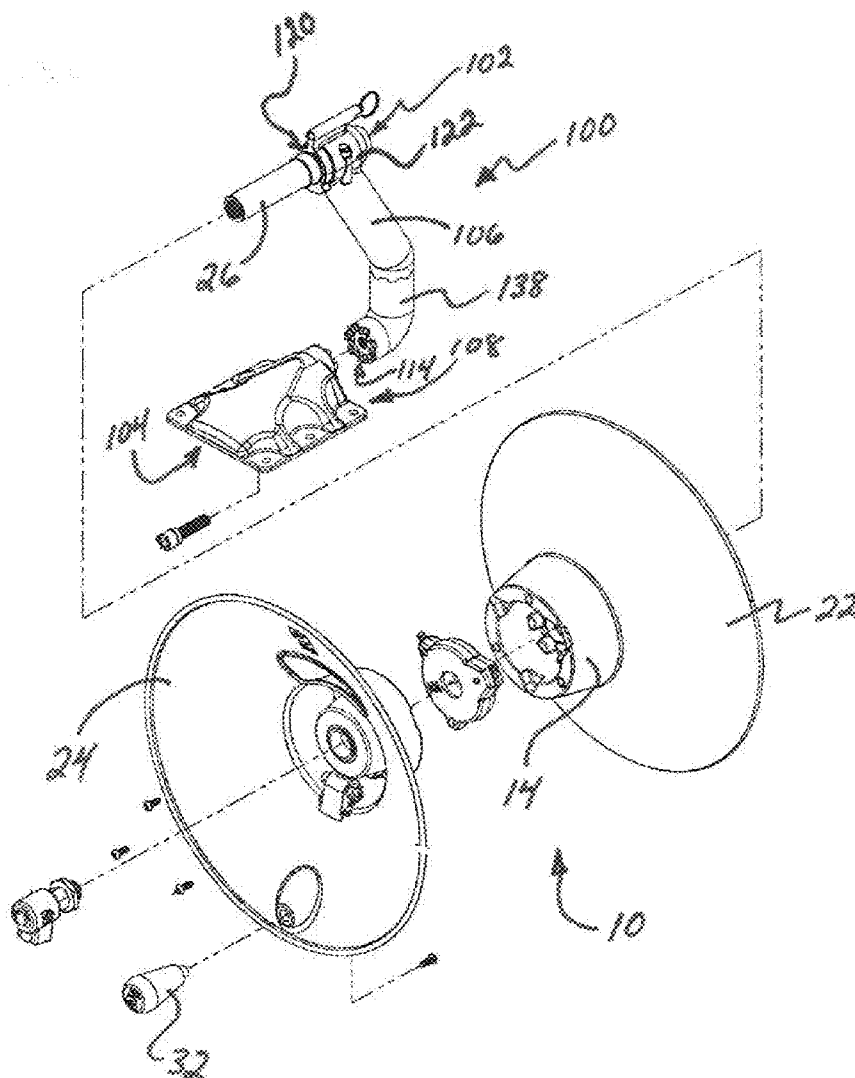




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(19) **United States**(12) **Patent Application Publication****Eley et al.**(10) **Pub. No.: US 2011/0297779 A1**(43) **Pub. Date: Dec. 8, 2011**(54) **REEL ASSEMBLY SUPPORT WITH
VARIABLE ORIENTATION**(52) **U.S. Cl. 242/398**(75) **Inventors:** **Craig D. Eley**, Lincoln, NE (US);
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(US)(21) **Appl. No.:** **12/792,345**(22) **Filed:** **Jun. 2, 2010****Publication Classification**(51) **Int. Cl.**
B65H 75/44 (2006.01)(57) **ABSTRACT**

A reel assembly is provided to support lengths of fluid delivery line. A support arm is secured at one end with the reel assembly and shaped at the opposite end to engage a support structure. The support arm includes separate arm sections; each having mating end portions that are shaped to be releasably, coaxially securable with one another to resist rotation with respect to one another. The arm sections may be provided in various shapes, including straight and angled, to provide a variable geometry. A pivot joint may be formed within the support arm to allow a portion of the support arm and the reel assembly to pivot with respect to the support structure.



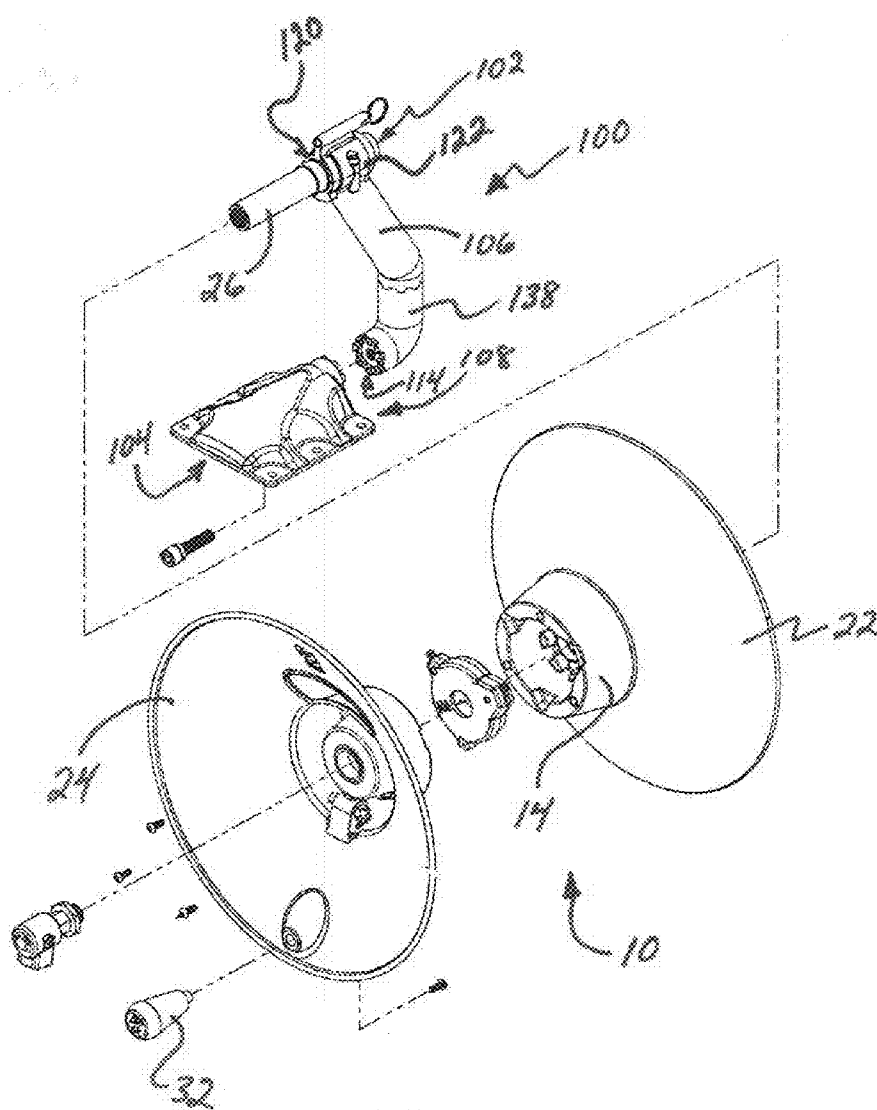
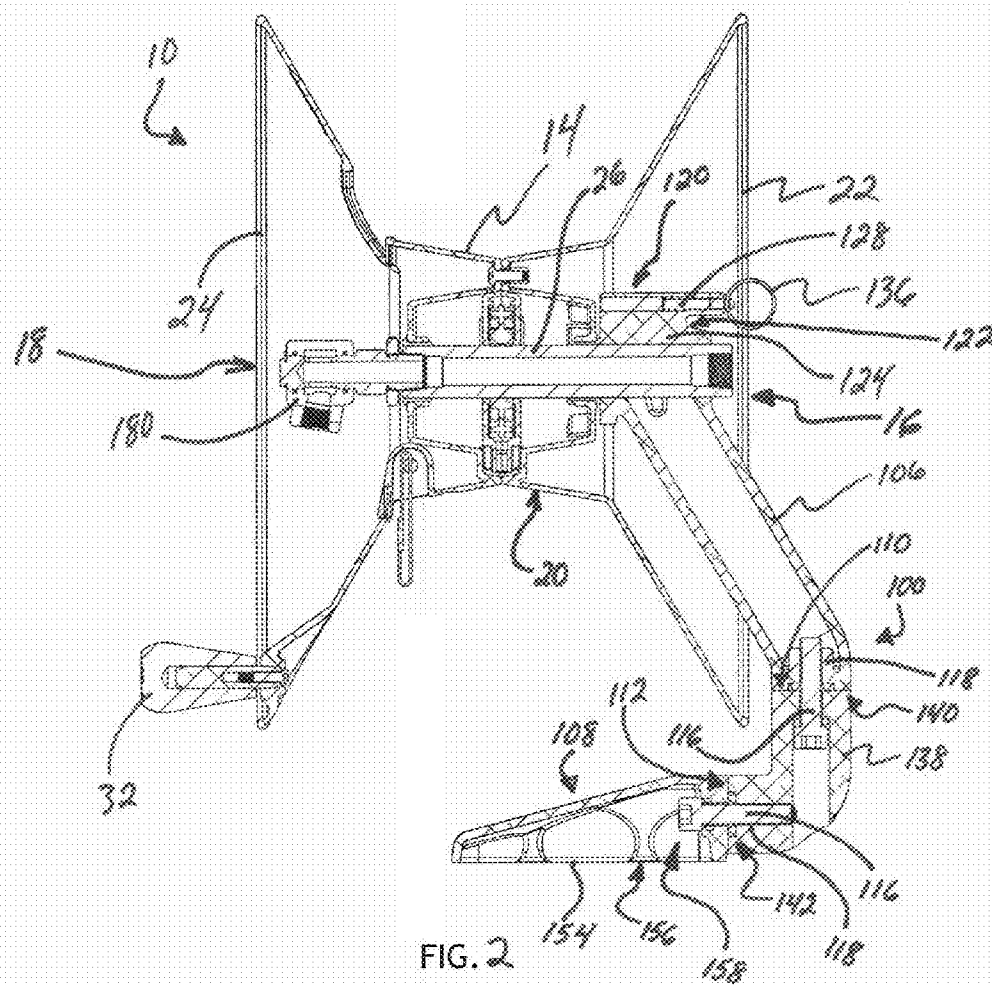


