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Zell

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(54) **POOL COVER SPOOL**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(22) Filed: **May 27, 2003**

(51) **Int. Cl.**[7] **E04H 4/00**
(52) **U.S. Cl.** **4/502**
(58) **Field of Search** 4/502, 503; 242/395

(56) **References Cited**

U.S. PATENT DOCUMENTS

951,718 A		3/1910	Arnsdorff	
1,484,587 A		3/1924	Best	
3,070,811 A		1/1963	Bender	
3,091,414 A		5/1963	Patnaude	
4,179,080 A		12/1979	Patnaude	
4,324,370 A	*	4/1982	Guard et al.	242/403
4,328,930 A		5/1982	Kalendovsky	
4,407,027 A	*	10/1983	Colon, Jr.	4/502
4,459,711 A	*	7/1984	Sartain et al.	4/502
5,259,078 A	*	11/1993	Crandall	4/503
5,425,143 A		6/1995	Kalandovsky	
5,636,808 A	*	6/1997	Colin	242/395
5,701,613 A		12/1997	Richardson	
6,026,522 A		2/2000	Last	
6,618,869 B1	*	9/2003	Jacobs	4/502

FOREIGN PATENT DOCUMENTS

GB	2179627 A	*	3/1987

* cited by examiner

Primary Examiner—Charles E. Phillips
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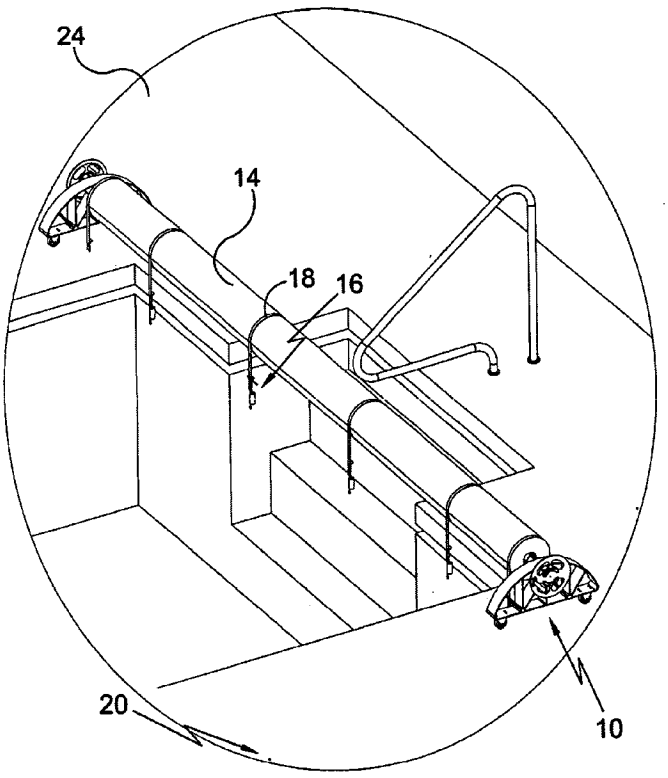
(57) **ABSTRACT**

The present invention **10** discloses a pair of end heads **28, 30** that are interconnected onto the inwardly disposed tube assembly **26** to form the pool cover **12** storage reel. Hand wheels **32** are rotationally attached to tube assembly **26** by end tubes **36** on the outside of the end heads **28, 30**. Each of the end heads **28, 30** includes a pair of casters **40** mounted to the bottom surface of the end head. The tube assembly **26** consists of five components, a center tube **34**, two outer tubes **36** and two end caps **42**. The center tube is of larger diameter and allows for the two outer tubes to be telescopically inserted into the opposing distal ends. The cylindrically shaped tubes include mating male **48** and female **46** extrusions along the surfaces to ensure joint rotational movement of the tube assembly. The telescoping tubes **26** include a series of holes **38** along the surface creating cavities and providing convenient and efficient means to store the straps, springs or other anchoring means that are positioned around the perimeter of the covering.

10 Claims, 18 Drawing Sheets



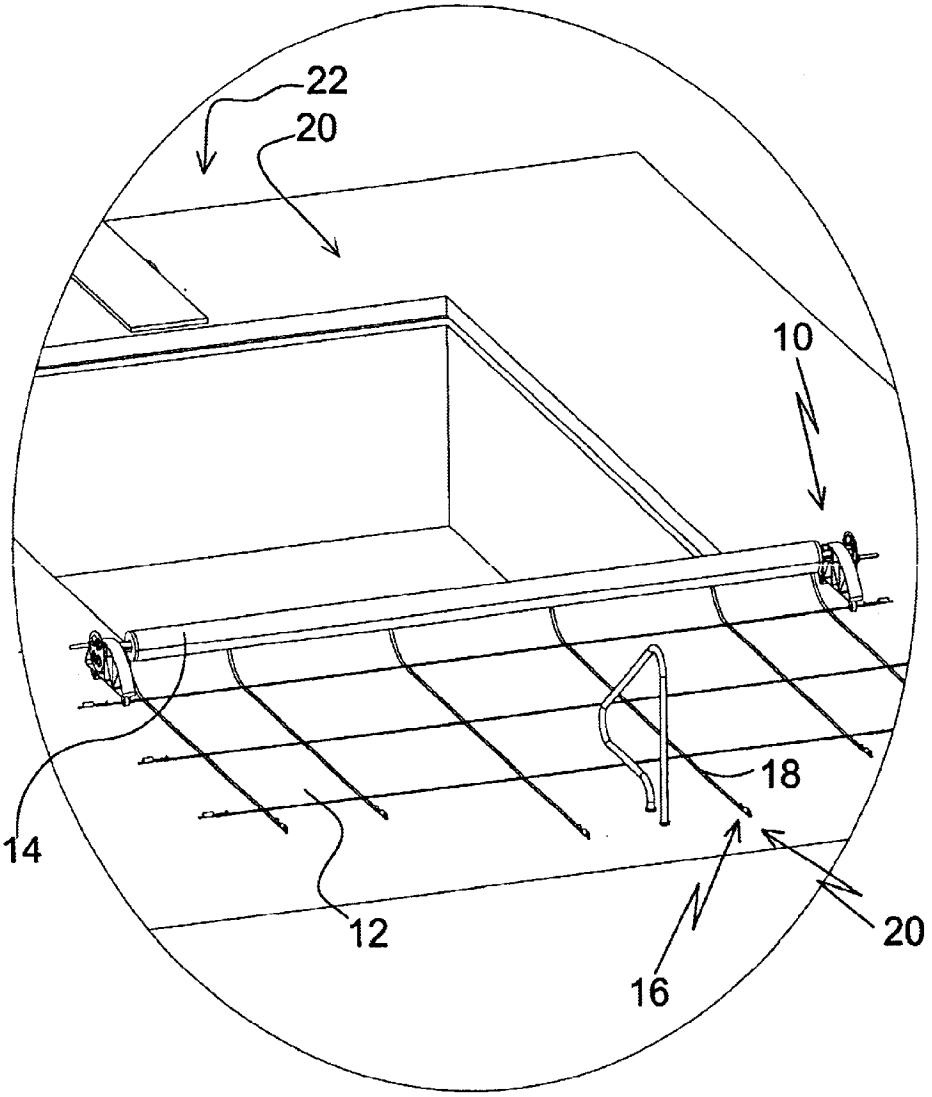
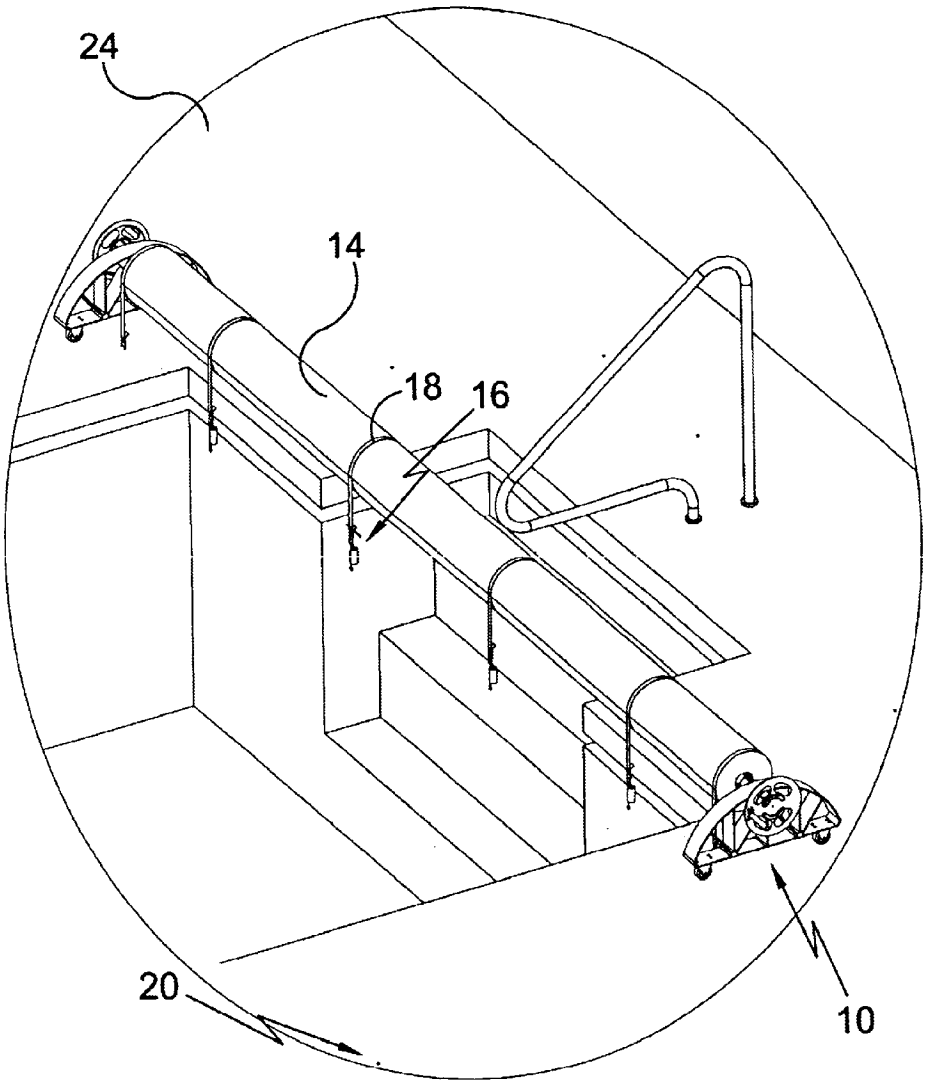


