Nov. 18, 1969 W. R. PENROD 3,478,975

WEB WINDING APPARATUS

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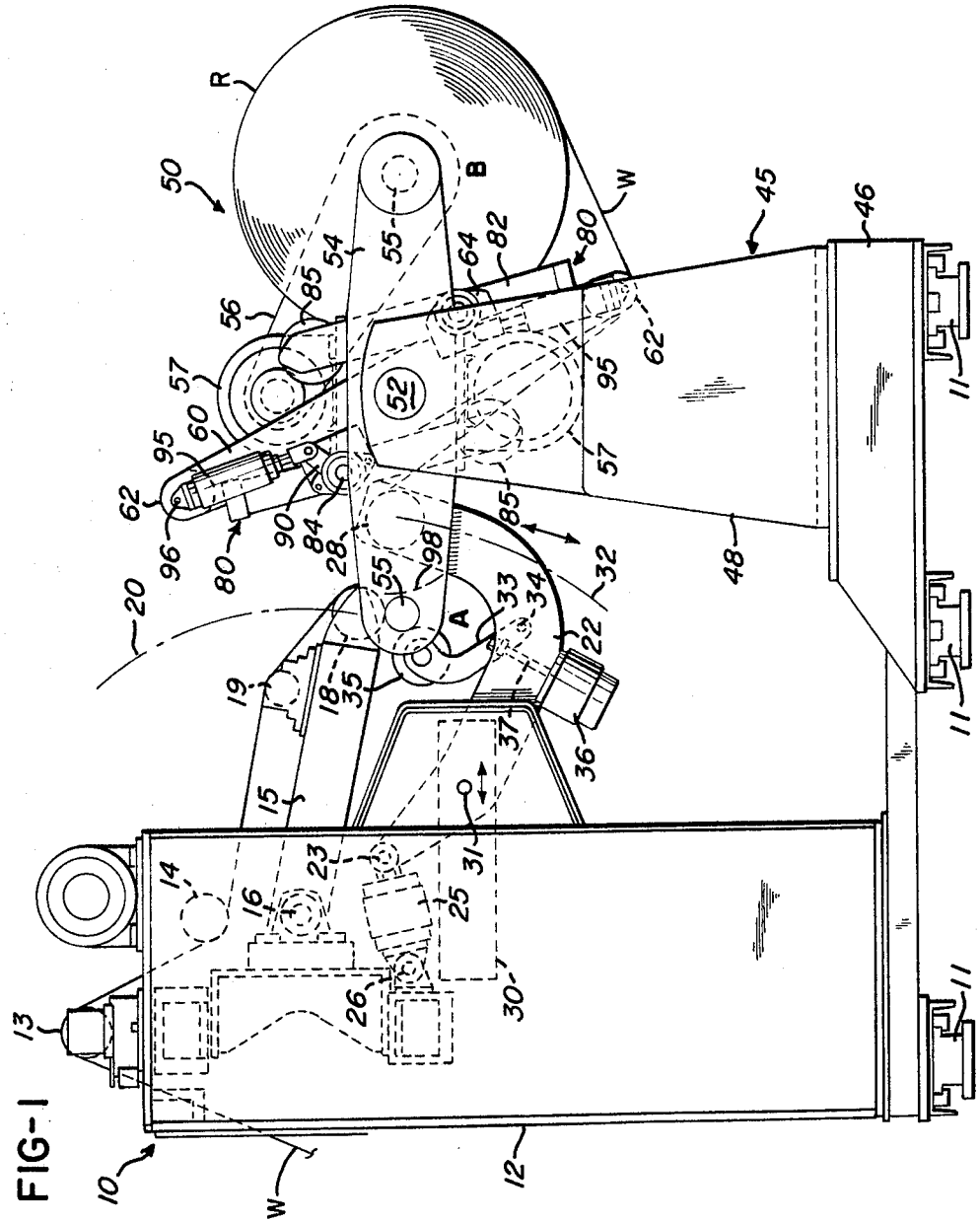



