Dec. 9, 1969 K. A. MAINSTONE 3,482,793

WINDER FOR WEB MATERIALS

Filed Oct. 2, 1967 2 Sheets-Sheet 1

FIG-1

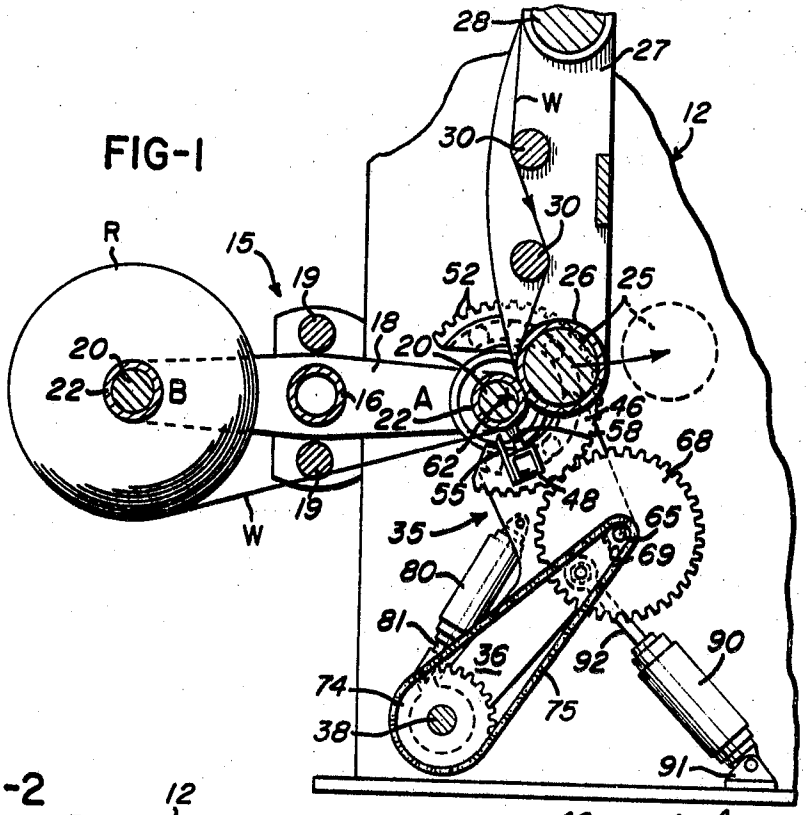


FIG-2

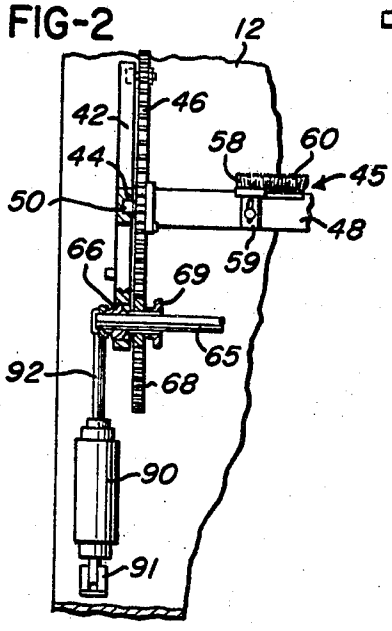
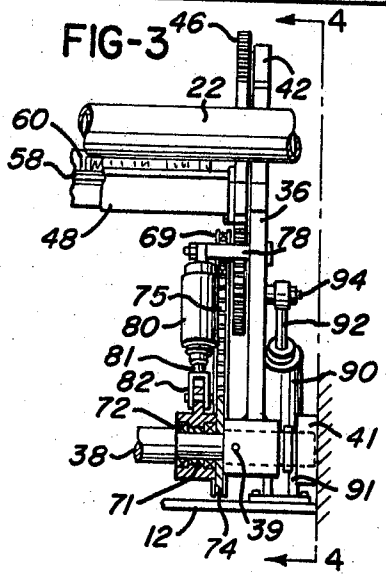


