United States Patent [19]

Rygiol

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[54] **CENTER UNWINDING SPOOL**

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[52] **U.S. Cl.** **242/129,** 242/137.1

[51] **Int. Cl.** **B65h 49/00**

[58] **Field of Search** 242/128, 129, 129.6, 129.8, 242/130, 137.1

[56] **References Cited**

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Primary Examiner—Leonard D. Christian

[57] **ABSTRACT**

A center unwinding spool intended to be utilized with wire, but being capable of being utilized with other materials, is constructed so as to have an internal annular groove containing a cylindrical winding located about a centrally located hub. A space is provided interiorly with the winding and a guide means for guiding the strand of material from the interior of the winding is used in such a manner that at least a part of the guide means is in communication with the annular space. This guide means may be an interior wall within the spool in communication with the exterior of the spool by an annular opening. This guide means may be a tube extending into the annular space and leading to the exterior of the spool.

2 Claims, 10 Drawing Figures

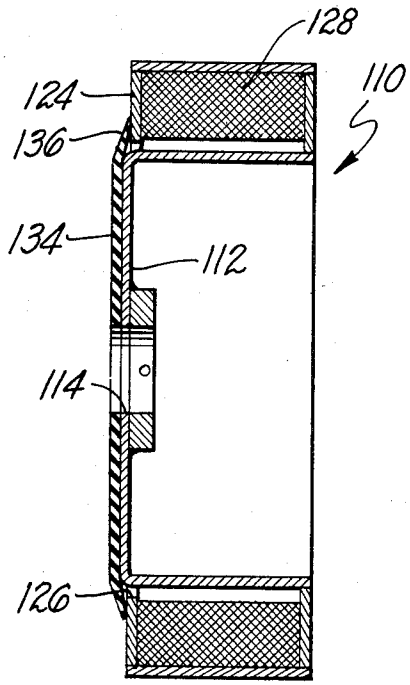


FIG. 1.

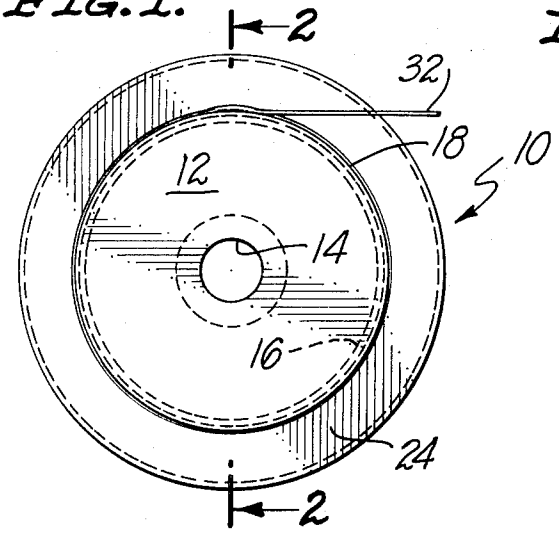


FIG. 2.

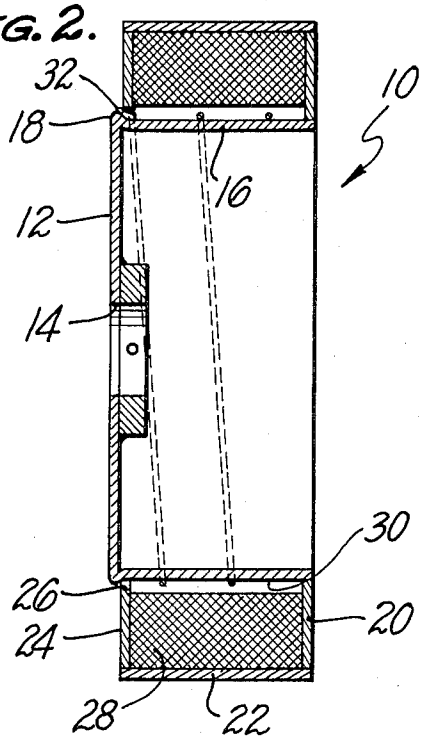


FIG. 3.