FIG 1



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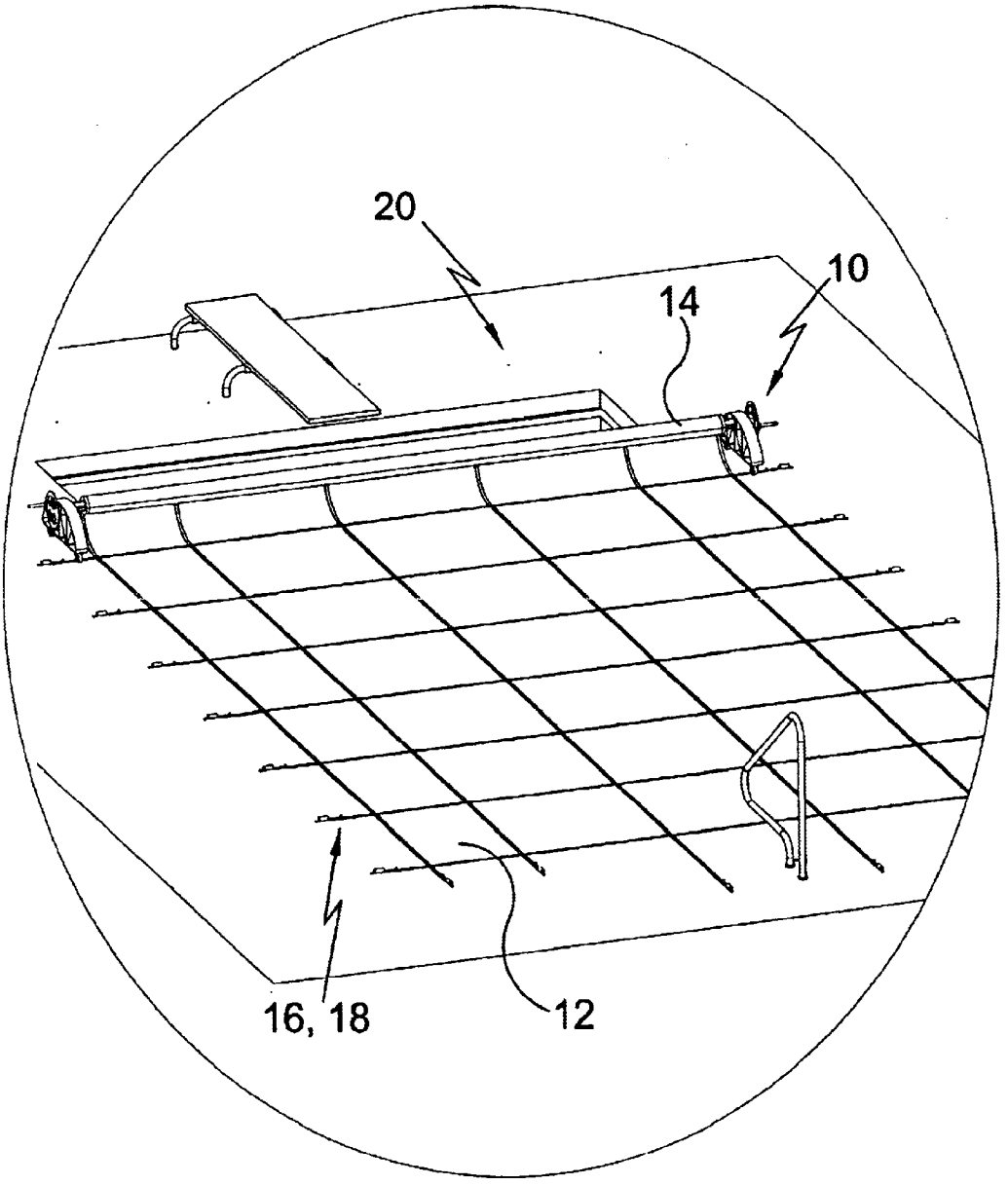

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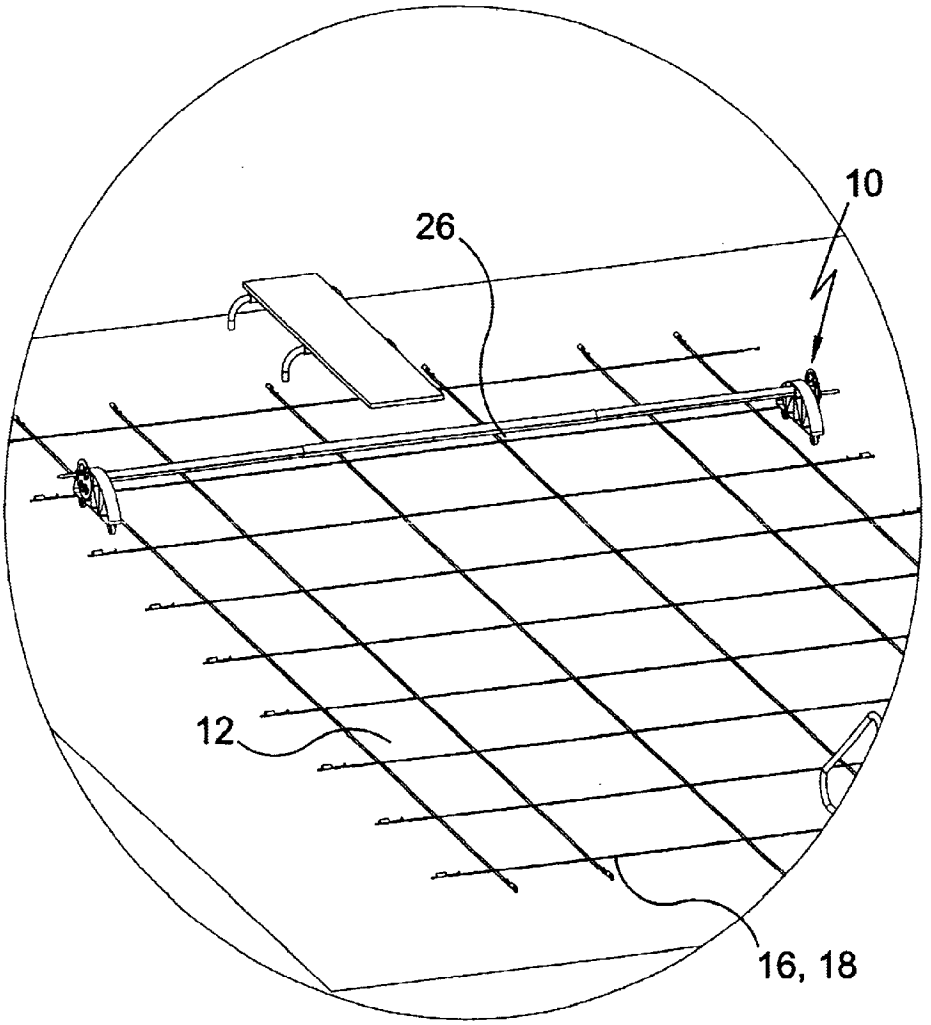

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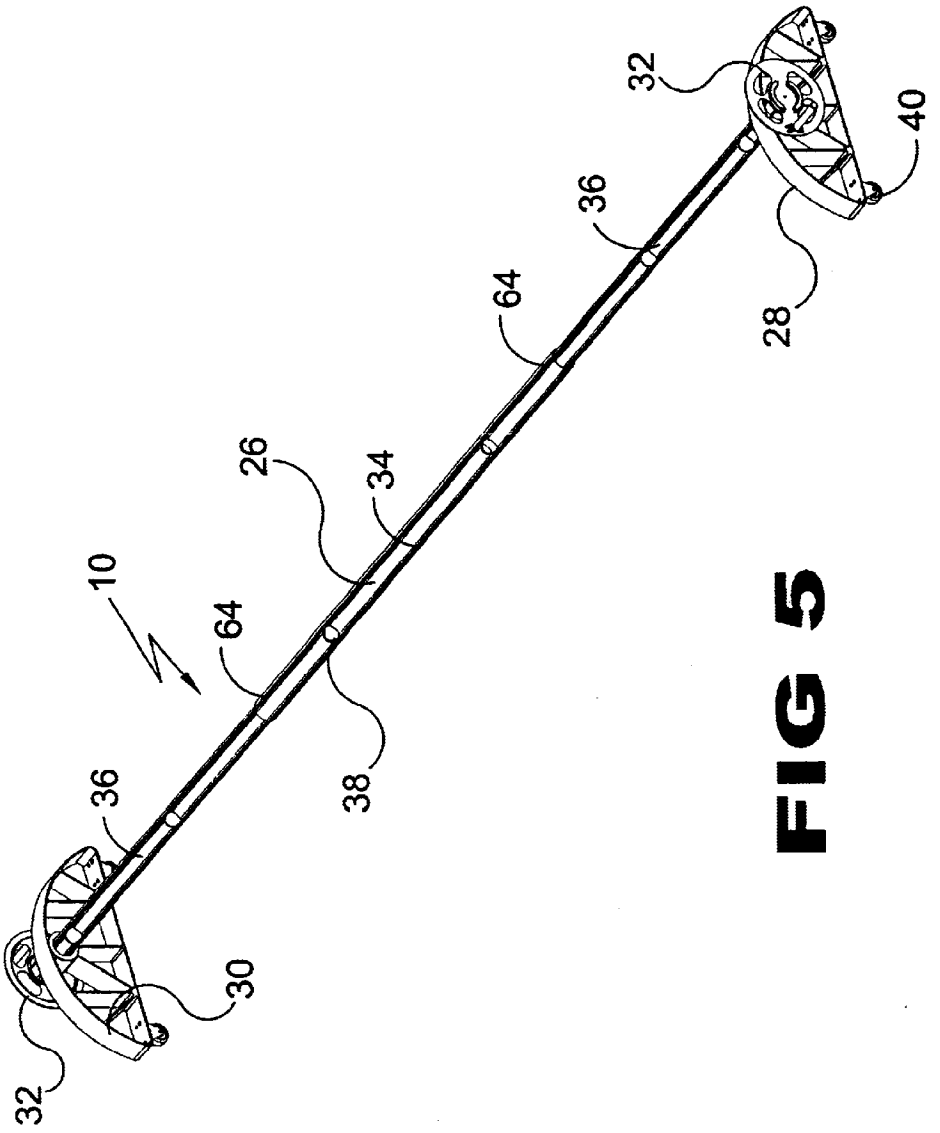

