United States Patent

Nystrand

[15] **3,697,010**

[45] **Oct. 10, 1972**

[54] **WEB WINDER WITH IMPROVED TRANSFER**

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[73] Assignee: **Paper Converting Machine Company, Inc.,** Green Bay, Wis.

[22] Filed: **Jan. 20, 1971**

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[52] **U.S. Cl.** .....**242/56 A**

[51] **Int. Cl.** **B65h 19/20**

[58] **Field of Search** .....242/56 A, 58.4, 56 R, 56.4, 242/56.5, 56.6

[56] **References Cited**

UNITED STATES PATENTS

3,345,009	10/1967	Rockstrom	242/56 A
2,984,426	5/1961	Johnson	242/56 A

FOREIGN PATENTS OR APPLICATIONS

841,213	7/1960	Great Britain	242/56 A
998,989	7/1965	Great Britain	242/56 A

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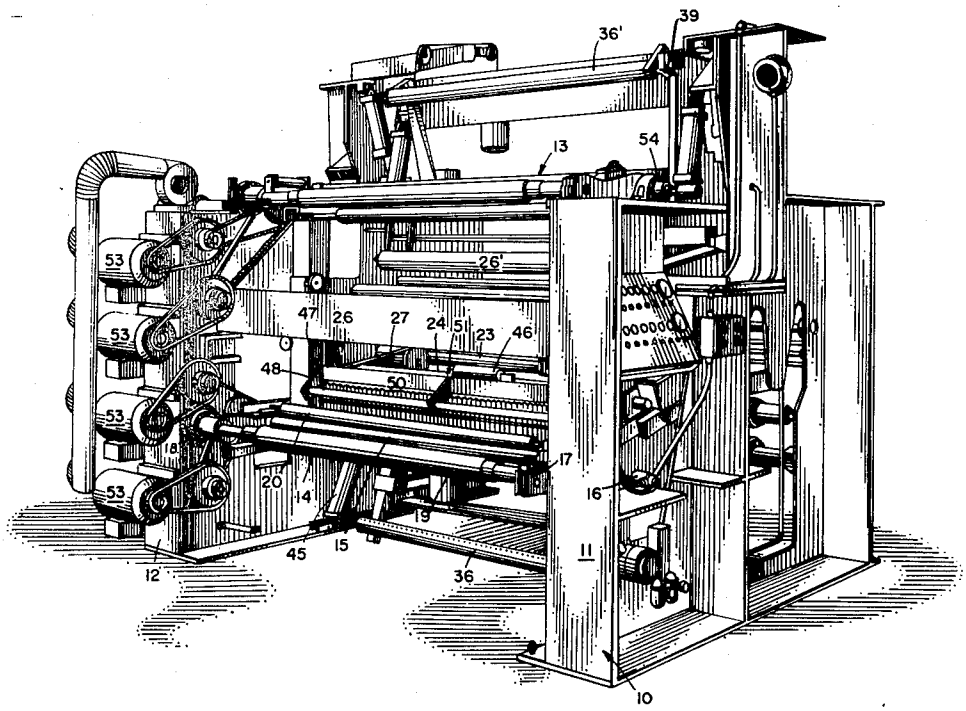
[57] **ABSTRACT**

A winder having a double mandrel turret equipped with a cutoff having an air-assist to obtain a secure start on an empty mandrel after a portion of the web has been wound on the other mandrel.

