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Wily

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[54] **STRAND CARRIER FOR BRAIDING MACHINES**

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Related U.S. Application Data

[63] Continuation of Ser. No. 879,294, Nov. 24, 1969, abandoned.

[52] **U.S. Cl.** **87/57**, 87/21

[51] **Int. Cl.** **D04c 3/18**, D04c 3/24, D04c 3/48

[58] **Field of Search** 87/21, 22, 55–57

[56] **References Cited**

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3,324,757	6/1967	Richardson	87/57
3,359,848	12/1967	Ostermann	87/56
3,362,282	1/1968	Karg	87/57 X
3,408,893	11/1968	Singh	87/57 X
3,425,315	2/1969	Kaufmann	87/57 X

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[57] **ABSTRACT**

Strand carrier for high speed braiding machines having a rotatable bobbin from which strand material is withdrawn to be fabricated into braided material on the machine and spring clutch means including a first torque type coil spring for controlling the rotation of the bobbin in the strand withdrawal direction and a second torque type spring for controlling the rotation of the bobbin in a direction reverse to the strand withdrawal direction.

7 Claims, 6 Drawing Figures

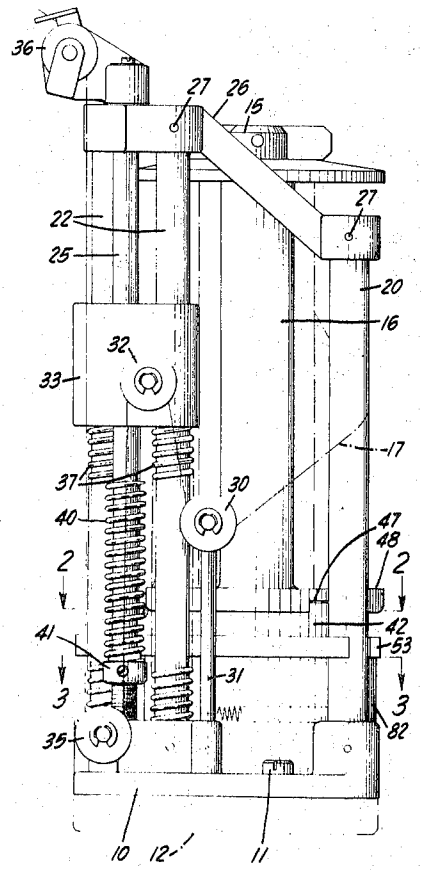


Fig. 1

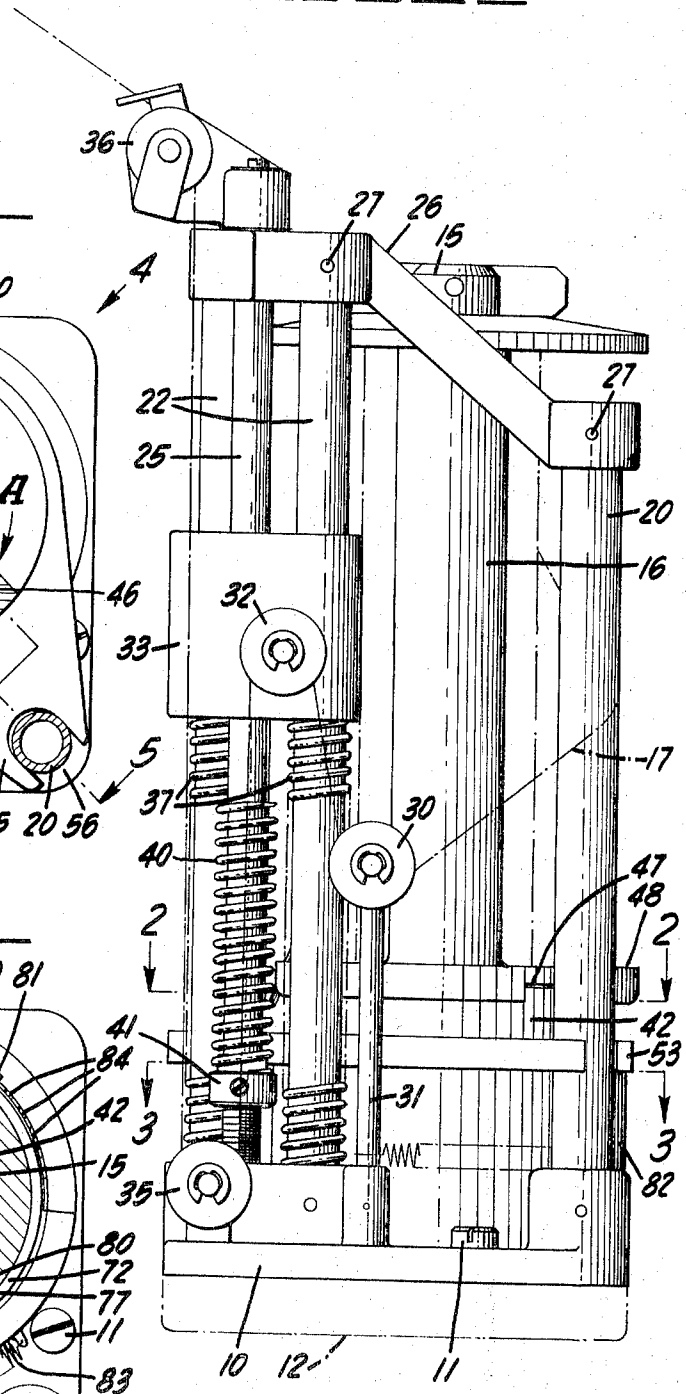


Fig. 2

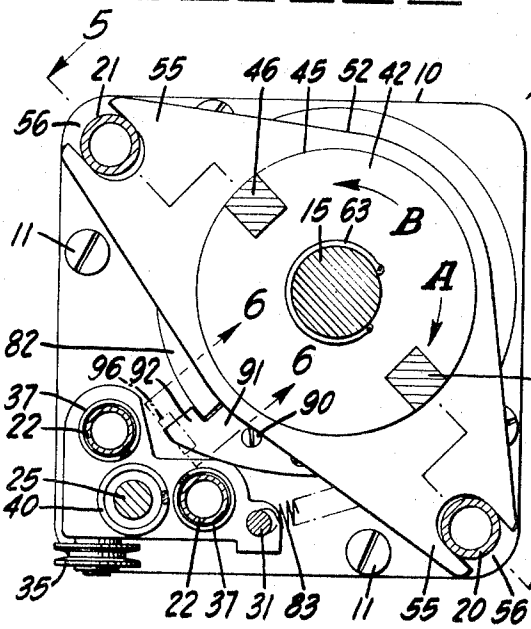


Fig. 3

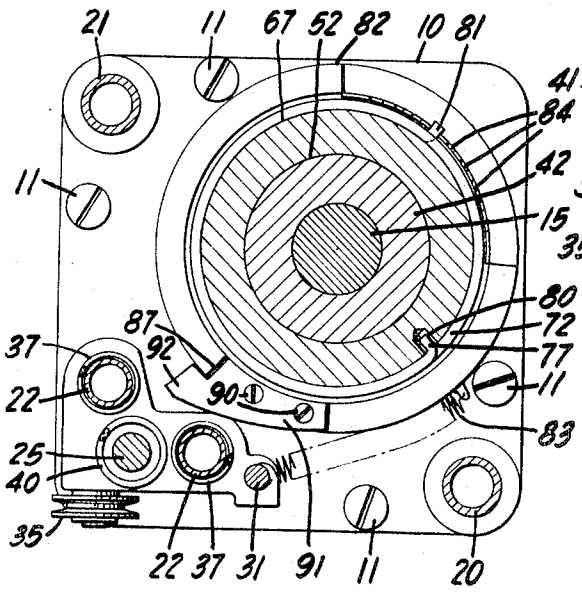


FIG. 4

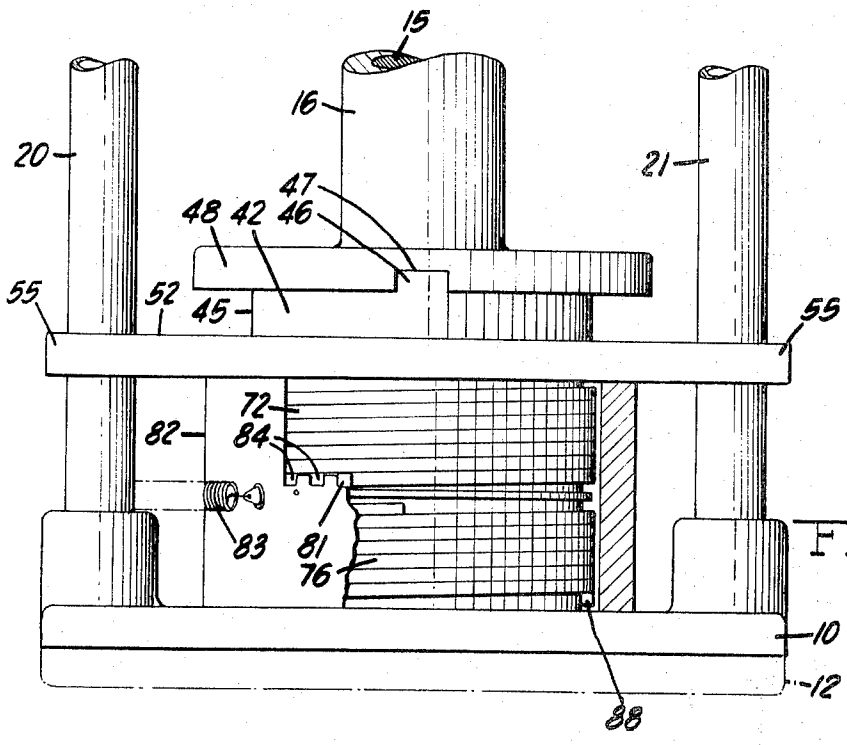


FIG. 6

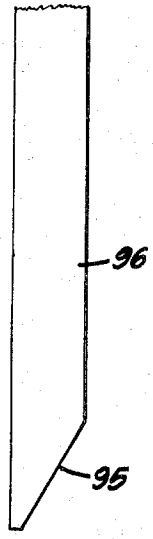
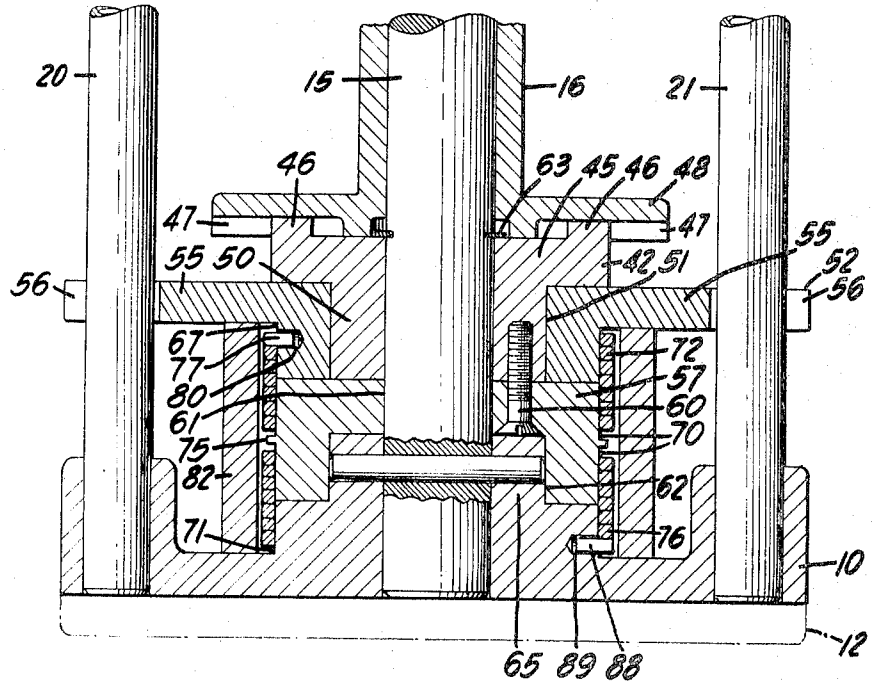
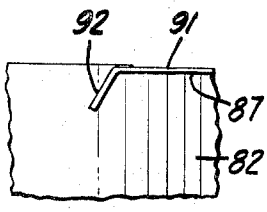


FIG. 5





STRAND CARRIER FOR BRAIDING MACHINES

The present application is a continuation of my co-pending application Ser. No. 879,294 filed Nov. 24, 1969, now abandoned.

