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(54) **RETRACTABLE TOW ROPE APPARATUS**

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(57) **ABSTRACT**

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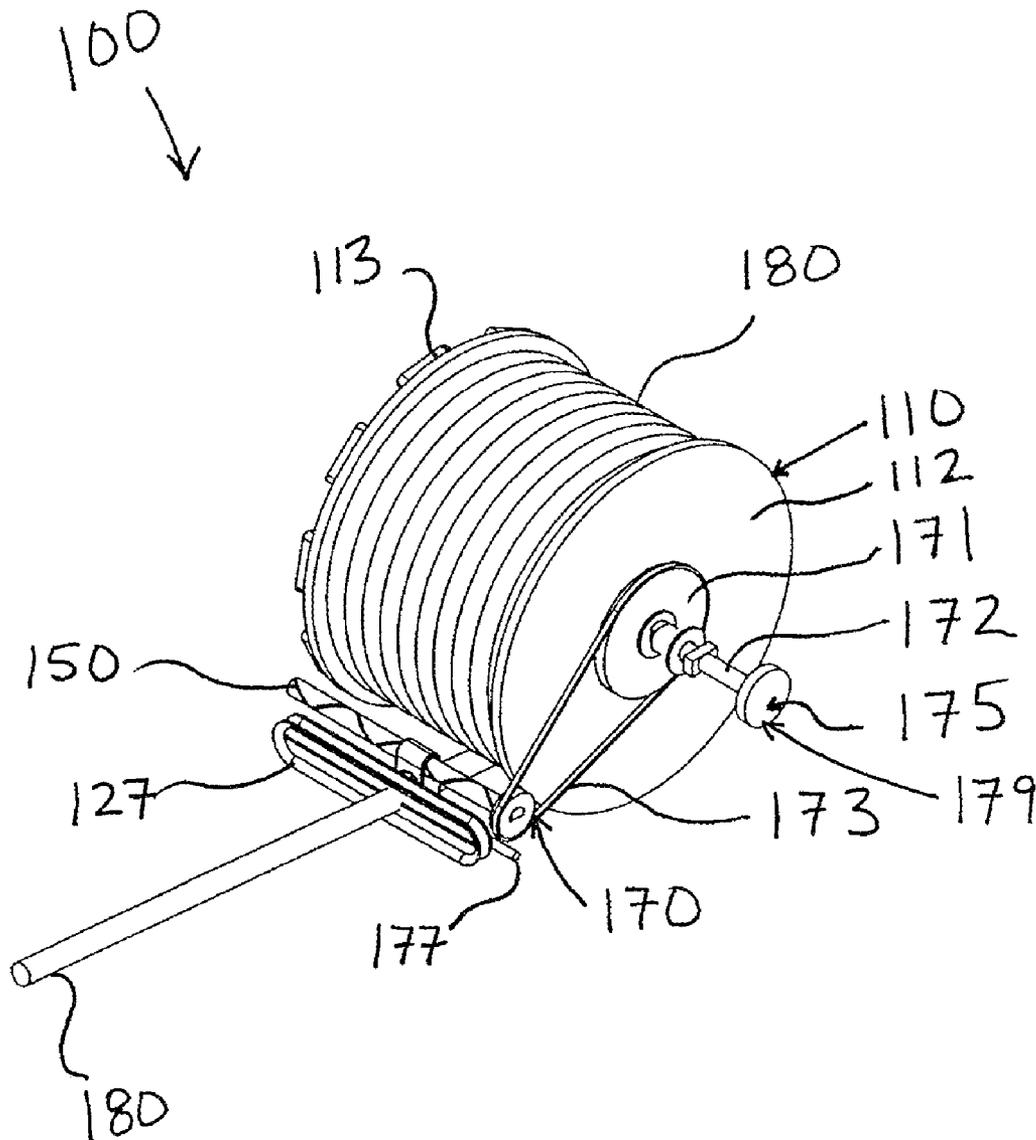
A retractable tow rope apparatus according to the present invention includes a hollow spool mounted for rotational movement inside a casing. A retraction spring is positioned inside the spool and is coupled to the spool and to the casing for selectively moving the spool therein. One end of the spool includes a flange defining a plurality of grooves. A spool brake is mounted to the casing for selective engagement with a respective groove, whereby to selectively stop the spool from paying out or retracting the tow rope. A retractable handle is mounted to the casing and coupled to the spool, enabling a user to manually turn the spool. The casing includes a handle for carrying the device. A bracket may be attached to the casing for releasably mounting the device to a boat.