FIG. 1



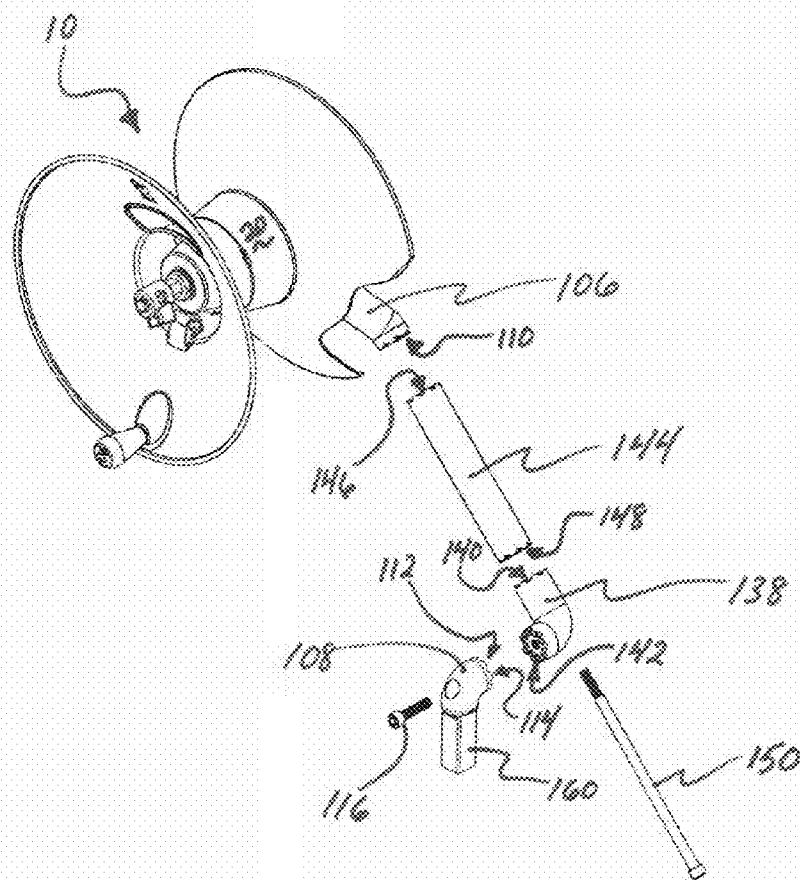


FIG. 3

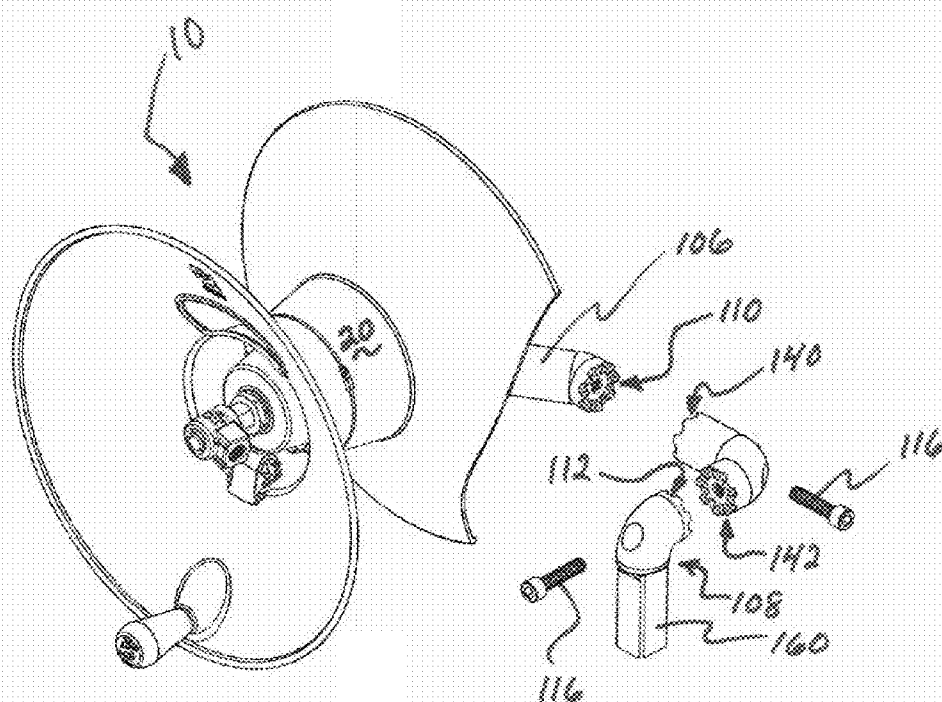


FIG. 4

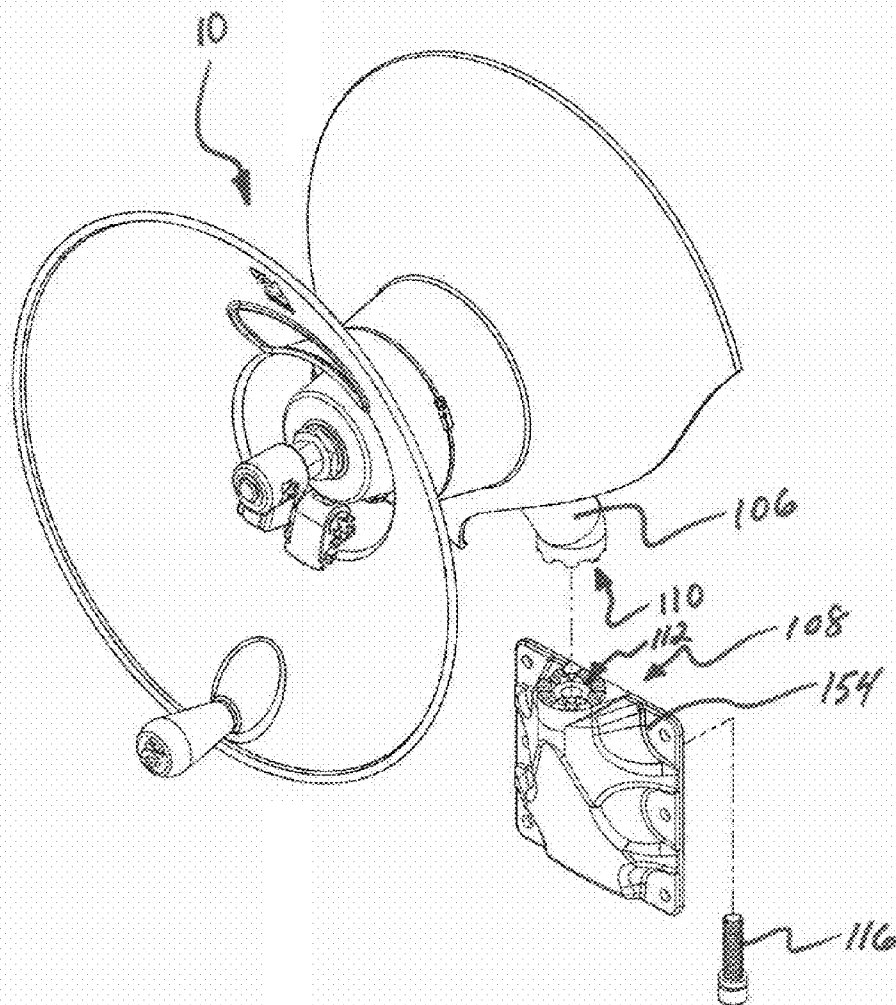


