

- [54] **PRE-TIED NAIL KNOT**
- [75] Inventors: **Leon L. Martuch; Donald L. Schmidt**, both of Midland, Mich.
- [73] Assignee: **Scientific Anglers, Inc.**, Midland, Mich.
- [22] Filed: **July 16, 1971**
- [21] Appl. No.: **163,357**
- [52] U.S. Cl. **289/1.2**
- [51] Int. Cl. **D04g 5/00**
- [58] Field of Search **289/17, 1.2**

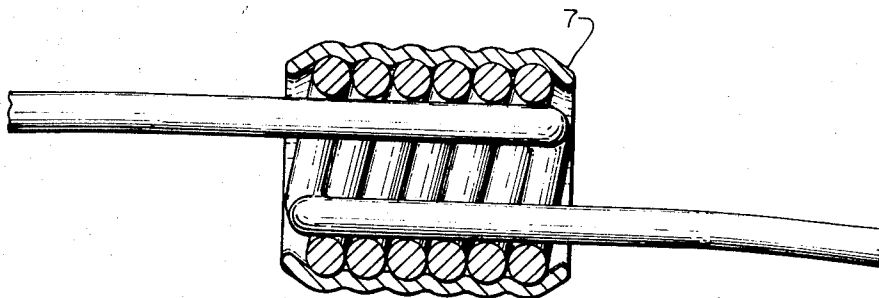
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Primary Examiner—Louis K. Rimrodt
Attorney—Gordon W. Hueschen, Talivaldis Cepuritis and David D. Centala

[57] **ABSTRACT**

A pre-tied, untightened, fisherman's nail knot supported by (1) an external coating around and between the surface of the loops of the knot; (2) an external support consisting of a tubing shrunk so as to contact the outer surfaces of the loops of the knot; (3) an internal support consisting of a rigid tube or bar within the loops of the knot; (4) an internal support consisting of a flexible tube within the loops of the knot; or (5) a combination of external and internal support.

