, said holes being arranged in an arc of a circle whose center is at shaft 32. Thus, when it is desired to have the knife 86 begin to move upward earlier, the microswitch is moved closer to the standard 34 so that it is engaged earlier by the cam plate 107. Of course, the knife 86 should not move upward until the yarn package 52 has passed out of the path of said knife.

Because of the provision of the latch 53 and notched portion 56 the knife 86 may be mounted with its blade 87 in close proximity to the yarn trailing from the yarn package 52, so that the cutting of said yarn is effected very shortly afetr the roller 106 has been depressed. If the latch 53 and notched portion 56 were not provided the yarn package would swing downward to a considerable extent during the movement of articulated arm 27 to position B, and the knife 86 would therefore have to be mounted with its blade 87 much further below the yarn. This would require the knife 86 to move for a considerable distance before its blade 87 came in contact with the yarn.

Referring again to Fig. 3, the pipe 117, leading to the bottom of the cylinder 94, has a branch 124 leading to a perforated tube 126 mounted above the rocking shaft 92 on the bracket 24 of the machine frame 23. It is therefore apparent that compressed air will be forced into and through the perforated tube 126 at the same time as the compressed air is admitted to the bottom of cylinder 94 to raise the knife 86. However, any other suitable means for injecting air into the perforated tube 126 when the knife 86 is raised may be employed. One end (to the right in Fig. 2) of the perforated tube 126 is closed and the perforations of the tube are so positioned as to direct the compressed air from said perforated tube in a stream, or streams, against the knife 86 when said knife is in its raised position.

When the knife 86 is raised, it moves to a position C (Fig. 1) and cuts the yarn. In this position the curved plate of said knife fits closely around the empty rotating yarn tube 13*a*, but does not touch said yarn tube, so that

the end of the cut yarn is carried by the knife into close proximity to the surface of said yarn tube. The air blast from the perforated tube **126** travels along the surface of the curved plate **89** and carries, and maintains, the yarn into contact with the empty yarn tube **13***a* so that the yarn begins to wind around said tube. The air blast also acts to prevent the yarn from starting to wind around the drive roll **19** after said yarn has made its first turn around the yarn tube since, as will be apparent from Figs. 4 and 5, the air blast passes adjacent to the surface of the drive roll in a direction opposite to that of the movement of the surface of said roll.

The knife **86** remains in its position C and the air supply to the perforated tube **126** continues as long as the roller **106** and lever **105** of switch **102** are depressed, i. e. until the swinging movement of the articulated arm has carried the cam plate **107** past the roller **106**, the cam plate **107** being of such length as to depress the lever **105** for the period of time necessary to start proper winding of the yarn. When the lever **105** rises again, the operation of the microswitch **102** and valve **101** cuts off the supply of compressed air to the perforated tube **126** and causes the knife **86** to descend to its original position.

When the articulated arm has swung to its position B, it is prevented from swinging in a reverse direction by the action of the pawl **76**, or other suitable device for supporting said arm in its position B, and the full yarn package **52** can be removed easily from the mandrel **17** by the operator of the machine. After removing the full package **52** the operator places an empty yarn tube **13** on the mandrel and swings the whole articulated arm **27** in a counterclockwise direction, as shown in Figs. 1 and 5, so that said arm is now in the position originally occupied by the second articulated arm **27***a*, when viewed from the side as in Figs. 1 and 5. In this position the articulated arm **27** is supported by the pin **57***a* of said second articulated arm **27***a*, while its forearm **28** is prevented from swinging counterclockwise by the engagement of the end of the slot **47** in strap **44** with the pin **48**. The axis of the mandrel **17** is now at a point U (Figs. 1 and 5).

When the yarn package on the second articulated arm **27***a* is full the entire operation is repeated and the parts return to their original positions. More particularly, the dog **39** is moved to the left (Fig. 2) by the action of the timer **74**, causing the articulated arm **27***a* to swing to a position B (Fig. 5) where it is supported by the engagement of its pawl **76***a* (Fig. 1) with the cut-out portion **77** of the stationary shaft **32**. During this swinging movement the axis of the arbor **18***a* travels from the point Q (Fig. 5) through the points R and S to the point T, while the cam plate **107***a* engages the roller **105** to actuate the knife **86** and to provide a stream of air from the perforated tube **126**. At the same time the first articulated arm **27** drops to its original position with its empty yarn tube **13** in contact with the rotating drive roll **19** and its upper arm **29** supported by the dog **39**. The operator then removes the full yarn package from the mandrel **17***a*, places an empty yarn tube **13***a* on said mandrel, and swings the second articulated arm **27***a* counterclockwise to its original position so that the arbor **18***a* is at the point U.