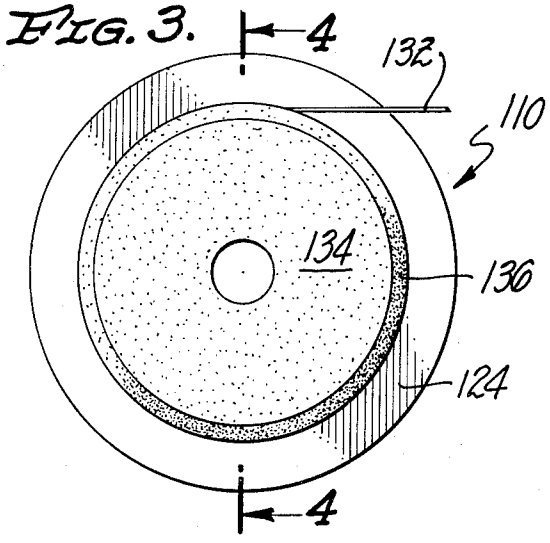


FIG. 4.

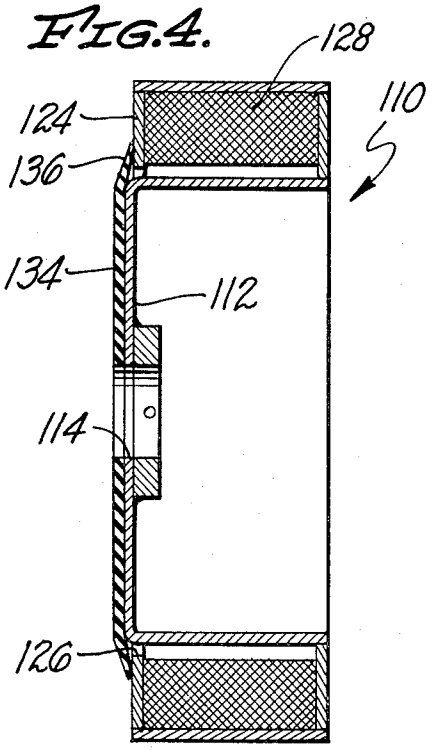


FIG. 5.

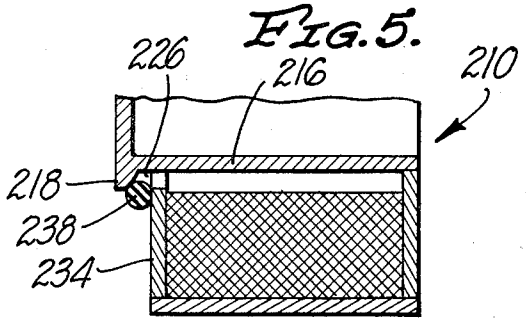


FIG. 6.

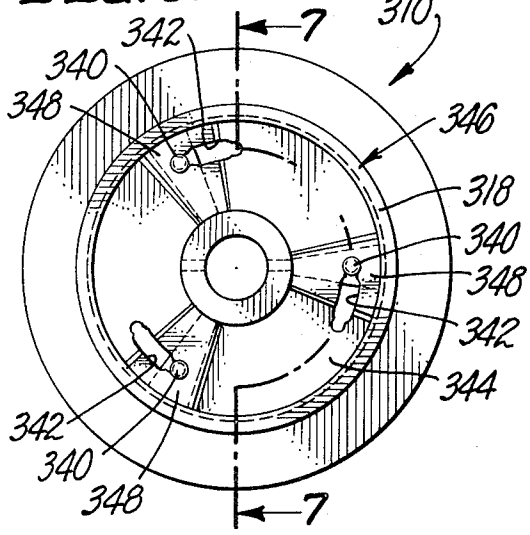


FIG. 7.

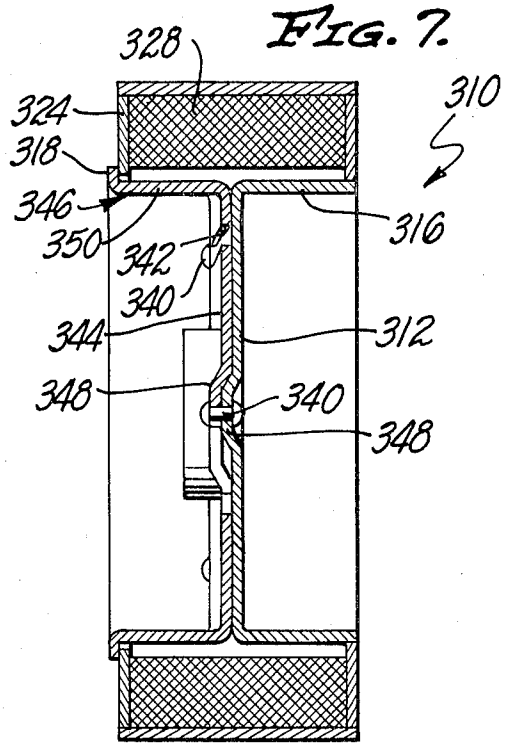


FIG. 8.