FIG. 5

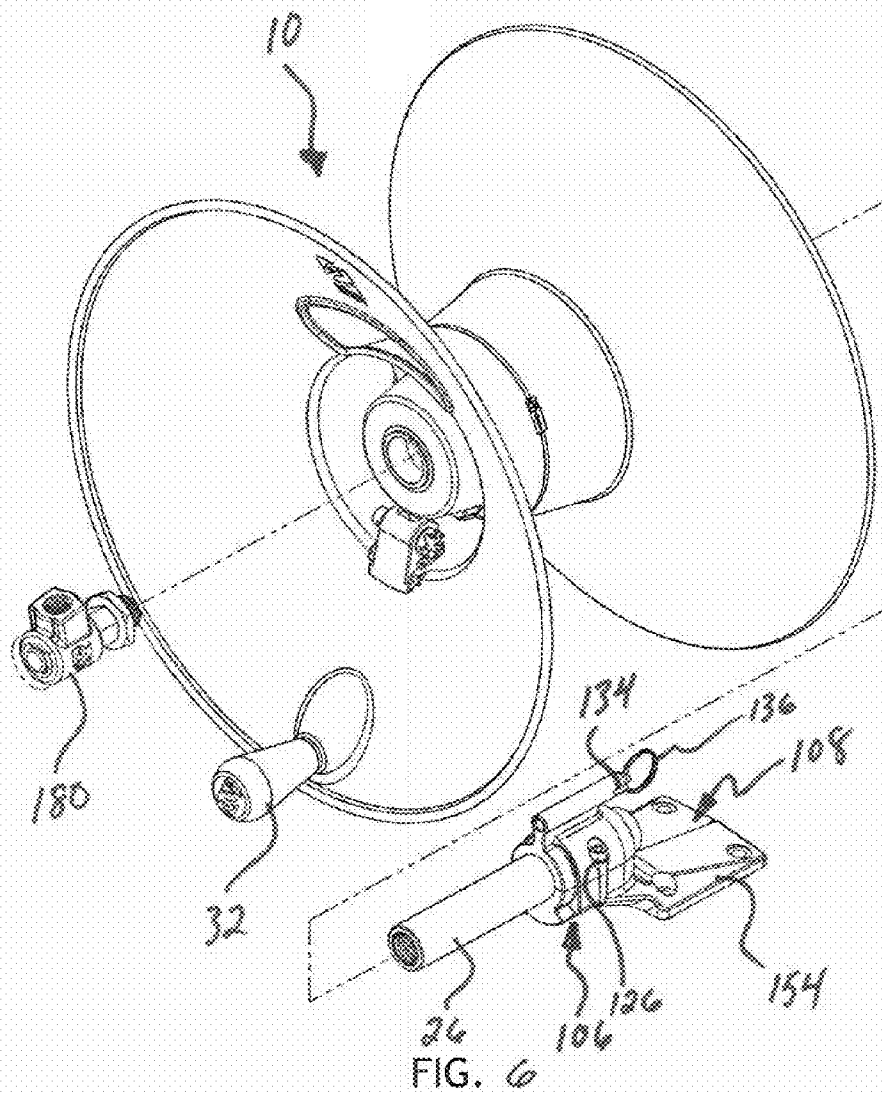


FIG. 7

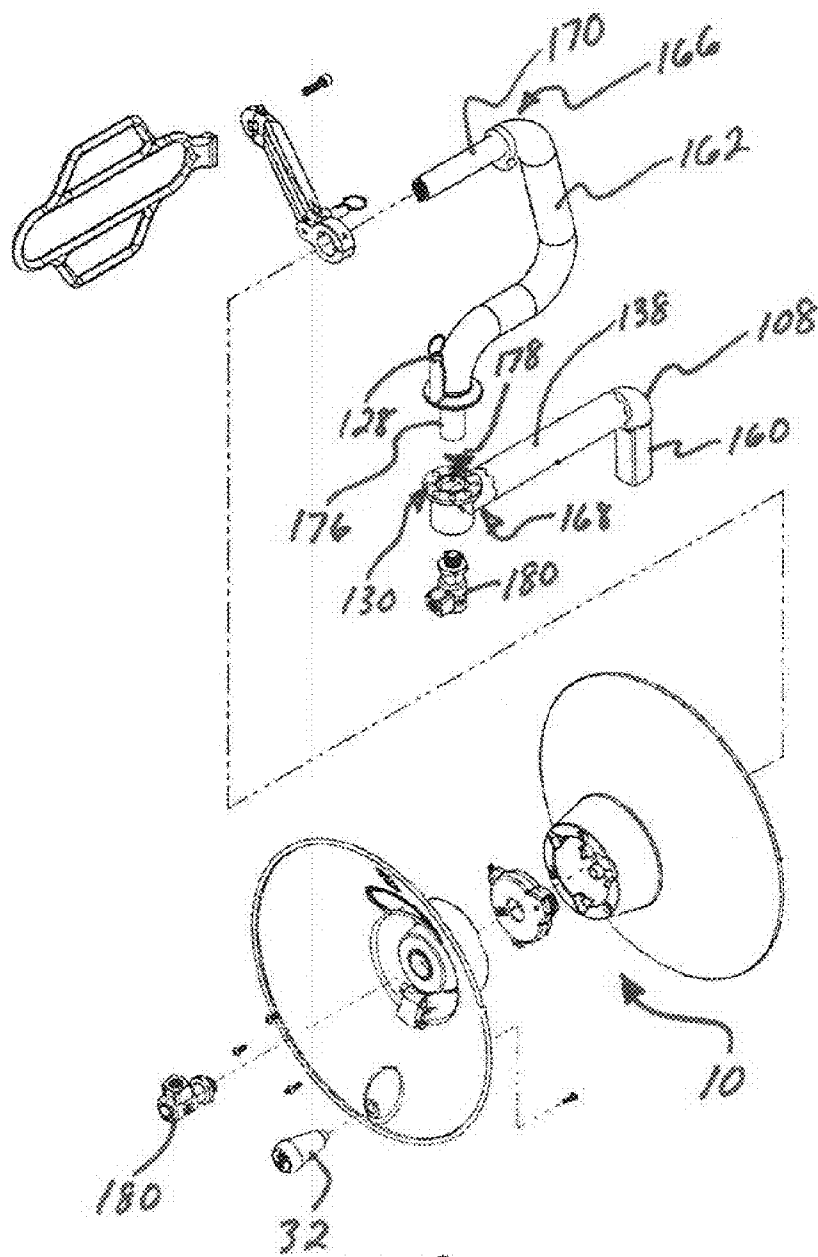
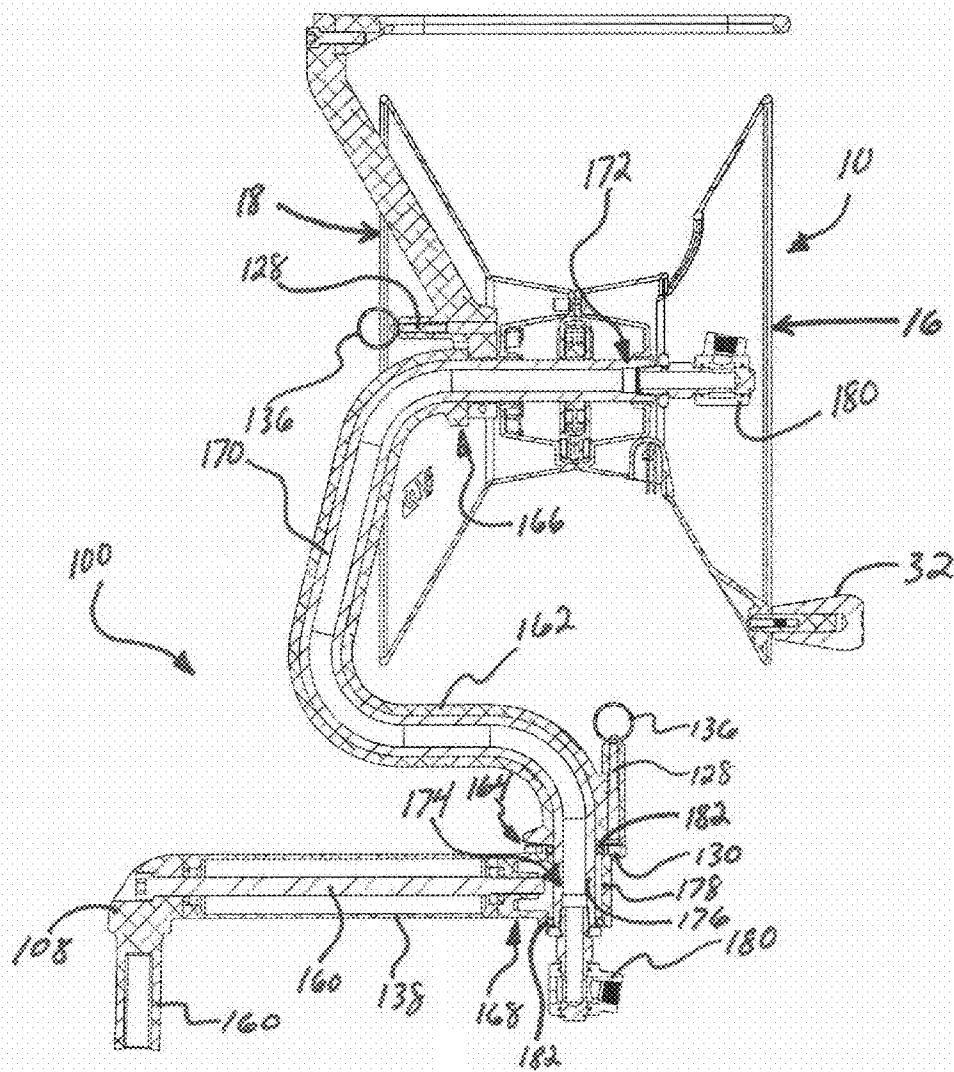