FIG-3



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FIG-4

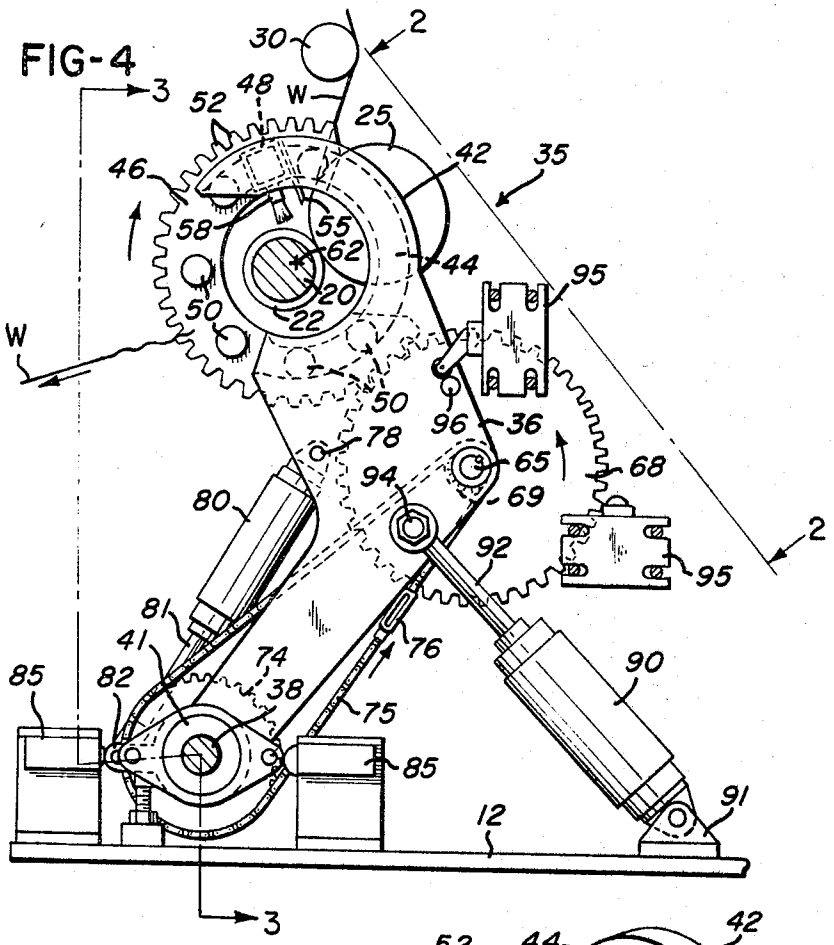
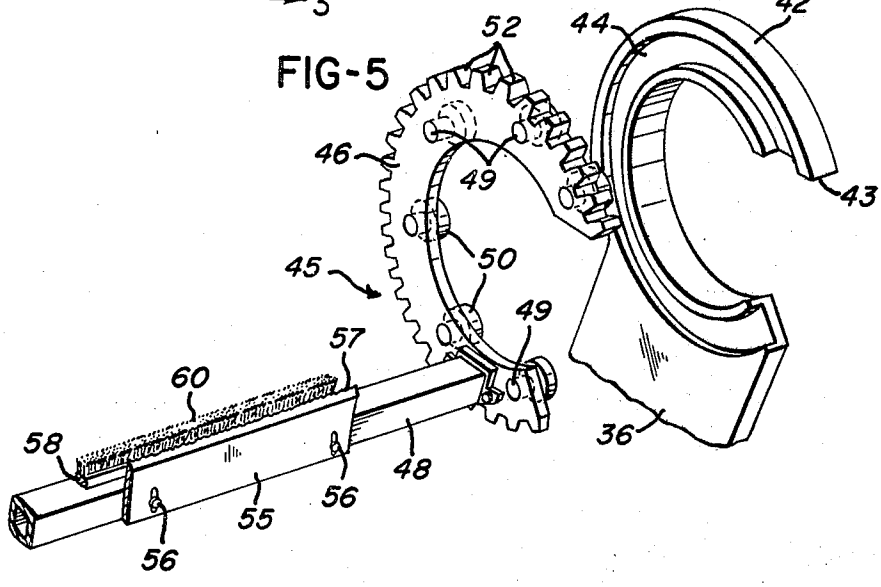