FIG-1

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FIG-2

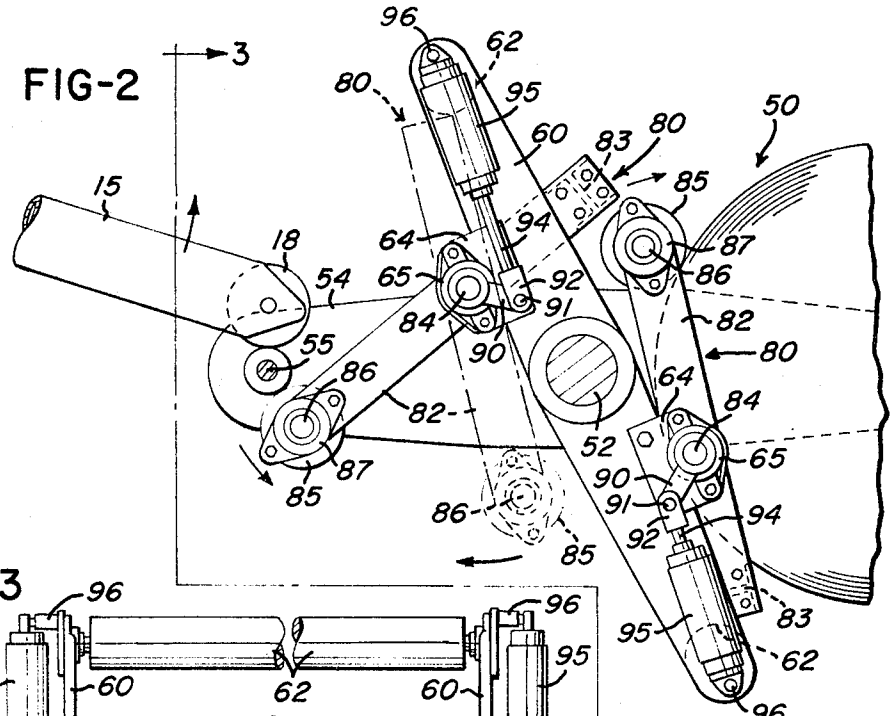



FIG-3

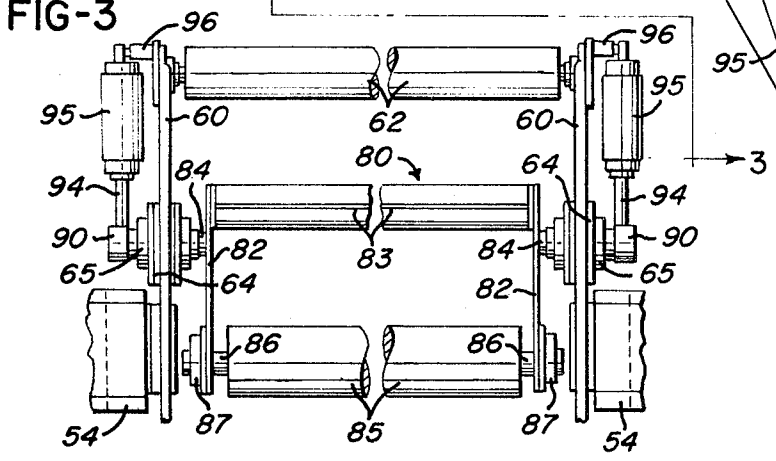
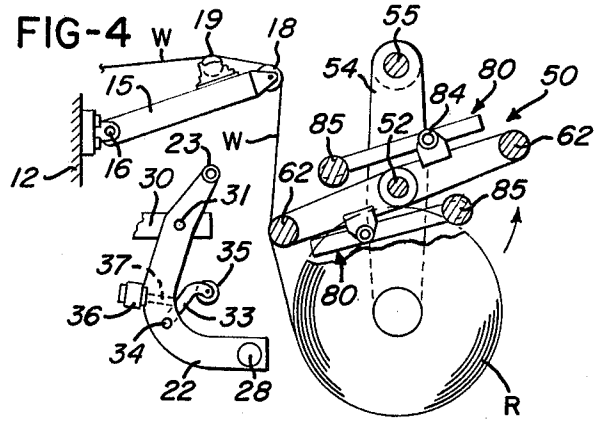



FIG-4



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3,478,975

# WEB WINDING APPARATUS

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Int. Cl. B65h 67/04
U.S. Cl. 242—64 8 Claims

## ABSTRACT OF THE DISCLOSURE

In a continuous winder, a turret supports a plurality of cores each having a rider roll supported by a frame pivotally mounted on the turret, and each frame includes a pair of parallel spaced arms connected by a beam which serves to counterbalance the rider roll and to maintain close parallelism between the rider roll and its corresponding core. Fluid cylinders are mounted on the turret for rotating the frames so that each counterbalanced rider roll is effective to produce a constant pressure against a winding roll on its corresponding core while indexing of the turret.

