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(19) **United States**(12) **Patent Application Publication****Waz et al.**(10) **Pub. No.: US 2016/0068366 A1**(43) **Pub. Date: Mar. 10, 2016**(54) **DETACHABLE WIRE MANAGEMENT
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(2013.01)

(57)

ABSTRACT

A wire management device for providing ability to wind, unwind and retract wires, cords, cables, strings, threads and similar objects onto a spool. By having wire brought onto the spool from one side through a slot, hole, opening, or over the edge of spool wall, the device may engage loose, unilaterally or bilaterally attached wires external to it, thereby delivering a new functionality and also making it portable and reusable. Wire centering elements enable centering of the spool with respect to the wire when tension is applied to the wire. These elements do not hamper the winding, unwinding, or retraction of the wire. A wire distribution guide mechanism further enables even distribution of the wire across the spool when the wire is retracted, while not affecting the operation of the wire management device.

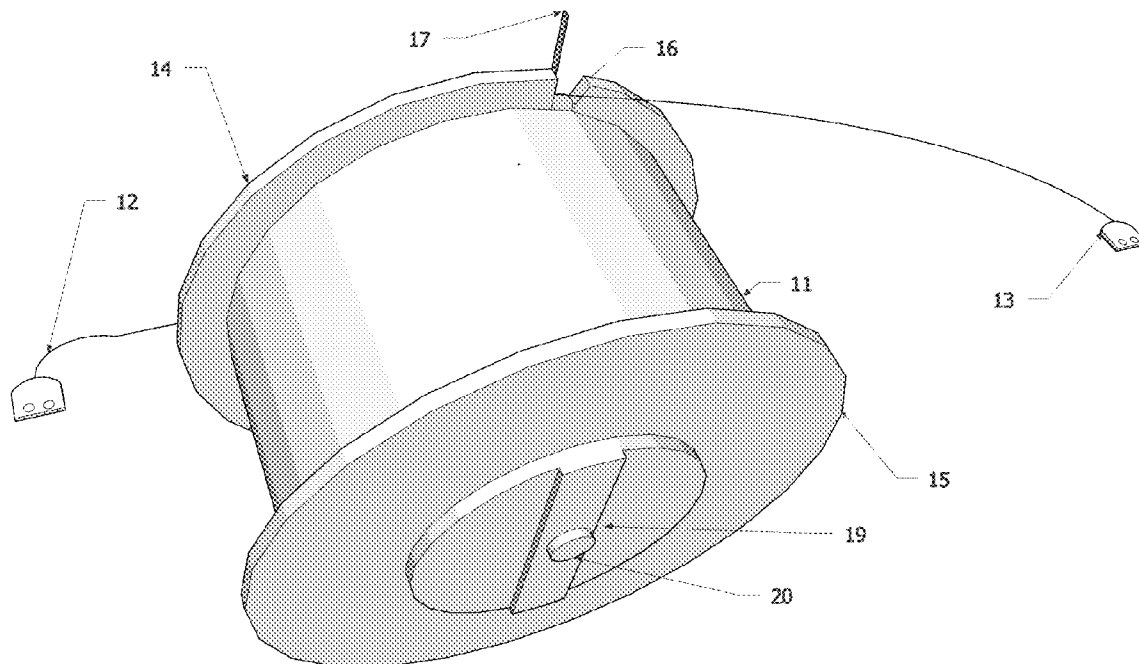


FIG.1

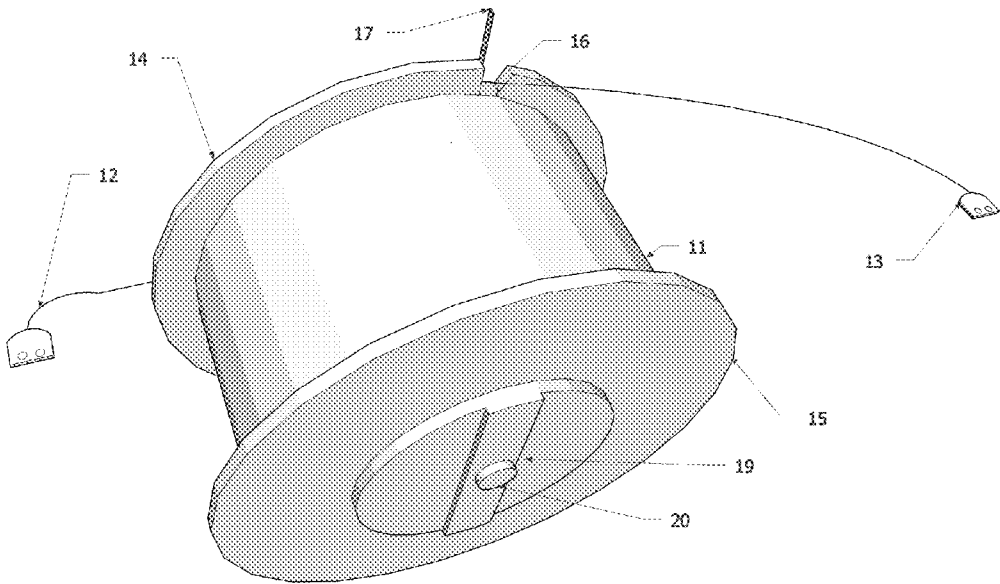
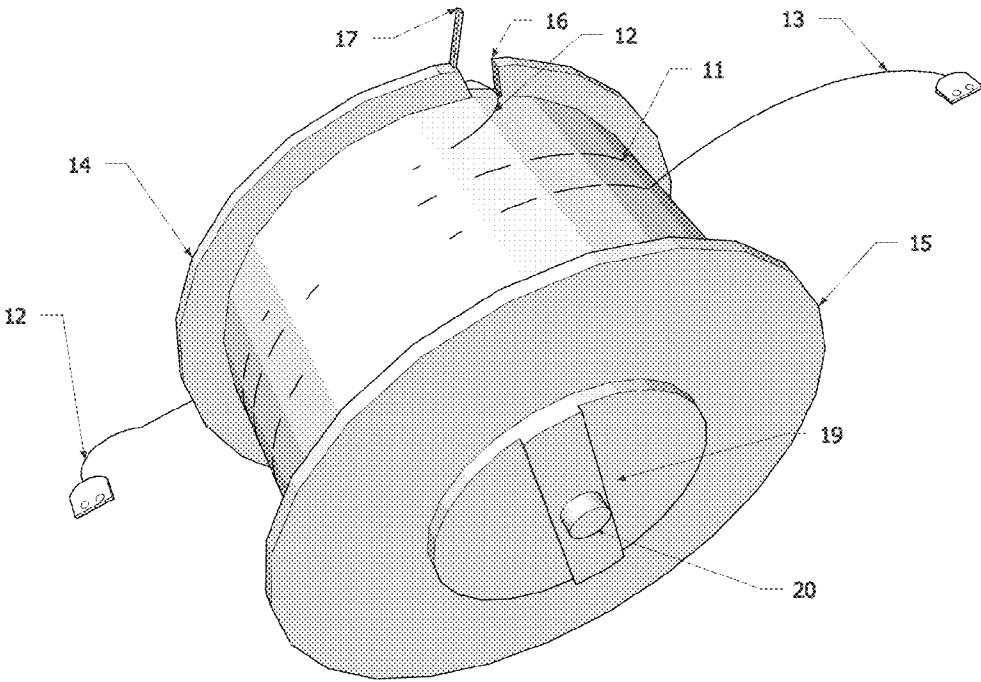
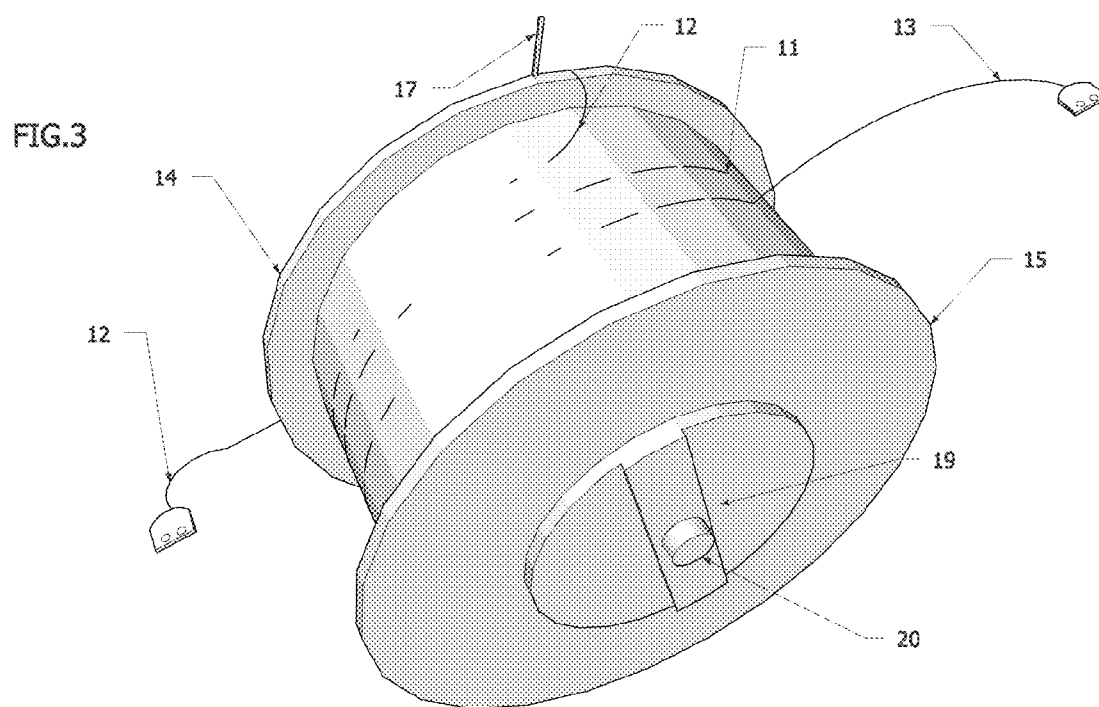
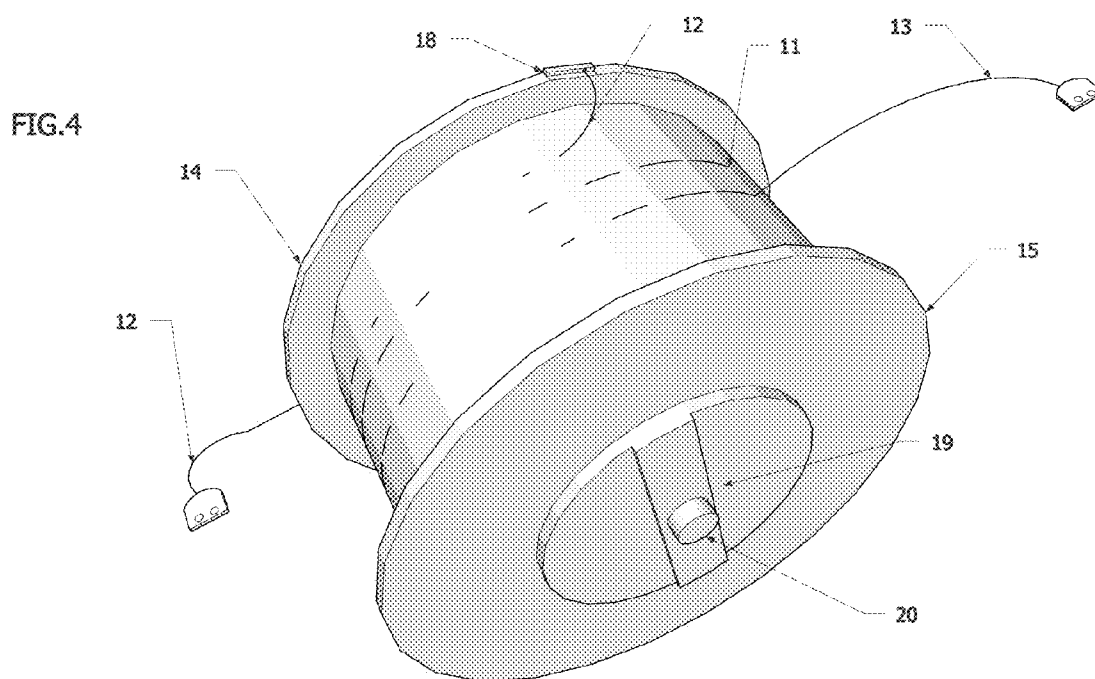