FIG-5



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WINDER FOR WEB MATERIALS

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Int. Cl. B65h 19/20, 54/22
U.S. Cl. 242—56 7 Claims

ABSTRACT OF THE DISCLOSURE

A continuous winder for web materials includes a rotatable turret supporting a plurality of core shafts and being movable to shift each core shaft successively between web transfer and roll unloading positions. A cutoff knife and wiper mechanism associated with the turret and having a carriage mounted for movement in an arcuate path substantially centered on the axis of a core located in the web transfer position in order to cut the web and to direct the cut leading end of the web into the nip of the new core and a rider roll.

BACKGROUND OF THE INVENTION

In apparatus for winding a web of material onto a core and for cutting and transferring the leading end of the web from a fully wound roll to an empty core without stopping the web, it is common to employ an indexing reel or turret such as shown in Phelps Patent No. 2,943,806 issued to the assignee of the present invention. The turret supports a pair of diametrically spaced cores so that when a roll is almost fully wound on one core, the turret is indexed to transfer the roll to an unloading station and to move an empty rotating core to a web transfer station where the web is directed partially around the core through a nip formed with a rider roll. Commonly one or more enveloping rolls are brought into engagement with the web adjacent the empty core to produce substantial envelopment of the web around the empty core before transfer.

The web is severed and the leading end is wiped onto the outer surface of the empty core by a knife and wiper mechanism which is usually pivotally supported to move generally tangentially past the empty core in a path partially simulating the required path of the web around the core. Adhesive is commonly applied to the outer surface of the empty core, especially with light gage webs, so that the leading end of the web is attached to the core surface and is carried into the nip formed between the core and the rider roll. It is desirable to eliminate the operation of applying adhesive on each new empty core and to provide a winder having a highly dependable web transfer mechanism for eliminating the problems encountered and time delay when a web transfer is missed.

SUMMARY OF THE INVENTION

The present invention is directed to a winder incorporating an indexing reel or turret and having an improved web transfer mechanism which is highly dependable and is ideally suited for use with very thin webs such as light gage plastic film material. In general, the winder of the invention incorporates a knife cutoff and wiper carriage which is carried by a pair of arms pivotable between a retracted position to provide for build up of a roll and indexing the turret, and a position adjacent an empty core at the web transfer station where the knife and wiper carriage is rotatable on an axis substantially concentric with the axis of the empty core.

Preferably, the rotational axis of the knife and wiper carriage is slightly offset from the axis of the empty core in a direction towards the nip formed with the rider roll so that the wiper effectively releases the web immediately

ahead of the nip. As a result of this substantially concentric relationship of the rotational axis of the knife and wiper carriage and the axis of the empty core, the leading end of the web is wiped or directed approximately 180° in a circular path around the rotating empty core to assure that the lead end of the web is directed into the nip formed between the empty core and a rider roll.