2 Claims, 6 Drawing Figures



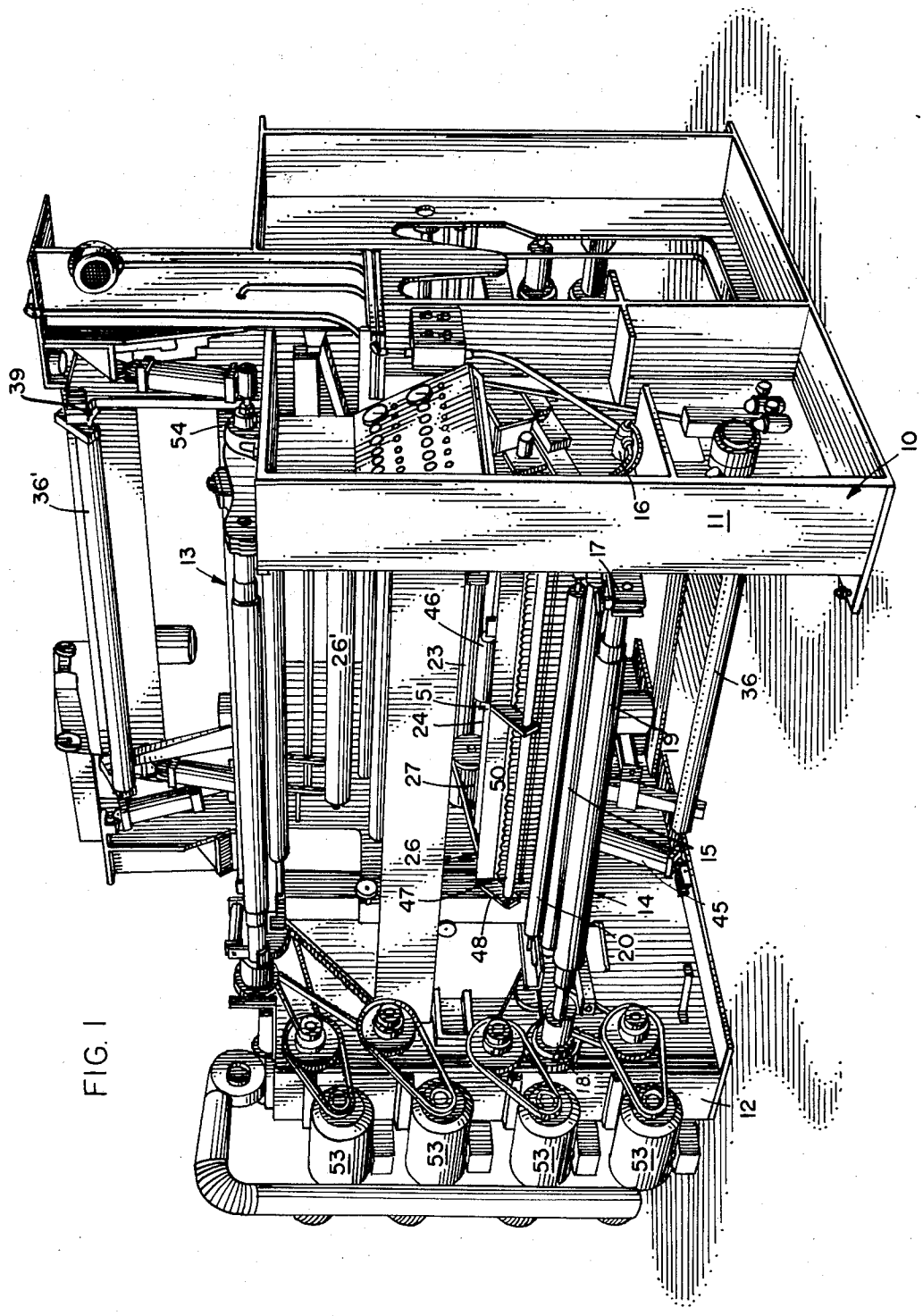


FIG. 1