BACKGROUND OF THE INVENTION

Conventionally in strand carriers for braiding machines the strand material is wound on bobbins rotatably mounted on the carriers and the bobbins are alternately held against rotation to provide tension in the strand material and released under control of tension members to permit withdrawal of the strand material as the carriers are moved along sinuous paths about a braiding point of the machine to be braided into fabric. In prior strand carriers, such as disclosed in U.S. Pat. No. 3,324,757, the bobbin is provided with ratchet teeth for engagement by a pawl or detent for engaging a single tooth of the ratchet, said pawl being moved by spring means into holding engagement with the ratchet teeth on the bobbin. The pawl is released from the bobbin by a tension member which is moved by the strand, against the action of compression springs, from a strand take-up position to the pawl release position. As the pawl is released from the bobbin tension in the strand and the movement of the tension member in the strand take-up direction rotate the bobbin in the strand pay-off direction and the length of strand withdrawn from the bobbin is taken up and tensioned by the tension member, and movement of the tension member in the take-up direction again releases the pawl for engagement with the bobbin ratchet. Since this re-engagement of the pawl with the ratchet very often occurs between a pair of the ratchet teeth the take-up movement of the tension member continues to rotate the bobbin in the strand pay-off direction until a tooth engages the pawl to stop the bobbin movement. When this take-up movement of the tension member is combined with the inertial forces normally tending to rotate the bobbin in the pay-off direction as the carrier moves between inner and outer portions of its sinuous path the ratchet teeth impacts the pawl with sufficient force to damage both the pawl and ratchet teeth.

Also in the carrier of said Pat. No. 3,324,757 the inertial forces developed as the carrier moves in opposite directions between inner and outer portions of its sinuous path sometimes causes the bobbin to rotate in the reverse or strand rewind direction to again move the tension member to release the pawl from the ratchet. When such reverse movement of the bobbin occurs the force required to overcome the inertia of the bobbin to again rotate it in the strand pay-off direction is transmitted directly to the strand which sometimes causes the strand to break.

In another prior form of braiding carrier, which is designed to reduce the damage to the bobbin ratchet and detent means and to prevent the bobbin reversing movement, such as that disclosed in U.S. Pat. No. 3,425,315, the detent is provided with the same number of teeth as the ratchet member associated with the bobbin to distribute the impact force developed in stopping the bobbin in the pay-off direction. This carrier is also provided with an overrunning clutch which permits rotation of the bobbin in the strand pay-off direction but prevents rotation of the bobbin in the reverse direction. However, while the clutch is effective in stopping the reverse rotation of the bobbin damage

continued to the teeth of the ratchet and detent during impact thereof to stop the rotation of the bobbin in the pay-off direction.

In addition to the damage to the bobbin ratchets and detents in the carriers of said Pats. Nos. 3,324,757 and 3,425,315 as above noted the normal range of movement of the tension members between their detent releasing and strand take-up positions is greatly increased by the excess length of strand inadvertently withdrawn by the tension members until the pay-off movements of the bobbins are stopped by the detents. This causes a fluctuation in the tension applied to the strands by the tension members beyond the desired strand tensioning limits and results in the formation of defective material braided by the machine.

SUMMARY OF THE INVENTION

Briefly summarized the invention resides in the provision of means for controlling the inadvertent rotation in opposite directions of a strand bobbin of a braiding carrier said controlling means including a first torque type spring having coils normally tending to contract to arrest the rotation of the bobbin in the strand pay-off direction, and a second torque type spring having coils normally tending to contract to arrest the rotation of the bobbin in a direction reverse to the strand pay-off direction. The coils of the first spring are expanded by movement of the strand tension member of the carrier in one direction to permit rotation of the bobbin in the strand pay-off direction and are permitted to contract to arrest bobbin rotation by the movement of the strand tensioning member in the opposite or strand take-up direction. The coils of the second spring are expanded by the rotation of the bobbin in the strand pay-off direction.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an elevational view of a strand carrier according to the instant invention;

FIG. **2** is a cross-sectional view taken along the line and in the direction of the arrows **2—2** of FIG. **1**;