12 Claims, 12 Drawing Figures



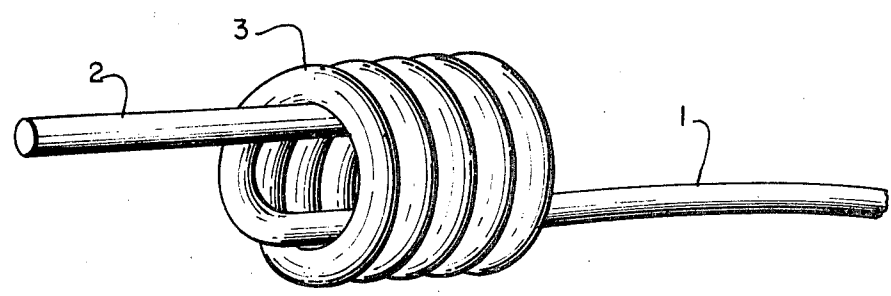


FIG. 1

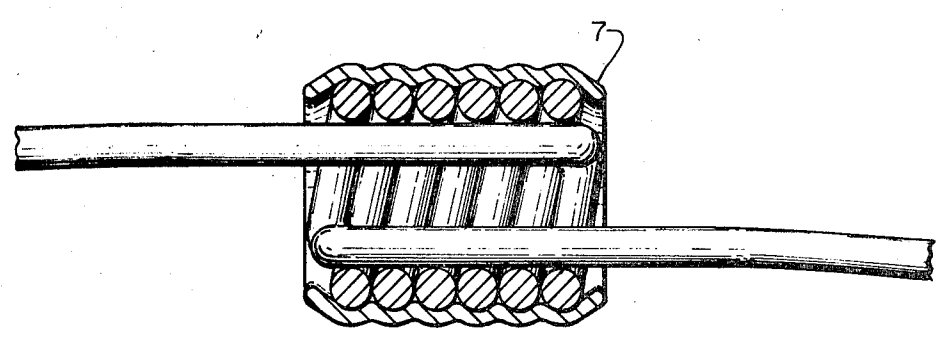


FIG. 2

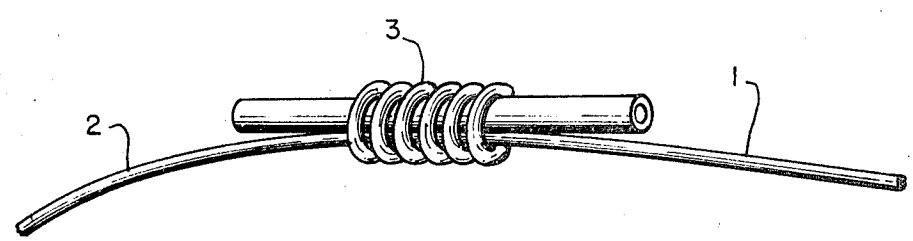


FIG. 3

INVENTORS
DONALD L. SCHMIDT
LEON L. MARTUCH

BY

ATTORNEY

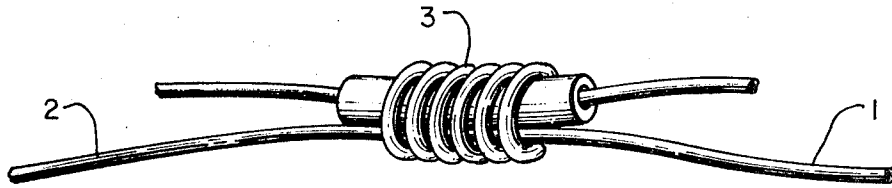


FIG. 4

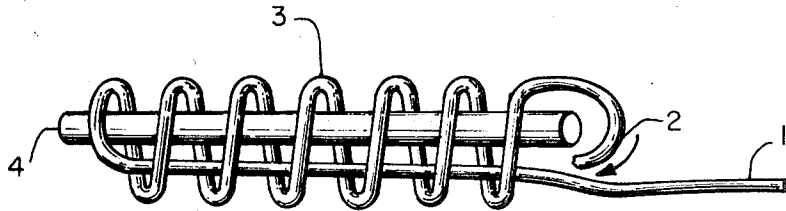


FIG. 5

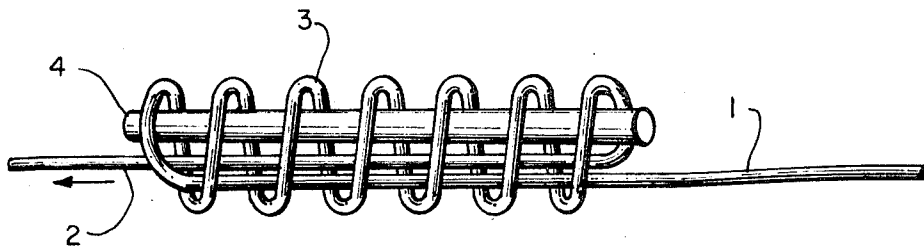


FIG. 6

INVENTORS
DONALD L. SCHMIDT
LEON L. MARTUCH

BY

ATTORNEY

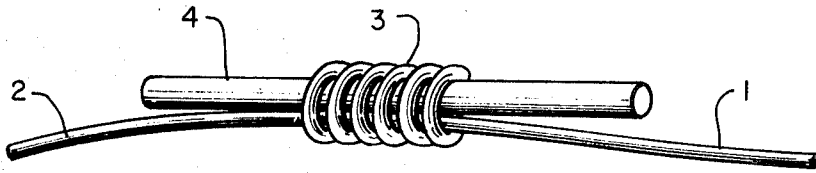


FIG. 7

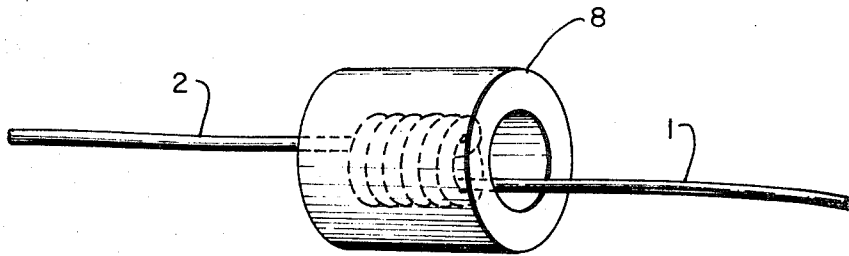


FIG. 8

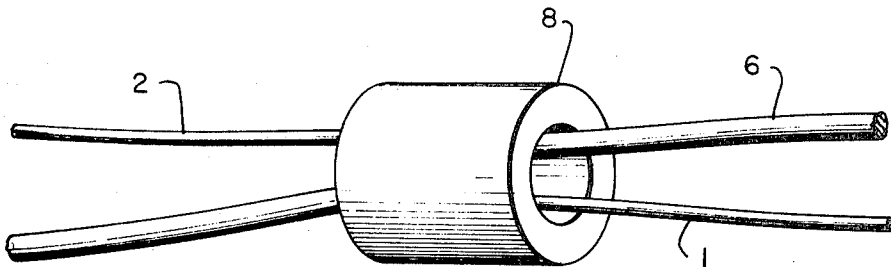


FIG. 9

INVENTORS
DONALD L. SCHMIDT
LEON L. MARTUCH

BY

Frank W. Bevilacqua

ATTORNEY

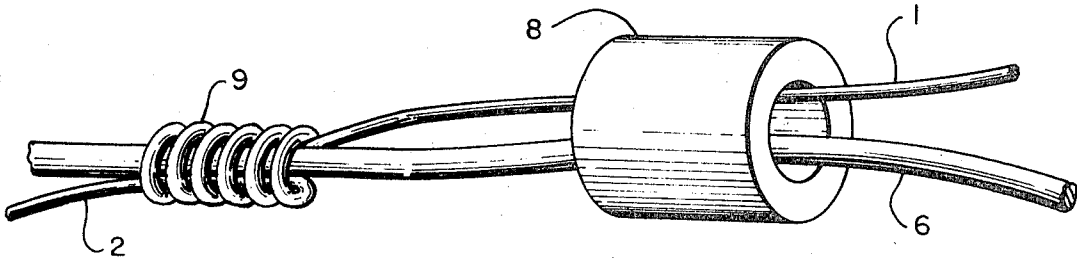


FIG. 10

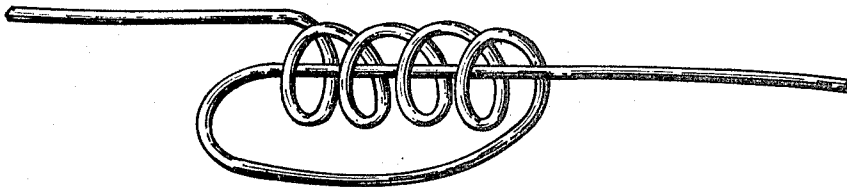


FIG. 11

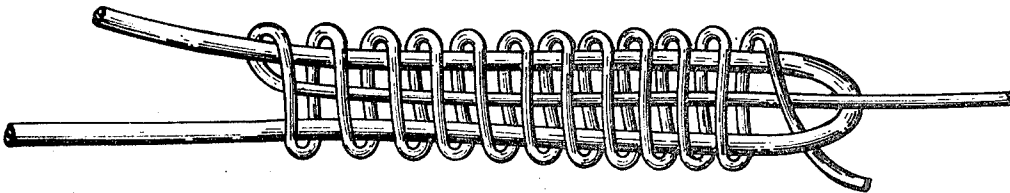


FIG. 12

INVENTORS
DONALD L. SCHMIDT
LEON L. MARTUCH

BY

David B. Centola

ATTORNEY

PRE-TIED NAIL KNOT

BACKGROUND OF THE INVENTION

This invention relates to a stable, pre-tied, untightened fisherman's nail knot.

In assembling tackle for fly fishing, it is necessary to attach a leader to the end of the line. A fisherman should therefore know how to obtain a secure connection between the line and the leader.

One of the strongest and best methods known for attaching a leader to a fly line utilizes a knot, commonly known as a nail knot. The knot is so named because it was first tied with the use of a nail.

The configuration of the knot is such that absent some means of support, the knot may not be left in a tied but untightened condition. An unsupported, untightened nail knot is unstable and will collapse. This previously required that the knot be tied upon the end of the line and immediately tightened into place each time that it was used.

The nail knot is particularly difficult to tie. Few fishermen possess the skills required to consistently produce a satisfactory nail knot. It is now possible to produce a stable, pre-tied, untightened nail knot, which retains its configuration and can easily be used by both the expert and the inexperienced fisherman without the trouble of individual preparation of the knot as needed.