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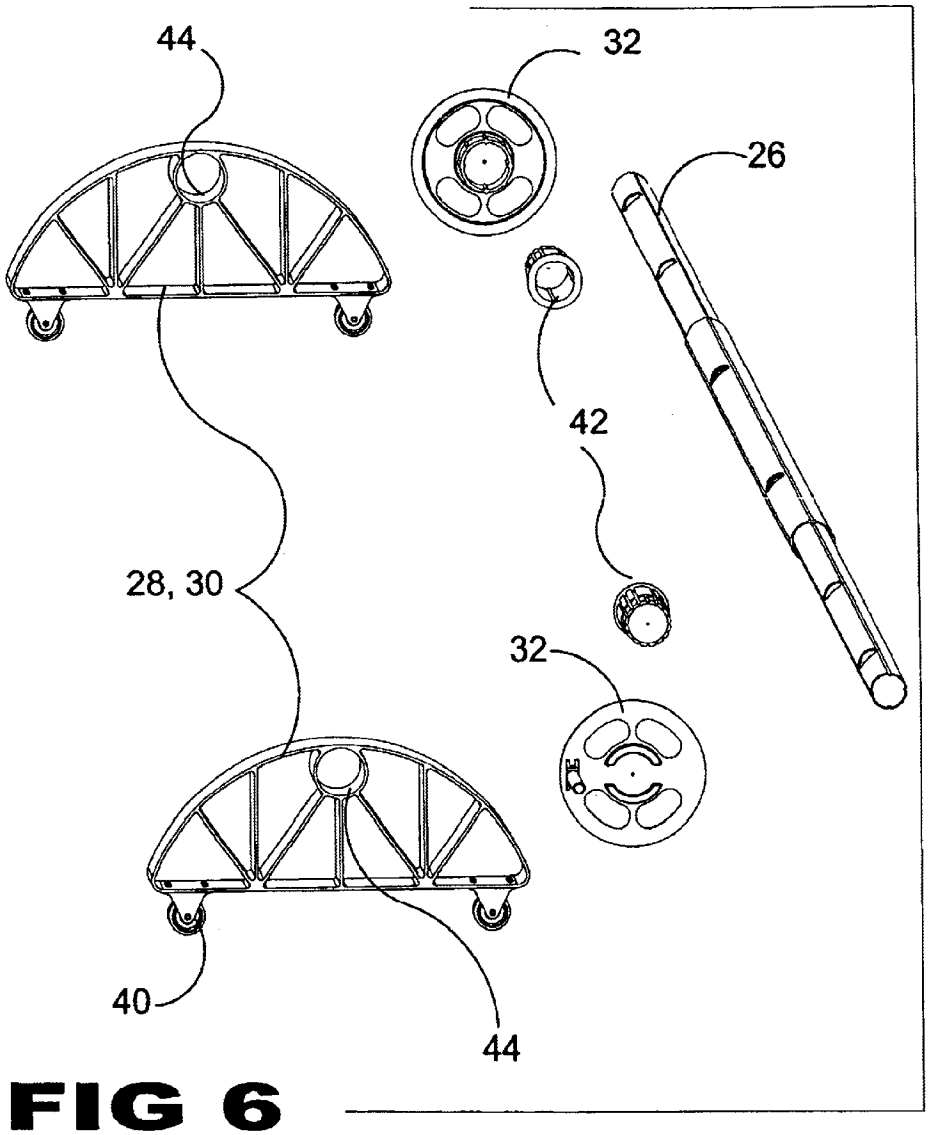

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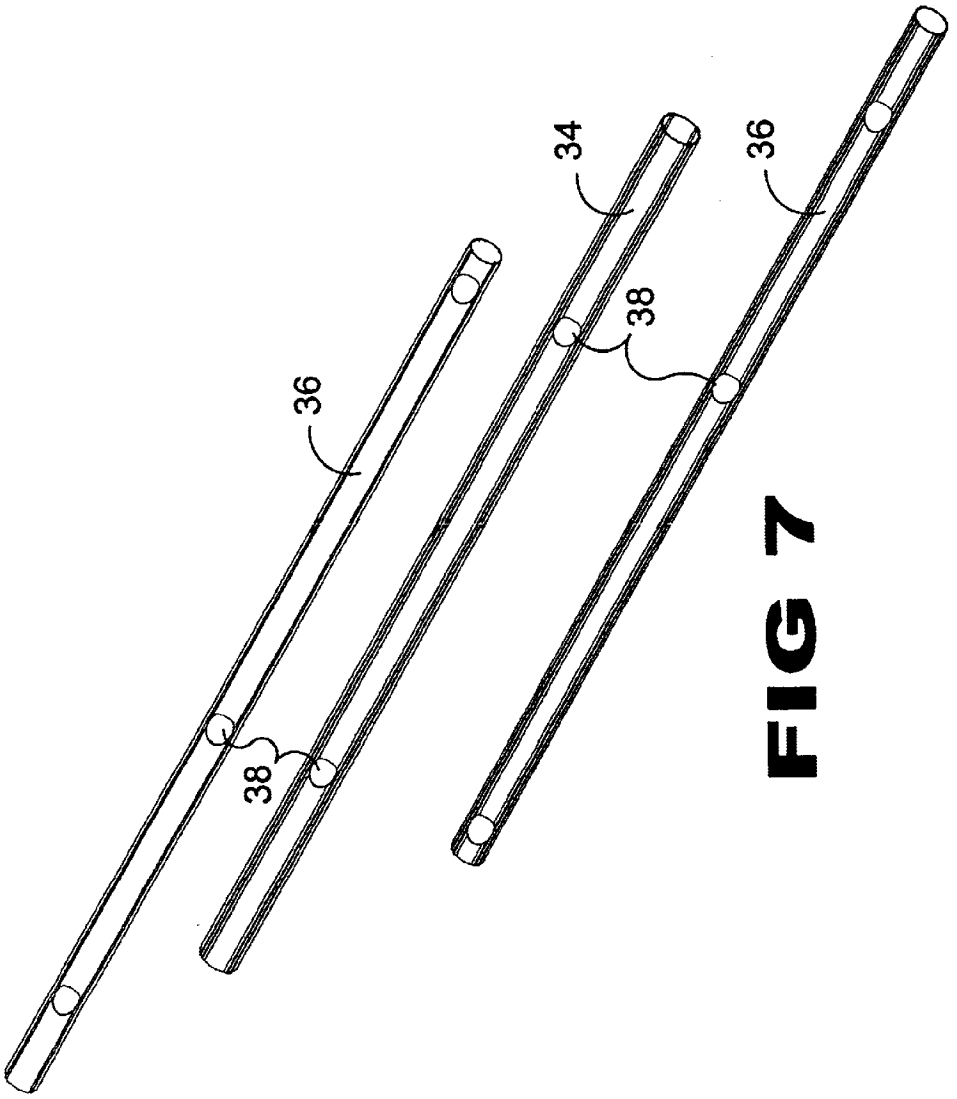
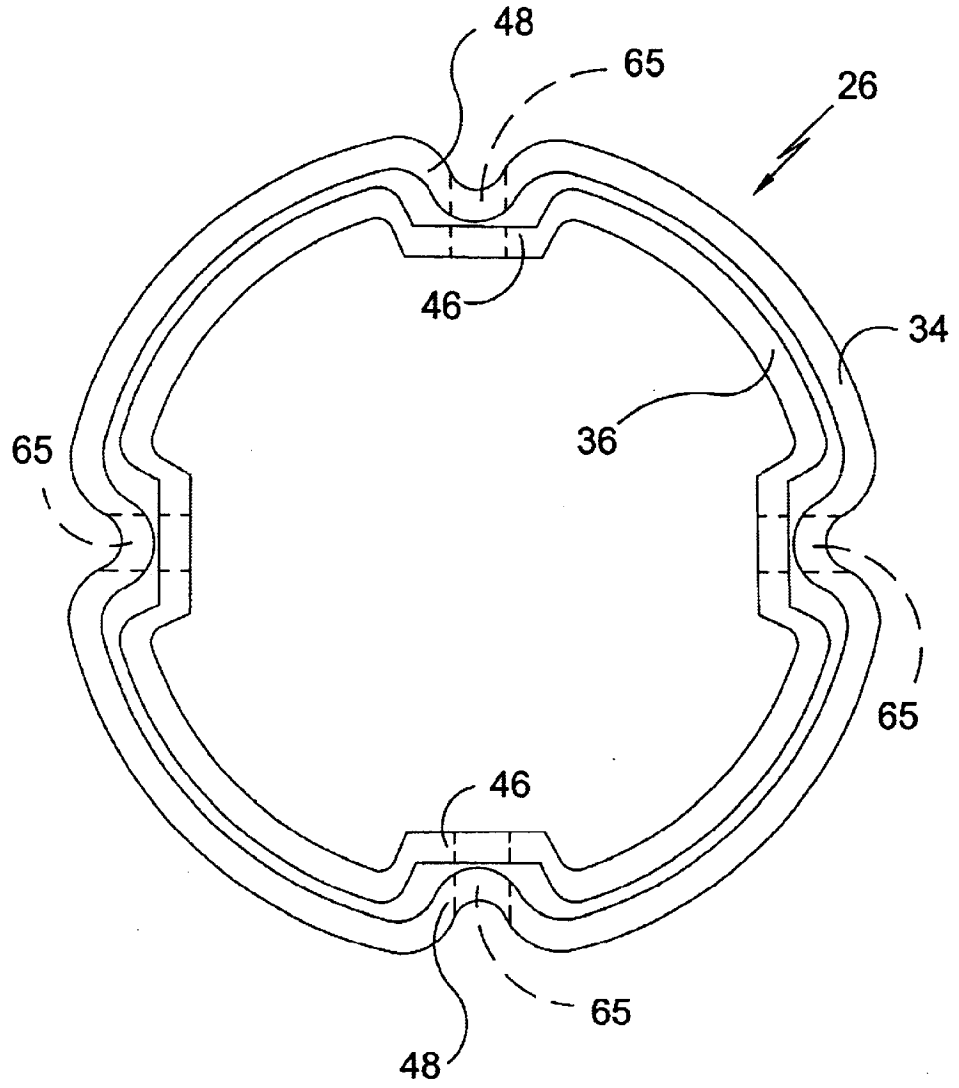