The effective wiping action produced by the wiper following the outer surface of the empty core also eliminates the need for pre-coating the outer surface of the empty core with adhesive. In addition, the cutoff knife and wiper mechanism of the invention provide the features of high dependability and compactness, and may be easily adapted for mounting on winders of various sizes.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a vertical section through a turret winder constructed in accordane with the invention, with the cutoff knife and wiper mechanism shown immediately prior to cutting and transferring the web;

FIG. 2 is a fragmentary view of the cutoff knife and wiper mechanism taken generally along the line 2—2 of FIG. 4;

FIG. 3 is a view of the cutoff knife and wiper mechanism taken generally along the line 3—3 of FIG. 4;

FIG. 4 is an end view taken generally on the line 4—4 of FIG. 3 and showing the web being transferred; and

FIG. 5 is a fragmentary perspective view of the support for the knife and wiper carriage.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The turret winder in FIG. 1 is shown as receiving a web W of material such as plastic film or paper. The winder includes a frame **12** which preferably is formed by a pair of vertical end stands, one supporting the necessary drive motors (not shown) for the winder and the other supporting the necessary control components.

A turret **15** includes a center shaft **16** supported by suitable bearings (not shown) mounted on the frame **12**. A pair of parallel spaced arms **18** are mounted on the shaft **16** and support a pair of diametrically spaced guide rolls **19** and a pair of diametrically spaced core spindles or shafts **20** on which cores **22** are mounted. In a manner well known in the art, the center shaft **16** of the turret **15** is rotatable by a suitable indexing drive (not shown) for moving each core **22** between a web transfer station A and a roll unloading station B, and the core shafts **20** are independently driven by separate drive motors (not shown).

A lay-on or rider roll **25** is provided for the turret **15** and has a resilient outer surface **26**. The rider roll is supported by a pair of arms **27** which are pivotally supported by the frame **12** for rotation on an axis substantially aligned with the axis of a guide roll **28** so that the rider roll **25** is movable in an arcuate direction indicated by the arrow to provide for build-up of a rewinding roll R at the web transfer station A. Preferably the rider roll **25** is counterbalanced by a set of opposing air cylinders (not shown) connected to the supporting arms **27**. A pair of guide rolls **30** are also supported by the arms **27** and direct the web W from the roll **28** to the rider roll **25**.

A roll change mechanism **35** includes a pair of angularly shaped arms **36** which are positioned adjacent the end stands of the frame **12** and are rigidly secured to a connecting torque shaft **38** (FIG. 3) by corresponding pins **39**. The shaft **38** is rotatably supported by bearings **41** mounted on the frame **12**. Each arm **36** has a hook-shaped upper end portion **42** (FIG. 5) defined by a gap **43** and has formed therein a semi-circular or C-shaped cam track or slot **44**. A web cutoff and wiper carriage **45** (FIG. 5) extends between each pair of arms **36** and in-

cludes a pair of C-shaped end plates **46** rigidly connected by a tubular cross member **48** having a rectangular cross-sectional configuration. A series of stub shafts **49** (FIG. 5) are mounted on each plate **46** and support corresponding rollers **50** which project into the corresponding cam track **44** formed within the adjacent arm **36**. Spur gear teeth **52** are formed on the outer periphery of each plate **46**.

An elongated knife **55** (FIG. 5) is adjustably mounted on one side of the cross member **48** of the carriage **45** by screws **56** and includes a serrated cutting edge **57**. An elongated wiping brush **58** is also mounted on the cross member **48** of the carriage by adjustable angle brackets **59** (FIG. 2) and incorporates flexible bristles **60** which project radially inwardly towards the axis **62** (FIG. 1) of curvature of the track for the web cutoff and wiper carriage **45** defined by the cam slots **44**. It is to be understood that other forms of flexible wipers may be employed in place of the brush **58**, as for example, a thin strip of rubber.

Referring to FIG. 2, a shaft **65** extends between the arms **36** and has end portions rotatably supported by bearings **66** mounted within aligned holes formed within the arms. A large diameter spur gear **68** and adjacent smaller diameter sprocket **69** are keyed to the shaft **65** adjacent each of the arms **36** so that each gear **68** engages the gear teeth **52** formed on the corresponding C-shaped end plate **46** of the carriage **45**.

