United States Patent [19]

Dickson, III et al.

[11] **3,814,341**

[45] **June 4, 1974**

[54] **YARN WINDING APPARATUS**

[75] Inventors: **Frederick Stoever Dickson, III,** Hockessin, Del.; **Warren Lee Williams,** Columbia, S.C.

[73] Assignee: **E. I. du Pont de Nemours and Company,** Wilmington, Del.

[22] Filed: **Sept. 7, 1973**

[21] Appl. No.: **395,229**

[52] **U.S. Cl.** ..... **242/35.5 R,** 242/18 PW

[51] **Int. Cl.** **B65h 54/02,** B65h 65/00

[58] **Field of Search** ..... 242/35.5 R, 18 R, 18 PW, 242/18 DD

[56] **References Cited**

UNITED STATES PATENTS

2,998,202	8/1961	Keith et al.	242/18 PW
3,030,039	4/1962	Roberts	242/18 PW
3,097,804	7/1963	Jackson	242/18 PW
3,166,262	1/1965	Vanneman, Sr.	242/18 PW
3,276,704	10/1966	Pabis	242/18 PW
3,488,010	1/1970	Parry	242/18 PW

Primary Examiner—Stanley N. Gilreath

[57] **ABSTRACT**

A yarn windup having two abutting yarn package supports per chuck in which two yarns are held near the abutting ends of the supports by retractable guides until the yarns are cut by a cutter. Transfer tails are then wound as the retractable guides are moved away from yarn engagement releasing the yarn into traverse guides to begin normal traverse winding. Optionally, the retractable guides are shaped so that during release of the yarn, they momentarily move the yarn slightly toward the abutting ends of the tubes to cross over and trap the cut yarn ends.