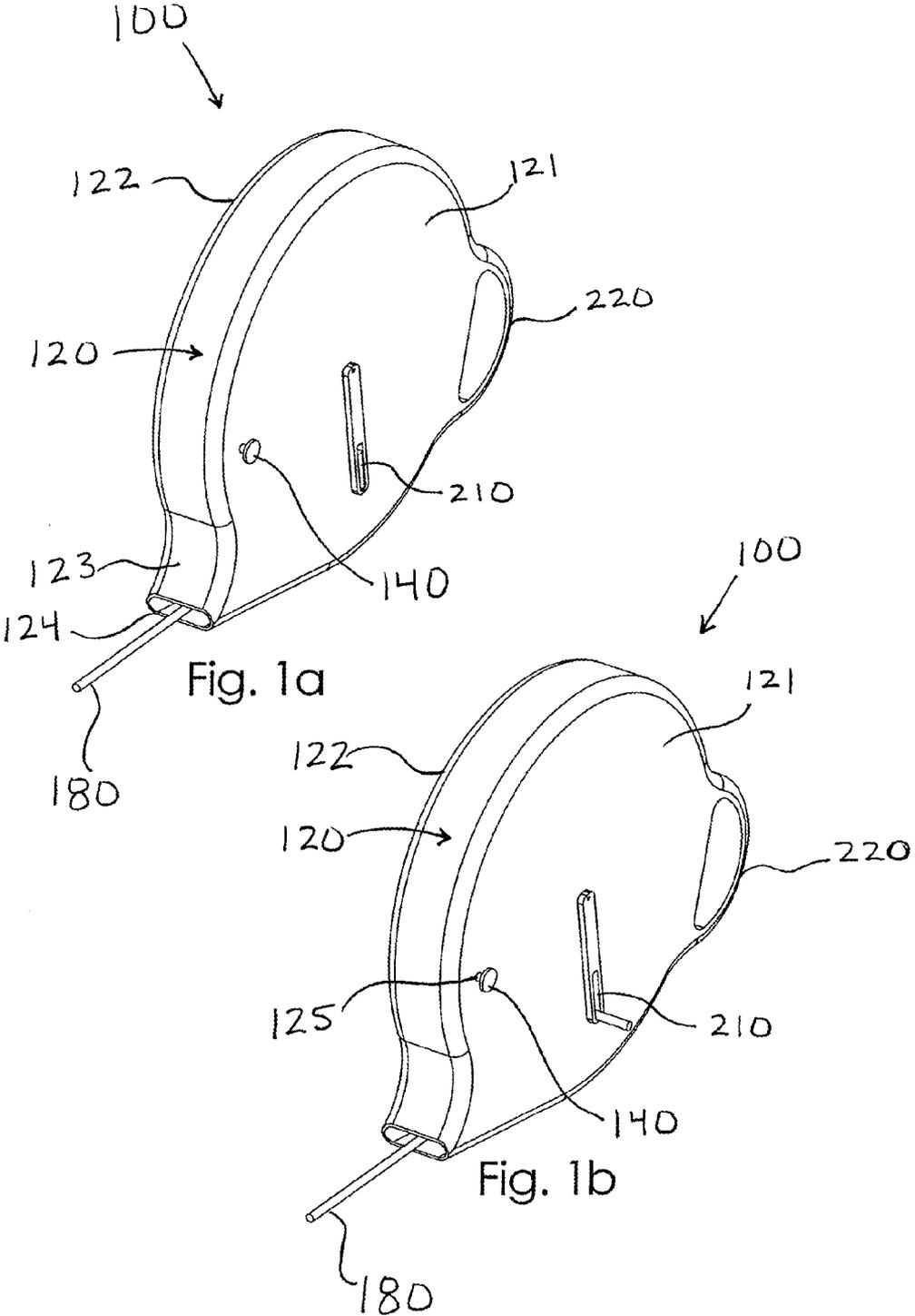
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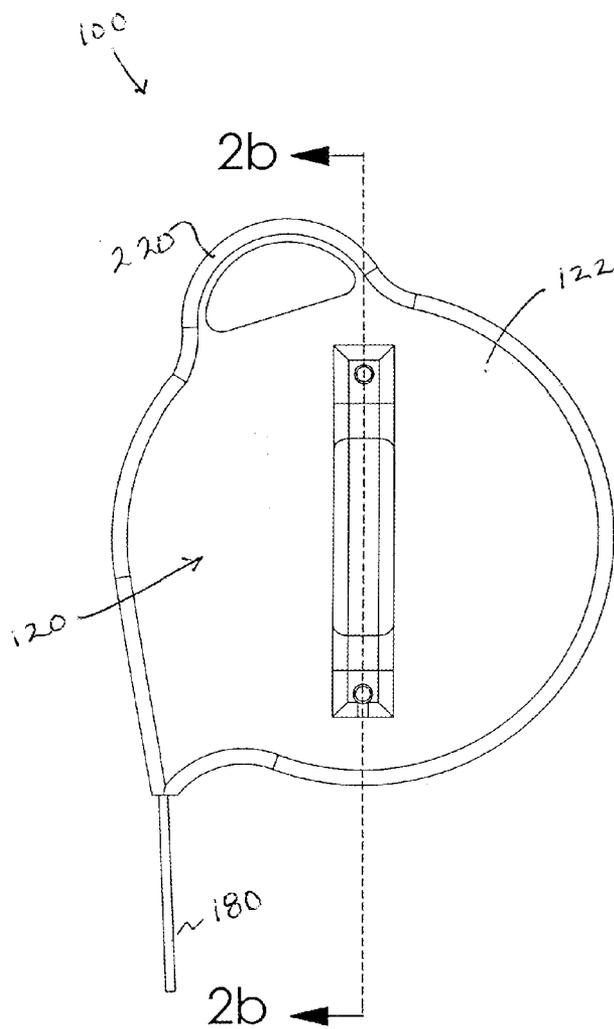