FIG.2







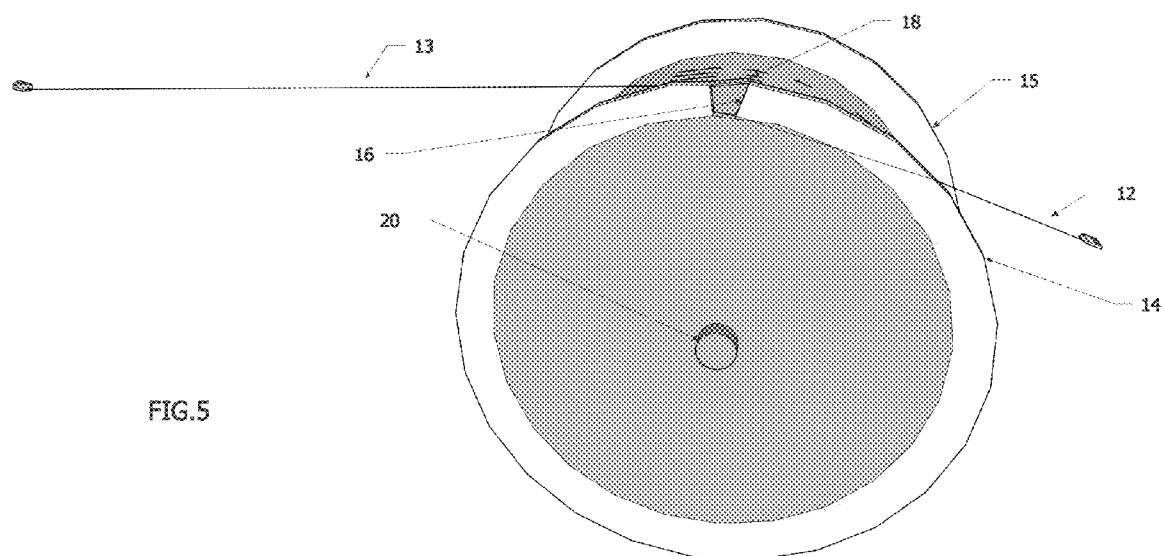
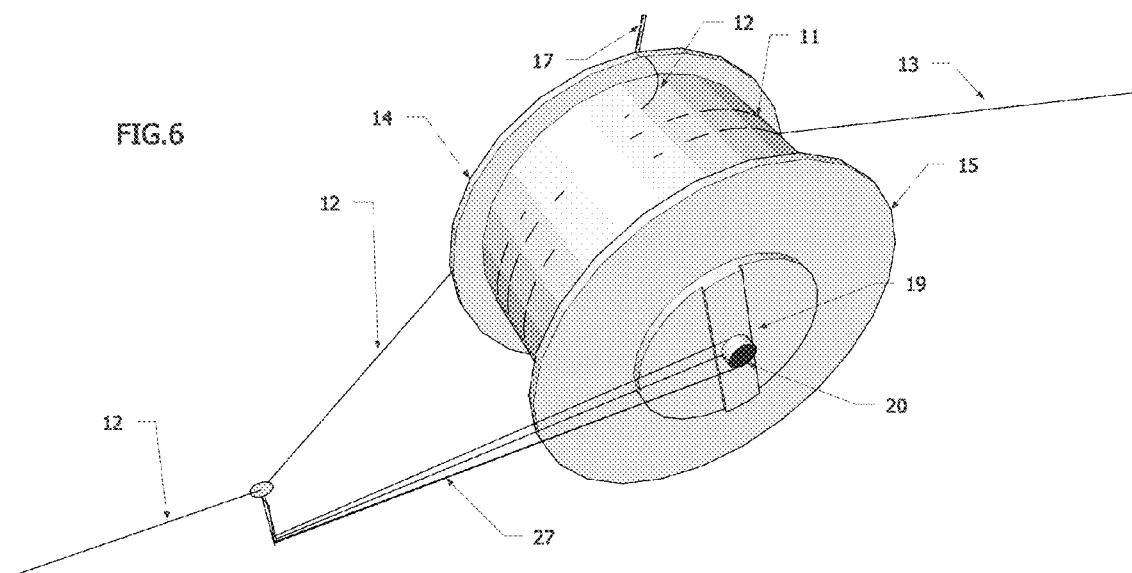