3 Claims, 3 Drawing Figures

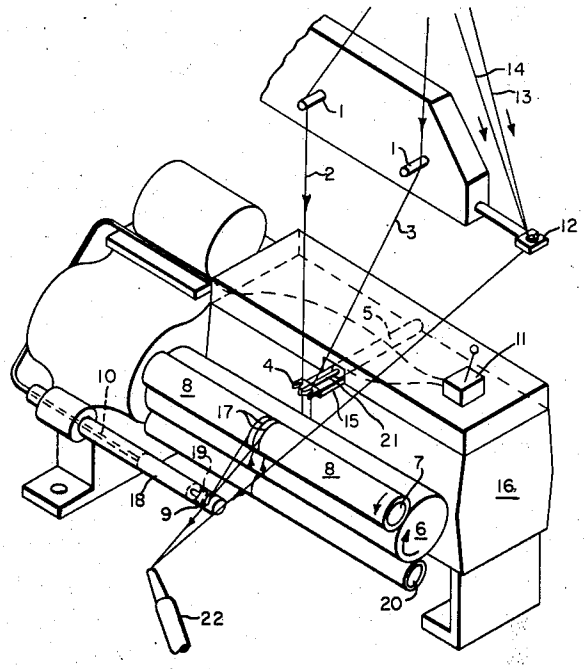


FIG. 1

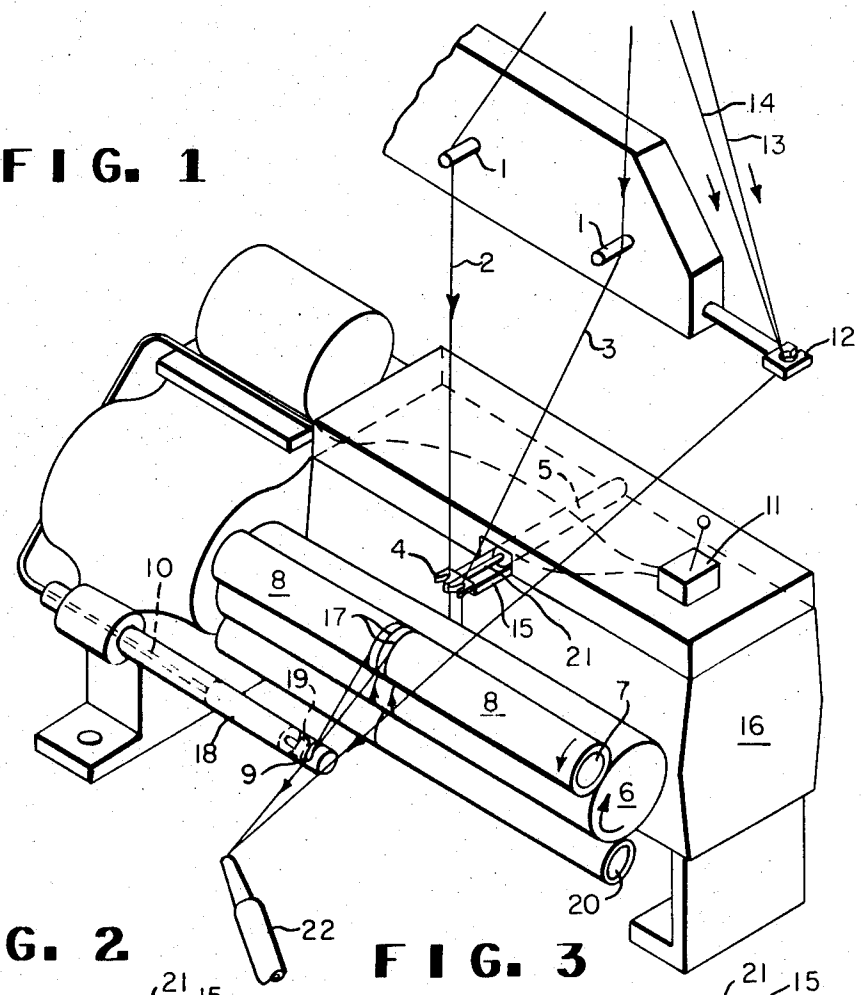


FIG. 2

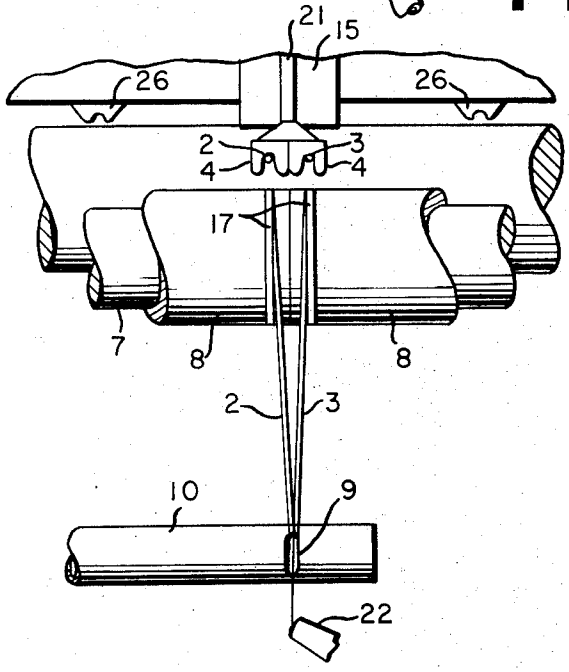
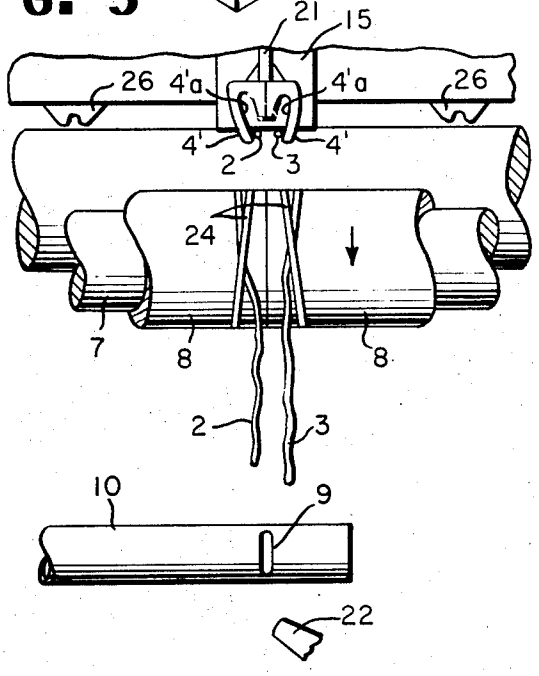


FIG. 3



YARN WINDING APPARATUS

BACKGROUND OF THE INVENTION

This invention concerns winding yarns or threads, more particularly, winding a transfer tail automatically as threadlines running at high speed are severed and begin winding on packages.