FIG 7



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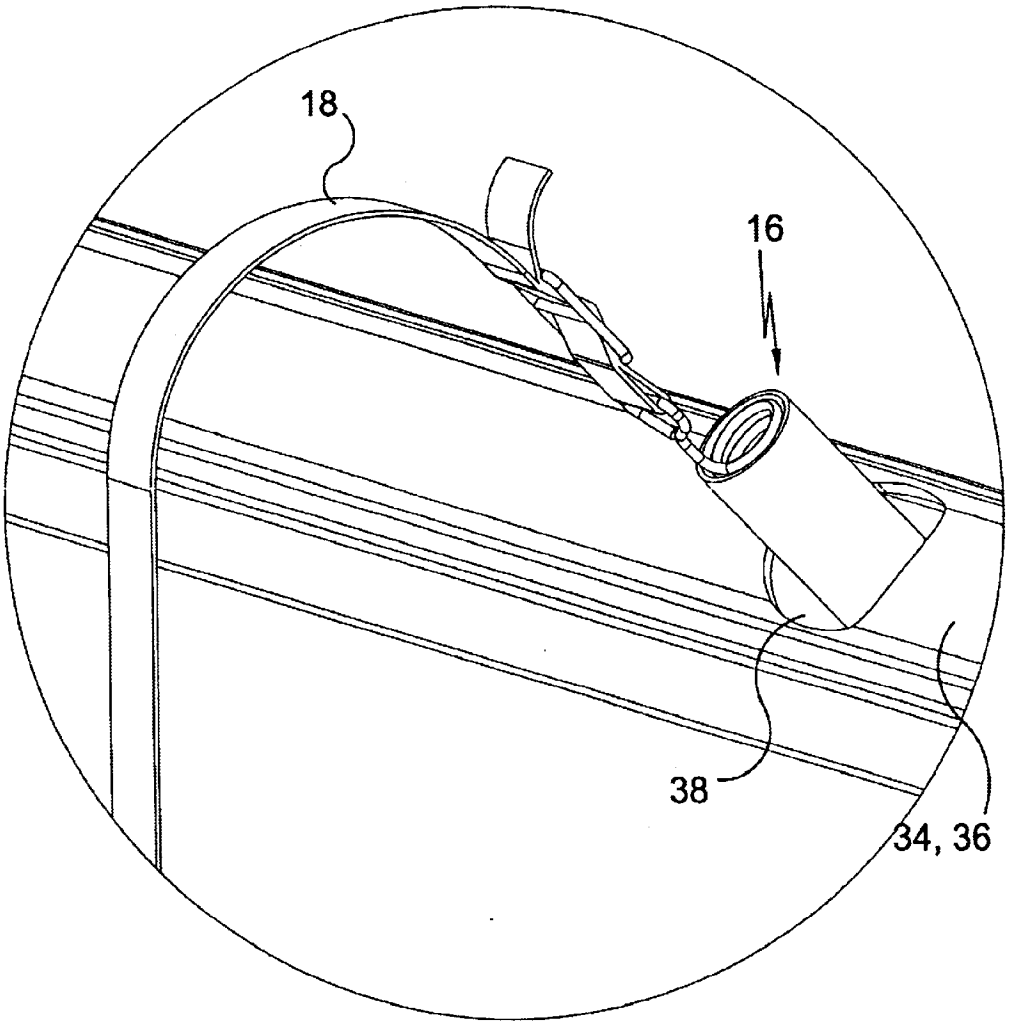

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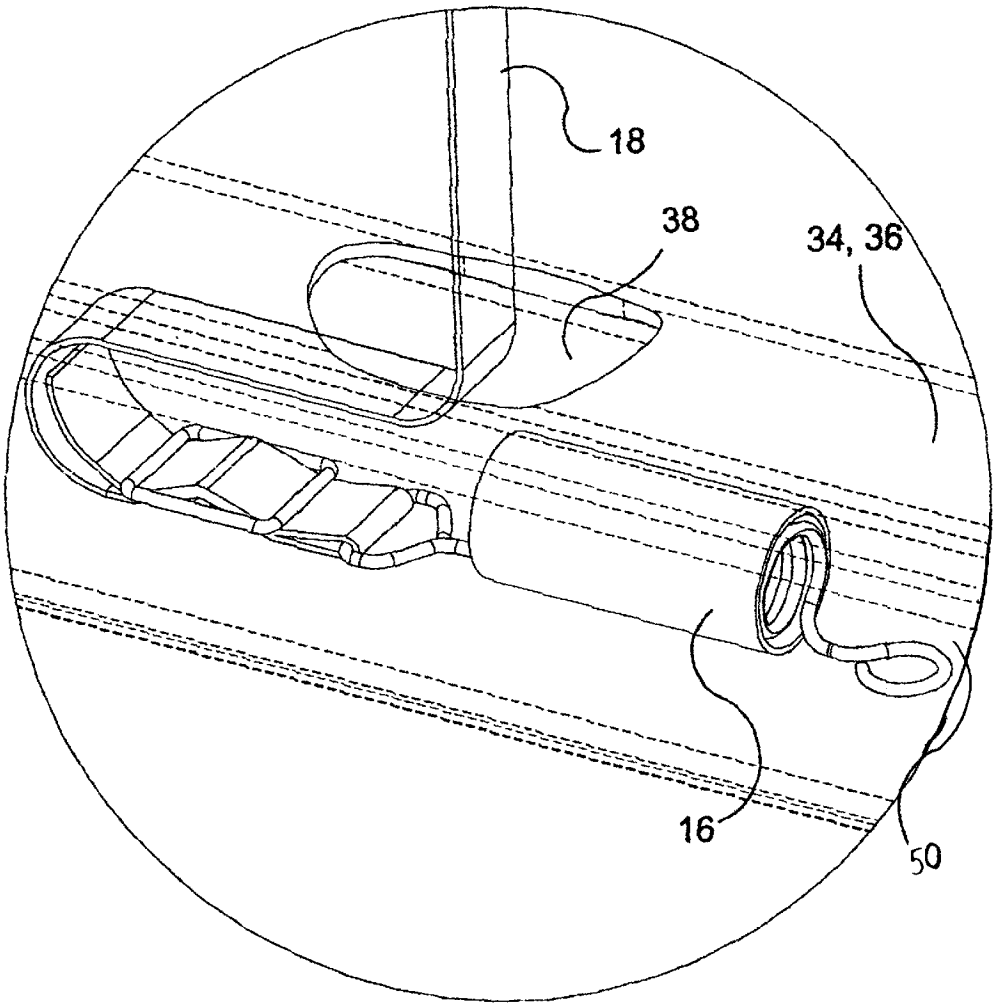