As stated, the valve and timer arrangement for operating the dog **39** is illustrated in Fig. 4. This arrangement is very similar to the valve and switch combination shown in Fig. 3. Thus, the valve **73** and the cylinder **72** and their connections are substantially identical with the valve **101** and the cylinder **94** and their connections. The valve **73** is operated by a pair of solenoids **128** identical with solenoids **110**, the solenoids **128** being energized alternately by the timer **74**, which is of conventional construction, so as to cause the piston **71** to move the dog **39**.

Another form of knife construction is illustrated in Fig. 6, although the form illustrated in Figs. 1, 2 and 5 is preferred. The knife **131** is provided with a semicircular portion **132** extending the full width of the yarn tube **13** or **13***a* and having a sharp cutting edge **133**. This semicircular portion **132** is adapted to fit closely around and engage the empty rotating yarn tube **13** or **13***a* when the knife **131** is in its raised position, so that the cut end of the yarn will be carried by said portion **132** into contact with the surface of the yarn tube **13** or **13***a*. There is no provision for an air blast. However, since the yarn tube **13** or **13***a* is made of cardboard and the knife **131** is made of relatively smooth metal, the yarn has a higher coefficient of friction with the yarn tube than with the knife, so that the yarn begins to wind around the yarn tube.

It is to be understood that the foregoing detailed description is given merely by way of illustration and that many variations may be made therein without departing from the spirit of our invention.

Having described our invention, what we desire to secure by Letters Patent is:

1. In a textile winding apparatus, a driving member for rotating a yarn package support, a plurality of means for mounting yarn package supports for rotation, each of said mounting means being independently movable, in turn, from an operative position, where the outer surface of the yarn on the yarn package support carried thereby is frictionally engaged by said driving member to wind yarn on said support, to an inoperative position where the wound yarn package is disengaged from said driving member, and means actuated by movement of a mounting means from operative to inoperative position for starting the winding of yarn around the support which is on a mounting means in said operative position.

2. Apparatus as set forth in claim 1 in which said driving member is a drive roll.

3. In a textile winding apparatus, a driving member for rotating a yarn package support, a plurality of means for mounting yarn package supports for rotation, each of said mounting means being independently movable, in turn, from an operative position where the outer surface of the yarn on the yarn package support carried thereby is frictionally engaged by said driving member to wind yarn on said support, to an inoperative position where the wound yarn package is disengaged from said driving member, means selectively operable to sustain said mounting means in said operative position and to release the mounting means so sustained for movement to inoperative position, and means for starting the winding of yarn around the support which is in operative position.

4. In a textile winding apparatus, driving means for rotating a yarn package support, a plurality of means for mounting yarn package supports for rotation, each of said mounting means being movable independently and consecutively in an endless closed path from an operative position where said driving means rotates the support on said mounting means to wind yarn on said support to a position where said support is not rotated by said driving means, and means actuated by movement of a mounting means from operative to inoperative position for starting the winding of yarn around the support which is on a mounting means in said operative position.

5. In a textile winding apparatus, driving means for rotating a yarn package support, a plurality of means for mounting yarn package supports for rotation, each of said mounting means being movable independently but consecutively, in an endless closed path, from an operative position, where the support carried thereby is operatively engaged with said driving means to wind yarn on said support, to an inoperative position where the wound support is operatively disengaged from said driving means, with an unwound portion of yarn trailing from said wound support, means for severing said unwound portion and for starting the winding of said trailing yarn around the support which is on a mounting means in said operative position, and means, actuated by the movement of a mounting means from operative to inoperative position, for operating said severing means.

6. In a textile winding apparatus, driving means for rotating a yarn package support by operative engagement

therewith, a plurality of independently movable pivotally mounted arms, each adapted to rotatably mount a yarn package support at the free end of said arm and each having its free end movable, in an endless closed path, from an operative position where said support is brought into operative engagement with said driving means to wind yarn thereon to an inoperative position where said wound support is operatively disengaged from said driving means, and means selectively operable to support successively an arm in said operative position and to release the arm so supported for movement in said closed path to said inoperative position.