SUMMARY OF INVENTION

The principal object of this invention is to provide a stable pre-tied, untightened nail knot. More specific objects and advantages are apparent from the following detailed description which is intended to disclose and illustrate but not limit the invention.

The present invention is based upon the discovery of a means by which a nail knot can be made to retain its configuration, i.e., the configuration of loops and their relationship to each other. Heretofore, an unsupported knot would collapse. The configuration of "upright" or free standing loops could not be maintained.

It has now been found that applying a surface coating or a shrink tubing to the loops and between the loops in the surface area causes the loops to retain their "upright" configuration and their relationship to each other and to the straight ends of the knot. Other mechanical devices, such as clamps, can also be used to retain the loops.

The configuration of the knot can also be retained by an internal support, more specifically a tube or rod, either rigid or flexible, which extends through the center of the knot, thus preventing the loops from collapsing.

Utilizing this stable pre-tied, untightened nail knot, it is no longer necessary for a fisherman to tie the knot each time it is required. Much time is saved by utilizing the pre-tied knot and a consistent knot and connection is obtained each time.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a drawing, on an enlarged scale, showing the configuration of an untightened fisherman's nail knot.

FIG. 2 is a sectional drawing, on an enlarged scale, showing a free standing fisherman's nail knot supported by a surface coating.

FIG. 3 is a drawing, on an enlarged scale, showing a nail knot having an internal support consisting of a hollow tube.

FIG. 4 is a drawing, on an enlarged scale, showing a nail knot having an internal support consisting of a flexible tube and the end of a fishing line inserted within the flexible tube.

FIGS. 5, 6 and 7 show the steps required in tying a nail knot.

FIG. 8 is a drawing, on an enlarged scale, showing a nail knot having an external support consisting of a thick external coating. FIGS. 9 and 10 are drawings, on an enlarged scale, showing the tightening on a fishing line of a pre-tied nail knot, having an external support consisting of a thick external coating.

FIG. 11 is a drawing, on an enlarged scale, showing the configuration of a variation of the nail knot known as the external nail knot.

FIG. 12 is a drawing, on an enlarged scale, showing another knot which consists of a series of loops and which lacking support may not be left in a tied but untightened condition.

Referring to FIGS. 5, 6 and 7, an outline of the production of a nail knot is depicted. Elements 1 and 2 refer to the two ends of the line making up the knot. This element can be the leader or a monofilament. Element 4 is the internal support which can be rigid or flexible, solid or hollow. In tying a nail knot, the leader is parallel to the support and extending past the support on one end about 6 inches. The short end of the leader is folded back towards the long end, and wound around the long end and the support at least 2 times and preferably 6 to 10 times, forming loops 3. What remains of the short end is then passed through the loops between the loops and the support.

FIGS. 5, 6 and 7 show the tying of a knot on an internal support. The same procedure is utilized in tying a knot for external support. For an externally supported knot, the internal support upon which the knot is tied is preferably a solid rod having a V-shaped groove along its length through which the end of the knot material may be passed underneath the loops. After the knot is formed and the external support is applied, the internal support may be removed.

In FIG. 2, a free standing nail knot having an external support consisting of a surface coating 7 is shown in a sectional view. The external support is mainly limited to the external surface of the loops and the area immediately adjacent to the inner surface of the loops. The presence or amount of support on the area immediately adjacent to the inner surface of the loops is dependent upon the type of external support used. When a surface coating is utilized, there will be more coating on the "inner surface" than when a shrink tube is utilized. A shrink tube external support is mainly restricted to the outer surface of the loops and the area between the loops.

FIG. 3 shows a pre-tied nail knot on an internal support member 4. The support member shown is a short piece of tubing.

FIG. 4 shows a pre-tied nail knot on a flexible internal support 5. In this drawing, a fly line 6 is inserted within the flexible internal support. The knot will be tightened without removing the flexible support. In tightening the knot, the flexible support is deformed and held tightly against the line by the knot.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Although a major and important use of the nail knot

is associated with the sport fishing industry, it is not limited to this area, but may be utilized just as efficiently in other areas. Having utility in other areas, besides joining of fishing elements, the size (diameter) of the filament making up the knot and therefore the bulkiness of the knot will vary according to its area of use. The discussion will be directed mainly to its use in the sport fishing industry; however, its applicability to the other areas will be apparent to those skilled in the art based on this discussion.