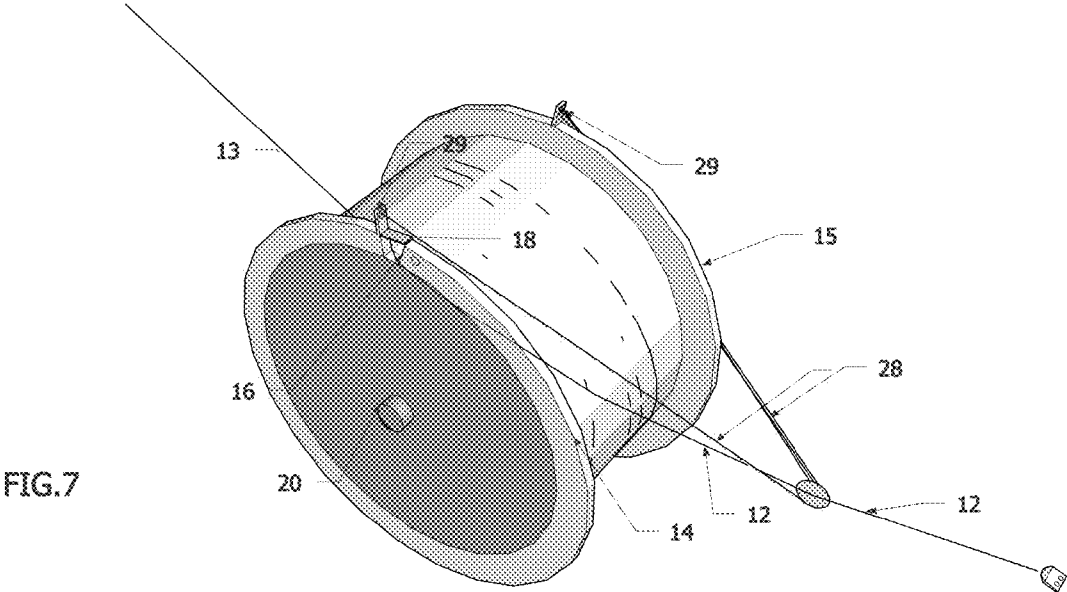
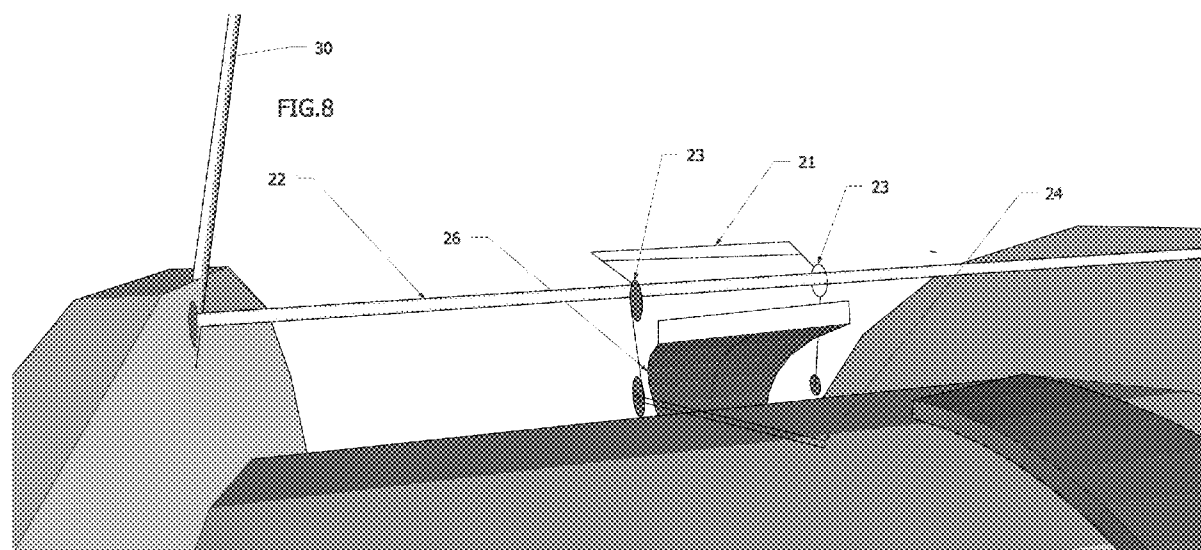
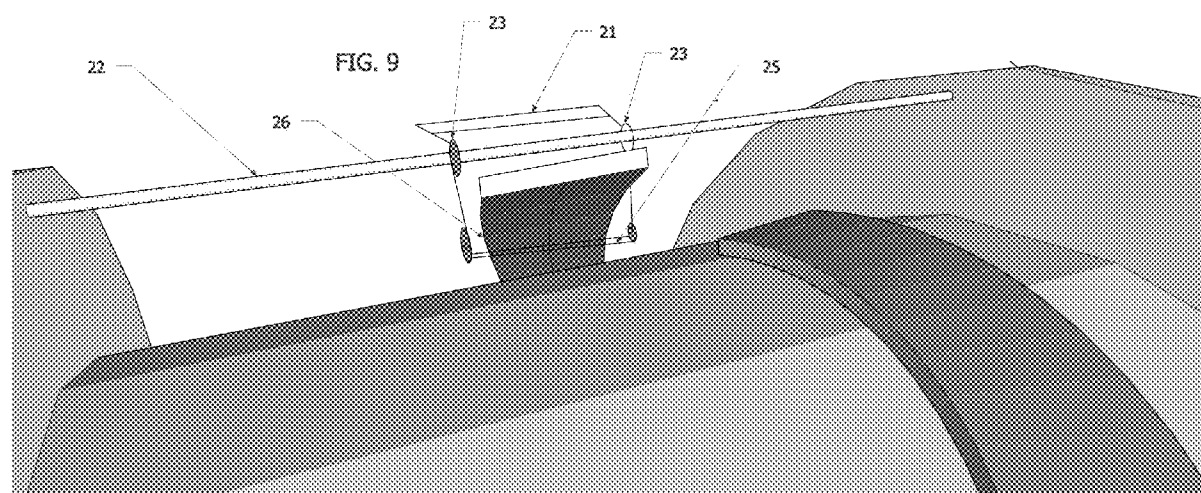