FIG. 8



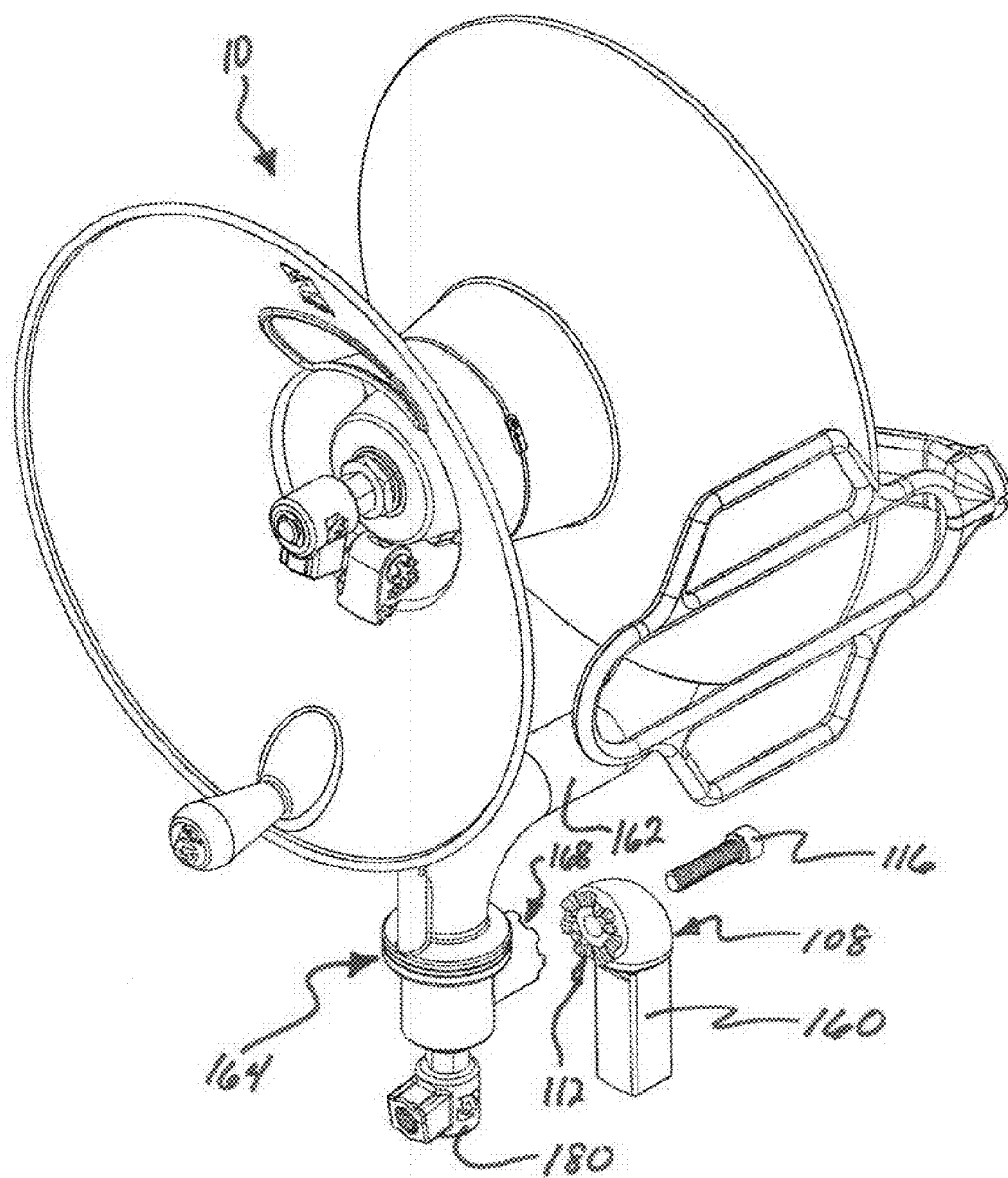


FIG. 10

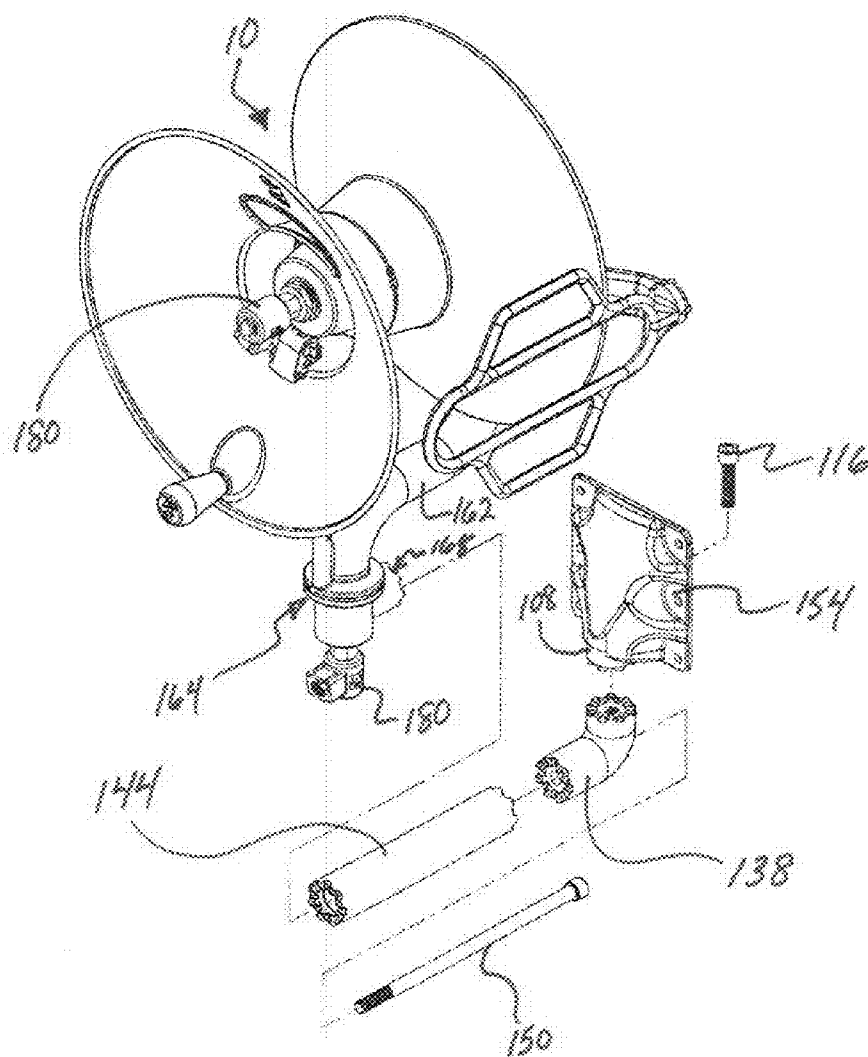


FIG. 11

REEL ASSEMBLY SUPPORT WITH VARIABLE ORIENTATION

BACKGROUND

[0001] Reel assemblies have been used in a variety of different environments, for different purposes, for many years. To be sure, reels are frequently mounted to permanent structures, such as the interior or exterior walls of buildings, to deliver various fluids such as water and air. Other reel assemblies are secured with portable frames that may be wheeled or carried from one location to another in a convenient fashion. Irrespective of the portable or stationary manner, most reel assemblies commonly require a support arm to secure the reel assembly with an operating structure.

