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Bergstrom

[11] **3,908,918**

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[54] **DOFFING MEANS FOR THE PACKAGE WOUND ON A STRAND WINDING MACHINE**

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[52] **U.S. Cl.**..... **242/18 R;** 242/18 PW; 242/19; 242/41

[51] **Int. Cl.**[2]..... **B65H 54/02;** B65H 67/04

[58] **Field of Search**..... 242/18 R, 18 DD, 41, 19, 242/18 PW

[56] **References Cited**

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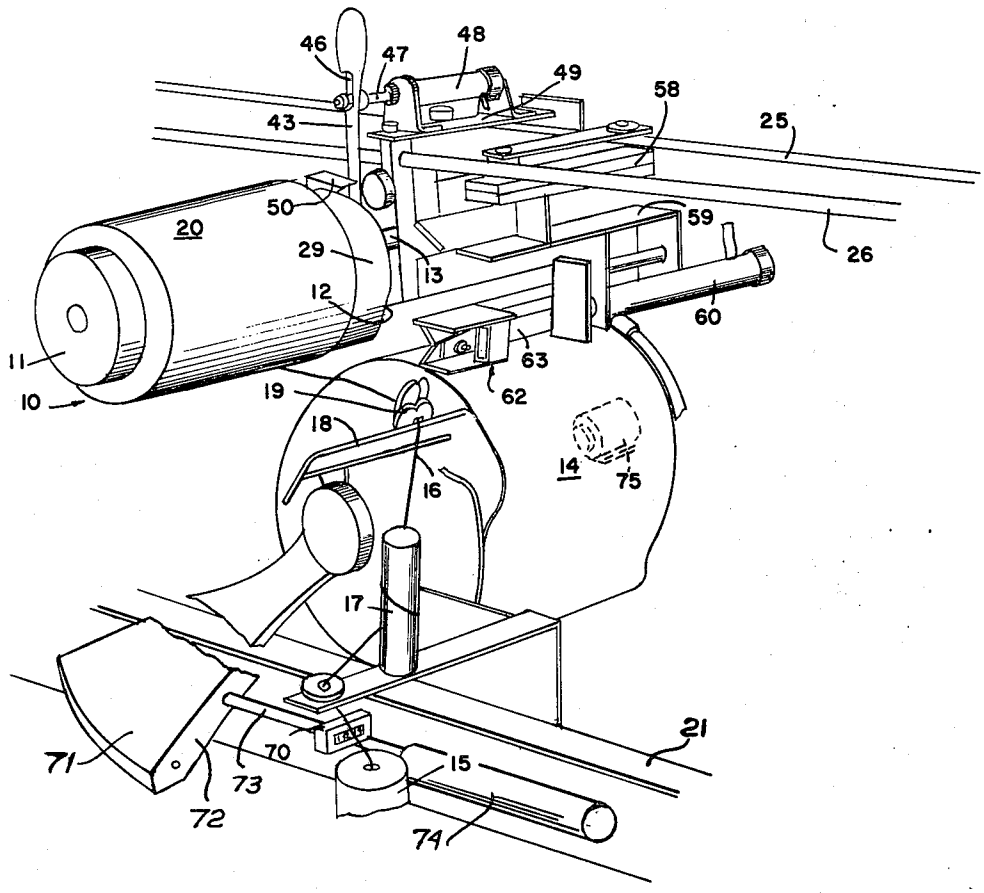
Primary Examiner—Stanley N. Gilreath

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[57] **ABSTRACT**

An attachment for a strand winding machine for automatically doffing a package wound thereon after first releasing the leading bound end of the package, severing the strand from the supply and then gripping the severed end for the initial winding of a subsequent package with means for sequentially operating the different steps.