FIG.5









DETACHABLE WIRE MANAGEMENT DEVICE

CLAIM OF PRIORITY UNDER 35 U.S.C. §119

[0001] The present Application for Patent claims priority to Provisional Application No. 61/914,963 entitled “DETACHABLE WIRE MANAGEMENT DEVICE” filed Dec. 12, 2013, and hereby expressly incorporated by reference herein.

BACKGROUND

[0002] The present disclosure relates to wire management of loose wires, as well as unilaterally or bilaterally attached wires.

[0003] WMDs are generally used for the following reasons: (1) the ability to physically contain wires, usually by means of winding them on a spool; (2) the ability to easily unwind and rewind wires from and back on to the spool; (3) the ability to minimize the length of the unwound wire to maintain spatial order. This is achieved typically by applying tension to the wire to keep it straight.

[0004] WMDs currently available on the market are not capable of delivering all of the above functionalities, while such a WMD could be attached to a loose, unilaterally or bilaterally attached wire in such a way that both ends of the wire are accessible. Such a device would be externally (with respect to the wire) engaged to control the wire. An example of this type of wire management would be power cord management of a clothes iron. While there are irons with a built-in mechanism to pull out and retract back the electric cord, there are no external devices to provide that same functionality to wind and unwind the iron power cord. Another example is a WMD that provides cord retraction used on computer mice. These types of WMDs are permanently built into the mouse cord and no external WMDs are available to be attached to the mouse cord externally for the same purpose. Also, when the mouse wire is being extended or retracted both ends of the wire have to move at the same time. However no WMDs are available that are able to engage and disengage easily wires fully external to the spool, provide effective and smooth extension and retraction action, provide access to both ends of the wire regardless of the amount of wire wound on the spool, maintain one end of the wire in an essentially fixed position while the other is extended or retracted regardless of the movement range, leaving the coiled wire minimally affected by the extension and retraction, providing a simple wire winding method and possessing a simple structure.

SUMMARY

[0005] The present disclosure provides an improved WMD having a spool with one of a built-in motor, a manual crank, a spring loaded retraction mechanism, or any other suitable retraction mechanism. The device is external (i.e., detached) to the wire thus enabling a loose, unilaterally or bilaterally attached wire to be first wound up, then unwound (extended) and refracted back onto the spool. Wires may also be pre-wound and contained in an enclosure attached to the spool. Advantages of the presently disclosed WMDs as described in the following section, but not limited to it, are that (1) it provides a way to control wires by attaching said WMD to a wire external to it, either loose or permanently or temporarily unilaterally or temporarily bilaterally attached; (2) it can later be detached and applied to another wire multiple times ensuring portability and reuse; (3) it provides constant access to

both ends of the wire and assures that one end will move no more than the distance between the two extreme positions of the wire entry point on the rotating spool while the other end is being extended or retracted; (4) it does not require multiple spools or dividing the spool into separate sections; (5) it provides smooth wire extension and retraction action; (6) winding and retraction action has very limited effect on the position of the coiled wire on the spool maintaining an orderly distribution of the wire on the spool; (7) it can be centered with regard to the wire when tension is applied to the wire; (8) it may have a controlling wire guide to help manually distribute wire evenly over the spool; and (9) the wire guide enables control of non-round wires to be orderly wound onto the spool.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] FIG. 1 is a perspective right-side view of a WMD built in accordance with the invention showing unwound wire.

[0007] FIG. 2 is a perspective right-side view the WMD of FIG. 1 with wire wound onto the spool through a spool wall slot and wire lock open.

[0008] FIG. 3 is a perspective right-side view of the WMD of FIG. 1 with wire brought onto the spool over the edge of the spool wall with the wire lock open.

[0009] FIG. 4 is a perspective right-side view of the WMD of FIG. 1 with wire brought onto the spool over the edge of the spool wall with the wire lock closed.

[0010] FIG. 5 is a perspective left-side view of the WMD of FIGS. 1 and 2 with tension applied to the wire.

[0011] FIG. 6 is a perspective right-side view of the WMD of FIG. 1 with a wire centering element mounted.

[0012] FIG. 7 is a perspective left-side view of the WMD of FIG. 1 with a different type of wire centering element mounted.

[0013] FIG. 8 is a perspective front view of the WMD of FIGS. 1 and 2 with a wire guide added, and the wire guide is open and lowered to accept wire.

[0014] FIG. 9 is a perspective front view of the WMD of FIGS. 1 and 2 with wire guide lowered and closed to control wire distribution on the spool.

DETAILED DESCRIPTION

[0015] It is first noted that for the present description, the term “wire” may include wires, cords, cables, strings, threads and similar objects that can be wound on a spool, and also such wires may comprise multiple sections joined by connectors rather than a single section. The abbreviation “WMD” signifies a wire management device. Furthermore, the term “wall” may include an entire side of the spool or a portion thereof.

[0016] FIG. 1 is a perspective right-side view of a WMD constructed in accordance with one embodiment. The following parts are shown: **11** spool, **12** first portion of the wire (i.e., the stationary portion not to be wound on the spool), **13** second portion of the wire (i.e., the portion to be wound and unwound on the spool), **14** left spool wall fixedly attached to the spool and rotating with it around the spool axis, **15** first spool wall either fixedly connected to or disconnected from the spool axis, **16** spool wall slot configured to accept the first portion (unwound) of the wire, **17** wire lock such as clamp, press fit, or any other suitable mechanism in the open position, **19** wire winding mechanism, **20** spool axis attached to

the wire winding mechanism. The long end of wire 13 is led through an aperture or slot 16 in the spool wall 14 onto spool 11. The stationary end 12 remains outside of the spool. The wire locking mechanism 17 is open to feed the wire through an aperture or slot 16. The wire is then wound around the spool 11 causing wire end 13 to be extendable and retractable.

[0017] FIG. 2 is a perspective right-side view of the WMD showing the wire wound on spool 11 with the open wire lock 17. The initial winding can be accomplished either by circling the wire around the spool 11 or by rotating the spool 11 around its axis portion 20 to take the wire onto the spool.