FIG 10

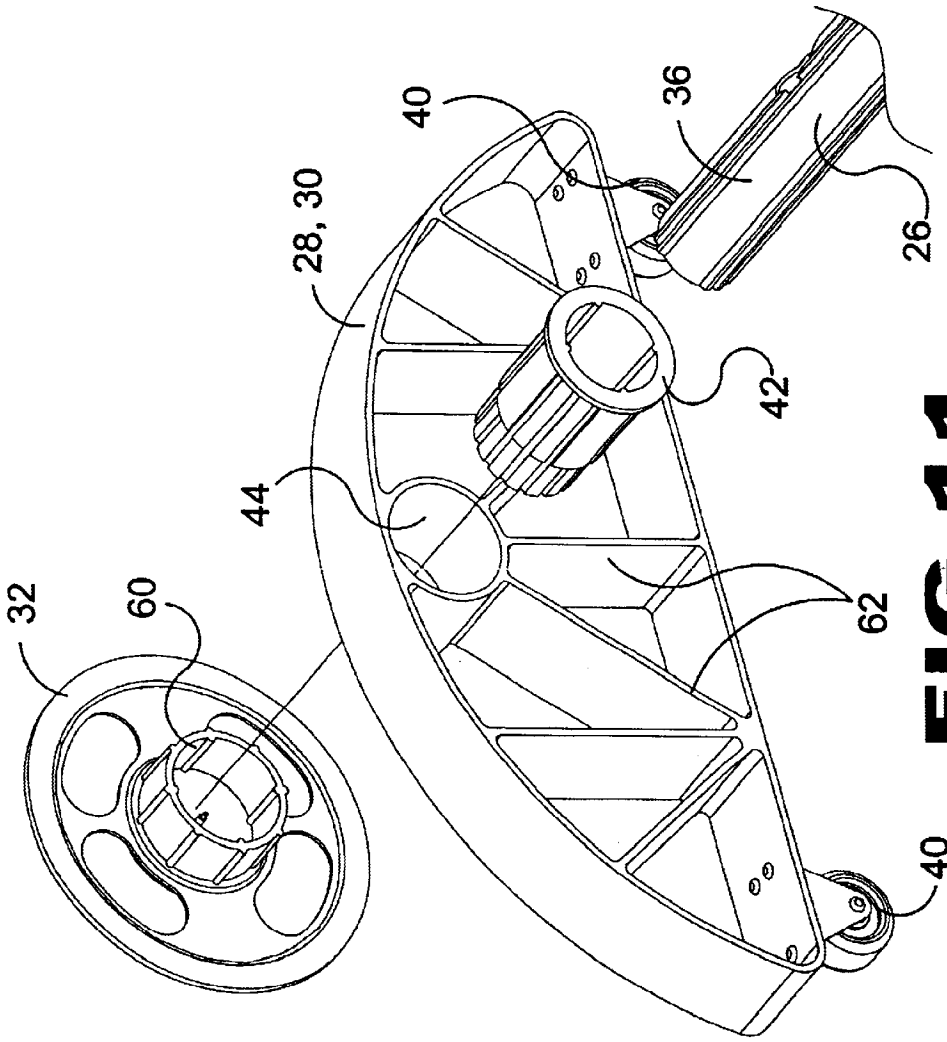

FIG 11

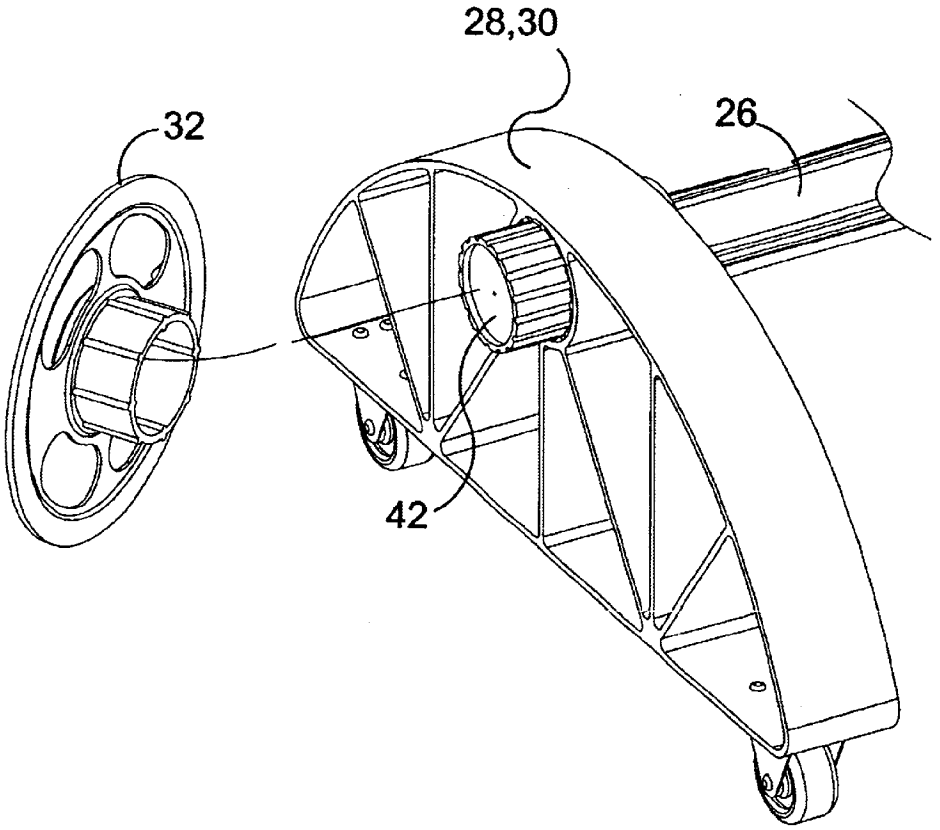

FIG 12

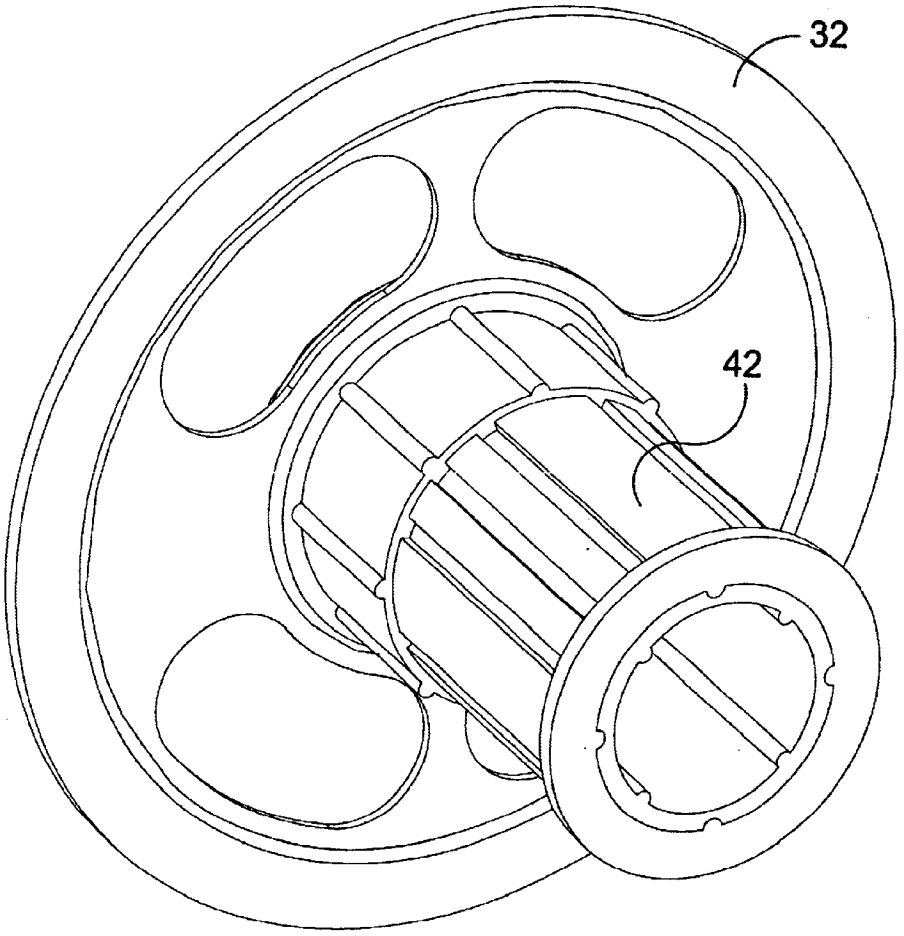

FIG 13

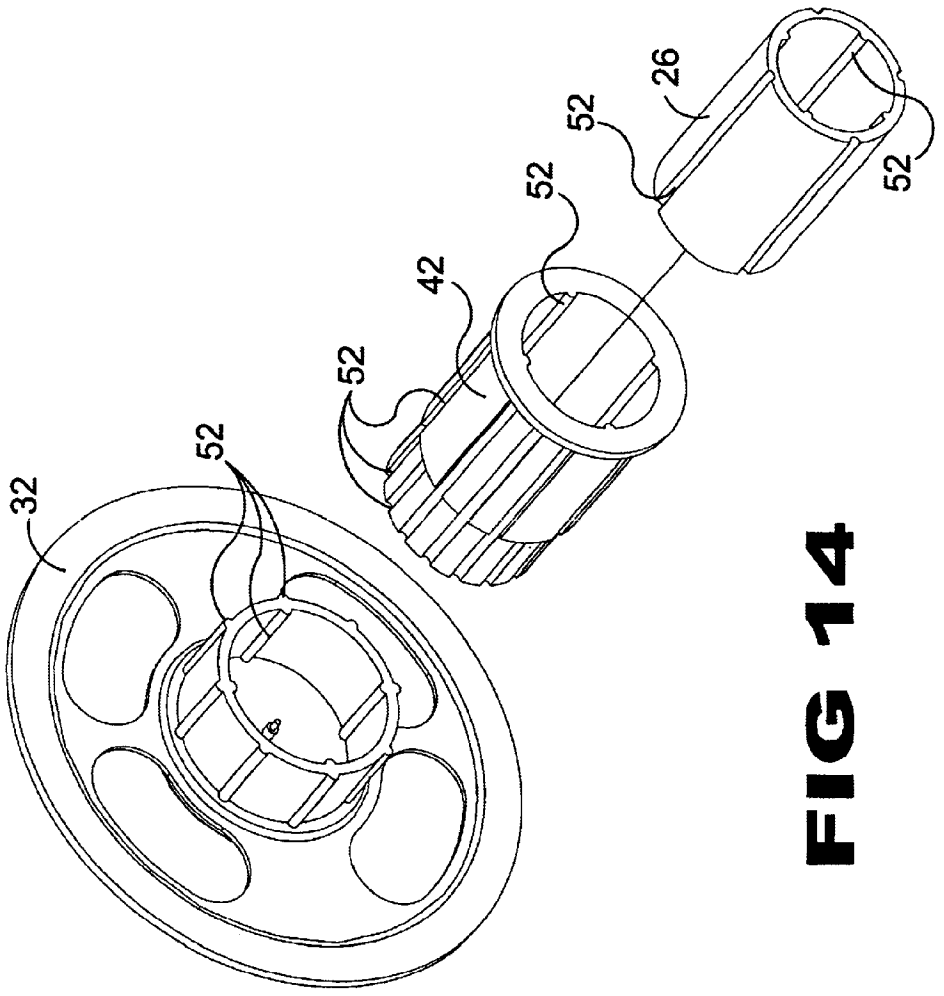

FIG 14

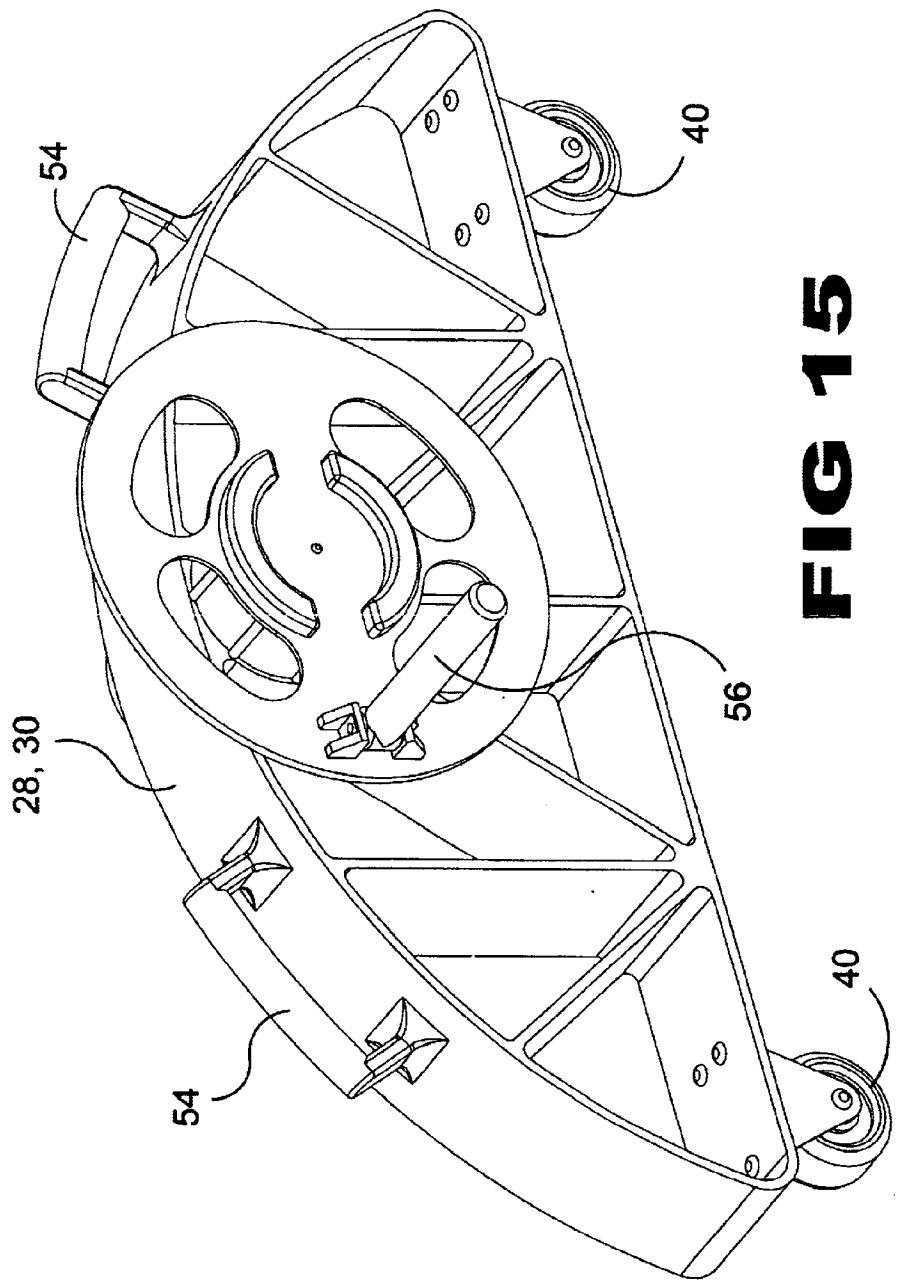

FIG 15

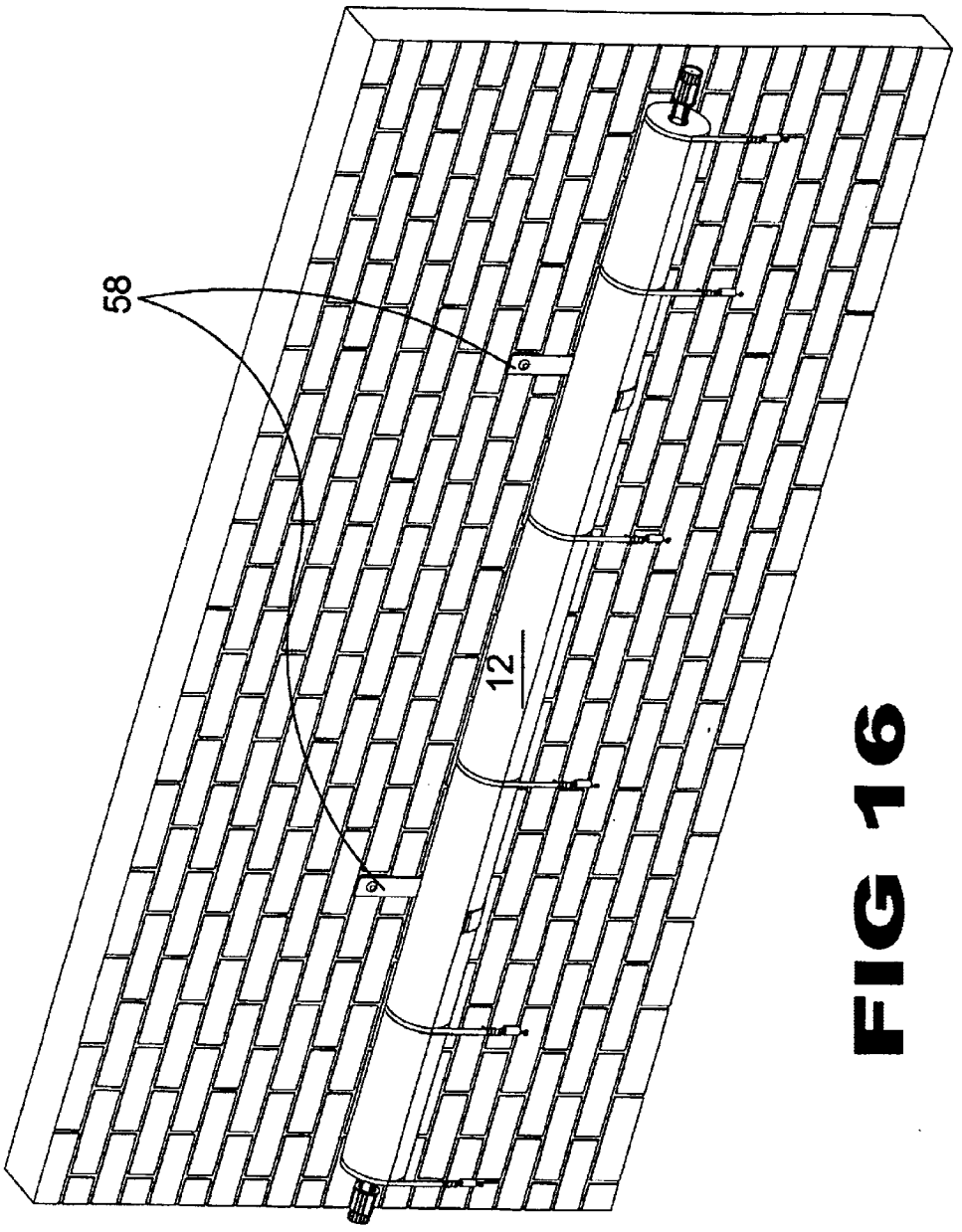

FIG 16

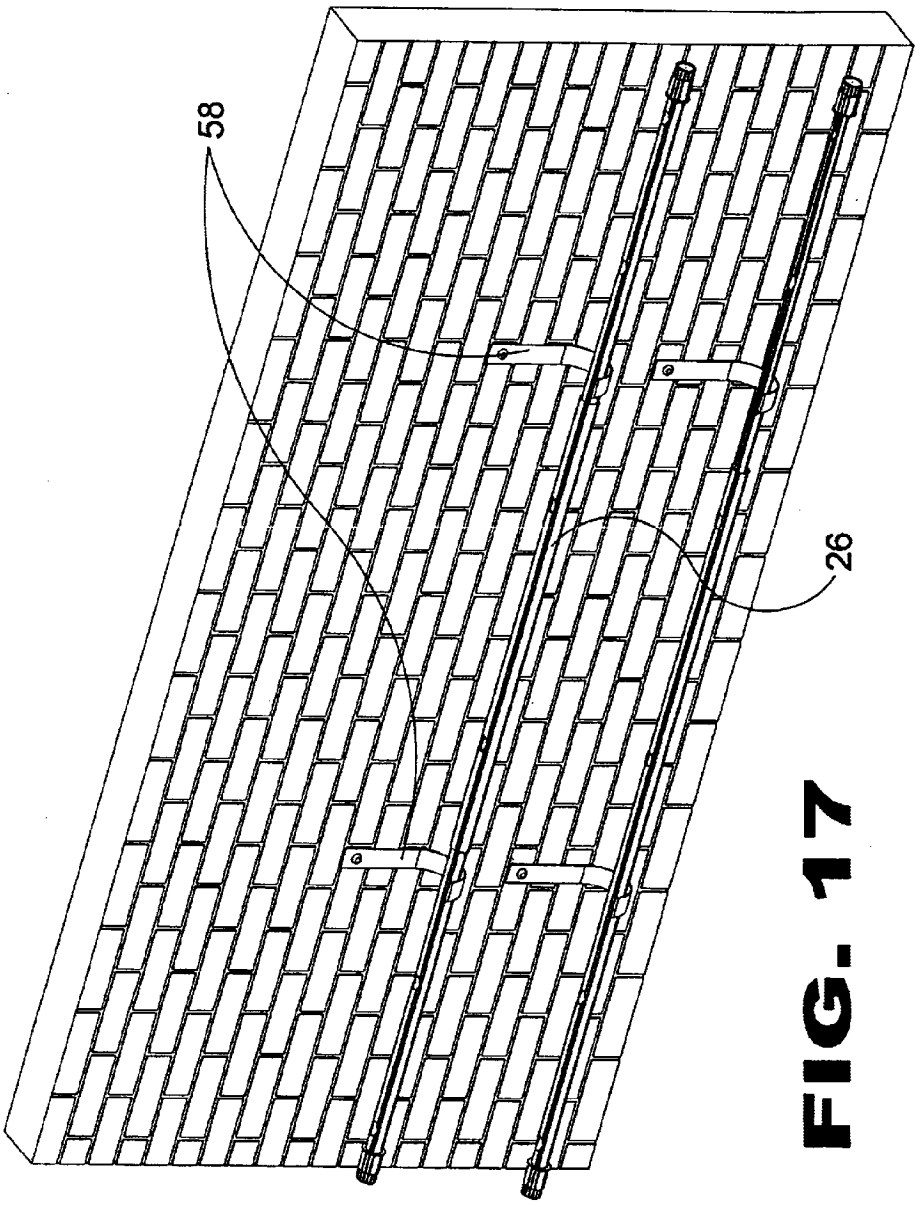

FIG. 17

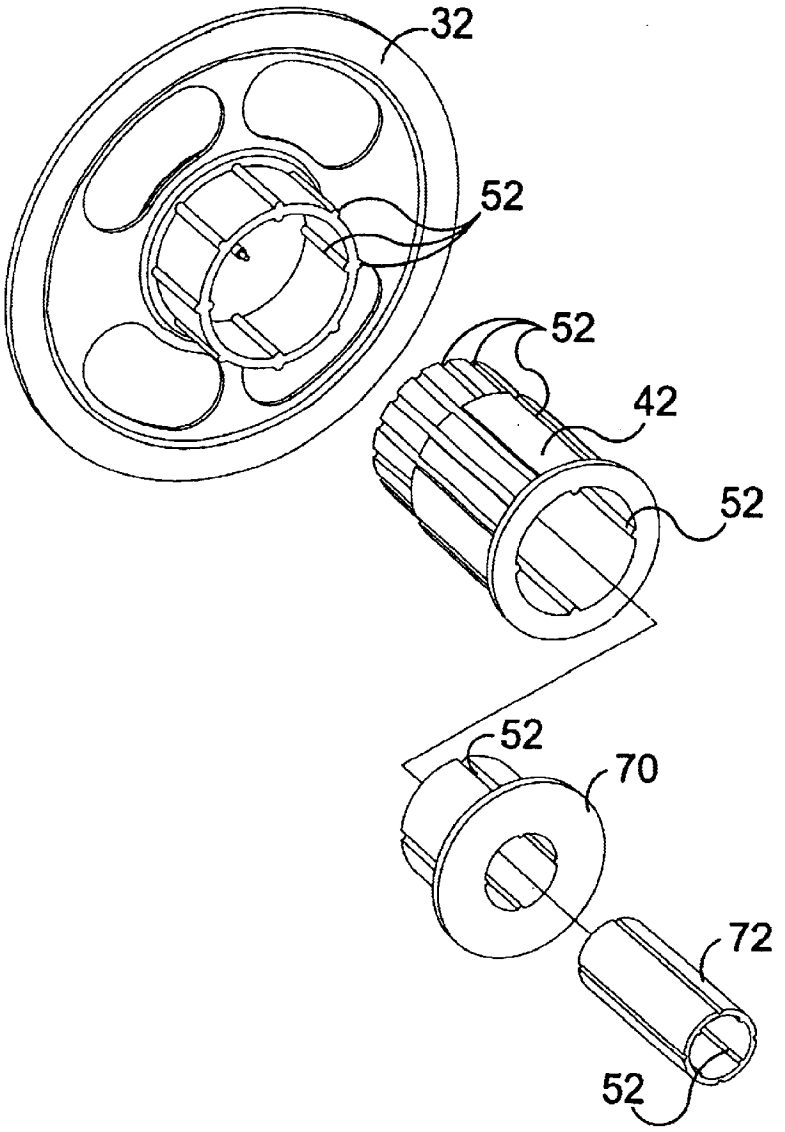

FIG 18

POOL COVER SPOOL

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates generally to pool covers, and, more specifically, to a pool cover reel suitable for installation and removal of an in ground pool safety cover.

Pool covers are often utilized to reduce maintenance, provide safety and for support of heat retention. Yet, installation and removal of a pool cover can be painstaking and troublesome often requiring 2 or more people to properly secure or remove.

Disclosed within is an improved reel that facilitates the transporting of pool covers, tarpaulins, and such materials used to cover areas to be protected. In particularly, pool covers, tarpaulins, and such materials that utilize straps, springs or other anchoring means around the perimeter of the covering.

The present invention consists of a pair of end heads that are interconnected on the inward section by a tube assembly to form the pool cover storage assembly. Hand wheels are rotationally attached to the outward section of the end heads. Each of the end heads includes a pair of casters mounted to the bottom surface of the end head. The casters provide for quick and easy lateral movement of the pool cover storage assembly allowing for proper positioning and facilitating the transport of the pool cover storage assembly to and from the poolside.

The tube assembly consists of five components, a center tube, two outer tubes and two end caps. The three-part tube assembly provides for means to extend or retract the tube length to ensure proper pool cover length. The recessed cotterpins provide a rigid tube assembly as the cover is being rolled up and maintain symmetrical positioning of the center tube. The center tube is of larger diameter and allows for the two outer tubes to be inserted into the opposing distal ends.

The cylindrically shaped tubes include male and female extrusions along the surfaces to ensure joint rotational movement of the tube assembly. The end caps are positioned at both ends of the outer tubes and facilitate a cylindrical bearing surface.

The end heads include a molded cylindrical sleeve on the horizontal plane that allows for the rotational motion of the tube assembly and hand wheel. With end caps secured to the ends of the tube assembly, the tube assembly is inserted into the sleeves of the end heads. The tube assembly is positioned such that a portion of the end cap protrudes through the end head sleeve allowing the hand wheel to be mounted on the outer side of the end head and thus anchoring the pool cover storage assembly. The extruded contours of the hand wheel, end cap, and tube assembly provide for a rotationally rigid body while allowing for easy axial connection and separation.