4 Claims, 7 Drawing Figures



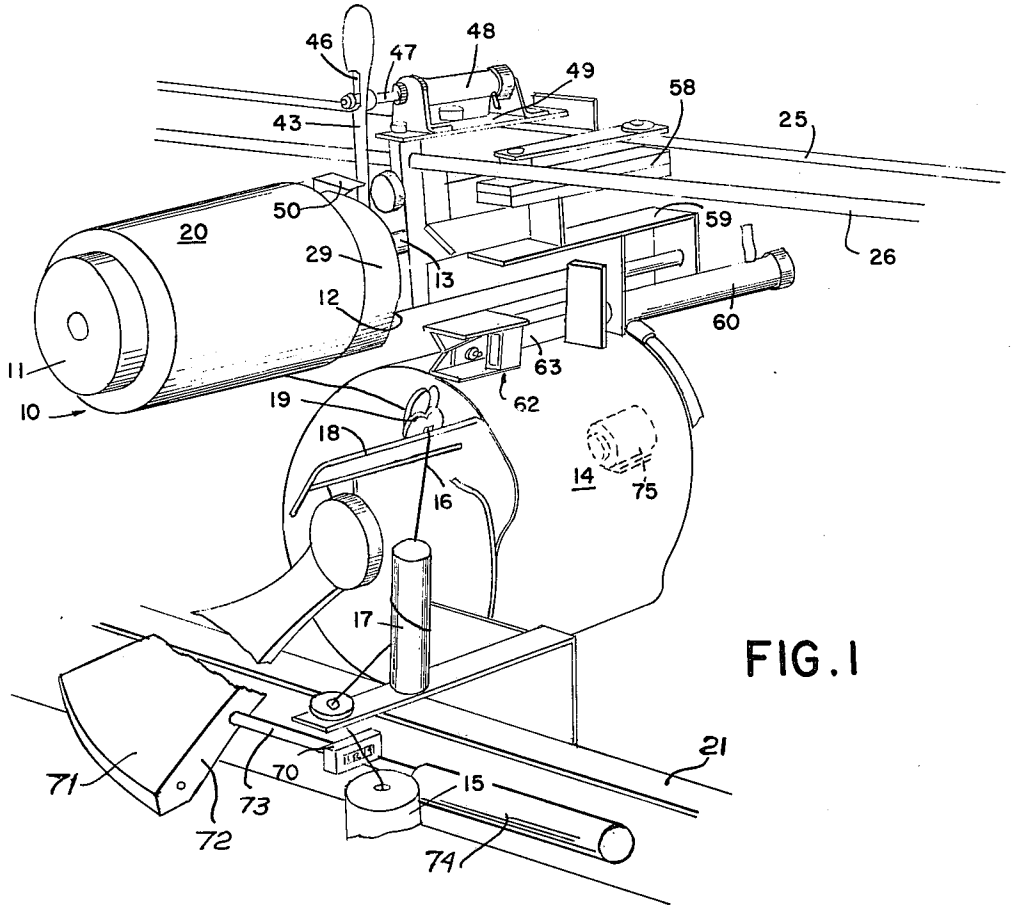

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FIG. 1

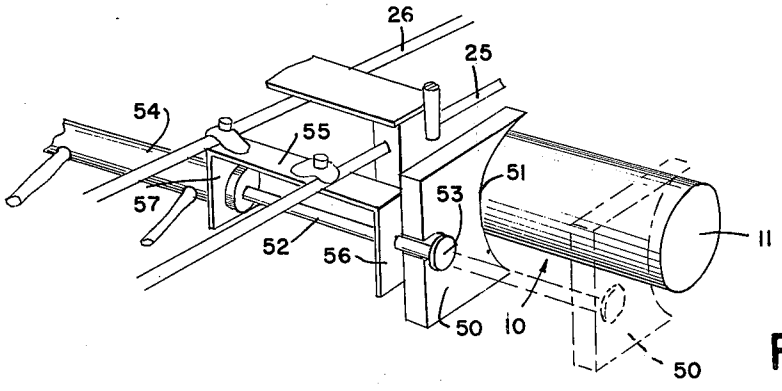

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FIG. 2

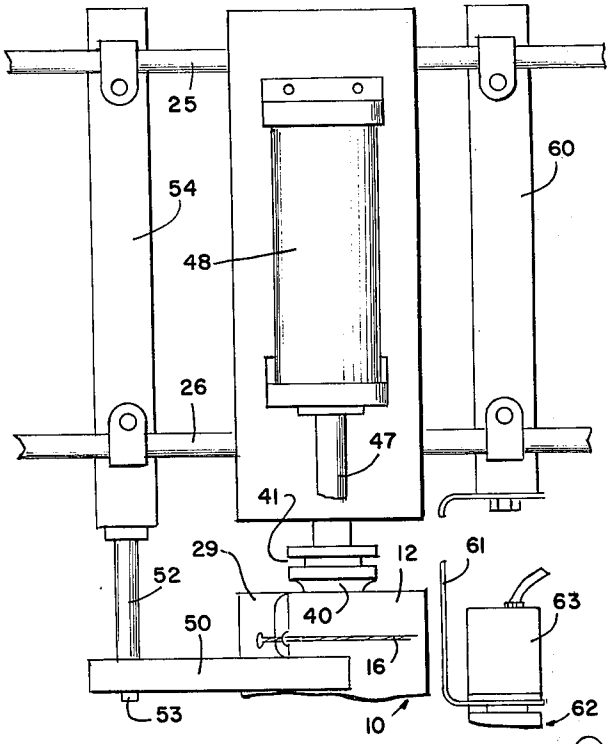


FIG. 3

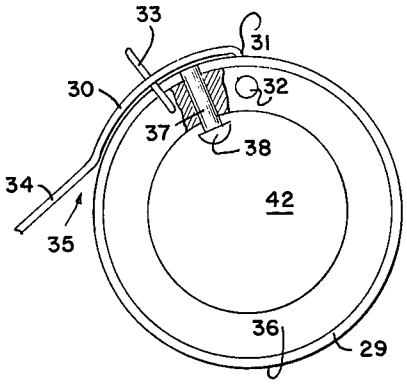


FIG. 5

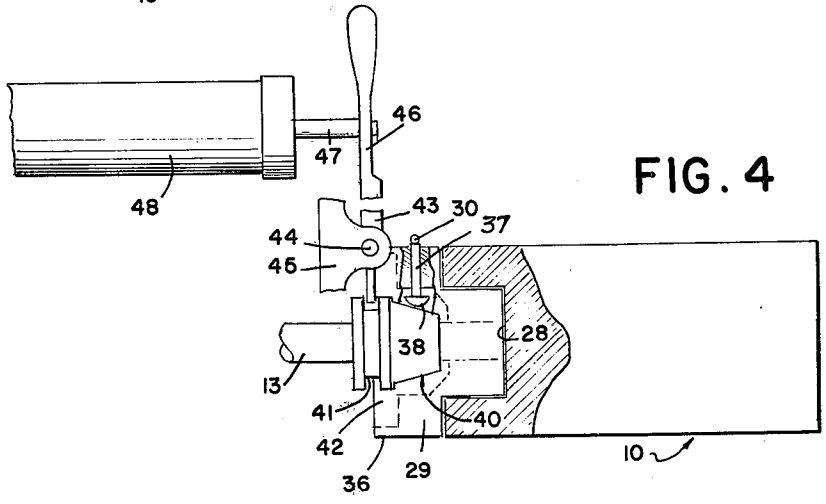


FIG. 4

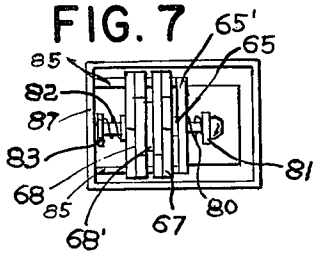


FIG. 7

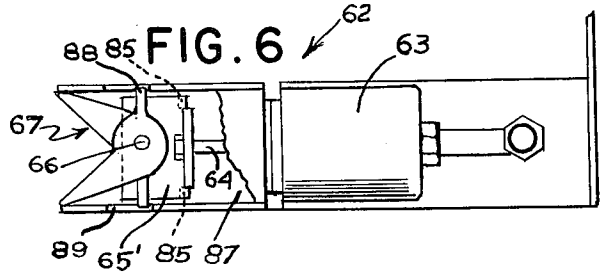


FIG. 6

DOFFING MEANS FOR THE PACKAGE WOUND ON A STRAND WINDING MACHINE

BACKGROUND OF THE INVENTION

Strand winding machines in the past have been semi-automatic with the result that manual operations take far more time to perform than the time needed to wind the strand into a package containing a predetermined length of strand. The most time consuming of the manual operation is that of threadingly attaching the leading end of the strand to the spindle or drum on which it is wound. Each end, and there are usually six in a normal machine grouping has to be threaded through an eye, a traverse guide and then in some way fastened to the spindle, drum or arbor on which it is to be wound. The machine runs a number of revolutions, depending upon the strand length which has been set, and then stops. Each end must then be individually cut, tied to the package and the package doffed from the drum, arbor or spindle by hand. Then the leading end of the yarn is tied to the arbor or drum for a new package, the operation starts over again. The general type of machine is shown in U.S. Pat. No. **1,838,538** and **2,165,018.** In some cases there has been in the past machines built which automatically doff and start the package over again, but this invention is for the machines which have not had automatic doffing and relates to the conversion to an automatic doffing and winding of strand packages until a supply of the strand material which is to be wound is exhausted.