[0002] Oftentimes support structures for reel assemblies are no more than an arm that is secured to a support frame or wall at one end and to a non-rotating portion of the reel assembly at an opposite end. Such support arms may be provided in a number of different shapes and configurations in order to dispose the reel assembly at a favorable orientation with respect to the support structure. In this manner, a user may conveniently deploy and rewind lengths of hose supported on the reel assembly. However, due to the fact that many different use environments require different support configurations, many users have had to custom fabricate support arms so that the reel assembly is disposed at the correct location and orientation. Such custom fabrication is time consuming and impractical for most users, whether in a commercial or residential setting. Accordingly, some users are forced to buy support arms having particular lengths and configurations that orient the reel assemblies in a manner that is oftentimes less than satisfactory. For example, some arms may engage a wall or other support structure in a manner that disposes the reel assembly at an awkward angle. Other support arms may position the reel assembly too close or too far away from the support structure. Other support arms are satisfactory in their geometry but are provided in a less than durable state that is prone to bending and breaking in various heavy duty applications.

[0003] Various attempts have been made to provide a support arm that is selectively movable between various positions with respect to the support structure to which it is secured. However, such designs tend to be over complex and suffer from movable joints that are prone to frequent misalignment or breakage. Moreover, such designs typically only allow the user to move or re-orient the reel assembly in a single direction or axis with respect to the support structure. Finally, it is difficult to develop a single design for a reel assembly support arm that permits multiple configurations for various users and different applications. Oftentimes a plurality of different embodiments is required to satisfy a handful of different applications. As such, complexity and cost of manufacture increases needlessly.

SUMMARY

[0004] This Summary is provided to introduce a selection of concepts in a simplified form that are further described below in the Detailed Description. This Summary, and the foregoing Background, is not intended to identify key aspects or essential aspects of the claimed subject matter. Moreover, this Summary is not intended for use as an aid in determining the scope of the claimed subject matter.

[0005] A support system is provided to selectively orient a reel assembly in a wide array of different use positions. The reel assembly includes opposite end portions and a line support section that is oriented to support the lengths of one or more fluid delivery lines. The support arm includes a plurality of individual arm sections that have one or more mating end portions. The mating end portions are shaped to releasably, coaxially secure with one another in a manner that resists rotation of the mating end portions with respect to one another. One end portion of the reel assembly is rotatably coupled with a mounting end portion of the support arm. An opposite, end portion of the support arm is shaped to securably engage a support structure, such as a wall, mobile or stationary support frame, and the like.

[0006] In some embodiments, the mating end portions of the arm sections are shaped to have a plurality of spaced-apart teeth that are shaped to permit teeth from the mating end portion of the first arm section to intermesh with the teeth from the mating end portion of the second arm section. Accordingly, the arm sections may be secured with one another in one orientation, separated from one another, rotated axially with respect to one another, and secured with one another in a second secure position. In some embodiments, each arm section may be provided in a variety of shapes, wherein the arm sections have long axes that are straight, angled, curved and the like.

[0007] In some embodiments, a pin member having a long axis is associated with a mounting end portion of the support arm and is movable along the long axis between locked and unlocked positions with respect to a plurality of recesses formed within an end portion of the reel assembly. The recesses are shaped to receive a length of the pin member in the locked position, whereby rotational movement of the reel assembly is substantially prevented.

[0008] Embodiments of the system will include a mounting end portion of the support arm that is shaped to have an elongated mounting post. Reciprocally, the support structure may include a receiving socket that is shaped to releasably and securably receive the mounting post to mount the system. In other embodiments, the mounting end portion of the support arm is provided with a mounting plate securably engaged to a generally planar portion of the support structure.

[0009] Various embodiments of the system will include a pivot joint between the first and second end portions of the support arm, whereby a length of the support arm that is coupled with the reel assembly may be selectively pivoted with respect to the other end of the support arm. In some embodiments, the pivot joint is disposed within an arm section between a mounting end portion that engages the reel assembly and a mating end portion of the arm section, whereby the reel assembly and a portion of the arm section pivots on an a pivot axis with respect to the mating end portion and the remainder of the support arm. A locking pin may be associated with the pivot joint that is selectively movable between locked and unlocked positions, whereby pivoting movement of the mounting end portion of the arm section, with respect to the mating end portion, is substantially prevented.

[0010] These and other aspects of the present system and method will be apparent after consideration of the Detailed Description and Figures herein.

DRAWINGS

[0011] Non-limiting and non-exhaustive embodiments of the present invention, including the preferred embodiment,

are described with reference to the following figures, wherein like reference numerals refer to like parts throughout the various views unless otherwise specified.

[0012] FIG. 1 depicts a partially exploded, isometric view of one embodiment and orientation of the support arm and demonstrates one manner in which it may be coupled with a reel assembly.

[0013] FIG. 2 depicts a side elevation, cutaway view of the support arm and reel assembly depicted in FIG. 1.

[0014] FIG. 3 depicts an isometric, partially exploded view of another embodiment of the support system as the same may be used to support a reel assembly.

[0015] FIG. 4 depicts a partially exploded isometric view of still another embodiment of the support system as the same could be used to support a reel assembly.

[0016] FIG. 5 depicts yet another partially exploded isometric view of the support system as the same could be used to support a reel assembly.

[0017] FIG. 6 depicts still another embodiment of the support system as the same could be used to support a reel assembly.

[0018] FIG. 7 depicts another embodiment of the support system as the same may provide pivotable support to a reel assembly.

[0019] FIG. 8 depicts yet another embodiment of the support system as the same could provide pivotable support to a reel assembly.

[0020] FIG. 9 depicts a cutaway, side elevation view of another embodiment of the support system as the same could provide pivotable support to a reel assembly.

[0021] FIG. 10 depicts yet another embodiment of the support system as the same could provide pivotable support to a reel assembly.

[0022] FIG. 11 depicts still another embodiment of the support system as the same could be used to provide pivotable support to a reel assembly.

DETAILED DESCRIPTION

[0023] Embodiments are described more fully below with reference to the accompanying figures, which form a part hereof and show, by way of illustration, specific exemplary embodiments. These embodiments are disclosed in sufficient detail to enable those skilled in the art to practice the invention. However, embodiments may be implemented in many different forms and should not be construed as being limited to the embodiments set forth herein. The following detailed description is, therefore, not to be taken in a limiting sense.

[0024] Support systems of the present technology are generally provided to support at least one reel assembly in one of various use positions with respect to a base support structure. It is contemplated that the support systems may be used with reel assemblies of a nearly endless number of different designs. Commonly, however, a reel assembly 10 used with the support systems disclosed herein will be configured to support one or more lengths of generally flexible fluid delivery lines 12. Some examples of such fluid delivery lines 12 include hoses designed for the delivery of various gases, such as compressed air, and liquids, such as water and other chemical compositions. Accordingly, irrespective of the specific design of the reel assembly 10, it is contemplated that the reel assembly 10 will include a line support section or hub 14 that extends between opposite end portions 16 and 18 of the reel assembly 10. The hub 14 may be shaped as a drum with a partially open or continuous exterior surface 20, which is

adapted for supporting a length of the hose 12. Other designs of hubs 14 may be used, such as those including individual, elongated support members circumferentially spaced about an axis of rotation. Some reel assemblies may include a pair of opposing flanges 22 and 24 that project outwardly from the opposing end portions 16 and 18 of the reel assembly 10, to form an annular channel for receiving a length of the fluid delivery line 12. The reel assembly 10 will commonly include an axle 26, having a first end portion 28 and a second end portion 30, that is provided to extend coaxially with the hub 14 and be operatively coupled with the hub 14 in a manner that permits selective rotation of the hub 14 about the axle 26. In some embodiments, a handle 32 is secured with one of the opposing flanges 22 or 24 to permit manual rotation of the reel assembly 10. Components of applicant's reel assembly described in U.S. Pat. No. 7,389,790, issued on Jun. 24, 2008, may provide an exemplary embodiment of a reel assembly 10 that may be used with the support systems of the present technology.

[0025] With reference to FIGS. 1-5, a modular support arm 100, having a first end portion 102 and a second end portion 104, may be provided to support the reel assembly 10 in one of various positions. In many embodiments, the support arm 100 will have at least a first arm section 106, associated with the first end portion 102, and a second arm section 108, associated with the second end portion 104. The first arm section 106 and second arm section 108 are provided as separate structures that each include mating end portions 110 and 112 that are releasably, coaxially securable with one another. Specifically, the mating end portion 110 and mating end portion 112 are shaped to engage one another in a manner that resists rotation of the mating end portions 110 and 112 with respect to one another. In some embodiments, the mating end portions 110 and 112 are shaped to have a plurality of spaced-apart teeth 114 that are shaped to intermesh with one another in a first secure position as depicted in FIG. 2. The first arm section 106 and second arm section 108 may then be separated from one another, rotated axially with respect to one another, and re-secured with one another in a second secure position that changes the orientation of the support arm 100. In this manner, the mating end portions, with their spaced-apart teeth 114, serve as indexing cogs. The mating end portion 110 and mating end portion 112 may be secured with one another using various mechanical fasteners such as the threaded fastener 116 that passes coaxially at least partially through the second arm section of the 108 and is received, coaxially, by mating threads 118 associated with the mating end portion 110 of the first arm section 106.