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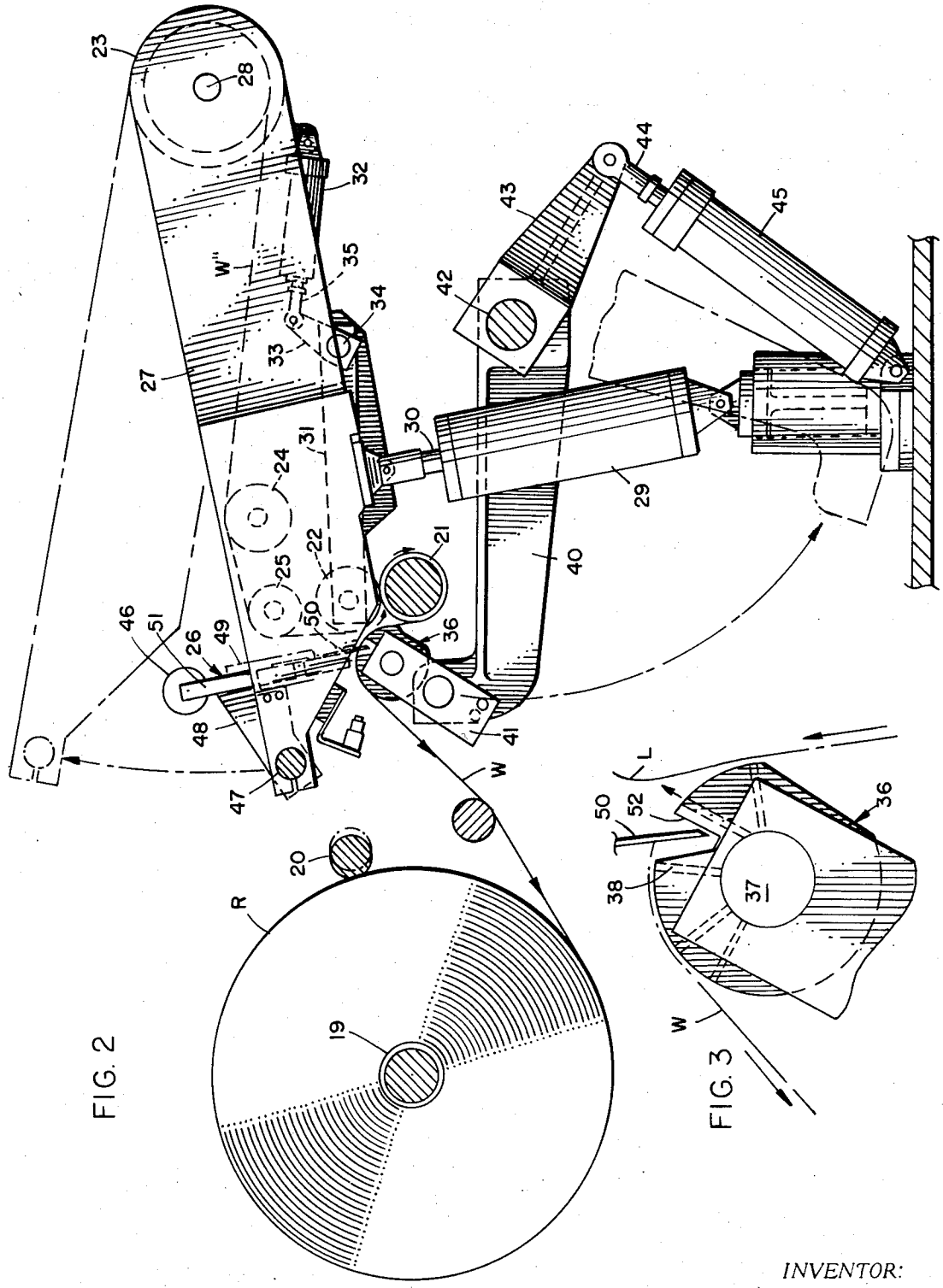