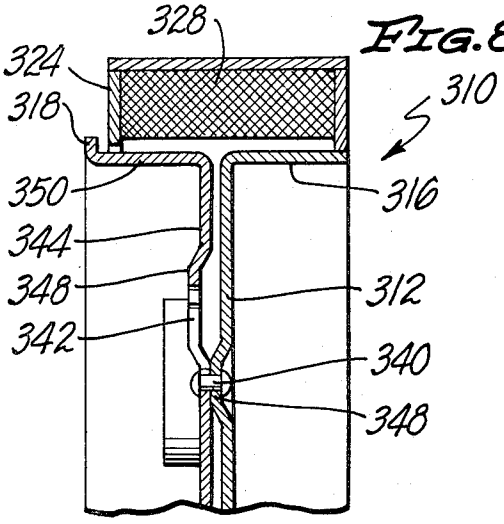


FIG. 10.

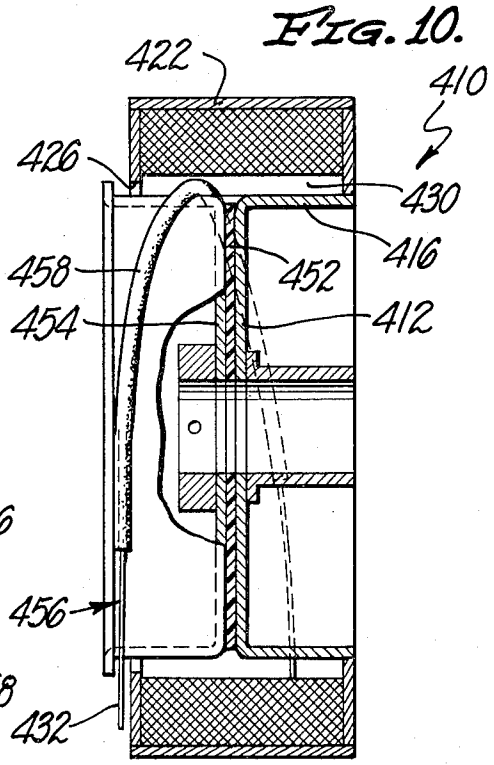
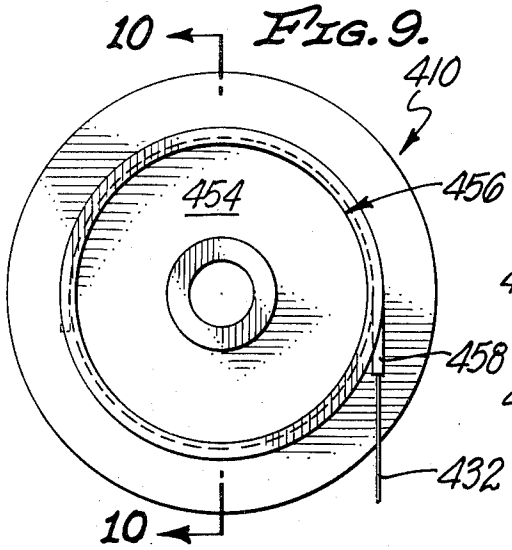


FIG. 9.



CENTER UNWINDING SPOOL

BACKGROUND OF THE INVENTION:

For reasons which are unimportant to an understanding of the present invention set forth in this specification, wire is conventionally supplied to a user upon spools. Such spools normally include a hub and a periphery or peripheral portion serving to support a cylindrical winding of a length or strand of wire. During the use of such a spool of wire a user will withdrawal wire from it as the wire is needed or used.

Depending upon the construction of such a spool wire may be withdrawn from such a spool in any of a variety of different ways. In probably the most conventional wire spools, wire is normally pulled off of the periphery of the spool in a tangental manner as the spool is either rotated or allowed to rotate. Occasionally, wire will be removed from a spool in which the winding is exposed to the exterior of the spool by being pulled off of the end of the spool.

Some spools are constructed of a more or less cup-like or basket-like shape and serve to hold a winding of wire so that such a winding extends completely around the interior of the spool. In structures of this type a length or strand of wire is removed from the winding outwardly through an opening in the end of the spool, while either the spool is held still or is rotated.