The telescoping tubes include a series of holes along the surface creating cavities and providing convenient and efficient means to store the straps, springs or other anchoring means that are positioned around the perimeter of the covering. The cover anchors are inserted into the holes before the cover is rolled around the tubes. The openings extruded into the tubes provide for the anchors to be coiled and stored during non-use. This allows for a pleasing appearance, prevents entanglement, and provides ease of assembly when uncoiled.

By modifying the end caps or adding adapter bushings (i.e. maintaining the same outside diameter but reducing the inside diameter suitable for a smaller tube assembly), the same end heads can also be used to install or remove a solar cover.

DESCRIPTION OF THE PRIOR ART

There are other pool cover storage devices. Typical of these is U.S. Pat. No. 951,718 issued to Julius A. Arnsdorff on Mar. 8, 1910.

Another patent was issued to H. S. Best on Mar. 4, 1924 as U.S. Pat. No. 1,485,587. Yet another U.S. Pat. No. 3,070,811 was issued to E. A. Bender on Jan. 1, 1963 and still yet another was issued on May 28, 1963 to H. A. Patnaude as U.S. Pat. No. 3,091,414.

Another patent was issued to Henry A. Patnaude on Dec. 18, 1979 as U.S. Pat. No. 4,179,080. Yet another U.S. Pat. No. 4,324,370 was issued to Wayne Guard et al. on Apr. 13, 1982. Another was issued to Jiri Kalendovsky on May 11, 1982 as U.S. Pat. No. 4,328,930 and still yet another was issued on Oct. 4, 1983 to George M. Colon, Jr. as U.S. Pat. No. 4,407,027.

Another patent was issued to Jiri Kalandovsky on Jun. 20, 1995 as U.S. Pat. No. 5,425,143. Yet another U.S. Pat. No. 5,636,808 was issued to George M. Colin on Jun. 10, 1997. Another was issued to Cedric D. Richardson on Dec. 30, 1997 as U.S. Pat. No. 5,701,613 and still yet another was issued on Feb. 22, 2000 to Harry J. Last as U.S. Pat. No. 6,026,522.

U.S. Pat. No. 951,718 Inventor: Julius A. Arnsdorff
Issued: Mar. 8, 1910

This invention has to do with the handling and display of linoleums, oil cloths and the like; and it has for its object to provide a device of roller character embodying such a construction that a piece of material may be expeditiously and easily rolled on or off the device, and when the desired the device with the material that is rolled thereon may be conveniently rolled over a floor or other surface without liability of the material being fed off the device or disarranged in any manner.

U.S. Pat. No. 1,485,587 Inventor: H. S. Best
Issued: Mar. 4, 1924

This invention particularly relates to a display rack adapted to be employed in connection with chenilles, carpets, canvas and goods of similar character.

The main object of this invention is to provide an improved display rack upon which a single roll of goods of the character described may be stored in a compact roll, the roll being readily accessible for the purpose of display so that any desired length of goods may be withdrawn from the roll and displayed and either cut off from the roll or returned to the roll.

U.S. Pat. No. 3,070,811 Inventor: E. A. Bender
Issued: Jan. 1, 1963