When winding yarn on a package, it is generally desirable to provide an initial wrap in the form of a short helix on a package support tube outside the package area. This wrap is commonly referred to as a transfer tail. Means for winding such tails automatically on a single package are known; for example, from Jackson U.S. Pat. No. 3,097,804 and Vanneman U.S. Pat. No. 3,166,262. A method of applying two running threadlines on two yarn package tubes on the same chuck is known from, for example, Pabis U.S. Pat. No. 3,276,704 and in the latter patent, the yarn is positively attached to the package tube by entrapping the yarn in a slot cut partially around the tube. The extra cost of providing such slotted tubes is sometimes justified by increased sureness of gripping the yarn; however, it would be desirable to avoid such cost if a well-secured transfer tail could be obtained otherwise. This added security of attachment presents a problem for the customer because the transfer tail is so tightly wedged in the cut that it is difficult to dislodge. In addition, when the transfer tail of one package is tied to the beginning of another package, the yarn may accidentally become snagged in the cut resulting in breakage of the yarn and failure to transfer yarn from the exhausted package to a new full package. Furthermore, when two or more yarns are handled simultaneously, it is desirable to find simpler ways of threading up the machine using less complex equipment.

SUMMARY OF THE INVENTION

In a yarn winding apparatus including two surface driven tubular yarn package supports having abutting ends, a self-threading traverse guide associated with each yarn support through which yarn passes and which move yarn axially of said supports in a normal stroke length as a package is wound, and means for collecting and disposing said yarn when not being wound into a package, a mechanism for initiating wraps simultaneously on adjacent ends of abutting supports which overlap a severed length adjacent its end, said mechanism comprising: a pair of fixed guides positioned above said traverse guides at equal distances from the vertical plane of the abutting support ends, each of said fixed guides being positioned within the stroke length of a corresponding traverse guide; a cutting means position beyond said supports in alignment with said plane; a pair of retractable guides positioned between said fixed guides and said traverse guides at equal distances from said vertical plane between said plane and the end of said stroke length, said guides having yarn engaging slots opening toward and in proximal alignment with said cutting means; means mounting said retractable guides for simultaneous movement to and from a yarn engaging position and motive means coupled to said mounting means for imparting said movement. Optionally, the retractable guides are shaped to move the running yarns momentarily toward the central abutting ends of the tubes as the guides retract, thus forcing the loops of yarn to cross the cut ends and trap them positively before the retractable guides release the yarns.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an isometric view of a typical windup showing a first pair of yarns strungup and ready for cutting.

FIG. 2 shows an overhead view of the yarn path from the retractable guides to the cutter in more detail.

FIG. 3 is a view similar to FIG. 2 showing an optional retractable guide arrangement for positively trapping the cut ends.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawing, it will be seen that the windup chosen for purposes of illustration includes generally as components thereof a machine frame **16**, a pair of rotatable chucks **7, 20**, a drive roll **6**, and reciprocating traverse guides **26** through which yarn advances to package supports **8**. A mechanism for initiating wraps simultaneously on abutting ends of package supports **8** is provided in association with the windup and includes a pair of fixed guides **1** positioned above traverse guides **26** at equal distances from the vertical plane of the abutting support ends, a pair of retractable guides **4** also positioned equal distances from the vertical plane of the abutting support ends but between guides **1** and guides **26**. The yarn engaging slots of the guides **4** are equally spaced from the plane of the abutting support ends by a distance less than that from the plane to the nearest end of the normal stroke length of traverse guides **26**. Preferably, the distance is between 0.10 and 0.30 inch.

FIG. **1** shows running yarns **2** and **3** held apart by fixed guides **1** and converging through retractable yarn guides **4** which are attached to piston rod **21** of air cylinder **5**. Yarn passes under and in contact with drive roll **6**, then between drive roll **6** and chuck **7** on which two yarn package supports **8** are positioned. Yarns are wrapped one and one-half times around supports **8** and then converged through slot **9** in cutter assembly **10** positioned beyond supports **8** with slot **9** located in proximal alignment with the abutting ends of the supports. The distance between the cutting mechanism **10** and the axes of chucks **7, 20** is preferably greater than the maximum radius of a completed yarn package. A suitable cutter assembly is described in greater detail in Vanneman U.S. Pat. No. 3,166,262. Two additional threadlines **13** and **14** are held temporarily in fixed guide **12** positioned beyond the end of drive roll **6** for later attachment to abutting yarn tubes on a second chuck **20**. The running yarns are held in sucker gun **22** which carries them to a waste bin during stringup. It may be preferable to stringup the tubes on chuck **20** before those on chuck **7**, depending on the particular combination of machine elements.

Referring to FIG. **2**, yarns **2** and **3** are held in stringup position by retractable guides **4** so that they form paths **17** within about one-fourth inch from the abutting ends of yarn support tubes **8**. Because the yarn is wrapped one and one-half times on tubes **8**, the visible wraps **17** tend to lie on top of yarn ends **2, 3** which are converging toward slot **9** in cutter bar **10**.

