July 28, 1970 H. J. SCHMICK 3,521,826

YARN PACKAGE TRANSFER APPARATUS

Filed Feb. 29, 1968 2 Sheets-Sheet 1

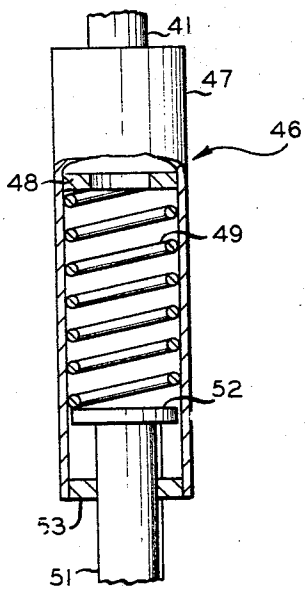


FIG. 3

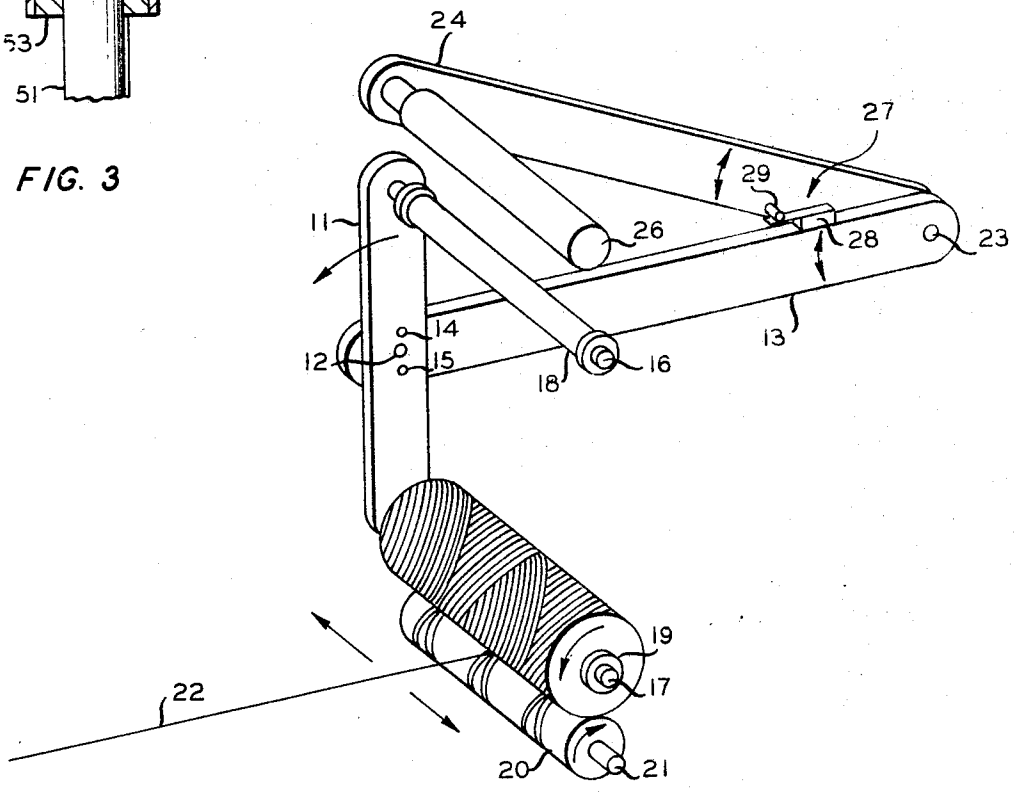


FIG. 1

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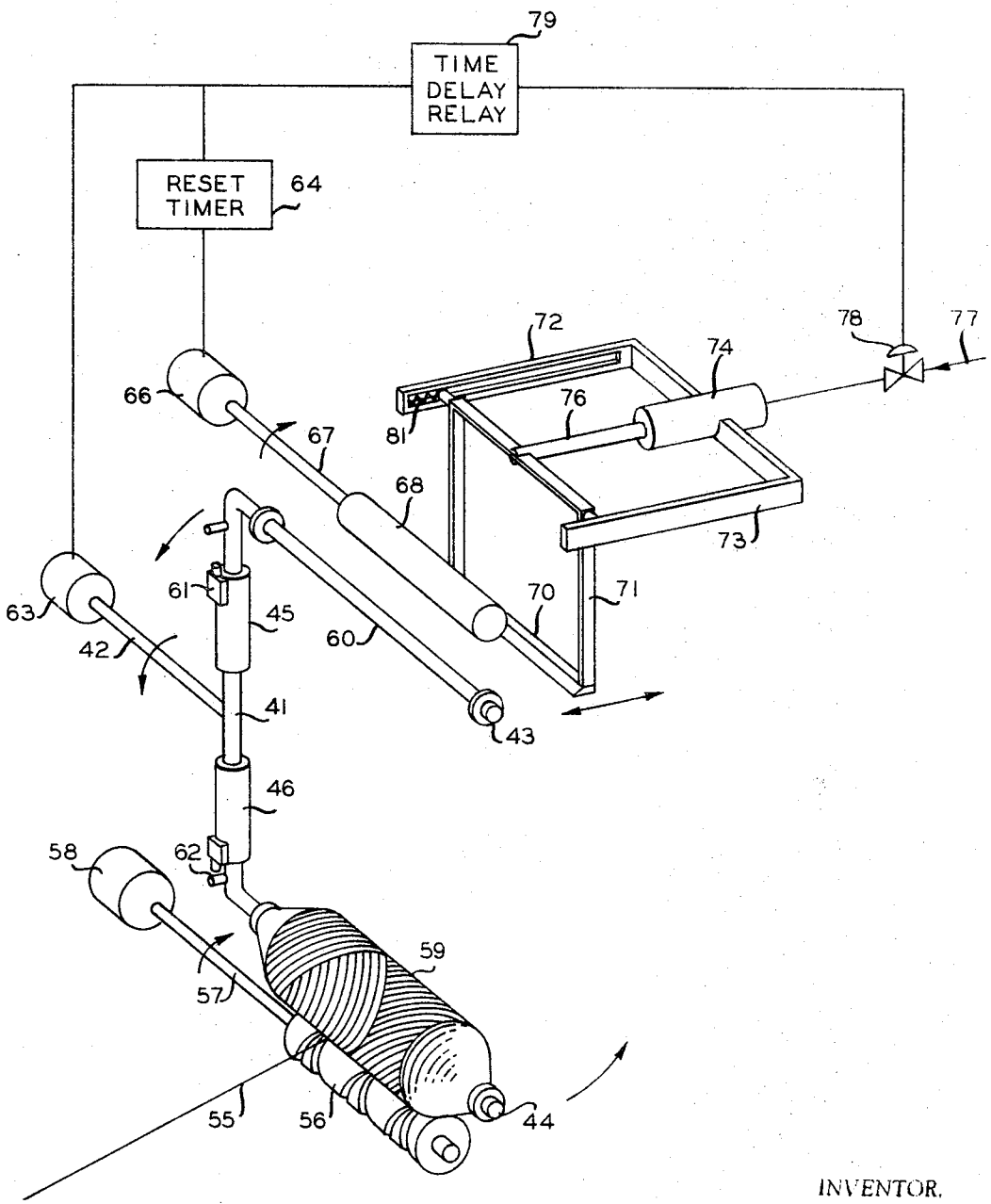


FIG. 2

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YARN PACKAGE TRANSFER APPARATUS

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U.S. Cl. 242—18 4 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus in combination including a pivotable arm having spindles to carry a yarn package at either end, drive means for each spindle and a yarn traversing means. Yarn is wound on the package contained on one spindle while the second spindle carries an empty package; as the first package is filled, the arm is rotated 180 degrees to bring the empty package into contact with the traversing yarn. When the yarn is cut it automatically wraps around and is taken up on the empty package.