Fig. 2a

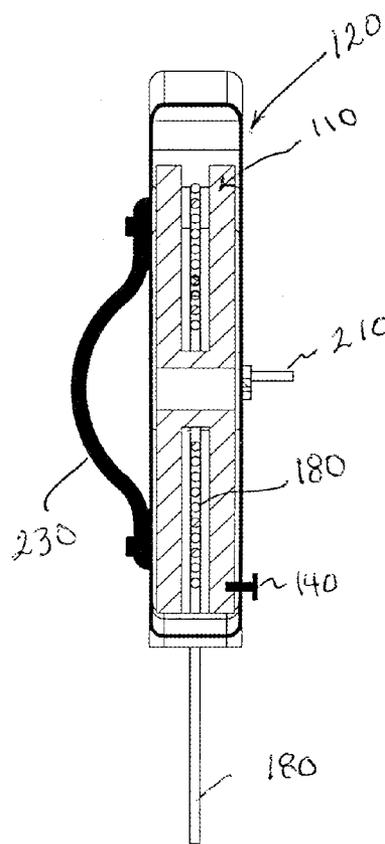
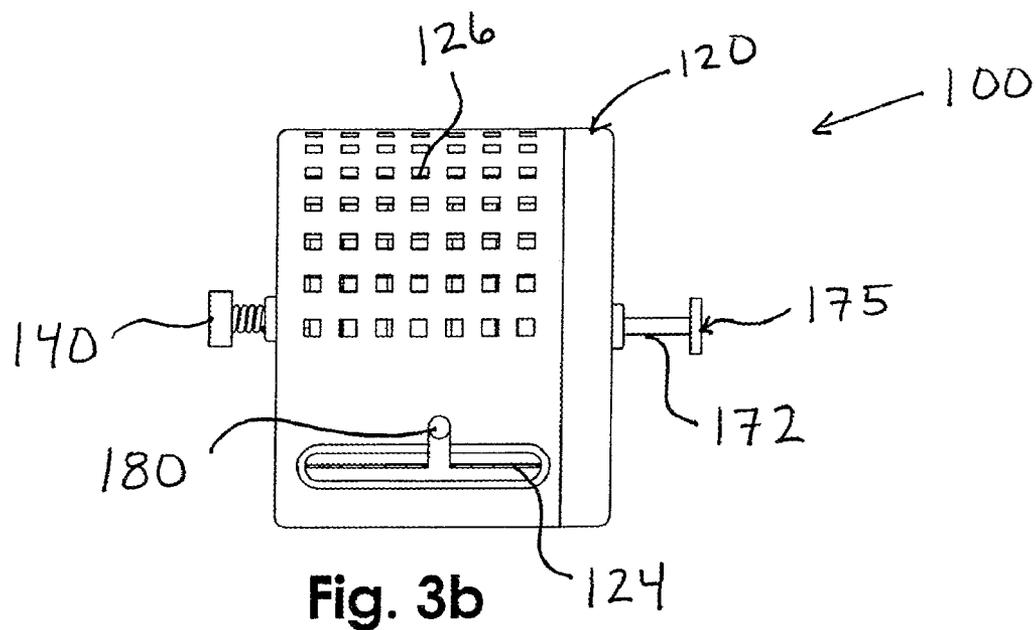