[0026] At least one end portion of the reel assembly 10 is operatively coupled with a mounting end portion 120 of the first arm section 106. In some embodiments, the mounting end portion 120 of the first arm section 106 is coupled with the axle 26 on which the reel assembly 10 rotates. Depending upon the orientation of the opposing flanges 22 and 24 of the reel assembly 10, it is contemplated that the first arm section 106 may extend outwardly from the axle at an angle, as depicted in FIGS. 1-5. This angle may approximate 45 degrees or other angle that best suits the design of the reel assembly 10 and its intended use. In various embodiments, the mounting end portion 120 is provided with a mounting receiver 122, which is provided with a recess that is shaped to receive a length of the axle 26 adjacent an end portion of the reel assembly 10. A mounting cap 124 is likewise provided, with a recess that is shaped to receive a length of the axle 26,

whereby the mounting cap 124 may be coupled with the mounting receiver 122 in a manner that disposes a length of the axle 26 between the mounting receiver 122 and mounting cap 124, securing the axle with the first arm section 106. One or more mechanical fasteners 126 may be provided to removably engage the mounting receiver 122 and the mounting cap 124 in a secure position. In particular, the mechanical fasteners 126 may help provide a compressive force that secures the axle 26 with respect to the first arm section 106. In this orientation, the axle 26 and first arm section 106 may be provided in a static position with respect to the rotatably mounted reel assembly 10.

[0027] In various contemplated uses, it may be desirable to secure the reel assembly 10 in a non-rotating position with respect to the axle 26 and the support arm 100. In some embodiments, an elongated pin member 128 may be coupled with the mounting end portion 120 of the first arm section 106 so that the pin member 128 is selectively movable along its long axis between locked and unlocked positions with respect to the reel assembly 10. A plurality of recesses 130 may be formed within an end portion of the reel assembly 10, adjacent the mounting end portion 120 of the first arm section 106. The recesses 130 will be shaped to receive a length of the pin member 128 in the locked position, whereby rotational movement of the reel assembly 10 is substantially prevented with respect to the first arm section 108. A plurality of recesses 130 may be positioned in a circular pattern about a central opening in the reel assembly 10 that receives the axle 26. In this manner, the reel assembly 10 may be locked, incrementally, in various positions throughout its rotational cycle. In some embodiments, a spring member 132 may be associated with the mounting end portion 120 of the first arm section 106 and the pin member 128 in a manner that biases the pin member toward the locked position. In particular, the mounting end portion 120 of the first arm section 106 may be formed to include a slot 134 that is shaped to slidably receive a handle member 136, associated, with an end portion of the pin member 128, when the pin member 128 is in the locked position. The pin member 128 may be rotatably coupled with the mounting end portion 120 of the first arm section 106 such that the pin member 128 may be moved into the unlocked position by sliding the handle member from within the slot 134 with the pin member 128 withdrawn from the recess 130 such that the handle member 136 is clear of the slot 134. The pin member 128 may be retained in the unlocked position by rotating the pin member 128 until the handle member 136 is prevented from re-entering the slot 134.

[0028] With reference to FIGS. 1 and 2, the support arm 100 may be provided with a third arm section 138 having a first mating end portion 140 and second mating end portion 142 that are shaped to engage the mating end portions 110 and 112 of the first arm section 106 and second arm section 108 in a manner that resists rotation of the mating end portions 140 and 142 of the third arm section 138 with the mating, end portions 110 and 112 of the first arm section 106 and second arm section 108. In some embodiments, the first mating end portion 140 and second mating end portion 142 may be shaped to have a plurality of spaced-apart teeth 114, such as described previously with respect to the first arm section 106 and second arm section 108. In some embodiments, such as depicted in FIGS. 1 and 2, the long axis that extends through the third arm section 138 may be bent to at least approximate a right angle. In this manner, the third arm section 138 may provide an "elbow section" for orienting the first arm section

106 with respect to the second arm section 108. Accordingly, the approximate right angle of the long axis that extends through the third arm section 138 may be at 90 degrees or may be provided to have an angle that is less than or greater than 90 degrees according to the desired design parameters. With the first mating end portion 140 of the third arm section 138 positioned against the mating end portion 110 of the first arm section 106, a mechanical fastener, such as the threaded fastener 116, may be passed through the first mating end portion 140 and received by mating threads 118 formed within the mating end portion 110 of the first arm section 106. Similarly, the second mating end portion 142 may be secured with the mating end portion 112 of the second arm section 108 by passing a mechanical fastener, such as the threaded fastener 116, through mating threads 118 formed within the second mating end portion 142 of the third arm section 138. However, it is contemplated that reversal of parts by passing the mechanical fasteners through one arm section and providing mating threads within an opposite arm section is contemplated.

[0029] With reference to FIG. 3, a fourth arm section 144 may be associated with the support arm 100. The fourth arm section 144 will be shaped to have a first mating end portion 146 and a second mating end portion 148 at opposite ends of the fourth arm section 144. The first mating end portion 146 and second mating end portion 148 will be shaped to engage the mating end portions of any of the first arm section 106, second arm section 108, and third arm section 138. In some embodiments, a long axis that extends through the fourth arm section 144 may be straight. In this manner, the fourth arm section 144 may serve as an extension for disposing the reel assembly 10 at a further distance away from the second arm section 108. An exemplary orientation is shown in FIG. 3, whereby the mating end portion 110 of the first arm section 106 is secured with the first mating end portion 146 of the fourth arm section 144. The second mating end portion 148 of the fourth arm section 144 is secured with the first mating end portion 140 of the third arm section 138. The second mating end portion 142 of the third arm section 138 may then be secured with the mating end portion 112 of the second arm section 108. As described previously with respect to the joinder of the first arm section 106, second arm section 108, and third arm section 138 with respect to one another, the fourth arm section 144 may be secured to adjoining arm sections through the use of one or more mechanical fasteners, such as the elongated threaded fastener 150, with mating threads 118 disposed within one mating end portion of an adjoining arm section.

[0030] A mounting end portion 152 of the second arm section 108 will be shaped to be securely engaged with a support structure, such as a wall, support frame, or the like, whether or not the support structure is statically positioned or mobile. With reference to at least FIGS. 1, 2, and 5, the mounting end portion 152 of the second arm section 108 is shaped, in some embodiments, to define a mounting plate. 154 having a mounting surface 156 that is shaped to securably engage a generally planar portion of the support structure. While it is contemplated that the mounting surface 156 will be formed to be generally planar in nature, other configurations are contemplated depending upon the environment in which the reel assembly 10 will be used. Moreover, it is contemplated

plated that the mounting surface **156** may be formed in a contiguous nature or in a plurality of spaced-apart planar structures. In some embodiments, the mounting surface **156** is shaped to define a recess **158** that extends into the mounting end portion **152** of the second arm section **108**, adjacent the mating end portion **112** of the second arm section **108**. While the recess may prove to reduce the weight of the second arm section **108** and reduce the amount of materials used to fabricate the same, it further provides an area that permits a mechanical fastener, such as the threaded fastener **116**, to be placed in the recess **158** and removably passed, at least partially, through the mating end portion **112** of the second arm section **108**. It is contemplated, therefore, that the recess **158** will be shaped to not only receive the mechanical fastener, but also provide access to the mechanical fastener with one of various types of tools for securing and removing the mechanical fastener.

[0031] With reference to FIGS. **3** and **4**, some embodiments of the mounting end portion **152** of the second arm section **108** may be shaped to have an elongated mounting post **160**. While it is contemplated that the elongated mounting post **160** could be secured to, or received within, nearly any structure, many embodiments will provide a collar or sleeve element (not depicted) that will securely receive the elongated mounting post **160**. In some embodiments, the elongated mounting post **160** will have a cross-sectional shape that is polygonal. Where the receiving sleeve is similarly shaped, rotation of the elongated mounting post **160** about its long axis will be substantially prevented. One or more fasteners may be passed through both the mounting sleeve and the elongated mounting post **160** to secure their position with respect to one another. However, it is contemplated that the weight of the support arm **100** and reel assembly **10** will generally keep the elongated mounting post **160** in its secure position with respect to a static or mobile structure.

[0032] With reference to FIG. **6**, it is contemplated that the support arm **100** may be provided in a form that includes a shortened or abbreviated first arm section **106** and second arm section **108**. In the exemplary embodiment depicted, the first arm section **106** is reduced to a form that includes, primarily, a mounting end portion **120** with the aforescribed mounting receiver **122** and mounting cap **124**. This mounting end portion may be removably or permanently secured with the axle **26** as described previously. The second arm section **108**, in this particular embodiment, may consist primarily of a mounting end portion **152** and a mounting plate **154**. Such embodiments will be desirable where it is not necessary to extend the reel assembly **10** away from a static or mobile mounting structure. In some instance, the mounting structure will include its own projection or aperture to which the support arm **100** will be secured.