The pre-tied nail knot of the present invention is usually constructed using a monofilament of nylon. However, a multiplicity of filaments which are braided, twisted or laid side by side may also be used. The filaments may consist of dacron, nylon, silk or any other suitable filamentous material. The material may also be coated, as normally found in fly line material.

The knot may be a separate item or at the end of another element, such as a leader. When the knot is a separate item, both portions to be joined are inserted within the knot and the knot tightened.

It is preferable that the knot be an integral part of one of the elements being joined. In this embodiment, the knot is formed at one end of the material, element 1, with the longest portion, element 2, being the remainder of the material.

For the sake of brevity, the following terms will be used hereinafter in the specification and the claims:

free standing knot — a pre-tied, non-tightened nail knot having an external support;

surface coating — the solid separable coating on a nail knot which is limited to the exterior surfaces of the loop, and the area between the loops (this also includes a thick coating as shown in FIGS. 8, 9 and 10); in coating the nail knot some coating may appear on the internal surface of the loop, i.e., the area immediately adjacent to the inner surface of the loops; this embodiment is also included in the definition of surface coating;

externally supported — a pre-tied nail knot whose support is mainly in the area of the loops;

external support — any material or device applied to the exterior of a pre-tied nail knot that holds the loops in an upright configuration and retains their relationship to each other and to the straight ends of the knot; this refers mainly to a surface coating or shrink tube;

shrink tube — tubing material, preferably of a synthetic thermoplastic material, which when treated takes the configuration of the object it surrounds and thus gives support to said object;

filamentous line — refers to either a monofilament or multifilament line; a monofilament line is preferred;

internally supported — a pre-tied nail knot having an internal support which may be a tube or a rod;

nail knot — unless otherwise indicated, refers to a pre-tied, non-tightened nail knot or the variation as shown in FIG. 11;

non-tightened — means an incompletely tightened knot (this may also be referred to as an untightened knot).

In a free standing knot, the entire support for the knot is derived from the surface coating. This surface coating should be sufficiently rigid to support the loops in relationship to each other and to retain the loop configuration. The surface coating should, at the same

time, be sufficiently fragile to crumble, break apart or separate from the loops when the knot is tightened. In this manner, the knot retains its configuration during normal handling and separates from the support as the knot is tightened.

Many substances may be utilized as the surface coating for an external support. These include, but are not limited to, waxes (both natural and synthetic) such as spermaceti, beeswax, carnauba, paraffin, candelilla, ceresin, stearic acid, the medium molecular weight polyethylenes, polyethylene glycols and polyoxyethylene esters and the like; inorganic plastics and cements, such as gypsum cement — plaster of paris and the like, dental cements — zinc phosphate cements (an example of which is MODERN TENACIN-L. D. Caulk Co.; this is a certified cement - ADA specification No. 8, First Revision) and silicate cement (an example is S. S. White Filling Porcelain Improved; New Filling Porcelain - S. S. White Dental Mfg. Co.; this is a certified cement - ADA Specification No. 9, First Revision) and the like; "plastic," gamma or amorphous sulphur and the like; natural resins such as Dammar, colophony, gum rosin, pine rosin, amber and the like; low melting metals, such as Wood's metal, Rose's metal and the like; thermoplastic resins, such as polystyrene, polyvinyl chloride, polyvinyl acetate and copolymers, polyvinylidene chloride, polymethyl methacrylate, cellulose nitrate, cellulose acetate, cellulose acetate butyrate, acrylonitrile polymers and the like; and thermosetting resins, such as phenol-formaldehyde, urea-formaldehyde, epoxy resins and the like. The preferred surface coating is a thermoplastic resin, further examples of which are well known in the art.

When a shrink tube is the means for the external support, it is preferred to use a synthetic thermoplastic material such as listed above for surface coating. Other materials may also be utilized and these are known to those skilled in the art.