It is considered that "packages" of wire on spools as indicated are all somewhat disadvantageous from a users standpoint and that the principal disadvantages of these conventional spools of wire are related to the inherent natural properties of wire, and more specifically to the spring-like characteristics of most wires. Wires of virtually all materials have spring-back characteristics and must be maintained under tension as they are removed from a spool by appropriate auxiliary apparatus such as brakes or the like. This is in order to avoid the possibility of the spring-back characteristics of the wire causing tangling of the wire in the event of the release of the tension on the wire or a lessening of the tension on the wire.

Further, existing spools of wire designed for certain types of wire discharge and removal such as spools having a winding of wire located internally or spools having the winding located so that the wire is intended to be removed over an end of the spool have the disadvantages that during the wire removal there is danger of the wire becoming twisted. This can be disadvantageous by making the wire removed from a spool react more or less like a torsion spring and/or by introducing into the wire a permanent deformation or twist. Although in some applications conseqeunces of this type may not be considered detrimental in others they can lead to complications.

BRIEF SUMMARY OF THE INVENTION:

From the preceding discussion it wil be apparent that there exists a need for new and improved "packages" of windings of wire upon spools. A broad objective of the present invention is to meet this need. It is not to be assumed from this that the invention is only applicable to wire located upon spools. The constructions set forth in this specification can be utilized with lengths or strands of other different materials such as polymer compositions. Thus, the structures explained herein can be utilized with windings of so-called monofilament polymer strands as well as with windings of various different metal wires.

Another objective of the present invention is to provide spools of wire or the like which may be easily and conveniently created at a comparatively nominal cost. A further objective of the invention is to provide spools of wire or other materials which may be easily handled and used. More important, however, an objective of the present invention is to provide spools containing cylindrical windings as herein described which are particularly desirable in that they control a strand of material such as a length of wire as it is discharged from a spool or removed from a spool so as to avoid detrimental consequences such as are encountered with prior art spools of wire.

In accordance with this invention these and various related objectives of the invention as will appear from a detailed consideration of this entire specification are achieved by changing the construction of a conventional spool having a hub, a periphery and a cylindrical winding of a strand or length of material so as to include the improvement of an internal annular groove located within the periphery of the spool so as to extend around the axis of the hub and so as to open inwardly towards the axis of the hub.

Within a structure of this invention the cylindrical winding is located within this groove so as to extend around the axis of the hub and the spool is formed so as to include an annular space extending around the axis of the hub which is in communication with or exposed to the interior of the winding. In a spool of this invention a guide means is in communication with this space is used for guiding a strand or length of material from the interior of the winding so that the strand may pass outwardly of the spool.

BRIEF DESCRIPTION OF THE DRAWINGS:

Further details of this invention will be apparent from a consideration of the remainder of this specification in conjunction with the accompanying drawings in which:

FIG. **1** is an end elevational view of a presently preferred embodiment or form of a center unwinding spool in accordance with this invention;

FIG. **2** is a cross-sectional view taken at line **2—2** of FIG. **1**;

FIG. **3** is an end elevational view of a modified embodiment or form of a center unwinding spool in accordance with this invention;

FIG. **4** is a cross-sectional view taken at line **4—4** of FIG. **3**;

FIG. **5** is a cross-sectional view corresponding to FIGS. **2** and **4** of a further embodiment of a center unwinding spool in accordance with this invention;

FIG. **6** is an end elevational view of a still further embodiment or form of an end unwinding spool in accordance with this invention showing the spool in a manner in which it normally appears during shipment;

FIG. **7** is a cross-sectional view taken at line **7—7** of FIG. **6**;

FIG. **8** is a cross-sectional view corresponding to FIG. **7** showing the spool illustrated in FIGS. **6** and **7** as it normally appears in use;

FIG. **9** is an end elevational view of another modified structure of a center unwinding spool of this invention; and

FIG. 10 is a cross-sectional view taken at line 10—10 of FIG. 9 in which certain parts are shown in elevation.

It is to be realized that none of the spools illustrated is the present invention since the invention itself relates to certain essentially intangible concepts as are set forth in the appended claims forming a part of this disclosure. These concepts can be utilized in other spools than those illustrated through the use or exercise of routine engineering skill or ability on the basis of the disclosure embodied in this specification and in the drawings.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT:

In FIG. 1 of the drawings there is shown a center unwinding spool 10 in accordance with this invention which includes a generally disc-like hub 12 having a centrally located bearing means 14 for use in rotatably mounting the spool 10 in a known manner. The periphery of this hub 12 carries an internal cylindrical or annular wall 16. At the juncture of the hub 12 and the wall 16 a small beveled lip 18 is located in such a manner as to extend generally, outwardly from the hub 12.