## BACKGROUND OF THE INVENTION

In winding a web of non-porous material, such as plastic film, onto a core of a turret winder, it is desirable to prevent air from being entrained between wraps so that succeeding wraps do not produce side slipping of the wraps and thereby produce a poorly wound roll. It is common to employ a rider roll for this purpose which is supported adjacent the turret winder and engages the outer surface of the winding roll to squeeze out air which would otherwise be entrained between the oncoming web and the winding roll.

The rider roll is also commonly used in conjunction with one or more enveloping rolls to form a cluster of rolls around an empty rotating core at the web transfer station for providing a good no-fold back start on the core when the web is severed. After the start is completed, the enveloping rolls are retracted, but the rider roll remains in contact with the winding roll and moves outwardly as the winding roll increases in diameter. When the winding roll has reached its desired diameter and it is time to bring in a new core, the rider roll is moved away from the winding roll to provide for indexing of the turret. During the time interval while the rider roll is moved away and the turret is indexing, the web winds poorly on the winding roll due to the problem of air being entrained between the wraps.

## SUMMARY OF THE INVENTION

The present invention is directed to an improved turret winder wherein each of the cores has a corresponding auxiliary rider roll carried by the turret. These auxiliary rider rolls are used primarily during the time the main rider roll is retracted from the winding roll for indexing the turret so that air continues to be squeezed out from between the oncoming web and the rewinding roll during indexing of the turret to bring a new core into a web transfer position.

In general, the preferred embodiment of the invention incorporates a turret winder including an auxiliary rider roll for each core on the turret. Each auxiliary rider roll is supported by a rotatable frame having parallel spaced arms connected by a beam member which serves to counterbalance the auxiliary rider roll relative to the pivot axis of the frame and also to maintain parallelism between the rider roll and its corresponding core. The beam member also provides sufficient flexibility so that each auxiliary rider roll will contact the full length of a tapered core



or a winding roll. The frame supporting each auxiliary rider roll is rotated by a set of air cylinders pivotally mounted on the turret and connected by levers to the shafts supporting the frame. Air at a constant pressure is supplied to each of the air cylinders, and each counterbalanced auxiliary rider roll thus produces a constant pressure against the rewinding roll on its corresponding core during the entire time that the turret is being rotated or indexed.

Other features and advantages of the invention will be apparent from the following description, the accompanying drawings and the appended claims.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational view of winding apparatus constructed in accordance with the invention and showing the major components in position for transferring the web from a full winding roll to an empty rotating core;

FIG. 2 is an enlarged fragmentary end view of the turret shown in FIG. 1 with the nearest core support arm removed;

FIG. 3 is an elevational view of a portion of the turret taken generally along the line 3—3 of FIG. 2; and

FIG. 4 is a schematic view of the apparatus during indexing of the turret.

### Description of the preferred embodiment

The winding apparatus shown in FIG. 1 generally includes a core enveloper **10** which is supported by a set of rails **11** and includes a frame **12** supporting guide rolls **13** and **14**. A pair of parallel spaced arms **15** are pivotally connected to the frame **12** by pins **16** and support a main rider roll **18** and a guide roll **19**. The arms **15** are movable by means such as suitable air cylinders (not shown) to move the main rider roll **18** along an arcuate path **20**.

The core enveloper **10** also includes a pair of parallel spaced arms **22** which have inner ends pivotally connected by pins **23** to the piston rods of corresponding fluid cylinders **25** pivotally connected to the frame **12** by pins **26**. An enveloping roll **28** is supported by the outer ends of the arms **22**, and power operated screw jacks **30** are connected to the arms **22** by pins **31** for moving the enveloping roll **28** along an arcuate path **32**. A pair of arms **33** are pivotally connected to the arms **22** by pins **34** and support another enveloping roll **35**. The arms **33** are moved relative to the arms **22** by corresponding air cylinders **36** mounted on the arms **22** and having piston rods **37** pivotally connected to the arms **33**.