SUMMARY OF THE INVENTION

In a strand winding machine, the strand is led from a supply usually through some tensioning means, then to a traverse and then to the spindle or drum upon which it is to be wound. The winding machine is equipped with a device for stopping the machine after a predetermined length of yarn is wound on the drum or spindle. Upon the stopping of the spindle or drum, the doffing attachment here shown comes into operation, a clutch releasing the snared end of the strand. Then, the mechanism, which carries the strand traverse and is weighted to swing the traverse close to the package, is swung away from the package, a strand severing and gripping device then being projected forward to engage and sever the strand between the traverse guide and the package and to grip the end of the strand which is to start a subsequent package. A plate which partially surrounds the drum or spindle at the supported end thereof, then advances to push the wound package off of the free end of the drum or spindle. The gripping means then retracts and draws the strand in the path of movement of a snaring device adjacent to the spindle or drum upon which the strand is to be wound so as to be held by this snaring device. The spindle or drum is then rotated to wind a package thereon. The cycle may be repeated for a subsequent package.

DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view looking at one side of the winder with certain of the essential parts of the doffing mechanism shown therein;

FIG. **2** is a perspective view of a portion of the other side of the machine showing the doffing plate and the drum or spindle upon which the strand is packaged;

FIG. **3** is a top plan view of a portion of the doffing mechanism with parts for release of the snared end of the strand omitted;

FIG. **4** is an elevation, partially broken away, of a portion of the doffing mechanism showing the clutch for releasing the snared end of the strand;

FIG. **5** is an end view partly broken away of the strand snaring means which rotates with the drum or spindle;

FIG. **6** is a plan view partly broken away of the cutting and gripping device;

FIG. **7** is an end view of FIG. **6.**

DESCRIPTION OF ONE EMBODIMENT OF THE DEVICE

Looking at FIG. **1, 10** designates a drum or spindle having a free end **11** and a supported end **12** and driven by a shaft **13** from some suitable mechanism housed in the casing **14** which contains an electric motor **75,** a traverse cam and other suitable driving means (not shown) but refer to U.S. Pat. No. **1,838,538** and **2,165,018.** The strand material **16** to be packaged is led from a supply **15** through a counter **70,** about some tensioning means **17,** and then over a guide **18** to a traverse guide **19** where it is packaged as at **20** on the drum or spindle **10.**

The packaging head here shown and above described is known as a "Leesona No. **50**" referred to in the patents above mentioned and is one of a plurality in side-by-side relation mounted upon a support shown partly at **21.** There are rods **25** and **26** extending over the top of these machines or heads tying them together, and it is upon frame **21** and these rods **25** and **26** that the doffing attachment is supported for making the doffing automatic.