The extremity of the wall 16 remote from the hub 12 carries a ring-like disc 20 which in turn carries a cylindrical peripheral wall 22 so that this wall 22 is centrally located about the axis of the hub 12 and the wall 16. This wall 22 in turn carries a ring-like disc 24 which extends in a plane perpendicular to the axis of the hub 12 parallel to the disc 20. A small annular opening 26 separates the disc 24 from the lip 18.

With this structure the two discs 20 and 24 and the wall 22 in effect define an internal annular groove located within the periphery of the spool 10 so as to extend around the axis of the hub 12 inwardly towards this axis. A cylindrical winding 28 of a strand or length of metal wire or similar material is located within this groove so as to be separated from the wall 16 by a comparatively small annular space 30 extending around the axis of the hub 12.

With this structure a strand or length 32 of the material within the winding 28 may be led from the interior of this winding 28 around the hub 12 and the wall 16 outwardly through the opening 26. When the spool 10 is rotatably mounted using the opening 14 and this strand 32 is pulled the tension or pull on the strand 32 will move this strand 32 from the interior of the winding 28. As this occurs coils of the strand 32 will tend to tighten around the wall 16 within the space 30 as to engage this wall 16 and be guided by it so that it will pass outwardly through the opening 26.

Because of this function the wall 16 and the opening 26 may be considered as a guide means for guiding the strand 32 from the interior of the winding 28 so that this strand can pass outwardly from the spool 10. From a consideration of the spool 10 it will be apparent that this spool constitutes a simple, effective, relatively inexpensive, easily handled package. It will not normally be apparent that this spool 10 has a significant advantage in those instances where the tension on the strand 32 is relaxed or broken.

Under those circumstances the portion of the strand 32 engaging the wall 16 will, because of the inherent resiliency or spring-back characteristics of the material employed in the strand, engage the wall 16 so as to grasp it as long as the strand is not completely released. It will thus, act more or less as a friction brake to stop the rotation of the spool 10. This will eliminate the need for an external brake or tension device as used with prior related wire spools. Within the spool 10 the wire "spring-back" will serve to help hold the wire in place.

In FIGS. 3 and 4 of the drawings there is shown a modified spool 110 which is essentially extremely similar to the spool 10. For convenience and in the interest of brevity those parts of the spool 110 which are the same or substantially the same as various parts of the spool 10 are indicated herein and in the drawings by the numerals previously used to designate such parts preceded by the numeral "1" and are not separately described herein.

In the spool 110 a resilient disc 134 is secured to the hub 112 so as to extend over the opening 126. This hub 112 is provided with a bearing 114. This disc may be formed of rubber or similar material, and preferably includes a peripheral lip 136 which bears against the exterior of the disc 124 so as to form a seal with this disc 124 at all times. If desired, the lip 18 can be omitted in the spool 110 since the disc 134 takes over the function of this lip 18 in serving in conjunction with the wall 116 as a guide for a strand 132. The lip 136 deforms as the strand 132 is removed from the spool 110 so as to accommodate this strand 132 in such a manner that essentially the entire winding 128 is isolated or sealed off from ambient conditions at all times. This construction is desired when a greater degree of protection is desired for the winding 128 than it is possible to achieve in the spool 10.

In FIG. 5 of the drawings there is shown another modified spool 210 which is also extremely similar to the spool 10. Again for convenience and in the interest of brevity parts of the spool 210 which are the same or substantially the same as various parts of the spool 10 are indicated herein and in the drawings by the numeral previously used to designate such parts preceded by the numeral "2" and are not separately described herein.

The spool 210 differs from the spool 110 by providing a modified manner of sealing or closing off the opening 226. In this spool 210 a small elastomeric O-ring 238 is positioned under the lip 218 so as to fit against the wall 216 and the disc 224. This O-ring 238 will deform slightly as the strand 232 is passed beneath it next to the disc 224 in the same manner in which the lip 236 bends or gives way to accommodate the strand 232.

Another modified form of sealing is shown in a spool 310 illustrated in FIGS. 6, 7 and 8. This spool 310 is quite similar to the spools 10, 110 and 210 previously described. In order to shorten this specification as much as possible and for convenience of explanation those parts of the spool 310 which are the same or substantially the same as various parts of the spool 10 are indicated herein and in the drawings by the numerals previously used to designate such parts preceded by the numeral "3". Such parts or substantially the same parts are not described separately herein.