As soon as the yarns are positioned in slot **9** of cutter bar **10**, the operator moves the valve **11** (FIG. **1**) connected to a source of compressed air (not shown)

which causes air to flow to both cylinders **5** and **18.** Cylinder **18** in cutter mechanism **10** causes blade **19** to sever both threadlines; at the same time cylinder **5** retracts piston rod **21** and guides **4** into the housing on top of machine frame **16.** As guides **4** retract, threadlines **2** and **3** contact the end of bumper plate **15** attached to frame **16** and as guides **4** retract further, the yarns are released and move away from center to seek the shortest threadline distance between fixed guides **1** and tubes **8.** In so doing, they move off the surface of bumper plate **15** and into the space between machine frame **16** and drive roll **6** where they are picked up by traverse guides **26** to begin winding a normal package. As the yarns move away from the tail winding position, they describe a helical path along tubes **8.** The portion of this helical path which is not covered by the yarn package becomes the transfer tail. In the case of large yarn bundles with many filaments, which spread into a fairly wide band as they are pressed between tubes **8** and drive roll **6,** an appreciable force is required to pull threadlines **2, 3** from beneath wrap **17.** When such yarns are cut by cutter **10,** the cut ends are immediately trapped by wrap **17** and become folded back and overwrapped with succeeding yarn.

FIG. **3** shows an optional arrangement of retractable guides **4.** The arrangement shown in FIG. **2** traps the cut yarns solely by superimposing succeeding yarn wraps on the path of the end to be cut. However, when small compact yarn bundles are being wound, running ends **2, 3** may not be trapped firmly by wrap **17.** In this case, it is desirable to trap the cut ends more positively. In FIG. **3,** retractable guides **4'** are shown with outer arms and yarn engaging surfaces **4'***a* inclined inward toward the plane of the abutting support ends. As piston rod **21** retracts, yarns **2** and **3** contact bumper plate **15** and then move toward each other as the guide surfaces converge. This forces yarn waraps **24** to move toward the abutting ends of the tube and cross over the cut ends, trapping them securely. As piston rod **21** retracts further, guides **4'** release yarns **2** and **3** which move away from center in attempting to reach a shorter path from guides **1** to tubes **8.** In so doing, they move off the surface of bumper plate **15** and eventually are caught by traverse guides **26** to begin normal winding.

Before starting to string the machine, the operator moves air valve **11** to inactivate cutter **10** and to move piston rod **21** carrying retractable guides **4** toward drive roll **6** to a position for stringup.

The length of the transfer tail wound by this method

is determined by the retracting speed of air cylinder **5,** the proximity of bumper plate **15** to the threadlines **2** and **3,** the distance between threadlines **2** and **3** and the bumper plate as shown in FIG. **2,** and the length and shape of the outer arms of guides **4.** These are considered adjustable features to be selected at the discretion of the user.

The retracting speed of air cylinder **5** may be regulated, for example, by a needle valve in the air supply line. Alternatively, a time delay may be introduced to start the retraction a definite time interval after the cutter operates.

A transfer tail wound by this method is easy to grip and unwind in the customer's mill.

What is claimed is:

1. In a yarn winding apparatus including two surface driven tubular yarn package supports having abutting ends, a self-threading traverse guide associated with each yarn support through which yarn passes and which move yarn axially of said supports in a normal stroke length as a package is wound, and means for collecting and disposing said yarn when not being wound into a package, a mechanism for initiating wraps simultaneously on adjacent ends of abutting supports which overlap a severed length adjacent its end, said mechanism comprising: a pair of fixed guides positioned above said traverse guides at equal distances from the vertical plane of the abutting support ends, each of said fixed guides being positioned within the stroke length of a corresponding traverse guide; a cutting means position beyond said supports in alignment with said plane; a pair of retractable guides positioned between said fixed guides and said traverse guides at equal distances from said vertical plane between said plane and the end of said stroke length, said guides having yarn engaging slots opening toward and in proximal alignment with said cutting means; means mounting said retractable guides for simultaneous movement to and from a yarn engaging position and motive means coupled to said mounting means for imparting said movement.

2. The mechanism as defined in claim **1,** each of said slots having a yarn engaging surface inclined toward said plane.

3. The apparatus as defined in claim **1,** wherein said motive means is a reversible pneumatic cylinder connected to a supply of pressurized gas, said cylinder having a piston connected to a rod, said retractable guides being connected to the rod.

* * * * *