FIG. 2

FIG. 3

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FIG. 4

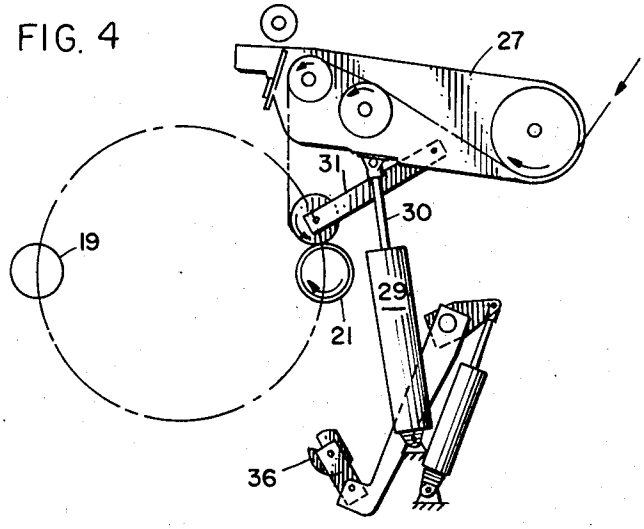


FIG. 5

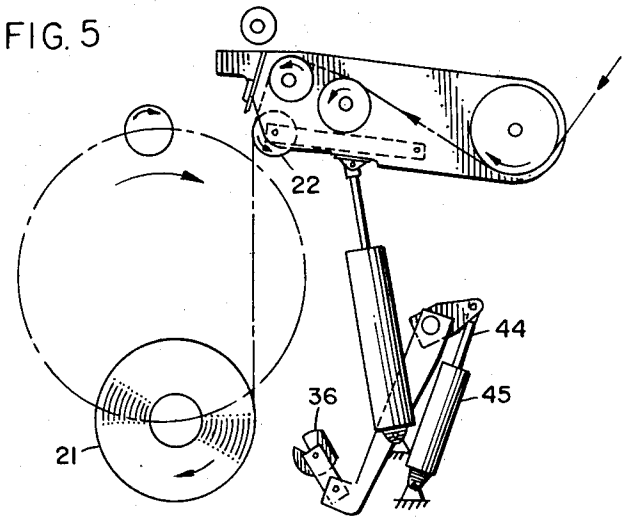
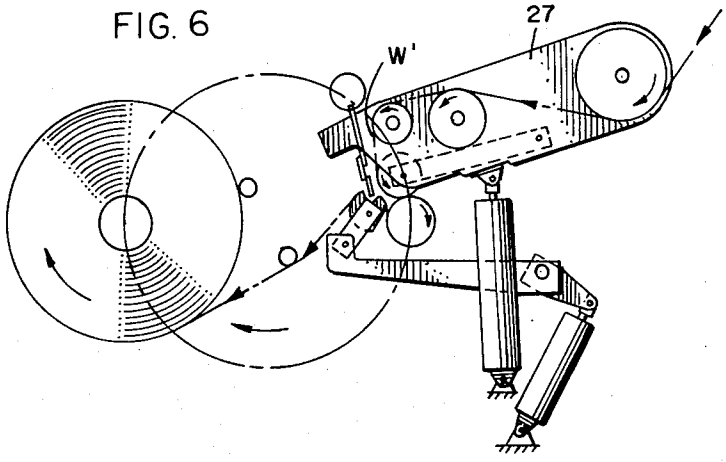


FIG. 6



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WEB WINDER WITH IMPROVED TRANSFER

BACKGROUND AND SUMMARY OF THE INVENTION

This invention is an improvement on the co-owned U.S. Pat. of Volm et al No. 3,266,744.

The invention finds utility in the winding of web on cores in a continuous fashion. By "continuous" I refer to the fact that as soon as one winding cycle approaches completion, the roll of web material is moved out of the winding position and an empty core is brought into that position. The web is then severed transversely and the leading edge of the remaining web is wound about the fresh core. In many instances in the past, it has been deemed necessary to make use of glue to properly affix the leading edge to the new core. In other instances, a glueless transfer has been achieved, but at the expense of going through involved and carefully timed machinery. Illustrative of the latter is U. S. Pat. No. 3,350,027. The drawbacks of the prior art are avoided according to the instant invention which makes use of an air-assist member for driving the leading edge of the severed web into a nip defined between a rider roll and the fresh core-equipped mandrel.