This invention relates to a yarn package transfer apparatus. In one aspect the invention relates to a device for the automatic transfer of yarn from a full package to an empty package as the yarn is being taken up.

In many textile operations, yarn is passed from a feed package, through various guiding means to an operation such as twisting or texturing and through a traversing means such as a traveler ring or grooved winder and onto a take up package. When the take up package is full, it is necessary to stop the feed, change packages replacing with an empty package and to restring the yarn. Alternatively, the yarn may be strung while running from a full package onto an empty package but this requires great dexterity and careful timing. Replacement of the full package is a difficult task by either doffing method.

Accordingly, it is an object of the invention to doff packages of yarn.

Another object of the invention is to provide a reliable efficient apparatus for doffing yarn packages wherein the running yarn is transferred from a full to an empty package.

These and other advantages of the invention will be apparent to one skilled in the art upon consideration of the following disclosure, the accompanying drawings and appended claims.

FIG. 1 is an illustration of one embodiment of the apparatus of the invention.

FIG. 2 is a perspective view of another embodiment of the invention.

FIG. 3 illustrates in greater detail elements shown in FIG. 2.

According to the invention, there is provided a yarn package doffing apparatus comprising in combination a centrally pivoted arm which is rotatable about its pivot point; first and second parallel spindles, one being mounted at either end of the arm and extending from the arm; yarn traversing means positioned to traverse in winding alignment with the spindles; and drive means to rotate yarn packages carried upon the spindles.

The arm is capable of rotating 360 degrees about its pivot point with the extending spindles positioned substantially 180 degrees apart; the arm is locked in place with a spindle and a package carried thereon positioned to receive yarn from the traversing means. The arm supports the package-carrying spindles and rotates to interchange their positions. As the drive means rotates the yarn package, the traversing means causes the yarn to be wound uniformly on the package. When the package is full and it is necessary to doff or change packages, the arm is rotated bringing the second spindle and package into contact with the running yarn as it continues to be wound on the first package, the yarn is then cut and wraps while running about the driven empty package. During the time that this package is filled, the operator removes the full package and replaces it with an empty package.

In one embodiment of the invention, a driven roller having intersecting left hand and right hand helical grooves is utilized as the traversing means and also functions to drive the package onto which yarn is being wound by frictional contact. Since the driving element and the driven element are in frictional contact and yarn is being wound upon the driven element it is necessary to provide for movement of one or the other of the elements in order to compensate for the buildup of yarn upon the package. This can be accomplished by providing for movement of the grooved roller away from or for movement of the spindle and package toward the pivot point of the arm. It is also possible to provide for movement of the pivot point itself away from the roller. One suitable apparatus utilizing the frictional contact drive means comprises an adjustably mounted grooved roller with its longituidnal axis biased toward the pivot of the arm so that as the yarn package is built, the roller yields away from the pivot point. The building of yarn o n the package can also be compensated for by apparatus wherein the arm is fitted with a sleeve into which one portion can slide allowing the retraction of the spindle and package toward the pivot point.

Referring now to the drawings, the invention will be described in detail. FIG. 1 illustrates an arm **11**, pivotally mounted at point **12** on member **13**. Arm **11** is provided with two tensioned pins **14** and **15** which fit into depressions (not shown) in member **13** to yieldably lock the arm in place after rotation about pivot point **12**. Spindles **16** and **17**, positioned equidistant from pivot point **12**, extend perpendicularly at either end of arm **11**. Yarn packages **18** and **19**, such as bobbins or pirns, are rotatably carried upon the spindles. A traversing means, grooved roller **20**, is carried upon shaft **21** and driven on by means not shown. Roller **20** is positioned to traverse yarn **22** in winding alignment with yarn package **19**.

Member **13** is pivoted at point **23** to provide means for adjusting the distance from pivot point **12** to grooved roller **20**. Member **24** is also pivoted at point **23**. Extending from pivoted member **24** is a roller **26** which is driven by means not shown. A microswitch **27** having a switch **28** carried on member **13** and a contact arm **29** extending from member **24** actuates the driving means for roller **26** when contact is broken.