This invention relates to a cover for swimming pools, and in particular to a flexible cover which may be quickly and easily applied and removed. A pool with no cover protection during periods of non-use presents several difficulties of maintenance, for instance, pollution by such foreign matter as dust, pollen, leaves, insects, and even small animals. A cover may also be saving of life in the case of small children. In another aspect it will tend to inhibit heat transfer and thus retain overnight a reasonable amount of the heat stored in the water by day.

It is an object of this invention to provide a pool cover which is flexible, easily applied, and occupies small space when not in use.

U.S. Pat. No. 3,091,414 Inventor: H. A. Patnaude Issued: May 28, 1963

The invention relates to a dolly for the handling of swimming pools covers, in particular for the removal of a cover from a swimming pool and the replacement of same on the latter.

The object of this invention is to provide a dolly which may be used in pairs, one on each side of the swimming pool, for removal from and replacement of the cover on the latter.

U.S. Pat. No. 4,179,080 Inventor: Henry A. Patnaude Issued: Dec. 18, 1979

Disclosed herein is an improved dolly for transporting tarpaulins or vinyl covers that are to be deployed or retracted over areas to be protected. The improvements consist of providing the cover deployment area with a protective shroud, an improved framework and suspension system, an improved steering arrangement, and a supplemental nesting area for tarpaulin supporting shafts that have been already deployed or are to be deployed.

U.S. Pat. No. 4,324,370 Inventor: Wayne Guard et al. Issued: Apr. 13, 1982

A roller apparatus for winding and unwinding a pool cover is provided which comprises a telescoping roller section which can be adjusted in length, wheel or pedestal supports to support the roller above a pool edge, axle members connecting the roller to the wheel or pedestal supports, the latter containing ball bearings to permit axle rotation and means, such as a crank or motor, connected to one of the axle members for rotating the roller to collect the pool cover, the latter being connected to the roller. Once the pool cover is taken up, the apparatus can be rolled on its wheels, or carried where pedestal supports are used, to a storage area.

U.S. Pat. No. 4,328,930 Inventor: Jiri Kalendovsky Issued: May 11, 1982

A cover system for an outdoor swimming pool including a light-weight cover member, a composite reel member on which the cover is wound as it is removed from a covering position overlying a swimming pool to a storage condition and a pair of supporting stands to each of which one end of the reel member is journaled. The reel itself is composed of at least two tubular end sections each of which has on one end a hub member having an axle which is received in a bearing carried by each stand. The other ends are connected in abutting relation by internal expanding members disposed within the adjacent ends of the tubular members. One or more intermediate sections may be connected between the end sections by similar internal expanding members. Each stand includes a tubular member bent to substantially inverted U-shape to provide a handle member and having divergent terminals which provide two legs. A third leg is provided by a separate angled tubular member attached to the U-shaped member at the portion from which one leg diverges.