Referring to FIGS. **4** and **5** the drum or spindle **10** is recessed as at **28** and there is inserted therein an end member **29** which is mounted on drive shaft **13** for rotation and axial movement relative thereto and which has an arcuate resilient strand clamping wire **30** or snaring clamp means following the curvature of the member **29** for a short distance. One end of wire **30** is inserted into the member **29** at **31** where it is held by a screw **32** in the end face of the member **29.** A bail **33** bridges the wire **30** and acts as a shield therefor. This wire **30** is bent outwardly as at **34** so as to leave a mouth, trap or snare **35** for the picking up of a strand of material which is in the path of movement of the portion **34** of the wire. The strand will wedge itself between the wire and the surface **36** of member **29** and be bound therein, the wire being somewhat resilient, thereby flexing to permit the strand to move under the wire and be clamped. A pin **37** is attached to the wire **30** and extends inwardly through a hole in the member **29** as seen more particularly in FIGS. **4** and **5** and is provided at its inner end with a head **38** which when engaged and forced outwardly, will move the wire **30** outwardly and release the strand material which is gripped between the wire and the surface **36** of the member **29.**

A strand release member **40** having a groove **41** is tapered and is adapted to enter the recess **42** in the member **29** and engage the head **38** of the pin **37** so as to force the wire **30** outwardly and release a snared strand from beneath it. In order to operate this clamp release member **40,** there is a lever **43** pivoted as at **44** on a bracket **45** fixed to the machine with its outer end portion **46** attached to a plunger **47** of an air cylinder **48**

so that when this air cylinder is actuated to force its plunger **47** to the left as seen in FIG. **4**, the clamp release **40** will enter the recess **42** and engage the pin **38** and move it outwardly to release the strand material which has entered the snare **35** and has been clamped between wire **30** and surface **36** of member **29**. As seen in FIGS. **1** and **3**, the air cylinder **48** is mounted by means of a bracket **49** above the rods **25** and **26** so that its plunger **47** may be attached to the lever **43** to actuate clamp release **40**.

The strand which is wound upon the spindle or drum **10** is slid off the free end **11**, as seen in FIG. **2**, by means of a plate **50** located just beyond the strand clamping portion **29** toward the free end of the drum and having an arcuate edge **51** to partly embrace the drum **10** and lie close to the surface of the drum. To one side of the axis of the drum, there is a plunger **52** secured to the plate as at **53** which is actuated by a motor, such as an air cylinder **54**, to reciprocate the plunger parallel to the axis of the spindle or drum **10** and move the plate **50** axially of the drum. This motor is supported from the bars **25** and **26** of the machine by means of a bracket **55** having arms **56** and **57** to support the air motor and its plunger **52**.

Another air motor **60** (FIG. **3**) is also supported from the bars **25** and **26** by bracket **58, 59** (FIG. **1**). The motor **60** has a plunger on the end of which is a bracket **61** reciprocated by the plunger of motor **60**, and on this bracket there is supported a cutting and clamping device designated generally **62** which device is operated by a further air motor **63** axially aligned therewith.

The plunger **64** of this motor **63** has mounted on its end one leg of an L-shaped plate **65'** with a boss **65** extending from the other leg of the plate through which boss a pin **66** extends. Strand grippers **67** are mounted on the pin between the boss **65** and a flange **68'** fixed on the pin while cutters **68** are mounted on the other side of the flange. By this arrangement grippers **67** may be tensioned by spring **80** and nut **81** pulling the flange toward the boss, while cutters **68** may be tensioned by spring **82** and nut **83** forcing the cutters through a washer toward the flange **68'**. The cutters and grippers thus may be separately and individually tensioned as desired.

The L-shaped plate **65'** has fingers **85** to engage the plate **87** to guide it in its reciprocating movement. The grippers **67** have arms **88** which enters slots in the side wall of their housing. As the plate **65'** is moved forward, the arms **88** engage the ends of the slots and then the grippers pivot about this point of engagement toward each other to grip the strand. The pair of cutters **68** operate likewise.