Referring to FIG. 3, a sleeve **71** is mounted on each end portion of the shaft **38** and is supported by a pair of anti-friction bearings **72**. A sprocket **74** is mounted on each sleeve **71** and is connected to the correspondingly aligned sprocket **69** by an endless chain **75** having a turnbuckle **76** (FIG. 4) for selecting the desired tension. A stud **78** (FIG. 3) extends from each arm **36** and supports an air cylinder **80** having a piston rod **81** pivotally connected to an ear **82** projecting from the corresponding sleeve **71**. When the piston rods **81** are extended (FIG. 4), the ears **82** for each mechanism **35** engage corresponding limit switches **84** which actuate valves (not shown) causing the rods **81** to be retracted.

An air cylinder **90** (FIG. 4) is mounted on the frame **12** by a bracket **91** and includes a piston rod **92** pivotally connected to the corresponding arm **36** by a stub shaft **94**. The cylinders **90** are supplied with air through lines having solenoid actuated reversing valves (not shown) controlled by a pair of limit switches **95** (FIG. 4) adjustably mounted on the frame **12** and actuated by a stud **96** projecting from the adjacent arm **36**.

In operation, when a winding roll R of web material is approaching its desired diameter on a core **22** positioned at the transfer station A, the corresponding rider roll **25** is raised by air cylinders (not shown), and the turret is slowly rotated to index an empty rotating core **22** to the transfer station A. The roll change mechanism **35** is moved by the air cylinders **90** from its retracted position to a position where the C-shaped cam tracks **44** and correspondingly shaped plates **46** of the carriage **45** partially encompass the rotating shaft **20** of the empty core as illustrated in FIG. 1. As mentioned above, the axis **62** of curvature of the tracks for the carriage **45** is slightly offset in relation to the axis of the rotating empty core **22** towards the nip formed with the rider roll **25**.

When it is time to sever and transfer the web W from the full roll R to a rotating empty core **22**, the pair of cylinders **80** are actuated to rotate the corresponding pair of gears **68** and thereby to rotate the carriage **45** quickly on its axis **62**. The quick rotation of the carriage causes the serrated edge **57** of the knife **55** to sever the web and the brush **58** to wipe the leading end of the web in a circular path around the outer surface of the core **22** and into the nip formed with the rider roll **25**. The slightly offset relation of the rotational axis of the carriage **45** assures that the bristles **60** of the brush **58** or any other flexible wiper will release the end of the web immediately before the carriage stops and the web enters the nip as illustrated in FIG. 4. A number of rollers **50** are mounted on each plate **46** to assure that at least two or three rollers remain in each track **44** after the carriage **45** is rotated approximately 180° and thereby maintain the alignment of the carriage.

When the knife and brush reach the positions shown in FIG. 4, the limit switches **85** are actuated, causing the cylinders **80** to reverse and thereby to rotate the knife and wiper carriage **45** in a counterclockwise direction so that the knife **55** and brush **58** return to their normal or home position as shown in FIG. 1. The cylinders **90** are then actuated to move the arms **36** and thereby to retract the carriage **45** away from the newly formed roll and to enable the roll to build up against the force exerted by the rider roll **25**.

From the drawings and the above description, it can be seen that a winder having a mechanism **35** constructed in accordance with the present invention provides several desirable features and advantages. For example, the C-shaped end portion **42** on each of the arms **36** and the C-shaped gear segments or plate **46** on the carriage **45** traveling in the cam tracks **44** make it possible for the knife **55** and wiper brush **58** to move about an axis substantially concentric with the axis of an empty rotating core **22** positioned at the web transfer station A. Thus after the web is cut by the serrated edge **57** of the knife **55**, the leading end of the web is held in contact with the outer surface of the rotating core by the brush **58** to assure that the leading end of the web envelopes the core and enters the nip formed with the rider roll **25**.