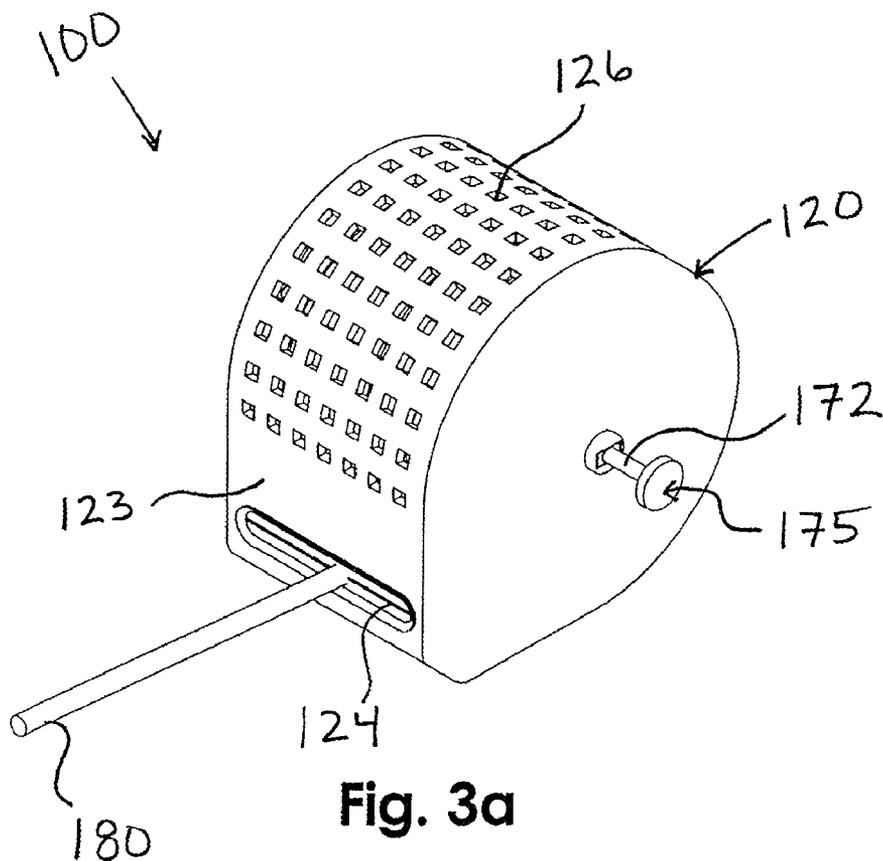
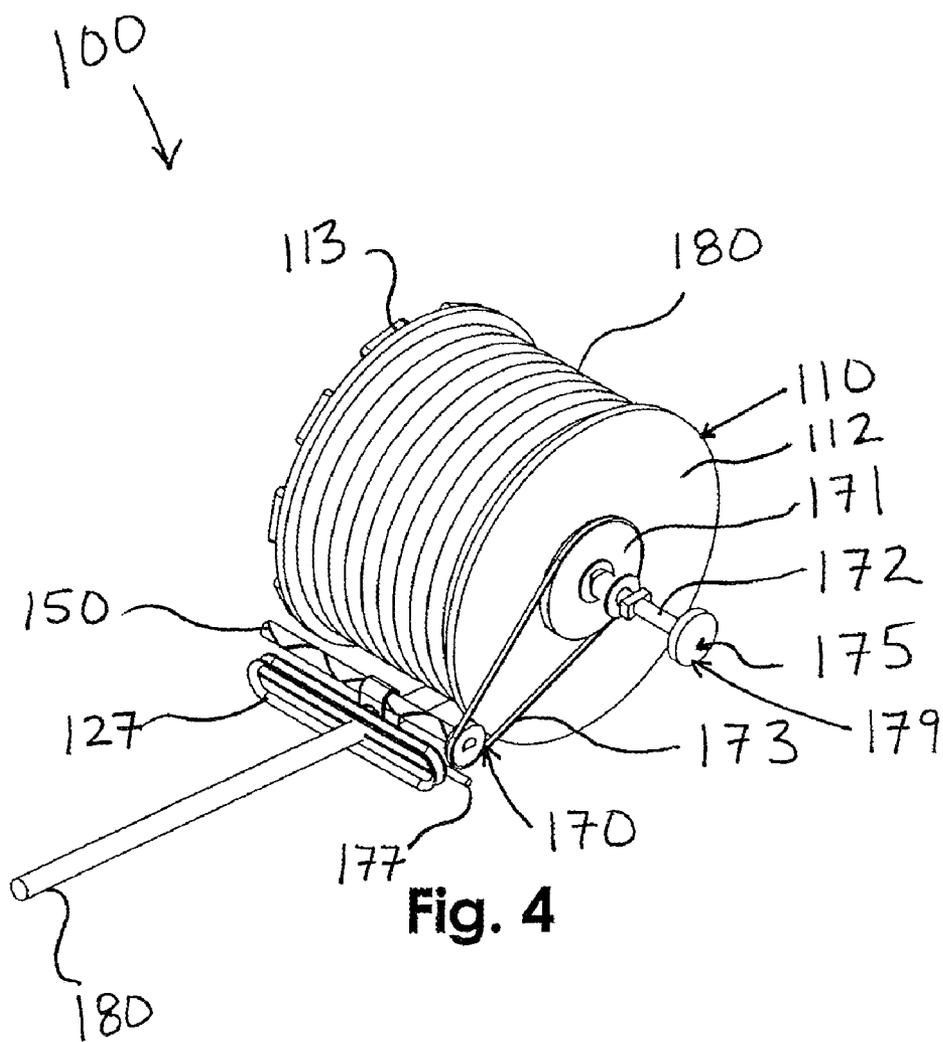
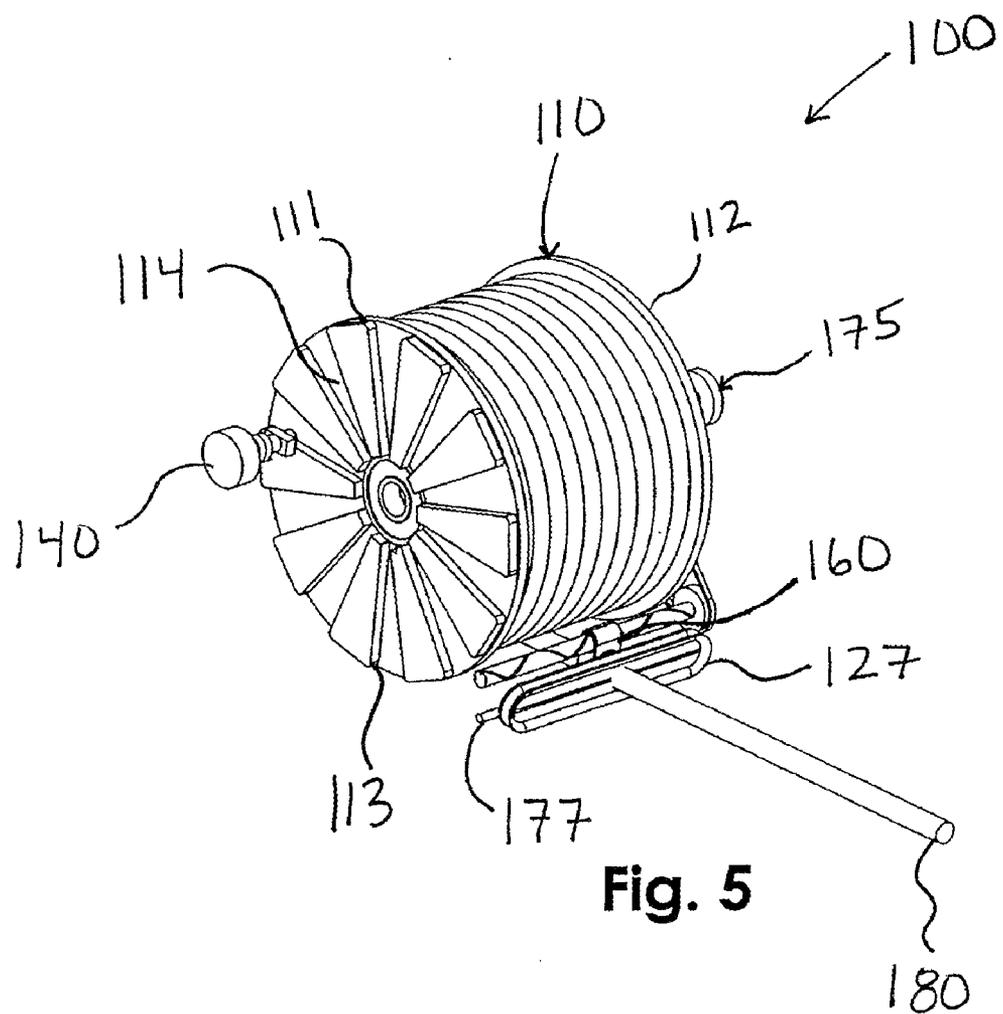