7. In a textile winding apparatus, driving means for rotating a yarn package support, a plurality of independently movable arms, each pivotally mounted for movement about a horizontal axis and each adapted to carry a yarn package support rotatably at the free end of said arm, each of said arms having its free end movable in a vertical plane in an endless closed path from an operative position where said support is brought into operative engagement with said driving means to wind yarn on said support to an inoperative position where the wound support is operatively disengaged from said driving means, means for successively supporting each of said arms with its free end in said operative position, said supporting means being movable to allow said free end to move in said closed path to said inoperative position.

8. In a textile winding apparatus, driving means for rotating a yarn package support, a plurality of means for mounting yarn package supports for rotation, each of said mounting means being movable independently and consecutively in a closed endless path, situated in a vertical plane, from an operative position where said driving means is brought into operative engagement with the yarn package support on said mounting means, to wind yarn on said support, to an inoperative position where said support is operatively disengaged from said driving means, dog means for supporting said mounting means in said operative position, said dog means being movable to allow said mounting means to move from said operative to said inoperative position.

9. Apparatus as set forth in claim 8 in which a timer is operatively connected to said dog means for effecting movement thereof.

10. In a textile winding apparatus, driving means for rotating a yarn package support, a plurality of means for mounting yarn package supports for rotation, each of said mounting means being movable consecutively in a closed endless path, situated in a vertical plane, from an operative position where said driving means is brought into operative engagement with the yarn package support on said mounting means, to wind yarn on said support, to an inoperative position where said support is operatively disengaged from said driving means, dog means for supporting said mounting means in said operative position, said dog means being movable to allow said mounting means to move, due to the effect of gravity, from said operative position to said inoperative position, and means on each of said mounting means for supporting another of said mounting means.

11. In a textile winding apparatus, a drive roll for engaging and rotating a yarn package support, a plurality of articulated arms each adapted to rotatably carry at its free end a yarn package support, each of said articulated arms being movable in a closed path, by rotation about a common horizontal axis, from an operative position where said roll engages said yarn package support to wind yarn thereon, to an inoperative position where the wound support is out of contact with said roll, means on each of said articulated arms for supporting another of said articulated arms, dog means for supporting an articulated arm in said operative position, said dog means being movable out of the path of one of said arms and into the path of another of said arms to allow one of said arms to fall from said operative position and to support another of said arms in said operative position.

12. Apparatus as set forth in claim 11 in which the construction and arrangement is such that when an arm falls from said operative position it swings to an inoperative position and there are means for supporting said arm in said inoperative position.

13. Apparatus as set forth in claim 11 in which the construction and arrangement is such that when an arm falls from said operative position another falls into said operative position and the former arm carries therewith an unwound portion of yarn which unwound portion is engaged by the yarn package support on said latter arm in said operative position.

14. Apparatus as set forth in claim 13 which apparatus also comprises means for severing said unwound portion of yarn and for starting the winding of the severed yarn around the yarn package support of said latter arm, and means for actuating said severing and starting means when an arm falls from its operative position.

15. In a textile winding apparatus, a drive roll for engaging a rotating yarn package support, a pivotally mounted arm for carrying said support, a link connected to said arm for limiting the pivotal movement thereof, and a spring means frictionally engaging said link for damping the vibrations of said arm.

16. In a textile winding apparatus, means for rotatably mounting a yarn package support, driving means for rotating said support, means for providing a yarn with a portion of said yarn in contact with said support, means for traversing said yarn along the length of said support, and a cutter movable to sever said yarn and to bring said yarn into close proximity to said support, said cutter having a cutting edge and a curved body adapted to fit closely around a portion of said support.

17. In a textile winding apparatus, means for rotatably mounting a yarn package support, driving means for rotating said support, means for providing a yarn with a portion of said yarn in contact with said support, means for traversing said yarn along the length of said support, and a cutter movable to sever said yarn and to bring said yarn into close proximity to said support, said cutter having a cutting edge and a curved body adapted to fit closely around a portion of said support, said edge and body extending substantially the entire length of said support.

18. In a textile winding apparatus, means for rotatably mounting a yarn package support, driving means for rotating said support, means for providing a yarn with a portion of said yarn in contact with said support, means for traversing said yarn along the length of said support, a cutter movable to sever said yarn and to bring said yarn into close proximity to said support, and a stationary member for discharging a fluid stream between said cutter and said support, for directing the cut end of yarn around said support.