FIG. **3** is a cross-sectional view taken along the line and in the direction of the arrows **3—3** of FIG. **1**;

FIG. **4** is a view of an enlarged scale taken in the direction of the arrow **4** of FIG. **2** with parts broken away in order to show other parts more clearly;

FIG. **5** is a cross-sectional view on an enlarged scale taken along the line and in the direction of the arrows **5—5** of FIG. **2**; and

FIG. **6** is a detailed view on an enlarged scale taken in the direction of the arrows **6—6** of FIG. **2.**

DESCRIPTION OF THE PREFERRED EMBODIMENT

The strand carrier shown herein is adapted for use in a high speed braiding machine and the instant invention is particularly directed to means in such carrier for controlling the feeding of wire strand material from a supply bobbin on the carrier to a point at which the strand is braided into fabric. Specifically, the braiding carrier is of the type shown in U.S. Pat. No. 3,425,315 which includes a bobbin on which a supply of strand material is wound, fixed guide members for guiding the strand from the bobbin toward the braiding point of the machine, a tension member for the strand, and means for controlling the rotation of the bobbin in both the strand pay-off direction and in the direction reverse to

the strand pay-off direction. The means for controlling the rotation of the bobbin in the strand pay-off direction includes a member connected to and rotatable with the bobbin and a first torsion type spring having coils normally tending to contract to grip and hold the rotatable member and bobbin against rotation in the strand pay-off direction and means which is operated by the strand tension member to expand the coils of the first spring to release the bobbin for rotation in the strand pay-off direction. The means for controlling the rotation of the bobbin in the reverse direction comprises a second torsion spring having coils arranged to normally contract to grip and stop the rotation of the rotatable member and bobbin in the reverse direction and to release the member and bobbin during their rotation in the strand pay-off direction.

Referring particularly to FIGS. 1 to 3 of the drawings, the strand carrier includes a foot member **10** which is adapted to be secured, as by screws **11**, to one of the horn gear operated foot portions of conventional carriers or similar driving members, indicated diagrammatically at **12** in FIG. **1**, which are adapted to operate the carriers along oppositely directed sinuous paths about the braiding point of a braiding machine. A spindle **15** is mounted in fixed position in the foot member **10** (FIG. **5**) for rotatably supporting a bobbin **16** for strand material **17** of single or multiple filament steel wire or the like. Also secured in fixed positions in the foot member **10** are posts or standards **20** and **21**, a spaced pair of tubular support members **22** and a support rod **25.** The upper ends of the posts **20** and **21**, support members **22** and support rod **25** are retained against deflection relatively to each other by a bracket **26** which is secured to the posts and support members as by pins **27** (FIG. **1**).

In its path from the bobbin **16** to the braiding point of the machine, the strand **17** passes from the bobbin around the post **20**, under a grooved roller **30** rotatably mounted on a support member **31** on the foot member **10** and over a grooved roller **32** rotatably mounted on a tension member **33** slidably mounted on the support members **22** and support rod **25.** From the roller **32** the strand passes under a grooved roller **35** on the foot member **10** and over a grooved roller **36** on the bracket **26** to the braiding point of the machine. The tension member **33** is adapted to be moved to apply tension to the strand **17** under the control of coil type compression springs **37** mounted on the support members **22** between the tension member and foot member **10**, and a compression spring **40** mounted on the support rod **25** between the tension member and an adjustable nut **41** treadably carried on the support rod **25** adjacent the foot member (FIG. **1**), in the manner and for purposes set forth in said Pat. No. 3,425,315.