[0033] With reference to FIGS. **7-11**, some embodiments of the support arm **100** may replace the previously described first arm section **106** with a first arm section **162** that includes a pivot joint **164** between the mounting end portion **166** and the mating end portion **168** of the first arm section **162**. While the pivot joint **164** is depicted and described as being disposed within the first arm section **162**, it is contemplated that nearly any of the arm sections described herein may include a pivot joint similar to the pivot joint **164**. To that end, it is further contemplated that multiple pivot joints may be associated with one or more of the arm sections of the support arm **100**. Where the pivot joint **164** is disposed within the first arm section **162** between the mounting end portion **166** and the

mating end portion **168**, the mounting end portion **166** will pivot on a pivot axis with respect to the mating end portion **168**.

[0034] In some regards, the first arm section **162** may be formed similarly to the first arm section **106**. For example, the mounting end portion **166** of the first arm section **162** may include a mounting receiver **122** and mounting cap **124** as described previously herein. To that end, the mounting end portion **166** may be removably or permanently secured with a portion of the reel assembly **10**, such as the axle **26**. However, in other embodiments, it is contemplated that such mounting structures will be unnecessary as the first arm section **162** will include an axle support member **170**, having a first end portion **172** and an opposite second end portion **174** that extend from within the first arm section **162**. A length of the first end portion **172** may be formed to define the axle **26** on which the reel assembly **10** rotates. It is also contemplated, however, that the first end portion **172** may simply form a mounting point for a separate axle **26**. The second end portion **174** of the axle support member **170** may be formed to define a pivot support **176**, whereby a length of the second end portion **174** extends into a socket **178** in the mating end portion **168** of the first arm section **162** in order to pivotably support a portion of the first arm section **162** and the reel assembly **10**. One or more bearings **182** of various designs known and used in the industry may be disposed between the pivot support **176** and the socket **178** to provide a secure, rotatable coupling between the pivot support **176** and the socket **178**. In some embodiments, a length of the pivot support **176** will be oriented perpendicularly in relation to the axle **26** on which the reel assembly rotates. In this manner, the reel assembly **10** may be pivoted throughout a plane on which the axle **26** lies.

[0035] In some orientations, an engagement face of the mating end portion **168** of the first arm section **162** is oriented to face perpendicularly from the pivot axis on which the pivot support **176** rotates. In such embodiments, the mating end portion **168** of the first arm section **162** is shaped to have a decidedly right angle prior to its terminal end portion. In doing so, however, the apex of the bend at the mating end portion **168** provides an opportunity to engage a swivel coupling **180** with the second end portion **174** of the axle support member **170**. Where the axle support member **170** is provided as a hollow, tubular structure, and a swivel coupling **180** is secured with the second end portion **174**, the swivel coupling **180** may be joined with a fluid source delivery line (not depicted) so that the fluid may be delivered from the fluid delivery line, through the axle support member **170** directly to the reel assembly **10** and, in some instances, a second swivel coupling **180** that is secured with the first end portion **172** of the axle support member **170**. A terminal end portion of this second swivel coupling **180** may then be secured with the fluid delivery line **12** supported on the reel assembly **10**. In this manner, the reel assembly **10** may pivot about its axle **26** and pivot about an axis extending through a portion of its support arm **100** while fluid is effectively delivered from a fluid source to the fluid delivery line **12** on the reel assembly **10**.

[0036] In some embodiments, a second elongated pin member **128** may be coupled with the mating end portion **168** of the first arm section **162** such that it is selectively movable along its long axis between locked and unlocked positions. A plurality of recesses **130** may be formed within the first arm section **162**, adjacent the mating end portion **168**, whereby the recesses are shaped to receive a length of the pin member

128 in the locked position in order to substantially restrict pivoting movement of the pivot support **176** with respect to the mating end portion **168** of the first arm section **162**. In some embodiments, the pin member **128** may move along an axis that is generally parallel with the pivot axis on which the pivot support **176** rotates. Accordingly, the plurality of recesses **130** may be positioned in a circular pattern that encircles the pivot axis, enabling the pivot joint **164** to be freely rotated and secured at a plurality of positions along its rotational path. A spring member **132** may be coupled with the mating end portion **168** of the first arm section **162** and the pin member **128** in a manner that biases the pin member **128** toward the locked position. The mating end portion **168** of the first arm section **162** may be formed to include a slot **134** that is shaped to slidably receive a handle member **136** that is associated with an end portion of the pin member **128**, when the pin member **128** is in the locked position. In some embodiments, the pin member **128** may be rotatably coupled with the mating end portion **168** of the first arm section **162** such that the pin member **128** may be moved to the unlocked position by sliding the handle member **136** from within the slot **134**. The pin member **128** will be generally retained in the unlocked position by rotating the pin member **128** until the handle member **136** is prevented from re-entering the slot **134**.

[0037] In many embodiments, the first arm section **162** may be provided with a shape that first extends downwardly and away from the reel assembly **10** at an angle, such as previously described for the first arm section **106**. The first arm section **162** may then bend beneath itself so that a length of the first arm section **162** is positioned beneath the reel assembly **10** and in a plane that is generally parallel with the axis on which the reel assembly **10** rotates. The first arm section **162** may then bend again so that the second end portion **174** of the axle support member **170** is disposed in a generally vertical fashion, beneath the reel assembly **10**. In some respects, at least a portion of the first arm section **162** will generally resemble a question mark. It is contemplated that this orientation will place a majority of the weight from the reel assembly **10** directly on the pivot support **176** and retain the same within its socket **178**.

[0038] It is contemplated that the first arm section **162** and the axle support member **170** could be formed in a uniform construction with one another. However, it is also contemplated that the first arm section **162** and the axle support member **170** will be separate structures simply coupled with one another. To this end, these structures may be formed from the same or dissimilar materials. For example, in some embodiments, the axle support member **170** may be formed first from a material, such as various castable or extrudable metals, or from various polymers, depending upon the intended use. Thereafter, the first arm section **162** may be formed around the axle support member **170** and formed from other castable or extrudable metals, polymers, and the like. In at least one specific example, the first arm section **162**, as well as the reel assembly **10** and the remainder of the support arm **100**, may be formed from a lightweight, aluminum material or blend of materials that is corrosion resistant as well as lightweight and inexpensive.

[0039] The aforementioned modular nature of the support arm **100** with its plurality of arm sections applies irrespective of whether or not a first arm section **162**, with its pivot joint **164**, is used. With reference to FIGS. 8-11, a third arm section **138** may be provided with a long axis extending through the

third arm section **138** that is straight. In some embodiments, the mating end portion **168** of the first arm section **162** may be secured with the first mating end portion **140** of the third arm section **138**. The second mating end portion **142** of the third arm section **138** may then be secured with the first mating end portion of the second arm section **108**. As described herein previously, the mounting end portion **152** of the second arm section **108** may be shaped to have a mounting plate **154** or an elongated mounting post **160**, as those structures have been described previously herein.

[0040] With reference to FIG. 7, a third arm section **138** may be provided with a long axis that extends through the arm section **138** and is bent to approximate a right angle. A fourth arm section **144** may also be provided that has a long axis extending through it that is bent to at least approximate a right angle. In this embodiment, the mating end portion **168** of the first arm section **162** is secured with the first mating end portion **140** of the third arm section **138**. The second mating end portion **142** of the third arm section **138** may then be secured with the first mating end portion **146** of the fourth arm section **144**. Finally, the second mating end portion **148** of the fourth arm section **144** may be secured with the mating end portion **112** of the second arm section **108**. In this manner, a mounting plate **154**, disposed at the mounting end portion **152** of the second arm section **108**, may be disposed directly beneath the pivot axis of the pivot support **176** and receive a majority of the weight from the reel assembly **10** and the support arm **100** directly.

[0041] Although the system and methods of employing the same have been described in language that is specific to certain structures, materials, and methodological steps, it is to be understood that the invention defined in the appended claims is not necessarily limited to the specific structures, materials, and/or steps described. Rather, the specific aspects and steps are described as forms of implementing the claimed invention. Since many embodiments of the invention can be practiced without departing from the spirit and scope of the invention, the invention resides in the claims hereinafter appended. Unless otherwise indicated, all numbers or expressions, such as those expressing dimensions, physical characteristics, etc. used in the specification (other than the claims) are understood as modified in all instances by the term "approximately." At the very least, and not as an attempt to limit the application of the doctrine of equivalents to the claims, each numerical parameter recited in the specification or claims which is modified by the term "approximately" should at least be construed in light of the number of recited significant digits and by applying ordinary rounding techniques. Moreover, all ranges disclosed herein are to be understood to encompass and provide support for claims that recite any and all subranges or any and all individual values subsumed therein. For example, a stated range of 1 to 10 should be considered to include and provide support for claims that recite any and all subranges, or individual values that are between and/or inclusive of the minimum value of 1 and the maximum value of 10; that is, all subranges beginning with a minimum value of 1 or more and ending with a maximum value of 10 or less (e.g., 5.5 to 10, 2.34 to 3.56, and so forth) or any values from 1 to 10 (e.g., 3, 5.8, 9.9994, and so forth).