DETAIL DESCRIPTION OF THE INVENTION

The invention is described in conjunction with an illustrative embodiment in the accompanying drawing, in which:

FIG. 1 is a perspective view of a winding machine incorporating the teachings of this invention;

FIG. 2 is a fragmentary enlarged side elevational view, partially in section, of the lower turret portion of FIG. 1;

FIG. 3 is an enlarged fragmentary side elevational view of the central portion of FIG. 2;

FIG. 4 is a schematic elevational view of the operational parts of the turret seen in FIG. 2, and where the parts are disposed for the winding operation; and

FIGS. 5 and 6 are views similar to FIG. 4, but showing the elements of the turret winder in their condition for indexing and web transfer, respectively.

In the illustration given, and with particular reference to FIG. 1, the numeral 10 generally designates the frame of the winding machine which includes side frames 11 and 12. The web material proceeds from a suitable source (not shown) located at the left of the machine. This may be a parent roll in the case of paper, or an extruder in the case of plastic such as polyethylene. Also, the machine in question is capable of winding two webs or two sets of webs simultaneously by virtue of having an upper turret generally designated 13, and a lower turret generally designated 14. The two turrets are essentially the same in make-up, so, for ease of explanation, only the lower turret winder 14 will be detailed.

Each turret 13 and 14 incorporates the teachings of the above-mentioned Volm U.S. Pat. No. 3,266,744, and reference may be had to that patent for details of construction not shown or described herein. Essentially, each turret winder 13 or 14 includes a pivot shaft 15 (seen only in FIG. 1 and relative to the lower turret 14). The pivot shaft 15 is rotatably mounted within bearings (as at 16 relative to the right hand end in FIG. 1) suitably mounted on the side frames 11 and 12. The pivot shaft 15 is connected to a motor (not shown) for the purpose of rotating the same so as to index the turret — the motor being provided on the "drive" side of the machine, i.e., being associated with side frame 12 and located on the side thereof remote from the turret 14. At each end, the pivot shaft 15 is equipped with a turret arm as at 17 and 18. In the fashion shown and described in the above-mentioned Volm et al U.S. Pat., each turret arm supports a pair of mandrels, only one of which is seen in FIG. 1 and identified by the numeral 19. Associated with each mandrel (consistent with the disclosure of the above-mentioned Volm et al U.S. Pat.) is an auxiliary rider roll as at 20. The auxiliary rider roll 20, as can be seen from FIG. 2, is associated with the mandrel 19 and operates to restrain the trailing edge of the web from flapping after the winding cycle has been completed.

The invention here is concerned with the means for transfer of the web from one mandrel to another, and this will be described first in conjunction with FIG. 2. The situation reflected in FIG. 2 is the moment of transverse severance of the web W, thus corresponding to the beginning of a new winding cycle. At this point in time, a previous portion of the web W has been substantially wound on the core (not identified) ensleeved on the mandrel 19 to develop the web roll R. A knife mechanism, generally designated 26, has been actuated to slice through the web W (see FIG. 3) so as to develop a leading edge L, which, by virtue of an air blast, will be directed into the nip defined by the other mandrel 21, and the principal rider roll 22.

When the leading edge L is so directed, it is captured in a "pocket" provided by the aforementioned nip in combination with an upstream portion of the web as at W' (as seen in FIG. 6). By this phenomenon, I avoid the use of glue on any core which may be provided either on or in place of the mandrels.

As mentioned before, the web or webs to be wound proceed from a source (not shown) which is normally provided to the right of the portion of the machine seen in FIG. 2. The web W proceeds over a bedroll 23 (see the upper right hand portion of FIG. 2) which may be employed for slitting in case a tubular output of an extruder is to be wound. The web W, in the portion designated W'', proceeds over an expander roll 24, around an idling roll 25 for partial wrapping engagement with the main rider roll 22, and thence to the core-equipped mandrel 21. Although the perspective view in FIG. 1 does not lend itself to identifying all of the interior components of the machine, the bedroll 23 can be seen in the center of the view, as can a portion of the expander roll 24. The rider roll 22 is obscured by the knife assembly generally designated 26, but a corresponding rider roll 26' in the upper turret 13 can be seen.

