TITLE OF THE INVENTION:

METHOD OF TERMINATING A
STRANDED SYNTHETIC FILAMENT CABLE

Patent Application of

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CROSS-REFERENCES TO RELATED APPLICATIONS

This application claims the benefit of an earlier-filed U.S. Patent Application having serial Number 12/889,981. The application lists the same inventors.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not Applicable.

MICROFICHE APPENDIX

Not Applicable

~~DESCRIPTION~~METHOD OF TERMINATING A STRANDED SYNTHETIC FILAMENT CABLE

~~Title of the Invention: Method of Termination a Stranded Synthetic Filament Cable~~

1. ~~Technical~~ Field of the Invention~~.~~

This invention relates to the field of synthetic cable terminations. More specifically, the invention comprises a method for terminating a multi-stranded cable having at least a partially non-parallel construction.

2. ~~Background~~ Description of the Related Art~~.~~

Synthetic rope/cable materials have become much more common in recent years. These materials have the potential to replace many traditional wire rope assemblies. However, the unique attributes of the synthetic materials can – in some circumstances – make direct replacement difficult. The smallest monolithic component of a synthetic cable will be referred to as a filament. Bundles of such filaments will be referred to as a "strand." Strands are then gathered to make a cable. In some instances strands will be grouped into "strand groups," and these strand groups will then be gathered to make a cable.

A synthetic filament is analogous to a single wire in a bundled wire rope. However, in comparison to the relatively stiff steel wire used in a wire rope, the synthetic filament: (1) is significantly smaller in diameter; (2) is significantly less stiff (having very little resistance to buckling); (3) has a much lower coefficient of friction.

These differences become particularly significant when dealing with a multi-stranded cable having a non-parallel construction. A discussion of the prior art will illustrate this point. FIG. 1 shows a prior art cable 10 constructed by helically winding six exterior strands 12 around a single core strand. This is a partially non-parallel construction. The single core strand runs parallel to the cable's central axis. However, the six exterior strands form a helical path and are clearly not parallel to the central axis. Such a cable may generally be referred to as having a "non-parallel" construction. A non-parallel cable may have some parallel components (such as a core strand or bundle of strands and possible one or more parallel outer layers). However, a load-bearing portion of its total mass is made of non-parallel strands. These may assume the form of a helix (as shown in FIG. 3), a braid, or any other suitable configuration.

Those skilled in the art will know that a construction such as shown in FIG. 1 does not distribute equal loads in all the strands when the cable is loaded in tension. The helical winding in the outer layer will produce an "unwinding" force as all the strands attempt to

Accordingly, it is important to constrain the cable so that these dislocations may be reduced or eliminated.

Problems also arise when a sheared end is locked into a termination in order to create a termination. If some filaments are longitudinally dislocated during the process leading up to the addition of the termination, then the resulting cable will not have an even load distribution across its filaments.

It would therefore be advantageous to provide a method of cutting and terminating a multi-strand non-parallel cable which would reduce the problems inherent in the use of synthetic filament ropes/cables. The present invention proposes just such a method.

BRIEF SUMMARY OF THE PRESENT INVENTION

The present invention comprises a method for straightening, constraining, cutting and terminating a multi-stranded, non-parallel cable. The cable filaments are aligned. A binder is then applied to the cable to maintain the alignment. The cable is then cut to a desired length. Each strand or group of strands is then placed in an individual termination. Each individual termination is then attached – either directly or through intermediate devices – to a collector.

Thus, the collector acts as a unified termination for the cable as a whole. However, each strand or group of strands has been cut, positioned, and locked into a relatively small termination. The relatively large cable is broken into smaller components so that consistent and repeatable termination technology known for use in small cables can be applied to create a termination for a much larger cable.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

FIG. 1 is a perspective view, showing a prior art cable made of seven strands.

FIG. 2 is a perspective view, showing an individual strand made of thirty-seven synthetic filaments encased within a jacket.

FIG. 3 is a perspective view, showing a prior art cable made of seven strand groups, each of which strand groups has seven strands.

FIG. 4 is a perspective view, showing a coil of cable.

FIG. 5 is a perspective view, showing the use of a helical wrap to stabilize the filament alignment of a synthetic cable.

74	core portion	76	outer ring
78	connector	80	loading eye
82	alternate connector	84	alternate connector
86	strand guide channel	88	distal guide
90	strand guide	92	curved passage
94	cylindrical pocket	96	slot
98	seam		

DETAILED DESCRIPTION OF ~~EMBODIMENTS~~ THE INVENTION

Ensuring appropriate filament alignment during the cutting and termination steps is a significant part of the inventive process. Returning to FIG. 4, the reader will recall that most synthetic cables are stored in a coil 22 wound on a spool. A portion of the cable must be straightened before it can be cut and terminated.

The individual strands and filaments of the synthetic cable have so little stiffness and filament-to-filament friction that it is difficult to prevent the filaments slipping longitudinally as the cable is manipulated. As stated previously, longitudinal slipping of some filaments results in unequal filament length in the finished cable. Some cables have an encapsulating jacket which tends to provide an inward compressive force. The jacket may be an entirely separate material – such as an extruded thermoplastic – or it may be a braid or winding of additional filaments of the same type used in the balance of the cable. The inward compressive force tends to increase filament-to-filament friction and thereby prevent longitudinal slipping.