What is claimed is:

1. A system for supporting lengths of one or more fluid delivery lines, the system comprising:
 - a reel assembly having opposite end portions and a line support section located between the opposite end por-

tions that is oriented to support the lengths of one or more fluid delivery lines; and

a support arm having a first end portion and a second end portion; the support arm having at least a first arm section, associated with the first end portion, and a second arm section, associated with the second end portion; the first arm section and second arm section including mating end portions that are releasably, coaxially securable with one another;

the mating end portions of the first arm section and second arm section being shaped to engage one another in a manner that resists rotation of the mating end portions of the first arm section and second arm section with respect to one another;

at least one end portion of the reel assembly being operatively coupled with a mounting end portion of the first arm section;

a mounting end portion of the second arm section being shaped to securably engage a support structure.

2. The system of claim 1 wherein the mating end portions of the first arm section and second arm section are shaped to have a plurality of spaced-apart teeth that are shaped to permit teeth from the mating end portion of the first arm section to intermesh with the teeth from the mating end portion of the second arm section.

3. The system of claim 2 wherein the mating end portions of the first arm section and second arm section are shaped to: (i) engage one another in a first secure position with respect to one another; (ii) separate from one another; (iii) rotate axially with respect to one another, and (iv) be secured with one another in a second secure position.

4. The system of claim 1 wherein the mating end portion of the first arm section and the mating end portion of the second arm section are secured with one another with a threaded fastener that passes, coaxially, at least partially through the second arm section and is received, coaxially, by mating threads associated with the mating end portion of the first arm section.

5. The system of claim 1 wherein the mounting end portion of the first arm section is coupled with an axle on which the reel assembly rotates; the first arm section extending outwardly from the axle at an angle.

6. The system of claim 5 further comprising a third arm section, associated with the support arm; the third arm section having first and second opposite mating end portions that are shaped to engage the mating end portions of the first and second arm sections in a manner that resists rotation of the mating end portions of the third arm section with the mating end portions of the first arm section and second arm section.

7. The system of claim 6 wherein a long axis that extends through the third arm section is bent to at least approximate a right angle; the mating end portion of the first arm section is secured with the first mating end portion of the third arm section; the second mating end portion of the third arm section being secured with the mating end portion of the second arm section.

8. The system of claim 7 further comprising a fourth arm section, associated with the support arm; the fourth arm section having first and second opposite mating end portions that are shaped to engage the mating end portions of any of the first, second, and third arm sections in a manner that resists rotation of the mating end portions of the fourth arm section with the mating end portions of any of the first arm section, second arm section, and third arm section.

9. The system of claim 8 wherein a long axis that extends through the fourth arm section is straight; the mating end portion of the first arm section being secured with the first mating end portion of the fourth arm section; the second mating end portion of the fourth arm section being secured with the first mating end portion of the third arm section; the second mating end portion of the third arm section being secured with the mating end portion of the second arm section.

10. The system of claim 5 wherein the mounting end portion of the first arm section is provided with a mounting receiver having a recess that is shaped to receive a length of the axle adjacent an end portion of the reel assembly; a mounting cap being provided with a recess to receive a length of the axle and shaped to couple with the mounting receiver, whereby a length of the axle is positioned between the mounting receiver and mounting cap, securing the axle with the first arm section.

11. The system of claim 10 further comprising at least one mechanical fastener that removably engages the mounting receiver with the mounting cap in a secure position.

12. The system of claim 5 further comprising a pin member having a long axis and operatively coupled with the mounting end portion of the first arm section; the pin member being selectively movable along the long axis between locked and unlocked positions; a plurality of recesses formed within an end portion of the reel assembly, adjacent the mounting end portion of the first arm section; the recesses being shaped to receive a length of the pin member in the locked position, whereby rotational movement of the reel assembly is substantially prevented.

13. The system of claim 12 wherein the plurality of recesses are positioned in a circular pattern about an opening in the reel assembly that receives the axle.

14. The system of claim 12 further comprising a spring member associated with the mounting end portion of the first arm section and the pin member in a manner that biases the pin member toward the locked position; the mounting end portion of the first arm section including a slot that is shaped to slidably receive a handle member, associated with an end portion of the pin member, when the pin member is in the locked position; the pin member being rotatably coupled with the mounting end portion of the first arm section such that the pin member may be moved to the unlocked position by sliding the handle member from within the slot; the pin member being retained in the unlocked position by rotating the pin member until the handle member is prevented from entering the slot.

15. The system of claim 1 wherein the mounting end portion of the second arm section is shaped to have an elongated mounting post; the support structure including a receiving socket that is shaped to releasably and securably receive the mounting post.

16. The system of claim 1 wherein the mounting end portion of the second arm section is shaped to define a mounting plate having a mounting surface that is shaped to securably engage a generally planar portion of the support structure.

17. The system of claim 16 wherein the mounting surface of the mounting plate is shaped to define a recess that extends into the mounting end portion of the second arm section, adjacent the mating end portion of the second arm section; the recess being shaped to permit a mechanical fastener to be placed in the recess and removably passed at least partially through the mating end portion of the second arm section.

18. The system of claim **1** wherein the support arm includes a pivot joint between the first and second end portions of the support arm, whereby a length of the support arm that is coupled with the reel assembly may be selectively pivoted with respect to the second end portion of the support arm.

19. The system of claim **18** wherein the pivot joint is disposed within the first arm section between the mounting end portion and mating end portion of the first arm section, whereby the mounting end portion pivots on an a pivot axis with respect to the mating end portion.

20. The system of claim **19** wherein an engagement face of the mating end portion of the first arm section is oriented to face perpendicularly from the pivot axis.

21. The system of claim **19** further comprising a pin member having a long axis and operatively coupled with the mating end portion of the first arm section; the pin member being selectively movable along the long axis between locked and unlocked positions; a plurality of recesses formed within the first arm section, adjacent the mating end portion; the recesses being shaped to receive a length of the pin member in the locked position, whereby pivoting movement of the mounting end portion of the first arm section, with respect to the mating end portion, is substantially prevented.

22. The system of claim **21** wherein the plurality of recesses are positioned in a circular pattern that encircles the pivot axis.

23. The system of claim **22** further comprising a spring member associated with the mating end portion of the first arm section and the pin member in a manner that biases the pin member toward the locked position; the mating end portion of the first arm section including a slot that is shaped to slidably receive a handle member, associated with an end portion of the pin member, when the pin member is in the locked position; the pin member being rotatably coupled with the mating end portion of the first arm section such that the pin member may be moved to the unlocked position by sliding the handle member from within the slot; the pin member being retained in the unlocked position by rotating the pin member until the handle member is prevented from entering the slot.

24. The system of claim **19** further comprising an axle support member, having first and second end portions; a length of the first end portion defining an axle on which the reel assembly rotates; the second end portion defining a pivot support, whereby a length of the second end portion extends into a socket in the mating end portion of the first arm section to pivotably support the reel assembly.

25. The system of claim **24** wherein a length of the axle support member extends coaxially through the mounting end portion of the first arm section.

26. The system of claim **24** wherein a length of the pivot support is oriented perpendicularly in relation to the axle.

27. The system of claim **24** further comprising a swivel coupling coupled with the second end portion of the axle support member, whereby a fluid delivery line may be operatively, pivotably coupled with the axle support line.

28. The system of claim **27** further comprising a second swivel coupling coupled with the first end portion of the axle support member, whereby a second fluid delivery line may be operatively, pivotably coupled with the axle support line while the fluid delivery line is supported on the reel assembly.

29. The system of claim **19** further comprising:

a third arm section, associated with the support arm; the third arm section having first and second opposite mating end portions and a long axis extending through the third arm section that is straight;

the mating end portion of the first arm section being secured with the first mating end portion of the third arm section; the second mating end portion of the third arm section being secured with the first mating end portion of the second arm section.

30. The system of claim **29** wherein the mounting end portion of the second arm section is shaped to have an elongated mounting post; the support structure including a receiving socket that is shaped to releasably and securably receive the mounting post.

31. The system of claim **29** wherein the mounting end portion of the second arm section is shaped to define a mounting plate having a mounting surface that is shaped to securably engage a generally planar portion of the support structure.

32. The system of claim **19** further comprising:

a third arm section, associated with the support arm; the third arm section having first and second opposite mating end portions and a long axis that extends through the third arm section that is bent to at least approximate a right angle;

a fourth arm section, associated with the support arm; the fourth arm section having first and second opposite mating end portions and a long axis extending through the fourth arm section that is bent to at least approximate a right angle;

the mating end portion of the first arm section being secured with the first mating end portion of the fourth arm section; the second mating end portion of the fourth arm section being secured with the first mating end portion of the third arm section; the second mating end portion of the third arm section being secured with the mating end portion of the second arm section.

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