A winder **45** has a base **46** mounted on the rails **11** and includes a pair of parallel spaced pedestals or end stands **48**. A turret **50** has a main center shaft **52** rotatably supported by bearings mounted on the upper portions of the stands **48** and includes a pair of parallel spaced arms **54** which are mounted on the main shaft **52** for supporting a pair of diametrically spaced parallel cores **55**. Each of the cores **55** is driven through a belt, chain or similar drive **56** connected to a corresponding motor **57** mounted on one of the arms **54**. The center shaft **52** of the turret **50** is also connected to a suitable drive motor (not shown) for rotating or indexing the turret to move each of the cores **55** between a web transfer station A and a roll unloading station B.

The turret **50** also includes another pair of parallel spaced arms **60** which are positioned inboard of the arms **54** at an angle of approximately 70° therewith. The arms **60** support a pair of diametrically spaced freely rotating guide rolls **62**. A pair of laterally projecting plates **64** are mounted on each arm **60** in diametrically spaced relation, and each set of corresponding plates **64** support a set of aligned bearings **65**.

A pair of U-shaped frames **80** are positioned between

the arms **60**, and each frame **80** includes a pair of parallel spaced arms **82** rigidly connected by an H-beam **83**. A pair of aligned shafts **84** project outwardly from the arms **82** of each frame **80** and are supported by the corresponding pair of aligned bearings **65** to provide for rotating each frame relative to the arms **60**. Each of the frames **80** supports an auxiliary rider roll **85** having journals **86** rotatably mounted within bearings **87** secured to the projecting ends of the arms **82**. Referring to FIG. 2, the shafts **84** are connected to the corresponding arms **82** approximately midway between the beam **83** and rider roll **85**, and the size and weight of the beam **83** are selected so that each rider roll **85** is precisely counterbalanced on the axis of the shafts **84** by the corresponding beam **83**.

A crank arm **90** (FIG. 2) is rigidly connected to the outer end of each shaft **84**, and each crank arm is pivotally connected by a pin **91** to a clevis **92** mounted on the end of a piston rod **94** extending from an air cylinder **95**. The air cylinders **95** are pivotally supported by studs **96** mounted on the outer ends of the corresponding arms **60**.

During winding of a roll R at station A, the web W of material is directed through the core enveloper **10** around the guide rolls **13**, **14** and **19** and through a nip formed between the main rider roll **18** and the winding roll R. When a winding roll R has almost reached its desired diameter, the roll change control button is pushed to start the drive motor **57** for the new core **55** and cause the turret **50** to begin rotating counterclockwise (FIG. 4). Simultaneously with the rotation of the turret **50**, the auxiliary rider roll **62** for the winding roll R moves into contact with the winding roll by actuation of the corresponding cylinders **95**, after which the main rider roll **18** is raised along the path **20**.

When the new core **55** of the turret **50** reaches a position approximately 40° from the web transfer station A, the turret stops and the enveloping rolls **28** and **35** are raised toward their respective positions shown in FIG. 1. After the enveloping rolls **28** and **35** are positioned, the turret **50** continues to index until the new core **55** arrives at station A and the winding roll arrives at station B. The main rider roll **18** is then lowered to form a nip with the new rotating core **55**. Since an auxiliary riding roll **62** remains in contact with the riding roll R during the full indexing of the turret, the web W will continue to be wound smoothly on the roll R without air being entrained between the wraps.

To sever the web W and to start a new roll R, a knife and wiper mechanism (not shown) carried by the arms **22** is actuated causing it to move along an arcuate path indicated by the line **98** (FIG. 1). Adjustment of this path for different sizes of cores is accomplished by adjusting the cylinders **25** which moves the pivot pins **23** for the arms **22**. As the web is severed, the leading end of the web is wiped into the nip formed between the new rotating core **55** and the main rider roll **18**, and a new roll is started.

The arms **22** and **33** are rotated to retract the corresponding enveloper rolls **28** and **35**, and the new roll R continues to form at station A while the main roll R remains in nip relation with the roll. In some installations, it may also be desirable to bring the corresponding auxiliary rider roll **85** into contact with the roll R during winding at station A. While a new roll is forming, the full roll R is unloaded at station B and a new core **55** is mounted on the arms **54**. The sequence is repeated when the winding roll R approaches its desired diameter at the web transfer station A.

From the drawings and the above description, it can be seen that a winder constructed in accordance with the invention provides several desirable features and advantages. For example, the provision of a counterbalanced auxiliary rider roll **85** in turret **50** for each of the cores **55** and a constant pressure air supply to the corresponding air cylinders **95** causes the auxiliary rider roll **85** to apply a constant pressure against the winding roll R during the entire time the turret **50** is being indexed to move the winding roll R from station A to station B and the new rotating core **55** from station B to station A. As a result, the final wraps made on the winding roll R are smooth and uniform, and it is necessary to scrap the first few hundred feet of the web on the roll R.