As the carrier moves around the braiding point of the machine, the bobbin **16** is adapted to be held against rotation and to be released for rotation in the strand pay-off direction, the clockwise direction as indicated by the arrow A in FIG. **2**, and to be held against rotation in a direction reverse to the strand pay-off direction, the counterclockwise direction as indicated by the arrow B in FIG. **2.** The means for holding the bobbin against rotation and for releasing the bobbin for rotation in the strand pay-off direction in accordance with the instant invention includes a member **42** mounted for rotation on the spindle **15**, the member **42** having an upper flange portion **45** with upwardly projecting lugs **46** for releasable engagement in slots **47** in the underside of a lower flange **48** of the bobbin, said slots extending radially of the spindle at opposite sides of the axial center thereof (FIGS. **4** and **5**). Extending downwardly from the flange portion **45** of the member **42** is a bearing portion **50** adapted to be rotatably received in a bore **51** in a bracket **52.** Arms **55** extending outwardly of the upper end of the bracket **52** are provided with open ended slots **56** adapted to closely embrace the support members **20** and **21** to hold the bracket against rotation during rotation of the member **42** and bobbin **16** in the manner hereinafter set forth. The member **42** also includes a lower portion **57** which is secured to the lower end of the bearing portion **50** as by screws **60**, the lower portion **57** having an upper bore **61** rotatably embracing the spindle **15** and a lower bore **62** rotatably embracing an upwardly extending hub **65** of the foot member **10.** The member **42** is maintained against axial movement on the spindle **15** between the upper end of the hub **65** of the foot member and a C-ring **63** or the like on the spindle, as shown in FIG. **5.**

The bracket **52** has an outer peripheral surface **67** aligned with an outer peripheral surface **70** on portion **57** of the member **42** and the surface **70** is in turn aligned with an outer peripheral surface **71** on the hub **65** of the foot member **10.** An upper torque type coil spring **72** is mounted on the peripheral surfaces **67** and **70** of the bracket **52** and member **42**, respectively, between the arms **55** of the bracket and an annular lip **75** on the member **42.** A lower torque type coil spring **76** is mounted on the surfaces **70** and **71** on the member **42** and hub **65**, respectively, between the annular lip **75** and the foot member **10**, which coil spring acts to hold member **42** and the bobbin **16** against rotation in the reverse direction. Member **42** and bobbin **16** could also be held against reverse rotation by other suitable means, such as a unidirectional or one way running clutch mechanism. The spring arrangement illustrated is extremely effective and represents a preferred construction, but effective operation of the bobbin pay-off can also be achieved by other mechanical configurations.

A projecting end **77** of the upper coil of the spring **72** is anchored in a hole **80** in the bracket **52** (FIG. **5**) and a projecting end **81** of the lower coil of the spring **72** is anchored in one of a series of notches **84** in a sleeve member **82** positioned for rotative movement between the foot member **10** and arms **55** of the bracket **52** and loosely surrounding the springs **72** and **76** (FIGS. **3** and **4**). A spring **83** connected between the sleeve member **82** and the support member **31** tends to bias the sleeve member clockwise as viewed in FIG. **3.** The coils of the spring **72** are arranged so that they normally tend to rotate clockwise relatively to the anchored upper end coil during contraction as viewed in FIG. **3**, and this tendency of the coils to contract coupled with the clockwise movement of the sleeve member **82** by the spring **83** causes the coils to tightly grip the surface **67** on the bracket **52** and surface **70** on the member **42** to hold the member **42** and bobbin **16** against rotation in the pay-off direction. On the other hand when the sleeve member **82** is rotated in the counterclockwise direction, as hereinafter set forth, the coils of the spring **72** are expanded to release the member **42** and bobbin **16** for rotation in the strand pay-off direction.

A projecting end 88 of the lower coil of the spring 76 is anchored in a hole 89 in the hub 65 (FIG. 5) and the coils are arranged so that they normally tend to rotate counterclockwise relatively to the anchored end coil, as viewed in FIG. 4, to contract and grip the surface 70 on the member 42 and the surface 71 on the hub 65 to hold the member 42 and bobbin 16 against movement in the counterclockwise or reverse direction to the strand pay-off direction and to release the member 42 and bobbin during movement in the strand pay-off direction.