[0018] FIG. 3 is a perspective right-side view of the WMD showing the wire wound on spool 11 with wire lock 17 open. The winding is accomplished in the manner shown in FIG. 2 without an aperture or slot. Instead of leading the wire through an aperture, it is brought over the edge of wall 14 of the spool 11 near open wire lock 17. The wire may be also side fed through a hole in spool wall 14 above the spool 11 surface or even through a hole in wall 14 below the spool surface and then through another opening back to the spool 11 surface. Regardless of whether an aperture or an entry over the wall is used, according to an aspect, side entry of the wire onto the spool is to be effected. The side entry through the spool wall may also be used to bring electric wires for the electric rewinding motor mounted inside spool 11 according to an embodiment.

[0019] FIG. 4 is a perspective right-side view of the WMD showing the wire wound on spool 11 with closed wire lock 18. The long end of wire 13 is brought on to the spool over spool wall 14 and held down by wire lock 18. The wire may also be held down in place by a section of same wire wound around itself on the spool,

[0020] FIG. 5 is a perspective left-side view of the WMD showing the wire unwound from spool 11 (extended out). Unwinding is accomplished by having slot 16 rotating with spool 11. Slot 16 is indented in wall 14, which is fixed to spool 11. This leaves short wire 12 untangled when it is loose (unconnected). While wall 14 rotates with spool 11, the other wall 15 does not in this embodiment. A spring (not shown) in the winding apparatus or mechanism 19 may be attached to wall 15. During unwinding by external force such as by hand, the rotational motion of spool 11 winds up the spring.

[0021] At this point, winding mechanism 19 is locked. Subsequently, when it is unlocked the wound up spring will provide the energy to pull back wire 13 and wind it back onto spool 11. The opposite spool wall 15 may also be fixed to spool axis 20 in another embodiment. Such an embodiment will require the winding spring to have one end attached to axis 20 and the other to the inside of spool 11. In both wall arrangements the operation of the WMD will be achieved without entanglement of movable wire end 13 while the stationary end 12 does not move more than the distance between the two extreme positions of the wire entry point to the spool, such as slot 16, during spool rotation.

[0022] FIG. 6 is a perspective right-side view of the WMD of FIGS. 1 and 2 with wire centering element 27 added and mounted on spool axis 20, on the end opposite to wall 14 where wire is brought on to the spool. Wire centering element 27 will help keep the WMD perpendicular to the wire when tension is applied to the wire on both sides 12 and 13 to keep it straight. Wire centering element 27 will not interfere with wire 12 when the spool is rotating. Such an element may also be detachable.

[0023] FIG. 7 is a perspective left-side view of the WMD showing a different version of the Wire centering element. It consists of two arms 28 attached to the edge of the spool walls or two posts 29 mounted on the edges of the spool walls perpendicular to the edges. This type of element will not interfere with wire 12 when the spool is rotating. Such element may also be detachable.

[0024] FIG. 8 is a perspective front view of the WMD showing wire guide 21 mounted on rod 22 between the spool walls. It consists of two eyelets 23 connected together and moving freely across rod 22. The eyelets are connected to the wire holder with a closing bar, which is shown in open position as 24. Wire is fed through the guide. Rod 22 with mounted on wire guide 21 may be mounted on one side and lifted to facilitate the initial winding of the wire on the spool. Lifted rod 25 is subsequently lowered.

[0025] FIG. 9 is a perspective front view of the WMD showing wire guide 21 locking bar 25 closed with flat wire 26 fed through wire guide 21. While wire is being retracted back on to the spool, wire guide 21 can be moved across wire guide rod 22 by moving the entire WMD assembly from side to side. This will enable the user to control distribution of the wire on spool 11. This would be particularly useful when the wires are long, non-round, and/or thick.

[0026] In light of the foregoing description, one skilled in the art will appreciate that the presently disclosed WMD affords a device that may control external wires (i.e., a wire that is part of some other device) by attaching it to the WMD. Of further benefit, it can be appreciated that the wire can be either a loose wire, unilaterally attached wire (i.e., attached at one end to a another device), or even bilaterally attached (i.e., the wire is attached at both ends). A further benefit is that the WMD is detachable, such that it can later be detached and could be applied to various different wire scenarios ensuring portability and reuse. Of further benefit, the disclosed WMD modes of controlling the wire include applying tension to the wire. Of further benefit, the disclosed WMD provides constant access to both ends of a wire and assures that one end will move no more than the distance between the two extreme positions of the wire entry point on the rotating spool while the other end is being extended or retracted. Of still further benefits, the present WMD does not require multiple spools or dividing the spool into separate sections; provides smooth wire extension and retraction action, the winding and retraction action has very limited effect on the position of the coiled wire on the spool maintaining an orderly distribution of the wire on the spool, can be centered with regard to the wire when tension is applied to the wire, may have a controlling wire guide to help manually distribute wire evenly over the spool, and the wire guide enables control of even non-round or circular wires to be orderly wound onto the spool.