The U-shaped frame **80** supporting each auxiliary rider roll **85** also provides desirable features. That is, with the arms **82** rigidly connected with the H-beam **83** and the shafts **84** positioned at the center of gravity of the assembly, not only is each auxiliary rider roll **85** precisely counterbalanced, but the beam **83** connects the arms **82** to provide substantial rigidity so that the corresponding auxiliary rider roll **85** is maintained parallel with its corresponding core **55** during rotation of the frame **80**. The construction of each frame **80** and its rotation by the corresponding air cylinders **95** through the crank arms **90** also provide a compact and simplified structure which assures dependable operation with minimum maintenance.

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.** In apparatus for continuously winding a web of material and including a turret having means supporting a plurality of cores in parallel spaced relation, and means rotatably supporting said turret for moving each said core between a roll unloading station and a web transfer station, the improvement comprising a rider roll for each said core, a frame supporting each said rider roll in parallel spaced relation to its corresponding core, means mounted on said turret and pivotally supporting each said frame to provide arcuate movement of each rider roll relative to the corresponding said core, means associated with each said frame for counterbalancing the corresponding said rider roll relative to the pivot axis of said frame, and fluid pressure cylinder means connected to each said frame and cooperating with said counterbalancing means to hold the corresponding said rider roll against the outer surface of the rewinding roll with a substantially constant pressure throughout rotation of said turret.

**2.** Apparatus as defined in claim **1** wherein each said frame is U-shaped and comprise parallel spaced arms, wherein said counterbalancing means comprise a beam member rigidly connecting said arms to maintain parallelism between the corresponding said rider roll and said core, said beam member being positioned relative to the pivot axis of said frame for counterbalancing the corresponding said rider roll.

**3.** Apparatus as defined in claim **1** wherein said turret comprises a center shaft and said supporting means for each said frame includes a pair of parallel spaced arms mounted on said shaft, a pair of diametrically spaced guide rolls mounted on said arms, a set of aligned bearings mounted on said arms for each said frame, shaft means being connected to each said frame and supported by the corresponding said set of bearings, said fluid cylinder means comprising a pair of air cylinders mounted on said arms for each said frame, and lever means connecting said shaft means to the corresponding said air cylinders.

**4.** Apparatus as defined in claim **3** wherein each said frame extends between the said pair of arms of said turret.

**5.** Apparatus as defined in claim **1** wherein said turret comprises a center shaft, a first pair of parallel spaced arms mounted on said shaft, means on said first pair of arms for supporting a pair of diametrically spaced said cores, means for rotating said cores, a second pair of

parallel spaced arms mounted on said shaft and positioned in angular relation to said first pair of arms, a pair of diametrically spaced guide rolls mounted on said second pair of arms, two of said frames supporting corresponding said rider rolls, and diametrically spaced pivot means mounted on said second pair of arms for supporting said frames.

6. Apparatus as defined in claim 5 wherein each said frame is U-shaped and includes parallel spaced arms rigidly connected by a beam member forming part of said counterbalancing means, and said pivot means is positioned for rotation of each said frame between said second pair of arms.

7. Apparatus as defined in claim 6 wherein said fluid cylinder means comprise a pair of air cylinders pivotally mounted in diametrically spaced relation on each of said second pair of arms, and said pivot means includes aligned shafts connected to said arms of each said frame, a lever connected to each said shaft, and means connecting each said lever to the corresponding said air cylinder.



8. Apparatus as defined in claim 1 in combination with a main rider roll, means spaced from said turret and supporting said main rider roll for movement between a position forming a nip with one of said cores located at said web transfer station and a retracted position spaced from said core, at least one enveloping roll, and means supporting said enveloping roll for movement between a position adjacent one of said cores located at said web transfer station and a retracted position spaced from said core.

**References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 2,970,786 | 2/1961 | Justus et al. | 242—56 X |
| 3,228,621 | 1/1966 | Ryan | 242—64 |
| 3,266,744 | 8/1966 | Volm et al. | 242—64 |
| 3,291,412 | 12/1966 | Rockstrom et al. | 242—65 |


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