In operation of the apparatus depicted in FIG. 1, package **19** driven by frictional contact with traversing roller **20**, rotates on spindle **17** to take up yarn **22**. To compensate for the yarn buildup on package **19** while maintaining the desired frictional contact, member **13** pivots about point **23** carrying the arm **12** upwardly and thus moving the pivot point **12** away from roller **20**.

When package **19** becomes full, arm **11** is rotated 180 degrees and locked into place by elements **14** and **15**. This rotation brings empty yarn package **18** into contact with the running yarn **22** and as member **13** pivots downwardly about point **23**, package **18** is contacted and driven by grooved roller **20**. Suitable and conventional stop means can be employed to limit the downward movement of arm **13** during rotation of arm **11** so that the empty yarn package **18** can swing into contact with driving roller **20**. The yarn **22** then passes between grooved roller **20** and the empty package **18** onto package **19**. The full package **19** rotates into contact with roller **26** which moves upwardly by the pivoting of member **24** about point **23**. Contact is broken in microswitch **27** and the driving means for roller **26** is actuated; roller **26** drives

package 19 by frictional contact, preferably at the same surface speed as package 18 is being driven by roller 20. When the desired amount of yarn has been wound on package 19, the yarn is cut at a point between the two packages and the free end of the running yarn is directed over driven empty package 18. As the free end is taken up in the nip of grooved roller 20 and package 18, the traversing yarn contacts it and forms the initial package wrap.

Member 24 is lifted by the operator removing roller 26 from contact with the full package, which is then doffed after rotation of the package is stopped and replaced with an empty yarn package. Suitable braking means can be utilized to stop the rotation of the full package. Member 24 is then lowered with pin 29 acting as a stop and also contacting with switching element 28 to stop the motor driving roller 26. This sequence of events with the arm being rotated 180 degrees is again repeated when package 18 is filled.

FIG. 2 illustrates another embodiment of the invention wherein the arm 41 is fixed to a shaft 42 and carries parallel spindles 43 and 44 at either end. The arm is constructed with sleeve members 45 and 46 on either side of the pivot. As shown in detail in FIG. 3, the sleeve member 46 includes an outer sleeve or cylindrical shell 47 having an internal flange 48 against which a spring 49 is positioned. A shaft 51 is slidably mounted within the sleeve 47 having its base plate 52 engaging the lower end of spring 49. A bushing 53 is provided to center the shaft and the shaft is keyed in the bushing to prevent its rotation. This construction, in which the shaft is free to slide within the sleeve and compress the spring, compensates for buildup of yarn 55 on the package when utilizing the drive means illustrated in FIG. 2.

Also illustrated in FIG. 2 are traversing means in the form of a grooved roller 56 mounted on a shaft 57 which is driven by motor 58. The grooved roller 56 drives yarn package 59 at a constant surface speed by frictional contact. An empty yarn package 60 is positioned on spindle 43.

Microswitches 61 and 62 are provided on either sleeve 45 and 46 so that when yarn buildup on the package causes the shaft to compress the spring and slide within the sleeve a certain distance, contact will be made in the microswitch to activate motor 63 which through means of gears, not shown, rotates shaft 42 through 180 degrees about an imaginary pivot point coinciding with the axial center of the shaft.

Upon activation of motor 63 a signal is transmitted to reset timer 64 which activates motor 66, driving shaft 67 and roller 68. The reset timer activates motor 66 for that period of time necessary to conveniently cut the yarn 55 while continuing the winding of the yarn. As the full package 59 is rotated into contact with roller 68, it is frictionally driven and the yarn now passes between the rotating empty package 60 and traversing-driving roller 56. In this embodiment, automated yarn cutting means mounted for intermittent movement into yarn path between the two spindles are provided, including a cutter 70 mounted on a sliding frame 71 which is carried upon rail members 72 and 73. The cutter 70 is moved into the yarn path to effect its cutting by means of an air cylinder 74 having a piston to drive shaft 76 which is rigidly connected to frame 71. The pressure line 77 to cylinder 74 contains a motor valve 78 which opens and closes responsive to a single signal.