The thickness of a surface coating is dependent upon the material selected for the coating and the degree of support desired. This thickness can easily be determined without undue experimentation.

In the preparation of a free standing knot, the material from which the knot will be constructed is wound on an internal support, coated with the surface coating, and after curing or cooling of the coating material the internal support is removed. The internal support may be any suitable material. It is preferably "prepared" prior to the winding of the knot and coating to insure that the coating would not adhere to the internal support. These procedures are well known to those skilled in the plastic moulding art and can be utilized in the present art. A means of "preparing" the internal support is the application of a teflon coating or silicon lubricant.

Internal support forms which require little or no prior preparation, such as aluminum, certain synthetic resinous material and the like can be utilized without any adherence of the coating to the support. These internal support forms are utilized only to prepare the knot and do not remain with the knot. The same form, however, can be used as the internal support, which is another embodiment of this invention.

The thickness of the surface coating varies, as discussed previously, with the coating selected and the degree of support desired. A thin surface coating is shown in FIG. 2 where element 7 represented the surface

coating. When this knot is tightened, the coating crumbles and flakes off or is peeled off. It is a convenient method for supporting a nail knot, especially if the knot does not undergo excessive handling. It is also especially convenient if the diameter of the knot is small.

For knots constructed of large or stiff materials or where a greater degree of external support is desired, the thickness of the coating may be increased, as illustrated in FIGS. 8, 9 and 10. In this type of support, the knot material is on the internal surface of the support. When the knot is tightened, the line pulls free from the coating support and the coating, which normally does not crumble, is slipped off. In a similar manner, the line pulls free from an external support consisting of shrink tubing as the knot is tightened. The tubing is then slipped off or is slit for removal.

In FIGS. 8, 9 and 10, elements 1 and 2 are the two ends of the knot material, element 6 is the line upon which the knot is to be tightened, element 8 is the "thickened" coating and element 9 is the tightened nail knot.

There are a variety of methods of supporting a pretied nail knot. The knot may be supported by an internal support, an external support or a combination of an internal and external support.

The method of removal of external supports after the knot is tightened in place has been discussed above. In the case of rigid internal supports, either alone or in combination with an external support, the internal support must be removed and the end of the fly fishing line inserted in its place before the knot may be tightened. If the knot also has an external support, it will retain its shape while the fly line is inserted. However, if the knot has no external support, it must be carefully held between the fingers while the internal support is withdrawn and the fly fishing line or material around which the knot will be tightened is inserted within the loops of the knot. A hollow, rigid support allows insertion of the line prior to removal of the support.

In application, the knot provided with an internal support is held or supported exteriorly with the fingers of the person applying the knot, while the internal support is withdrawn. It is important that the shape and relative position of the coils be maintained after the internal support is withdrawn. The fly fishing line, or material around which the knot will be tightened, is inserted into the center of the knot, taking the place of the internal support. The knot is then tightened.

With flexible internal supports, the knot is tightened over the internal support and without withdrawing it from the coils of the knot. If an external support is also present, it is removed by one of the methods discussed above.

Since the rigid, internal supports do not remain with the knot when it is tightened on a fly fishing line or such, there are few limitations as to an appropriate material for the support. It should be relatively light and relatively non-deformable. It should also be of a material which permits the knot to be slid off the support especially if the knot is coated.

A flexible internal support should have sufficient strength to support the knot while retaining sufficient flexibility to allow itself to be crushed between the inner surfaces of the coils of the knot and the line or such upon which the knot is being tightened.

Suitable materials for use as internal support, whether solid or tubular, include, but are not limited to,

polyethylenes, polypropylenes, polyvinyl chloride, polystyrene-acrylonitrile, aluminum, brass, stainless steel and the like. The flexible internal supports are preferably polymers such as those listed above. The rigid supports may be either the polymers listed above, the metals or their equivalents. Other suitable materials which have equivalent properties to those previously described can also be used in addition to those enumerated above. Many suitable materials for both rigid and flexible internal support are commercially available.