In the previously described spools 10, 110 and 210 the walls 16, 116 and 216 are of slightly larger width than the widths of the windings 28, 128 and 228. In the spool 310 the corresponding wall 316 is of approximately half of the width of these windings. This wall

316 is provided with a plurality of upstanding headed rivets 340 which project from it so that the heads on these rivets 340 fit through elongated, centrally enlarged slots 342 in a base 344 of a cover 346. This cover 346 is of a generally cup-like shape and has a peripheral lip 318 corresponding to the lip 18 previously described.

Both the wall 316 and the base 344 of the cover 346 are provided with radially extending corrugations 348 as shown in the drawings. When the spool 310 is in a closed position ready for shipment or the like these corrugations fit within one another as shown in FIG. 7 of the drawings so that the cover 346 is held with the lip 318 positioned against the disc 324 so as to prevent moisture, air or the like from entering the interior of the spool 310.

With this construction the cover 346 can be shifted by moving it so that the rivets 340 move in the slots 342 so as to space the cover 346 in such a manner that the corrugations 348 rest against one another. When this is done the lip 318 is spaced from the wall 316 a short distance in order to define an opening 326 corresponding to the opening 26 previously described. This opening 326 can, of course, be utilized so as to remove wire from the winding 328 as previously indicated. During such utilization the wall 316 and the corresponding peripheral wall 350 on the cover 346 together serve the function of the wall 16 previously described.

In FIGS. 9 and 10 of the drawings there is shown another modified spool 410 of the present invention which also is quite similar to the spool 10 previously described. In the spool 410 those parts which are the same or substantially the same as various parts of the spool 10 are also indicated herein and in the drawings by the numerals previously utilized in connection with such parts preceded by the numeral "4". Further, such corresponding parts are not separately described herein.

In the spool 410 the wall 416 is shortened as the wall 316 in the spool 310. This spool 410 also includes a disc of an anti-friction material such as Teflon 452 located between the hub 412 and the base 454 of a generally cup-shaped cover 456. This cover 456 fits generally within the interior of the winding 428 as shown so that a lip 418 on it corresponding to the lip 18 is spaced from the disc 424 so as to define an opening 426. This cover 456 is secured to and carries a curved tube of an anti-friction material such as a nylon or Teflon which leads from the interior of the space 430 around the interior of the winding 428 and out through the opening 426 so as to be directed away from the spool 410 in a tangential manner.

The spool 410 differs from the spools 10, 110, 210 and 310 in that in it the wall 422 is adapted to be rotated together with the rest of the spool 410 as a unit except the cover 456 and the tube 458 while this cover 456 and this tube 458 are stablized against movement in any conventional manner. With this structure any conventional mechanical means may be used to accomplish this rotation. As it occurs, the strand 432 will be pushed outwardly through the tube 458 so that this strand will be held under compression rather than under tension as it is ejected or moved from the device.

I claim:

1. A rigid spool used to supply a strand of material having a hub, said hub having a bearing means for rotatably mounting said spool, a periphery and a cylindrical winding of a strand of material, in which the improvement comprises:

an internal annular groove located within said periphery of said spool, said groove extending around the axis of said hub and opening inwardly towards the axis of said hub,

said cylindrical winding of said strand of material being located within said groove and extending around the axis of said hub, said winding being spaced from said hub,

guide means for guiding said strand of material from the interior of said winding so that said strand may pass outwardly of said spool, at least part of said guide means being located in communication with said annular space and being spaced inwardly towards the axis of said hub from said winding,

said guide means including an annular wall located so as to extend around the axis of said hub, said wall being exposed to the interior of said annular space and being spaced from said winding towards the axis of said hub,

said guide means also defining an annular opening from said space at an end of said wall, said annular opening extending completely around said axis of said hub,

resilient seal means positioned so as to normally cover and close off said annular groove and said annular opening, said seal means being capable of being temporarily displaced by said strand as said strand passes said guide means so as to permit said strand to be removed from said spool while isolating the interior of said spool from the exterior of said spool,

said strand extending from the interior of said winding around said hub and outwardly and substantially tangentially from said spool past said seal means.

2. A spool as claimed in claim 1 wherein:

said seal means comprises a resilient disc mounted on said hub and extending over and covering said annular opening and having a peripheral lip engaging said periphery.

* * * * *