Fig. 2b





**Fig. 4**



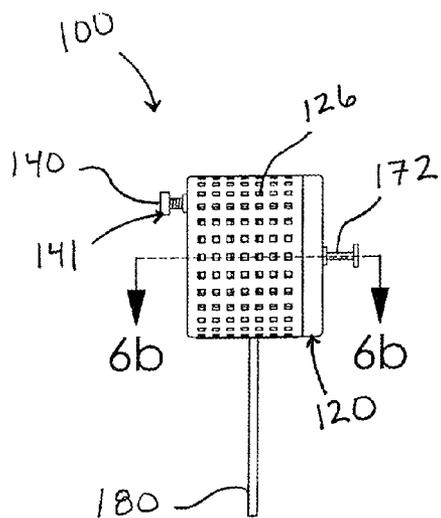


Fig. 6a

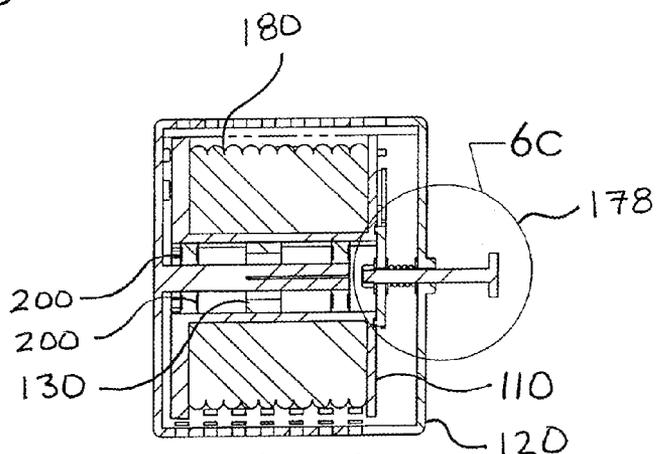


Fig. 6b

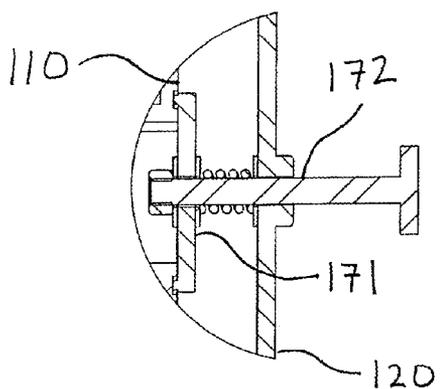
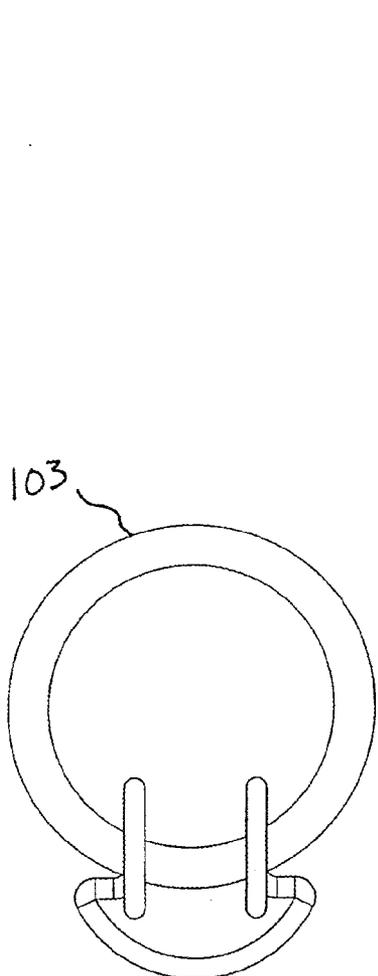
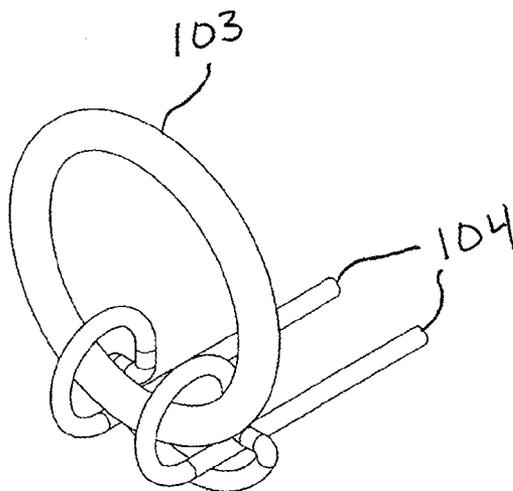


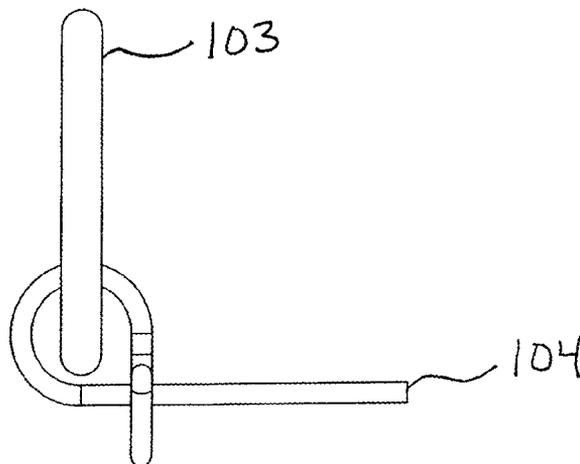
Fig. 6c



**Fig. 7b**



**Fig. 7a**



**Fig. 7c**

**RETRACTABLE TOW ROPE APPARATUS**

**BACKGROUND OF THE INVENTION**

[0001] This invention relates generally to tow ropes and related storage devices and, more particularly, to a retractable tow rope apparatus for storing and mobilizing a water ski rope.

[0002] A long length of rope is utilized when pulling a water skier behind a motorized boat. At the conclusion of a skier's time of skiing, such as when he falls down or a different skier desires to take a turn, the rope may be partially pulled back into the boat. Certainly, the rope must be pulled back within the boat when the overall skiing outing is completed for the day. The rope must then be allowed to dry and is stored away until its next use.

[0003] Various devices for reeling or retracting a rope or cable have been proposed in the prior art. Although presumably effective for their intended purposes, the existing devices do not provide a convenient means for transporting a tow rope from a storage location to a boat and back, for mounting the rope to the boat for use, or for easily gathering the rope following use. Specifically, the existing devices do not enable a user to easily transport and mount a length of tow rope, retract the rope automatically without electrical power, have means for selectively stopping the retraction, enable excess water to escape from the housing during retraction, or have means for squeezing water from the rope itself during retraction.

[0004] Therefore, it would be desirable to have a retractable tow rope apparatus that solves all of the above mentioned difficulties as well as conveniently but removably being mounted or mountable to the boat and being able to be carried by a user. Further, it would be desirable to have a retractable tow rope apparatus that prevents the rope from tangling during retraction.

**SUMMARY OF THE INVENTION**

[0005] Accordingly, a retractable tow rope apparatus for particular use with a motorized boat for waterskiing includes a hollow spool positioned for rotational movement within an outer casing. One end of the spool includes a flange defining a plurality of spaced apart indentations. A retraction spring is mounted inside the spool and is coupled to the spool and casing for selectively moving the spool relative to the casing. Specifically, the spool may be automatically moved by the spring to retract a tow rope about the spool. A spool brake is coupled to the outer casing and includes a configuration for selectively passing through the outer casing aperture and engaging a respective indentation in the spool flange. Activating the spool brake causes the spool to stop retracting. A retractable handle is coupled to the spool for manually turning the spool to retract or extend the tow rope.