In the sport fishing industry, the size of the knot most often utilized is relatively small. The knot is often used to tie a leader on to a fly fishing line, whose diameter is in the range of about 0.250 to 0.060 inches. In using an internal support, the outside diameter of the support must be relatively small in order to minimize the diameter of the knot. The support, however, must still have a diameter larger than that of the fly fishing line which will be inserted. In these instances, the wall thickness of a hollow internal support would be small. A rigid hollow internal support must therefore be structurally sufficient to withstand normal handling, without breaking apart or deforming, even with relatively thin walls.

The knot is prepared on the internal support as previously described. If the knot is to be surface coated, the coating is then applied and cured or cooled, as necessary.

In those instances where a surface coating is to be applied, the coating material and internal support material should be selected which are non-compatible, i.e., in which the coating will not combine with or strongly adhere to the support. If a coating material with a strong adherence to the support is used, it will not be possible to slide the knot off the support when required.

A slight adherence of the coating to the support is not detrimental and may be beneficial. This adherence will prevent any movement of the loops and of the support, in relation to each other, and thus prevents the two becoming separate under shipping conditions. The adherence, however, would not be sufficiently strong to prevent removal of the knot from the support when desired.

The conditions of curing the coating should also be controlled to prevent a weakening or deforming of the internal support or of the loops of the knot. The selection of the proper materials and operating conditions are known to those skilled in this art.

The substitution of a flexible internal support for the rigid support is another embodiment of the present invention.

In the preparation of a knot on a flexible support, it may be necessary to have a support within the flexible tube while the knot is being produced. This will prevent the collapsing of the tube in the event the knot is inadvertently tightened excessively during its production.

Although the discussion has been limited to the use of a nail knot in the sport fishing industry, it is once more emphasized that the nail knot is a good secure knot for general use and may therefore be used whenever a secure connection between two lines is desired.

In those instances where the knot is part of one of the materials being secured, the material must be flexible. Usable flexible material includes not only the synthetic and natural fibers previously discussed, but also thin wire such as copper and aluminum wire.

If the knot is not part of the material being secured, only the knot material used need be flexible and the two materials being connected may be rigid — such as rods.

It is also apparent that although this application is directed to a nail knot which is internally or externally supported, the same procedure can be utilized for other knots which cannot retain their configuration unless externally or internally supported. Such a knot is illustrated by FIG. 12. This knot is useful in the sport fishing industry for securing a fly line to a backing material. In this instance, the backing material would normally comprise the knot material.

While the illustrative subordinates of the invention have been described hereinbefore particularly, it will be understood that various other modifications will be apparent to and can readily be made by those skilled in the art without departing from the scope and spirit of the invention. Accordingly, it is not intended that the scope of the claims appended hereto be limited to the examples and description set forth herein, but rather the claims be construed as encompassing all the features of patentable novelty which reside in the present invention including all features which would be treated as equivalents thereof by those skilled in the art to which the invention pertains.

What is claimed is:

1. A pre-tied, untightened nail knot comprising filamentous line, having at least two loops, at least one end of said line passing through the loops, the two ends of said knot emerging from the knot in opposite directions, and a support, said support being selected from an external support, an internal support and a combina-

tion of external and internal support, said external support being selected from the group consisting of a solid separable coating around and between the loops of said knot and a shrink tubing, said internal support being a rigid or flexible support within the loops of said knot.

2. A pre-tied, untightened nail knot according to claim 1, wherein the two ends of said line passes through the loops in opposite directions.

3. A pre-tied, untightened nail knot according to claim 2, wherein the support is an external support.

4. A pre-tied, untightened nail knot according to claim 3, wherein said external support is a coating.

5. A pre-tied, untightened nail knot according to claim 4, wherein said coating is a thermoplastic resin.

6. A pre-tied, untightened nail knot according to claim 3, wherein said external support is a shrink tube.

7. A pre-tied, untightened nail knot according to claim 2, wherein the support is an internal support.

8. A pre-tied, untightened nail knot according to claim 7, wherein the internal support is a flexible tube.

9. A pre-tied, untightened nail knot according to claim 7, wherein the internal support is a rigid tube.

10. A pre-tied, untightened nail knot according to claim 7, wherein the internal support is a solid rigid support.

11. A pre-tied, untightened nail knot according to claim 1, wherein the support is a combination of an internal and external support.

12. A pre-tied, untightened nail knot according to claim 1, wherein said knot is at the end of and integral with a fishing leader.

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