Each of the rolls 22, 24, and 25 is carried by a pair of arms 27. The arms 27 are pivotally supported on the frames 11 and 12 for rocking action about the axis of the bedroll 23 as at 28 (see FIG. 2). The rocking action of the arms 27 is achieved through the action of a cylinder and piston rod unit 29 (see the lower central portion of FIG. 2). The arm 27 is in its raised position in FIG. 4, the piston rod 30 of the unit 29 being extended.

The main rider roll 22 is not directly supported between the arms 27, but is rotatably supported

between auxiliary arms 31 which are in turn supported on the principal side arms 27. A different position of the arms 31 from that seen in FIG. 2 can be seen in FIG. 4. For the purpose of properly positioning the roll 22 during different positions of the arms 27, the arms 27 support cylinder and piston rod units 32 (see FIG. 2). These units are connected to rocker arms 33, which in turn are fixed to a rotatable cross shaft 34. The arms 31 are fixed to the cross shaft 34 so as the piston rod 35 of the unit 32 is extended, a rocking motion is imparted to the arms 31, and this properly locates the main rider roll 22.

The invention is particularly concerned with the transfer means which, in the illustration given, is operably associated with the knife means 26. Included within the transfer apparatus is a transverse member, generally designated 36, which is equipped with a bore 37 coupled to a source of compressed air. The member 36 is equipped with a plurality of passages as at 38 for the delivery of jets of air. The member 36 can be seen in the extreme lower central portion of FIG. 1, while the corresponding member 36' is seen at the extreme upper portion. An air supply pipe 39 is seen in FIG. 1 relative to the member 36' for delivering the air which results in the aforementioned jets.

I employ the air jet transfer phenomenon only at the beginning of a winding cycle, and therefore provide means for shifting it in and out of position. For this purpose, the member 36 is mounted on a pair of support arms 40. In the illustration given, the member 36 is secured first to a block 41 which, in turn, is fixed to the arm 40, thereby permitting adjustment of the position of the member 36 for different diameter mandrels.

The arms 40 are fixed to a rocker shaft 42 which is journaled within the frames 11 and 12. Also fixed to the rocker shaft 42 are rocker arms 43. Each rocker arm 43 is coupled to the piston rod 44 of a cylinder and piston rod unit 45, which in turn is secured to the frame of the machine. When the piston rod 44 is extended in the condition seen in FIG. 5, the member 36 is retracted so as to permit indexing of the turret 14.

The knife mechanism 26 is also carried by the arms 27, and includes an actuator cylinder and piston rod unit 46 (see FIG. 2 in the upper central portion thereof). More particularly, a rocker shaft 47 is pivotally supported within the downstream ends of the arms 27. Fixed to the rocker shaft are arms 48 which carry the knife bracket 49 and knife 50. The unit 46 is supported on a stationary cross member of the machine frame 10, and is coupled to a link 51 which in turn is pivotally connected to the knife bracket 49. Thus, as the unit 46 is energized, the knife 50 is moved through a slight arc so as to slice through the web W and into a recess 52 provided in the member 36 (see FIG. 3).

It is believed that the understanding of the invention can be enhanced by a consideration of the operation of the machine whose parts have just been described.

OPERATION

The condition of the machine 10 in FIG. 2 is also illustrated in FIG. 6 but with less detail. This corresponds to the time in the winding cycle when the web has just been cut and the leading edge L is about to be blown into the nip defined by the core-equipped mandrel 21 and the main rider roll 22. This, as indicated previously, is achieved through the air assist delivered from the member 36. Once this is achieved, a winding cycle is initiated relative to the mandrel 21. In FIG. 1, four mandrel drive motors are designated 53, one for each mandrel of the two turrets 13 and 14. The drives on the mandrels are essentially similar to that described in conjunction with the above-mentioned Volm et al. U.S. Pat.