LISTING OF REFERENCE NUMERALS

- [0027] 11—spool
- [0028] 12—first portion of the wire (i.e., the portion not to be wound on the spool), this portion has the stationary end moving no more than the diameter of the spool during winding and unwinding
- [0029] 13—second portion of the wire (i.e., the portion to be wound and unwound on the spool) with the end moving during winding and unwinding
- [0030] 14—left spool wall fixedly attached to the spool and rotating with it around the spool axis

[0031] 15—first spool wall either fixedly connected to or disconnected from the spool axis
 [0032] 16—spool wall slot configured to accept the first portion (unwound) of the wire
 [0033] 17—wire lock open
 [0034] 18—wire lock closed
 [0035] 19—wire winding mechanism
 [0036] 20—spool axis attached to the wire winding mechanism
 [0037] 21—sliding wire guide mechanism
 [0038] 22—wire guide rod
 [0039] 23—wire guide eyelet
 [0040] 24—wire guide locking mechanism in the open position
 [0041] 25—wire guide locking mechanism in the closed position
 [0042] 26—non-round wire, cord, or cable
 [0043] 27—one arm wire centering element
 [0044] 28—two arm wire centering element
 [0045] 29—spool wall edge mounted post to attach wire centering element 28
 [0046] 30—wire guide in open position
 [0047] 31—spool lock
 [0048] 32—spool cover element
 [0049] 33—spool cover element hinge
 [0050] 34—external spool housing

1. A wire management device (WMD) comprising:

a spool having an axis portion around which the spool is rotatable and two side walls with at least one of the two side walls being a fixed side wall and attached to the axis portion of the spool, wherein at least a portion of a wire external to the WMD to be managed is capable of being wound onto the spool through one of an aperture in at least one of the side walls, a slot in an edge portion of at least one of the two side walls, or over said edge portion of one of the walls of the spool in conjunction with a locking mechanism configured to fixedly hold the wire relative to the wall;

wherein when the at least a portion of the wire is brought from one side onto the spool through the aperture, slot, or over the edge of the spool and is fixedly held by either a structure of the aperture or slot, the locking mechanism configured to hold the wire in place with at least a portion of the same wire wound around the spool, wherein the wire may be wound up on the spool and unwound from the spool through at least rotation of the spool.

2. The WMD of claim 1, wherein the locking mechanism is attached to a portion of at least one of the side walls.

3. The WMD of claim 2, wherein the locking mechanism is further configured to selectively and fixedly hold the wire in the aperture, slot, or at the edge of the spool wall over which the wire enters the spool.

4. The WMD of claim 1, further comprising:

a retraction mechanism disposed at said axis portion of the spool that is configured to rotate the spool around the axis portion through at least one of spring motive force or electromotive force.

5. The WMD of claim 4, wherein the retraction mechanism is configured to include a start and stop mechanism.

6. The WMD of claim 1, further comprising:

a rigid wire guiding structure mounted on at least one side of the spool near or above the spool edge; wherein the rigid wire guiding structure is configured to guide the wire during wind up, unwind and retraction of wire external to prevent wire entanglement and center the wire with respect to the WMD when tension is applied to the wire.

7. The WMD of claim 1, further comprising:

a sliding wire holder mounted on a rod spanning across the spool walls of the spool and configured to move slide side to side on the rod, wherein the wire may be inserted and locked in the sliding wire holder and the sliding wire holder is operable for controlling wire distribution across the spool when the wire is retracted back onto the spool.

8. The WMD of claim 1 wherein the wire has an end unilaterally attached to a device, both ends unattached, or other bilaterally attached to two respective devices.

9. The WMD of claim 1, further comprising at least one movable or fixed cover element mounted around the spool to hold the wire on the spool.

10. The WMD of claim 1, further comprising a housing protecting at least some part of the WMD.

11. A method for managing a wire comprising:

winding a wire to be managed onto a spool having an axis portion around which the spool is rotatable and two side walls with at least one of the two side walls being a fixed side wall and attached to the axis portion of the spool, wherein at least a portion of a wire being external to the spool is wound onto the spool through one of an aperture in at least one of the side walls, a slot in an edge portion of at least one of the two side walls, or over said edge portion of one of the walls of the spool in conjunction with a locking mechanism including wire being held in place by a section of same wire wound around itself on the spool;

winding up the wire or unwinding the wire on the spool wherein when the at least a portion of the wire is brought from one side onto the spool through the aperture, slot, or over the edge of the spool and is fixedly held by either a structure of the aperture or slot, the locking mechanism including wire being held in place by a section of same wire wound around itself on the spool, the wire is wound up on the spool and unwound from the spool through rotation of the spool.

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