The substantially concentric movement of the knife and brush relative to an empty core is especially suitable for light gage plastic film and eliminates the need for precoating adhesive on the outer surface of the empty core. The arrangement of the gears **68** connected by the shaft **65** and the chains **75** connecting the sprockets **69** and **74** for rotating each carriage **45** also provides the advantages of a positive acting mechanism which assures that the knife **55** and brush **58** will remain precisely parallel with the empty core as the carriage is rotated.

The simplified construction of each mechanism **35** also provides the important feature of high dependability and thereby assures that a web transfer from a fully wound roll R to an empty core **22** will not be missed. Furthermore, each mechanism **35** requires very low maintenance and is compact in construction so that it is particularly suited for use on various size winders. It is also to be understood that the winding apparatus of the invention may be employed for winding a plurality of webs on a common core or on corresponding cores mounted on a common core shaft.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise form of apparatus, and that changes may be made therein without departing from the scope of the invention.

What is claimed is:

1. Apparatus for providing a smooth and dependable transfer of a web from a winding roll to a rotating empty core without stopping the web and especially adapted to eliminate the need for adhesive on the core, comprising means for supporting the core and the roll in parallel spaced relation, a carriage including cutoff knife and wiper means, means supporting said carriage for rotary movement on an axis substantially concentric with the axis of the core to move said knife and wiper means in an arcuate path extending around the core to sever the web and to direct the leading end of the web around the core, and means for producing relative movement between said carriage supporting means and the core to provide for buildup of a roll of web material on the core.

2. Apparatus as defined in claim **1** wherein said carriage supporting means includes a pair of parallel spaced

arms, a rotatable torque shaft rigidly connecting said arms, C-shaped guide means on each said arm, said carriage including a C-shaped follower member supported for travel in each said guide means, an elongated cross member rigidly connecting said follower members and supporting said knife and wiper means, and means for effecting simultaneous rotation of said follower members to provide for uniform movement of said knife and wiper means in said path around the empty core.

3. Apparatus as defined in claim 2 wherein said C-shaped guide means on each said arm include means defining a C-shaped slot, and a plurality of rollers mounted on each said follower member and extending within the corresponding said slot.

4. Apparatus as defined in claim 2 wherein said means for effecting rotation of each said follower member include gear teeth on the outer periphery of each said follower member, a gear supported by each said arm and engaging said teeth, means connecting said gears for simultaneous rotation, and fluid cylinder means for rotating said gears.

5. Apparatus as defined in claim 4 wherein said means for effecting rotation of each said follower member include a first sprocket mounted on each said arm and connected to the corresponding said gear, a substantially larger second sprocket rotatably mounted on said torque shaft in alignment with the corresponding said first sprocket, chain means connecting each set of said corresponding first and second sprockets, and said fluid cylinder means including an air cylinder mounted on each said arm and connected to rotate the corresponding said second sprocket.

6. Apparatus for winding a roll of web material on a core and for transferring the web from a fully wound roll to a rotating empty core without stopping the web, comprising a turret having means supporting at least two cores in parallel spaced relation, means rotatably supporting said turret for indexing each said core between a roll unloading station and a web transfer station, a rider roll positioned to form a nip with a core positioned at said transfer station, a carriage including a cutoff knife and wiper member, means supporting said carriage for rotary movement on an axis substantially concentric with the axis of an empty core positioned at said transfer station to move said knife and wiper member in an arcuate path extending around said core to sever the web and direct the leading end of the web into said nip, and means for moving said carriage supporting means relative to said turret to retract said carriage from said transfer station to provide for build-up of a roll of web material and for indexing said turret.

7. Apparatus for providing a smooth and dependable transfer of a web from a winding roll to a rotating empty core without stopping the web, comprising means for supporting the core and the roll in parallel spaced relation, a carriage including cutoff knife and wiper means, means supporting said carriage for rotary movement on an axis substantially concentric with the axis of the core, and means for rotating said carriage to move said knife and wiper means in an arcuate path extending around the core to sever the web and direct the leading end of the web around the core.

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GEORGE F. MAUTZ, Primary Examiner