Shortly after transfer, the air-assist member 36 is retracted to the position seen in FIG. 4 where it remains throughout the major portion of the winding cycle relative to the mandrel 21. It will be appreciated that at the end of the winding cycle, the mandrel 21 must be shifted out of the right hand position to the left hand position via indexing of the turret. This phenomenon is depicted in FIG. 5. Thus, it is necessary to move the air-assist member 36 out of the orbital path of the mandrel 21.

At the same time the member 36 is retracted (by virtue of the actuation of the cylinder and piston rod unit 45), the arms 27 are moved upwardly to the dotted line position in FIG. 2 and to the position shown in FIGS. 4 and 5. This is achieved through the actuation of the cylinder and piston rod unit 29. Thus, the knife assembly 26 and the idling roll 25 are moved out of the orbital path which will be described by the mandrel 19 when it moves into the winding position previously occupied by the mandrel 21 (see FIG. 4). Since the winding cycle is of substantial duration (as contrasted to the time allowed for transfer), I move the more ponderous portions of the machine during this time and relatively slowly so as to avoid imposing shocks on the apparatus.

When the web has been wound to a predetermined amount on the mandrel 21, i.e., to the footage generally illustrated in FIG. 5, the turret 14 begins to index and the rider roll 22 is retracted by the actuation of the cylinder and piston rod unit 32. This clears the orbital path.

As the indexing is completed, viz., the mandrel 21 being in the left hand position, a cam,as at 54 relative to the turret 13, is positioned to actuate a limit switch (not shown) for signaling the delivery of air to the cylinder and piston rod units 45. This results in the elevation of the air-assist member 36 to the position indicated in FIGS. 2 and 6. When the air-assist member 36 reaches the uppermost position, the cylinder 46 is actuated to trigger the knife 50 to move it through an arc and slice the web W. For this purpose, the machine 10 is equipped with a microswitch which is actuated by the air-assist member 36 when it is in its uppermost position — this delivering a signal for actuating the cylinder and piston rod unit 46. This same signal is employed to open a valve (not shown) associated with the air delivery pipe 39 so as to create the air jets employed for driving the leading edge 12 into the nip defined by core-equipped mandrel 21 and the rider roll 22. The cam 54, which is fixed on the pivot shaft 15, — in addition to signaling the raising of the air-assist member 36, also signals for the deactuation of the cylinder and piston rod units 29, resulting in the lowering of the arms 27 to the solid line condition in FIG. 2. At the same time the units 29 are deactuated, so also are the units 32 so as to bring the rider roll 22 into the proper position for creating a nip in conjunction with the core-equipped mandrel 21.

According to the invention, the air assist member **36** develops an enveloping action relative to the mandrel next to be wound and is equipped with the slot **52**. Thus the web is supported on each side of the knife **50** when it is being severed. Further, I have found that the narrower the slot, the more effective the cut. In addition to this, the enveloping member is air-greased to prevent scuffing of the web material. This invention, therefore, shows a most effective way of severing difficult to cut materials, such as 0.006 inch thick polyethylene.

I claim:

1. In a web-winding machine, a frame having a pair of spaced-apart movable mandrel means, means for feeding a web to said frame for sequential winding on said mandrel means, movable knife means mounted on said frame on one side of said web for severing said web when the web is being wound on one mandrel means and partially wrapped about the other mandrel means, means on said frame adapted to coact with said other mandrel means to define a web-trapping pocket, air jet means on said frame on the side of said web opposite the side having said knife means for directing the leading edge of the severed web into said pocket; said air jet means including an elongated member pivotally mounted on said frame, said member being equipped with an elongated recess adapted to partially receive said knife means incident to the severing of said web.

2. The machine of claim **1** in which said frame is equipped with a pair of pivotally mounted spaced-apart arms carrying both said knife means and a rider roll, said rider roll constituting the coacting means for defining said pocket, said frame being equipped with a second pair of pivotally mounted spaced apart arms carrying said elongated member, and means on said frame for selectively pivoting both pairs of said arms to position said elongated member at a point closely adjacent said rider roll and with said knife means and elongated recess being on one side of said point and said other mandrel means being on the other side of said point.

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