19. In a textile winding apparatus, means for rotatably mounting a yarn package support, a drive roll for engaging said support to rotate the same, means for providing a yarn with a portion of said yarn in contact with said support, means for traversing said yarn along the length of said support and a cutter movable to sever said yarn and to bring said yarn into close proximity to said support, said cutter having a cutting edge and a curved body adapted to fit closely around a portion of said support, means for providing a fluid stream, between said body and said support, for directing the cut end of yarn around said support, and for preventing said yarn from beginning to wind around said drive roll.

20. In a textile winding apparatus a plurality of articulated arms rotatably mounted side by side on a common horizontal axis, each of said articulated arms com-

prising an upper arm mounted on said horizontal axis, a forearm jointed to said upper arm and carrying at its free end a mandrel for rotatably mounting a yarn package support, a drive roller for engaging and rotating a yarn package support, said drive roller engaging said support, with said support resting on said drive roller, to wind yarn on said support when the upper arm associated with said support is in an operative position, means for supporting said upper arm in its operative position and means for releasing said upper arm from its supporting means to allow said upper arm to drop from its operative position and thereby to cause the entire articulated arm corresponding to said upper arm to drop and swing to an inoperative position where its yarn package support is out of engagement with said drive roll, means for supporting the other articulated arm with its mandrel above the mandrel of said first-mentioned articulated arm when the latter mandrel rests on said drive roller, the construction and arrangement being such that said other articulated arm moves downward to bring its mandrel into contact with said drive roller when said first-mentioned articulated arm moves to said inoperative position.

21. In a textile winding apparatus, a drive roll for winding yarn on a yarn package support by engagement with said support, a plurality of independent arms, each carrying a mandrel for rotatably mounting a yarn package support, movable pivots for mounting said arms for movement of said arms in turn between an operative position, where the yarn package support carried by an arm engages and rests on said drive roll to wind yarn on said yarn package support, to an inoperative position where the yarn package support carried by said arm is disengaged from said drive roll, means selectively operable to support and release the pivot of the arm which is in said operative position, the construction and arrangement being such that on release of said selectively operable means said pivot moves, under the weight of said arm and said wound yarn package support, in a downward direction and said wound yarn package support moves away from said drive roll.

22. Apparatus as set forth in claim 21 in which said pivots are disposed on upper arms independently pivotally mounted on a horizontal axis.

23. Apparatus as set forth in claim 21 and comprising means for supporting one of said arms in an inoperative position with its mandrel above the mandrel of the arm which is in operative position, the construction and arrangement being such that said arm which is in inoperative position moves downward into said operative position on release of said selectively operable means.

24. Apparatus as set forth in claim 21 and further comprising means for limiting swinging movement of said arm on said pivot when said yarn package support moves away from said roller on release of said selectively operable means, the construction and arrangement being such that said limiting means is normally inoperative to limit said swinging movement and is rendered operative by pivotal movement of said arm resulting from building up of yarn on the yarn package support carried by said arm during the winding of said yarn on said yarn package support.

25. In a textile winding apparatus a plurality of articulated arms rotatably mounted side by side on a common horizontal axis, each of said articulated arms comprising an upper arm mounted on said horizontal axis, a forearm jointed to said upper arm and carrying at its free end a mandrel for rotatably mounting a yarn package support, a drive roller for engaging and rotating a yarn package support, said drive roller engaging said support, with said support resting on said drive roller, to wind yarn on said support when the upper arm associated with said support is in an operative position, means for supporting said upper arm in its operative position and means for releasing said upper arm from its supporting means to allow said upper arm to drop from its operative position and thereby to cause the entire articulated arm corresponding to said upper arm to drop and swing to an inoperative position where its yarn package support is out of engagement with said drive roll.

26. In a textile winding apparatus, driving means for rotating a yarn package support by operative engagement therewith, a plurality of rotatably mounted articulated arms, each adapted to rotatably mount a yarn package support at its free end, each of said articulated arms being movable independently but consecutively in an endless closed path, from an operative position where said support is brought into operative engagement with said driving means to wind yarn thereon to an inoperative position where said wound support is operatively disengaged from said driving means, there being a link having a lost motion connection, between the jointed portions of each of said articulated arms for limiting the relative movement of said jointed portions.

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