[0006] The casing includes a handle by which the entire retractable tow rope apparatus may transported by a user. Means for releasably mounting the device to the boat during use is also provided. A movable fairlead may also be mounted to the casing adjacent the aperture through which a tow rope enters the casing for evenly positioning a tow rope on the spool during retraction. A squeegee may also be positioned proximate the aperture for squeezing water from the tow rope during retraction.

[0007] Therefore, a general object of this invention is to provide a retractable tow rope apparatus for storing and deploying a tow rope.

[0008] Another object of this invention is to provide a retractable tow rope apparatus, as aforesaid, having a spring for automatically retracting a tow rope when activated.

[0009] Still another object of this invention is to provide a retractable tow rope apparatus, as aforesaid, in which the automatic retraction may be conveniently stopped by a user, if desired.

[0010] Yet another object of this invention is to provide a retractable tow rope apparatus, as aforesaid, that automatically drains excess water from the casing.

[0011] A further object of this invention is to provide a retractable tow rope apparatus, as aforesaid, that squeezes water from the rope during retraction.

[0012] A still further object of this invention is to provide a retractable tow rope apparatus, as aforesaid, that may be easily mounted to or removed from a boat.

[0013] Other objects and advantages of the present invention will become apparent from the following description taken in connection with the accompanying drawings, wherein is set forth by way of illustration and example, embodiments of this invention.

**BRIEF DESCRIPTION OF THE DRAWINGS**

[0014] FIG. 1a is a perspective view of a retractable tow rope apparatus according to an embodiment of the present invention with a manual spool handle in a retracted configuration;

[0015] FIG. 1b is another perspective view of the tow rope apparatus as in FIG. 1a with the manual spool handle in an extended configuration;

[0016] FIG. 2a is a side view of the tow rope apparatus as in FIG. 1a;

[0017] FIG. 2b is a sectional view taken along line 2b-2b of FIG. 2a;

[0018] FIG. 3a is another perspective view of the retractable tow rope apparatus illustrating additional features of the invention;

[0019] FIG. 3b is a front view of the tow rope apparatus as in FIG. 3a;

[0020] FIG. 4 is a perspective view of the tow rope apparatus as in FIG. 3a with the casing removed;

[0021] FIG. 5 is a perspective view from another angle of the tow rope apparatus as in FIG. 4;

[0022] FIG. 6a is a top view of the tow rope apparatus as in FIG. 3a;

[0023] FIG. 6b is a sectional view taken along line 6b-6b of FIG. 6a;

[0024] FIG. 6c is an isolated view on an enlarged scale taken from FIG. 6b; and

[0025] FIG. 7a to 7c are views of a ring assembly for mounting the tow rope apparatus to a boat.

**DESCRIPTION OF THE PREFERRED EMBODIMENT**

[0026] A retractable tow rope apparatus 100 particularly for use with watersports and/or with a boat according to the present invention will now be described in detail with reference to FIGS. 1a through 7c of the accompanying drawings. More particularly, a retractable tow rope apparatus 100 according to the current invention may include an

internal spool **110**, an outer casing **120**, a retraction spring **130**, a spool brake **140**, a drive screw **150**, a moving fairlead **160**, a drive assembly **170**, and a rope **180**.

**[0027]** The internal spool **110** (also referred to herein as a “hollow spool”) has opposed first and second ends **111**, **112**, and a first flange **113** may extend outwardly from the first end **111** as shown in FIGS. **4** and **5**. The first end **111** and/or the first flange **113** may define a plurality of indentations **114** (also referred to herein as “grooves”) which may or may not extend through the first end **111**. Though not shown in the drawings, the spool **110** may be understood to define an imaginary center axis extending from the spool first end **111** to the spool second end **112** about which the spool rotates, and the plurality of indentations **114** may extend radially outward at equally spaced apart intervals relative to the imaginary center axis (FIG. **5**). A retractable spool crank handle **210** (FIGS. **1a** and **1b**) may be coupled to the spool **110** to allow for selective rotation of the spool **110** relative to the outer casing **120** to manually wind the rope **180** about the spool **110** as described below.

**[0028]** The outer casing **120** surrounds the spool **110**, the spool being mounted for rotational/axial movement therein. The outer casing **120** has opposed first and second ends **121**, **122** and a front side **123** (FIGS. **1a** through **3b** and **6b**). It is understood that the outer casing **120** may present a narrow profile such that the rope **180** may be wound in a single column atop itself as it is retracted (FIG. **2b**). As shown in the other drawings, however, the outer casing **120** may present a larger profile (FIG. **3a**).

**[0029]** The outer casing first end **121** defines an aperture **125** (also referred to herein as a “hole”) having a dimension or configuration that is complementary to that of the plurality of indentations **114** in the first flange **113** of the spool **110** for reasons that will be described in more detail later. The front side **123** also defines a front opening **124** through which the rope **180** may pass. The outer casing **120** may define at least one hole **126** for draining liquid and/or enabling moisture to evaporate from the outer casing **120** (FIGS. **3a** and **3b**). The outer casing **120** includes a handle **220** (FIGS. **1a** and **1b**) for transporting the outer casing **120**, and means for coupling the outer casing **120** to the boat may be included. The means for coupling the outer casing **120** to the boat may include a bracket **230** (FIGS. **2a** and **2b**) having a configuration complementary to a pole, pylon, or other boat structure suitable for retaining the apparatus **100**. The coupling means may, alternatively, include a ring **103** attached to the outer casing **120** by a pair of ropes **104** as shown in FIGS. **7a**, **7b** and **7c**; the boat may include a vertical attachment pole (not shown), and the ring **103** may have a diameter complementary to a diameter of the attachment pole so that the ring **103** may be placed around the attachment pole. Alternately (or additionally), tie straps, hook and loop fasteners, one or more clips, and/or other fasteners may be used to couple the outer casing **120** to the boat.