Other cables have no compressive jacket. In those instances, it is important to provide a feature which creates the inward compressive force (and even some jacketed cables need an additional inward compressive force). This feature is generally referred to as a "binder." FIG. 5 shows a cable 10 with the addition of a binder. Helical wrap 24 has been wound around the cable's exterior to provide the desired inward compressive force. The cable may then be cut through this helical wrap. The helical wrap is left in place after the cut is made to maintain the desired filament alignment until the time the termination is attached to the end of the cable. It may remain in place beyond that time or in some instances may be removed. The reader should note that the helical wrap may or may not be applied to the entire length of the cable.

CLAIMS

~~Having described my invention, I claim:~~

~~Claim~~ 1. A method for terminating a cable, said cable including a plurality of strands made of synthetic filaments, at least a portion of which are non-parallel strands, comprising:

a. straightening a portion of said cable to form a straight portion;

b. applying a binder to said cable proximate said straight portion;

c. cutting each of said plurality of strands of said cable within said straight portion so that each of said plurality of strands has a cut end;

d. securing a plurality of terminations to said cut ends; and

e. gathering each of said terminations into a collector.

~~Claim~~ 2. A method for terminating a cable as recited in claim 1, further comprising installing a retained binder on said cable so that a length of said cable remains between said retained binder and said cut ends of said strands.

~~Claim~~ 3. A method for terminating a cable as recited in claim 1, wherein:

a. one of said terminations on said cut ends of said strands is a cast sphere; and

b. said collector includes a spherical socket sized to receive said sphere.

~~Claim~~ 4. A method for terminating a cable as recited in claim 1, wherein said collector includes multiple portions which are configured to be fastened together into a unified whole.

~~Claim~~ 5. A method for terminating a cable as recited in claim 1, wherein:

a. said cable includes inner strands and outer strands;

b. said collector includes a center block and an outer ring;

c. said terminations on said inner strands are connected to said center block; and

d. said terminations on said outer strands are connected to said outer ring.

~~Claim~~ 6. A method for terminating a cable as recited in claim 5, wherein said outer ring is connected to said center block by a rotation limiting connection.

~~Claim~~ 7. A method for terminating a cable as recited in claim 5, wherein said connection between said terminations on said outer strands and said outer ring is length-adjustable so that the tension in each of said outer strands can be adjusted.

~~Claim~~ 8. A method for terminating a cable, said cable including a plurality of strands made of synthetic filaments, at least a portion of which are non-parallel strands, comprising:

a. drawing a length of cable straight;

b. applying a first binder and a second binder to said straight length of cable;

c. cutting each of said plurality of strands of said cable within said straight portion so that each of said plurality of strands has a cut end;

d. applying a plurality of ~~termination~~ terminations to said cut ends; and

e. gathering each of said terminations into a collector whereby tensile loads carried by each of said plurality of strands are transferred to said collector.

~~Claim~~ 9. A method for terminating a cable as recited in claim 8, further comprising installing a retained binder on said cable so that a length of said cable remains between said retained binder and said cut ends of said strands.

~~Claim~~ 10. A method for terminating a cable as recited in claim 8, wherein:

a. one of said terminations on said cut ends of said strands is a cast sphere; and

b. said collector includes a spherical socket sized to receive said sphere.

~~Claim~~ 11. A method for terminating a cable as recited in claim 8, wherein said collector includes multiple portions which are configured to be fastened together into a unified whole.

~~Claim~~ 12. A method for terminating a cable as recited in claim 8, wherein:

a. said cable includes inner strands and outer strands;

b. said collector includes a center block and an outer ring;

c. said terminations on said inner strands are connected to said center block; and

d. said terminations on said outer strands are connected to said outer ring.

~~Claim~~ 13. A method for terminating a cable as recited in claim 12, wherein said outer ring is connected to said center block by a rotation limiting connection.

~~Claim~~ 14. A method for terminating a cable as recited in claim 12, wherein said connection between said terminations on said outer strands and said outer ring is length-adjustable so that the tension in each of said outer strands can be adjusted.

~~Claim~~ 15. A method for terminating a cable, said cable including a plurality of strands made of synthetic filaments, at least a portion of which are non-parallel strands, comprising:

a. straightening a portion of said cable to form a straight portion;

b. cutting each of said plurality of strands of said cable within said straight portion so that each of said plurality of strands has a cut end;

c. securing each of said cut ends within ~~a termination~~ terminations; and

d. gathering each of said terminations into a collector, said collector including a central area and a peripheral area, with a first portion of said terminations being attached to said central area and a second portion of said terminations being attached to said peripheral area.

~~Claim~~ 16. A method for terminating a cable as recited in claim 15, further comprising installing a retained binder on said cable so that a length of said cable remains between said retained binder and said cut ends of said strands.

~~Claim~~ 17. A method for terminating a cable as recited in claim 15, wherein:

a. one of said terminations on said cut ends of said strands is a cast sphere; and

b. said collector includes a spherical socket sized to receive said sphere.

~~Claim~~ 18. A method for terminating a cable as recited in claim 15, wherein said collector includes multiple portions which are configured to be fastened together into a unified whole.

~~Claim~~ 19. A method for terminating a cable as recited in claim 15, wherein said peripheral area of said collector is connected to said central area by a rotation limiting connection.

~~Claim~~ 20. A method for terminating a cable as recited in claim 15, wherein said connection between said second portion of said terminations and said peripheral area is length-adjustable so that the tension in each of said outer strands can be adjusted.