This cutting and clamping device has two pairs of blades, one of which is sharpened and the other of which is blunt. As the air motor **60** advances the cutting mechanism, it crosses the path of the strand **16** between the traverse guide **19** and the drum **10** to firmly engage the strand whereupon the motor **63** operates to have the two pair of blades come together, the pair of blades nearest the package **20** severing the yarn and the other pair gripping the strand. After the strand is severed and the leading end for the next package held, the package **20** is doffed and the cutting and clamping mechanism **62** retracts by means of the motor **60** to draw the strand across the path of the strand snaring device where it is caught in the open mouth **35** (FIG. **5**) and forced up between the wire **30** and the surface **36** of the member **29** so as to be held thereby as the spindle or drum starts to operate to wind another package. The swingable assembly which carries the traverse guide is weighted at **71** to swing the thread guide **19** close to the package **20**. A bracket **72** is engaged by plunger **73** from air motor **74** which is mounted on frame **21** so as to swing the assembly and thread guide away from the package when the counter **70** stops the motor **75**. The assembly will swing thread guide **19** under influence of weight **71**, toward the package when no air pressure is exerted on the piston of air motor **74**.

Motors **48, 54** and **60** are effectively double acting so that their plungers remain in either one or two positions. As air motors, there will be two ports as well understood and as electric solenoids there will be suitable coils for the desired result. Motors **63** and **74** are spring return types, actuating the same moving their plungers.

The sequence of operations is such that when the counting device **70** which shows the amount of strand material which is passed from the supply to the package, reaches a predetermined point the machine will stop. Upon the stopping of the machine there will be actuation of motor **74** to swing the assembly carrying the traverse thread guide **19** away from the package and the cutting and clamping device will move forward to sever the yarn and hold one end thereof. The held end will be the leading end of the subsequent package. The yarn release will be actuated to move the cone **40** into a position to release the strand from the drum and then the doffing mechanism or plate will move forwardly to slide the strand package off of the spindle or drum. At this point the reciprocating motors for the doffing plate and the strand release will return to their rearward position, the traversing strand guide will swing toward the drum **10** and the cutting and clamping mechanism will also return to its initial position thereby placing the strand which extends from the traverse guide to the cutting and clamping mechanism across the path of the mouth **35** of the snaring device so that the strand will be clamped in the snaring device for the starting of a new package. The spindle in the meantime is actuated to wind the yarn thereon.

The above is all automatic. Thus, when the machine is started, it will start winding; upon completion, doffing and again through the same cycle continuously until the supply is exhausted, whereupon other mechanism will stop the machine. The operations are controlled by a standard timing device which is readily available on the market for actuating the air motors in the sequence desired. Such a device may be a motor operated series of cams that actuate switches or is sometimes a resistance-capacitor timing device that operates a relay when a capacitor is charged to a certain voltage level.

I claim:

1. A doffing means for a strand winding machine having a driven package spindle supported at one end and free at the other end, a strand package measuring means for stopping said spindle at a predetermined package size, and a strand traversing frame, that improvement which comprises means for swinging the strand traversing frame from the package spindle, strand cutting means and strand clamping means reciprocably mounted to move parallel to the axis of said spindle and between the frame and the package after the traversing frame is swung away from the package to engage the strand as lead from a supply source to the package spindle, means to operate said cutting and

clamping means to cut and clamp the strand, releasable strand clamping means mounted on said spindle to rotate therewith, means to release said rotatable clamping means after stopping of the spindle, a plate adjacent the driven end of the spindle and reciprocably mounted to move parallel to the axis of the spindle and engage the strand package to slide it off the free end of the spindle, means to reciprocate said plate during stopping of the spindle, said rotatable clamping means clamping the leading end of the strand after the reciprocable clamping means retracts and the traversing frame is swung back adjacent the spindle.

2. A doffing means as in claim **1** wherein the rotatable strand clamping means on said spindle comprises a member having recess coaxial with the package spindle, a strand clamp on its outer surface and means extending from said clamp to said recess, said releasable means including a member mounted for movement along the spindle axis into said recess to engage said means extending into said recess to release said strand clamp.

3. A doffing means as in claim **1** wherein the cutter and clamp are independently and adjustably tensioned, including separate biasing means for independently and adjustably tensioning the reciprocable cutter and clamp.

4. A doffing means as in claim **1** wherein the means to release the clamping means is reciprocatably mounted to move parallel to the axis of said spindle.

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