**[0030]** The retraction spring **130** may be located inside the spool **110** and coupled to both the spool **110** and the outer casing **120** for selectively moving the spool **110** relative to the outer casing **120** (FIG. **6b**). As shown in FIGS. **1a**, **1b**, and **2b** through **6c**, the spool brake **140** may be coupled to the outer casing **120** and have a configuration for selectively passing through the outer casing aperture **125** and engaging a respective indentation **114**. A plurality of bearings **200** between the spool **110** and the outer casing **120** (FIGS. **6b**

and **6c**) may enable the spool **110** to spin unfettered when tension is applied to the rope **180** and the spool brake **140** is at a released configuration **141**.

**[0031]** The drive screw **150** may be coupled to the outer casing **120** to extend along the outer casing front opening **124**, and the moving fairlead **160** may be coupled to the drive screw **150** (e.g., by mating threads) as shown in FIGS. **4** and **5**. The drive assembly **170** may selectively associate the drive screw **150** with the spool **110**, so that movement of the spool **110** causes movement of the drive screw **150** (and thus the attached fairlead **160**) when the drive screw **150** is associated with the spool **110**. The fairlead **160** may also be attached to a fairlead guide axle **177** (FIGS. **4** and **5**) to keep the fairlead oriented properly. As shown in FIGS. **4** and **5**, the drive assembly **170** may include a clutch plate **171** adjacent the spool **110**, an engaging axle **172** for selectively associating the clutch plate **171** with the spool **110**, and a drive belt **173** for associating the drive screw **150** with the clutch plate **171**. The engaging axle **172** may have an outer end **175** accessible outside of the outer casing **120** for selectively moving the engaging axle **172** between engaged and released configurations **178**, **179** (FIGS. **6b** and **4** respectively).

**[0032]** The rope **180** has one end coupled to the spool **110**, and at least a portion of the rope **180** may pass through the moving fairlead **160** to a position exterior to the outer casing **120** (FIGS. **3a** and **6a**). A squeegee guide **127** may be coupled to the outer casing **120** adjacent the front opening **124** for cleaning and squeezing excess liquid from the rope **180** when the rope **180** is being passed through the front opening **124** to the moving fairlead **160** as shown in FIGS. **4** and **5**.

**[0033]** In use, the retractable tow rope apparatus **100** may be selectively mounted on a boat as described above for application in watersports or other water activities. The rope **180** is coupled to the spool **110** by one end and may be selectively coupled to any person or object on the other end. When the rope **180** is completely unwound from the spool **110** and coupled to a person or object, the retractable tow rope apparatus **100** may be used to tow the person or object through water. The rope **180** may be similarly used for towing when the spool brake **140** passes through the outer casing aperture **125** and engages a respective indentation **114**, as the spool brake **140** keeps the rope **180** from being wound about (or unwound from) the spool **110** when at this configuration.

**[0034]** When the spool brake **140** is in its released configuration **141** (FIG. **6a**) and tension is applied to the rope **180**, the plurality of bearings **200** (FIG. **6b**) between the spool **110** and the outer casing **120** enable the spool **110** to spin unfettered so as to unwind the rope **180** to a desired length. Tension on the rope **180** winds the retractable spring **130**, which in turn rotates the spool **110** in relation to the outer casing **120**. When the engaging axle **172** associates the clutch plate **171** with the spool **110** and the spool **110** is rotated, the rotation of the spool **110** activates the drive assembly **170** (FIG. **4**); the clutch plate **171** is rotated, which causes the drive belt **173** and therefore the drive screw **150** to rotate (FIG. **4**). Rotation of the drive screw **150** causes the moving fairlead **160** to move along the drive screw **150** (while maintaining proper orientation by way of the fairlead guide axle **177**) along the front opening **124**. When the engaging axle **172** does not associate the clutch plate **171**

with the spool 110, the spool 110 rotates with little or no effect on the drive assembly 170.

[0035] When tension is no longer applied to the rope 180 and the spool brake 140 is in its released configuration 141, the rope 180 will retract automatically due to the stored energy in the retraction spring 130 (FIG. 6*b*), and as long as the engaging axle 172 associates the clutch plate 171 with the spool 110 as noted above, the moving fairlead 160 may guide the rope 180 around the spool 110 to eliminate or minimize tangles. The rope 180 may also be wound manually around the spool 110 by using the retractable spool crank handle 210 (FIGS. 1*a*, 1*b* and 2*b*).

[0036] The squeegee guide 127 may prevent excess liquid from entering the outer casing 120 by cleaning and squeezing liquid from the rope 180 as the rope 180 is being wound about the spool 110 as described above (FIGS. 4 and 5). The hole(s) 126 in the outer casing 120 (FIGS. 3*a*, 3*b* and 6*a*) may allow liquid to be drained from the outer casing 120 and/or any moisture remaining on or within the rope 180 to evaporate. When the apparatus 100 is no longer needed, it may be easily removed from its mounting on the boat and transported by its carrying handle 220 to a storage location.

[0037] It is understood that while certain forms of this invention have been illustrated and described, it is not limited thereto except insofar as such limitations are included in the following claims and allowable functional equivalents thereof.

What is claimed is as follows:

1. A retractable tow rope apparatus for use with a boat, said retractable tow rope apparatus comprising:

a hollow spool having opposed first and second ends and a first flange extending outwardly from said first end, said first flange defining a plurality of indentations;

an outer casing surrounding said hollow spool and having opposed first and second ends and a front side defining a front opening, said first end of said casing defining an aperture complementary to said plurality of indentations in said first flange;

a retraction spring inside said spool, said spring being coupled to said spool and said casing for selectively moving said spool relative to said casing;

a spool brake coupled to said outer casing and having a configuration for selectively passing through said outer casing aperture and engaging each said indentation in said first flange, respectively;

a drive screw coupled to said outer casing and extending along said outer casing front opening;

a moving fairlead coupled to said drive screw for relative movement therealong;

a drive assembly selectively associating said drive screw with said hollow spool, whereby movement of said hollow spool causes movement of said drive screw when said drive screw is associated with said hollow spool;

a tow rope passing through said moving fairlead and having one end coupled to said hollow spool; and means for coupling said outer casing to said boat.