Secured in a recess 87 in the sleeve member 82, as by screws 90, is a plate 91 having a downwardly angled nose portion 92 adapted for engagement by a camming surface 95 formed on the lower end of a finger 96 secured to the tension member 33 (FIGS. 1, 2 and 6). Following each release of the bobbin 16 for movement in the strand pay-off direction by a movement of the sleeve member 82 in the counterclockwise direction the strand 17 is withdrawn from the bobbin and taken up by an upward movement of the tension member 33 to its position of FIG. 1 under the control of the springs 37 and 40. At this time the finger 96 is out of engagement with the nose portion 92 on plate 91 and the sleeve member 82 has been moved clockwise to its position of FIG. 3 to cause the coils of the spring 72 to grip the member 42 to hold the member 42 and bobbin 16 against further movement in the strand pay-off direction. Also at this time the coils of the spring 76 are in gripping engagement with the member 42 to hold the member and bobbin against rotation in the reverse direction. Thereafter, as the strand withdrawn from the bobbin is used at the braiding point during movement of the carrier thereabout, as above set forth, the tension member 33 is gradually moved downwardly, from its position of FIG. 1, until the finger 96 again engages the nose portion 92 to move the sleeve member 82 counterclockwise to expand the coils of the spring 72 to release the member 42 and bobbin 16 for rotation in the strand pay-off direction to permit withdrawal of a further length of strand from the bobbin.

It will be understood that the improvement specifically shown and described by which the above results are obtained can be changed and modified in various ways without departing from the invention herein disclosed.

I claim:

1. A strand carrier for a braiding machine, said carrier having a foot member, a spindle on said foot member for rotatably supporting a bobbin of strand material, means for guiding said strand along a path from said bobbin to a point at which said strand is to be braided into fabric, a tension member for tensioning said strand in said path from said bobbin to said braiding point, and means for controlling the movement of said tension member between a strand take-up position and a second position, the improvement including a first member on said spindle connected to said bobbin for rotation therewith, a first spring means associated with said first member, a second member associated with said first spring means and said first member, said second member being operated to a first position by said tension member during movement thereof to said second position to condition said first spring means to release said first member and said bobbin for rotation in a strand pay-off direction, means for moving said second member to a second position when said tension member is moved to said strand take-up position, said first spring means being conditioned by movement of said second member to said second position to hold said first member and said bobbin against rotation in said strand pay-off direction, and means associated with said first member for holding said first member and said bobbin against movement in a direction reverse to said pay-off direction.

2. A strand carrier according to claim 1 in which said first spring means comprises a torque type spring having coils normally tending to contract into gripping engagement with said first member to condition said first spring means to hold said first member and said bobbin against movement in said pay-off direction when said second member is in said second position, and said coils of said first spring means are expanded by said second member when moved to said first position to condition said first spring means to release said first member and said bobbin for rotation in said strand pay-off direction.

3. A strand carrier according to claim 1 in which said means for moving said second member to said second position comprises a spring connected to said second member, said spring normally tending to bias said second member to said second position.

4. A strand carrier according to claim 1 in which there is a third member supported in fixed position on said carrier, and said first spring means comprises a torque type spring having coils normally tending to contract into gripping engagement with said first and third members, one of the end coils of said first spring means being connected to said second member and the other end coil of said first spring means being connected to said third member, said coils of said first spring means being permitted to contract into gripping engagement with said first and third members when said second member is moved to said second position, and said coils of said first spring means being expanded to release said first member when said second member is moved to said first position.

5. A strand carrier according to claim 1 in which said means associated with said first member comprises a torque type coil spring having one end coil connected to a portion of said foot member, the coils of said coil spring normally tending to contract into gripping engagement with said first member and said portion of said foot member to hold said first member and said bobbin against rotation in said reverse direction, and said coils of said coil spring being arranged to release said first member during movement of said first member in said pay-off direction.

6. A strand carrier for a braiding machine comprising a base member, a spindle on said base member for rotatably supporting a bobbin of strand material, control means for guiding said strand along a path from said bobbin to a point at which said strand is to be braided into a fabric, said control means including a tensioning device movable between a strand take-up position and a second position and an actuator movable in response to said tensioning device, a brake member mounted on said spindle and connected to said bobbin for rotation therewith, a helical brake spring wound around said brake member, said spring being stressed and of a hand normally to wind down on said brake member to hold the brake member against rotation, an annular member operatively associated with said helical spring and said actuator, a part rigid with said annular member and en-

gageable by said actuator when said tensioning device is in said second position, said part being operable upon engagement by said actuator to turn said annular member in a direction to unwind said helical spring to release said brake member and said bobbin for rotation in a strand pay-off direction, and further means to hold said brake member and said bobbin against rotation in a direction reverse to said pay-off direction.

7. The strand carrier of claim **6,** wherein said further means comprises cylindrically wound spring means.

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