Simultaneously with the transmission of a signal to reset timer 64 a signal is transmitted to time delay relay 79, which after a delay of time sufficient to insure that yarn package 59 is being driven by roller 68, activates motor valve 78 to pressurize cylinder 74 and drive cutter 70 into the yarn path. Upon closure of the valve 78, the cutter is retracted from the yarn path by means of spring 81 carried upon the rail members and acting upon the frame 71.

When the yarn is cut, the free end is automatically taken up on empty yarn package 60. Suitable means, such as an air jet, can be used to direct the free end over and about package 60. Motor 66 shuts off and timer 64 resets itself automatically; roller 68, no longer being driven, acts as a brake to stop rotation of the full package. The operator then depresses package 59 out of contact with roller 68 and removes the yarn package.

The use of the apparatus of the invention reduces operator time to a minimum and allows one man to doff full packages from a number of winding machines. The use of such apparatus also eliminates the necessity of stopping the winding operation in order to doff full packages.

Modification and variation are within the scope of the invention, for example, the spindles can be driven directly rather than relying upon frictional contact to rotate the yarn packages. Yarn traversing means other than the grooved roller can be used.

That which is claimed is:

1. Yarn package transfer apparatus comprising in combination:

a centrally pivoted arm which is rotatable about its pivot point;

a shaft rigidly connected to said arm at said pivot point;

first drive means for rotating said shaft;

first and second yarn package spindles mounted on said arm parallel to each other at either end of said arm and extending substantially perpendicularly from said arm, said arm being rotatable about said pivot point in an arc to interchange the positions of said first and second spindles;

said arm having a first adjustable length section between said pivot point and said first spindle and a second adjustable length section between said pivot point and said second spindle, each of said first and second adjustable length sections comprising an outer sleeve member, a second shaft slidably mounted within said outer sleeve member, and a spring mounted within said outer sleeve member and engaging said second shaft to resiliently bias the respective adjustable length section in the extended position to permit adjustment of the length between said pivot point and the one of said spindles on which the yarn is being wound;

a first rotatable roller fixedly positioned in winding alignment and spaced apart from the respective spindle on which the yarn is being wound a distance allowing frictional contact with an empty yarn package carried upon said respective spindle to frictionally rotate a yarn package carried upon said respective spindle;

second drive means for rotating said first roller;

a second rotatable roller fixedly positioned in winding alignment and spaced apart from the other spindle a distance allowing frictional contact with a full yarn package on said other spindle to frictionally rotate a yarn package carried upon said other spindle;

third drive means for rotating said second roller;

yarn traversing means in winding alignment with one of said spindles to traverse the yarn back and forth as the yarn is wound on said one of said spindles;

cutting means mounted for intermittent movement into the yarn path between said first and second spindles;

means responsive to the movement of the shaft in the outer sleeve to the adjustable length section of said arm connected to the spindle on which the yarn is being wound, decreasing the length between said pivot point and the spindle on which the yarn is being wound, to activate said first drive means;

means responsive to the actuation of said first drive means to activate said third drive means for a predetermined time period; and

means responsive to the actuation of said first drive

means to activate said cutting means after delay for a predetermined time period.

2. Apparatus in accordance with claim 1 wherein said yarn traversing means comprising intersecting left-hand and right-hand helical grooves in the surface of said first roller.

3. Apparatus in accordance with claim 1 wherein said means responsive to the movement of the shaft comprises a microswitch.

4. Apparatus in accordance with claim 1 wherein each said second outer sleeve is provided with an internal flange and a bushing, the respective second shaft having a base plate on the inner end thereof, the spring being in compression between the internal flange and the base plate of the respective second shaft.

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