2. The retractable tow rope apparatus as in claim 1, wherein said outer casing defines a plurality of holes for draining liquid from said outer casing.

3. The retractable tow rope apparatus as in claim 1, further comprising a squeegee guide coupled to said outer casing

adjacent said front opening for cleaning said rope when said rope is passing through said front opening to said moving fairlead.

4. The retractable tow rope apparatus as in claim 1, wherein said drive assembly includes:

a clutch plate adjacent said hollow spool;

an engaging axle for selectively associating said clutch plate with said hollow spool; and

a drive belt associating said drive screw with said clutch plate.

5. The retractable tow rope apparatus as in claim 4, wherein said engaging axle has an outer end accessible outside said outer casing for selectively moving said engaging axle between engaged and released configurations.

6. The retractable tow rope apparatus as in claim 1, further comprising a plurality of bearings between said hollow spool and said outer casing to enable said hollow spool to spin unfettered when tension is applied to said rope and said spool brake is at a released configuration.

7. The retractable tow rope apparatus as in claim 1, further comprising a retractable handle coupled to said hollow spool for selectively rotating said hollow spool relative to said outer casing to manually wind said rope about said hollow spool.

8. The retractable tow rope apparatus as in claim 1, further comprising a handle coupled to said outer casing for transporting said outer casing.

9. The retractable tow rope apparatus as in claim 1, wherein:

said boat includes a vertical attachment pole; and

said means for coupling said outer casing to said boat includes a ring attached to said outer casing by a pair of ropes, said ring having a diameter complementary to a diameter of said attachment pole.

10. The retractable tow rope apparatus as in claim 1, wherein:

an imaginary center axis extends from said hollow spool first end to said hollow spool second end; and

said plurality of indentations extend radially outward at equally spaced apart intervals relative to said imaginary center axis.

11. The retractable tow rope apparatus as in claim 1, wherein:

a squeegee guide is coupled to said outer casing adjacent said front opening for cleaning and squeezing liquid from said rope when said rope passes through said front opening to said moving fairlead;

said drive assembly includes:

a clutch plate adjacent said hollow spool;

an engaging axle for selectively associating said clutch plate with said hollow spool;

a drive belt associating said drive screw with said clutch plate;

said engaging axle has an outer end accessible outside said outer casing for selectively moving said engaging axle between engaged and released configurations; and said outer casing defines a hole for draining liquid from said outer casing.

12. A retractable tow rope apparatus for watersports, said retractable tow rope apparatus comprising:

an outer casing having a front side and opposed first and second ends, said outer casing first end defining a hole and said outer casing front side defining a front opening;

an internal spool mounted inside said outer casing for rotational movement relative to said outer casing, said internal spool having opposed first and second ends and said spool first end defining a plurality of grooves;

a retraction spring coupled to said spool and said outer casing for selectively rotating said spool relative to said outer casing;

a spool brake coupled to said outer casing for selectively passing through said hole in said outer casing first end and engaging a respective groove of said spool first end;

a drive screw coupled to said outer casing and extending adjacent said outer casing front opening;

a moving fairlead coupled to said drive screw;

a drive assembly selectively associating said drive screw with said spool, whereby movement of said spool causes movement of said drive screw when said drive screw is associated with said spool;

a tow rope passing through said moving fairlead, said tow rope having an end coupled to said spool;

a squeegee guide coupled to said outer casing adjacent said front opening for removing liquid from said tow rope and reducing an amount of liquid that would otherwise enter said outer casing; and

a mounting device coupled to said outer casing for selectively mounting said outer casing.

**13.** The retractable tow rope apparatus as in claim **12**, wherein:

said outer casing defines a hole for draining liquid from said outer casing; and

a handle is coupled to said outer casing for transporting said outer casing.

**14.** The retractable tow rope apparatus as in claim **12**, wherein said drive assembly includes:

a clutch plate adjacent said spool;

an engaging axle for selectively associating said clutch plate with said hollow spool; and

a drive belt associating said drive screw with said clutch plate.

**15.** The retractable tow rope apparatus as in claim **14**, wherein said engaging axle has an outer end accessible outside said outer casing for selectively moving said engaging axle between engaged and released configurations.

**16.** The retractable tow rope apparatus as in claim **15**, further comprising a retractable handle coupled to said spool and accessible outside said outer casing for manually rotating said spool relative to said outer casing and winding said tow rope about said spool.

**17.** The retractable tow rope apparatus as in claim **16**, wherein:

an imaginary center axis extends from said spool first end to said spool second end; and

said plurality of grooves extend radially outwardly at equal intervals from said imaginary center axis.

**18.** The retractable tow rope apparatus as in claim **17**, wherein:

said engaging axle has a configuration complementary to a configuration of said spool and a configuration of said clutch plate to associate said engaging axle with said spool and said clutch plate when said engaging axle is at said engaged configuration;

said outer casing defines a hole for draining liquid from said outer casing;

a handle is coupled to said outer casing for transporting said outer casing; and

a plurality of bearings are between said spool and said outer casing to enable said spool to spin unfettered when tension is applied to said tow rope and said spool brake is at a released configuration.

**19.** The retractable tow rope apparatus as in claim **12**, further comprising a plurality of bearings between said spool and said outer casing to enable said spool to spin unfettered when tension is applied to said tow rope and said spool brake is at a released configuration.

**20.** A retractable tow rope apparatus for use with a boat, said retractable tow rope apparatus comprising:

an outer casing having a front side and opposed first and second ends, said outer casing first end defining a hole and said outer casing front side defining a front opening;

an internal spool mounted inside said outer casing for rotational movement relative to said outer casing, said internal spool having opposed first and second ends and said spool first end defining a plurality of grooves;

a retraction spring coupled to said spool and said outer casing for selectively rotating said spool relative to said outer casing;

a spool brake coupled to said outer casing for selectively passing through said hole in said outer casing first end and engaging a respective groove of said spool first end;

a tow rope having an end coupled to said spool, said tow rope passing through said front opening of said front side of said outer casing; and

a mounting device coupled to said outer casing for selectively mounting said outer casing to the boat.

\* \* \* \* \*