U.S. Pat. No. 4,407,027 Inventor: George M. Colon, Jr. Issued: Oct. 4, 1983

In the first embodiment of the apparatus, each end frame of the apparatus has one position at which wheels engage the decking surrounding the pool, and another position at which a braking region engages such deck. In accordance with the method, the operator rolls the apparatus to a desired location when each end frame is in the first-mentioned position, and then tilts each such end frame to the second-mentioned position. He then pulls the pool cover off of the now-stationary frame. In accordance with a second embodiment, each end frame is circular and operates as a wheel when it is desired to move the apparatus. To achieve braking, one edge region of each such wheel is pivoted to expose a chordal braking area. In accordance with the method relative to the second embodiment, the shifting from the rolling mode to the braking mode is effected when the indicated edge regions are at rotated positions such that they do not engage the decking.

U.S. Pat. No. 5,425,143 Inventor: Jiri Kalandovsky Issued: Jun. 20, 1995

A multiple pool cover deployment apparatus includes a portable carriage having a movable frame placed at one end of a pool and a main storage reel rotatably mounted thereon and having pool covers successively wound about the main reel. The apparatus also includes a first storage spool rotatably mounted to the frame adjacent to the main storage reel. The first storage spool has an elongated flexible rope wound thereabout. The apparatus also includes a portable stand placed at an opposite end of the pool across from the portable carriage and a second storage spool rotatably mounted on the portable stand. The rope is interconnected by a connector to a leading end of the outer pool cover and a leading portion of the rope is stretched across the pool and connected to the second storage spool for winding thereabout by rotating the second storage spool to cause unwinding of the outer pool cover from the main storage reel and unwinding of the rope from the first storage spool and concurrent pulling of the outer one of the pool covers and the rope across the pool from the portable carriage to the portable stand. The apparatus further includes an auxiliary storage reel mounted to the frame with a protective cover which can be attached to the last pool cover and would over the multiple pool covers to provide protection against sun radiation.

U.S. Pat. No. 5,636,808 Inventor: George M. Colin Issued: Jun. 10, 1997

A reel bearing assembly for supporting a reel in a support frame, the frame having a circular bearing opening having an axially extending cylindrical surface and radially inwardly extending flange and the assembly also including a specially shaped end cap for the reel which, with the configuration of the opening and flange in the support frame, defines a cavity which both radially and axially confines a bearing cage, the end cap having one or more retaining members which engage the flange on the support frame to hold the assembly together.

U.S. Pat. No. 5,701,613 Inventor: Cedric D. Richardson Issued: Dec. 30, 1997

A roll-up cover for a swimming pool comprises a continuous sheet of flexible reinforced plastic firmly attached to an aluminum roller with a number of reinforced loops at the free end of the plastic. The roller can be turned by a crank or wheel to roll the cover up and a pull with a hooked end is used to unroll the cover by inserting it into one of the reinforced loops and pulling the cover off of the roller. The loop straps on the free end of the cover can be hooked at the

end of the pull to keep the cover tight. The entire cover assembly is mounted on wheels so that it is of a portable construction, and it includes a debris removal and collection apparatus. The cover can be made of a plurality of interleaved pivotally connected members which is movable along the edges of a swimming pool by a plurality of rollers, and the cover is strong enough to support an adult or child in the event that they accidentally fall into the pool.

U.S. Pat. No. 6,026,522 Inventor: Harry J. Last
Issued: Feb. 22, 2000

A manually powered swimming pool cover drive for extending and retracting swimming pool covers and which includes a pair of overrunning one way clutch devices for intermittent coupled rotation with and also freewheeling about a drive shaft. A drum rotates with the drive shaft and allows winding of a cover about the drum when retracted from a covered position over a swimming pool. A pair of one way clutches may be trained around a drive shaft and coupled for rotating a cable reel allowing for the winding of cables used to extend a swimming pool cover. The respective pair of overrunning, one-way clutches are reciprocated back and forth respectively in a type of indexing operation, manually and with long lever handles for rotating the drive shafts.

While these dollies and pool covering devices may be suitable for the purposes for which they were designed, they would not be as suitable for the purposes of the present invention, as hereinafter described.

SUMMARY OF THE PRESENT INVENTION

The present invention discloses a pair of end heads that are interconnected on the inward section by a tube assembly to form the pool cover storage assembly or reel. Hand wheels are rotationally attached to the outward section of the end heads. Each of the end heads includes a pair of casters mounted to the bottom surface of the end head. The tube assembly consists of five components, a center tube, two outer tubes and two end caps. The three-part tube assembly provides for means to extend or retract the tube length to ensure proper pool cover length. The center tube is of larger diameter and allows for the two outer tubes to be inserted into the opposing distal ends. The cylindrically shaped tubes include longitudinal mating male and female extrusions along the surfaces to ensure joint rotational movement of the tube assembly. The end heads include a molded cylindrical sleeve on the horizontal plane that allows for the rotational motion of the tube assembly and hand wheel. With end caps secured to the ends of the tube assembly, the tube assembly is inserted into the sleeves of the end heads. The tube assembly is positioned such that a portion of the end cap protrudes through the end head sleeve allowing the hand wheel to be mounted on the outer side of the end head and thus anchoring the pool cover storage assembly. The extruded contours of the hand wheel, end cap, and tube assembly provide for a rotationally rigid body while allowing for easy axial connection and separation. The telescoping tubes include a series of holes along the surface creating cavities and providing convenient and efficient means to store the straps, springs or other anchoring means that are positioned around the perimeter of the covering. The cover anchors are inserted into the holes before the cover is rolled around the tubes. The openings extruded into the tubes provide for the anchors to be coiled and stored during non-use. This allows for a pleasing appearance, prevents entanglement, and provides ease of assembly when uncoiled.

A primary object of the present invention is to provide a pool cover reel that allows for storage of the cover straps, springs or other anchoring means.

Another object of the present invention is to provide a pool cover reel that facilitates various sizes of pool covers.

Yet another object of the present invention is to provide a pool cover reel that has detachable components allowing for attachment of a plurality of covers.

Still yet another object of the present invention is to provide a pool cover reel that has wheels for easy transport.

Another object of the present invention is to provide a pool cover reel that is rigid, yet lightweight for easy handling.

Yet another object of the invention is to provide a pool cover reel that includes male and female extrusions to allow for unison rotational movement of the tube and hand wheel assembly.

Still yet another object of the invention is to provide a pool cover reel that is economical to manufacture.

Another object of the present invention is to provide a pool cover reel that has handles for easy handling.

Yet another object of the invention is to provide a pool cover reel that includes recessed cotterpins to protect the cover from being damaged, provide a rigid tube assembly and maintain the symmetrical positioning of the center tube.

Still yet another object of the invention is to provide a pool cover reel that provides means for modified end caps or adapter bushings attached to the end caps suitable for a smaller diameter tube assembly making the unit suitable for use with both a solid safety cover and solar cover installation and removal.

Additional objects of the present invention will appear as the description proceeds.

The present invention overcomes the shortcomings of the prior art by providing an improved method of pool covering, storage, and interchangeability.

The foregoing and other objects and advantages will appear from the description to follow. In the description reference is made to the accompanying drawings, which form a part hereof, and in which is shown by way of illustration specific embodiments in which the invention may be practiced. These embodiments will be described in sufficient detail to enable those skilled in the art to practice the invention, and it is to be understood that other embodiments may be utilized and that structural changes may be made without departing from the scope of the invention. In the accompanying drawings, like reference characters designate the same or similar parts throughout the several views.

The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the present invention is best defined by the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

In order that the invention may be more fully understood, it will now be described, by way of example, with reference to the accompanying drawings in which:

FIG. **1** is a perspective view of a pool cover reel in use.

FIG. **2** is a view of a swimming pool cover roll mounted on the reel before the installation.

FIG. **3** is a view of the pool cover installation in progress.

FIG. **4** is a view of the completed pool cover installation.

FIG. **5** is a perspective view of the pool cover reel.

FIG. **6** is an exploded view of the pool cover reel.

FIG. **7** is an exploded isometric view of the telescoping tubes.

FIG. **8** is an end view of the tube assembly.

FIG. **9** is a perspective view of the pool cover anchor straps.

FIG. **10** is a perspective view of a stored pool cover anchor strap.

FIG. **11** is an exploded isometric view of the end head assembly.

FIG. **12** is a perspective view of the end head assembly with hand cranks removed.

FIG. **13** is an isometric view of the hand wheel and end cap assembly.

FIG. **14** is an exploded isometric view of the hand wheel and tube assembly.

FIG. **15** is a perspective view of an end head assembly.

FIG. **16** is a perspective view of the pool cover in storage.

FIG. **17** is a perspective view of the telescoping tubes in storage.

FIG. **18** is an exploded isometric view of the hand wheel, adaptor bushing and small diameter tube assembly.

LIST OF REFERENCE NUMERALS

With regard to reference numerals used, the following numbering is used throughout the drawings.

10 present invention
12 pool cover
14 pool cover roll
16 spring
18 strap
20 anchor
22 pool
24 deck
26 tube assembly
28 right end head
30 left end head
32 hand wheel
34 center tube
36 end tube
38 storage hole
40 caster
42 end cap
44 sleeve for end cap
46 female extrusions
48 male extrusions
50 cavity
52 extrusions
54 handle
56 hand crank
58 hanger
60 recess
62 frame member
64 cotter pin
65 cotter pin apertures
66 solid safety cover
68 solar cover
70 adaptor bushing
72 small diameter tube

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The following discussion describes in detail one embodiment of the invention (and several variations of that embodiment). This discussion should not be construed, however, as limiting the invention to those particular embodiments since practioners skilled in the art will recognize numerous other embodiments as well. For a definition of the complete scope of the invention, the reader is directed to the appended claims.

Turning to FIG. **1**, shown therein is a perspective view of a pool cover reel of the present invention **10** in use. A utilization of the present invention **10** is shown in the early phase of the deployment of a pool cover **12** showing pool cover roll **14**. The pool cover **12** is shown partially unrolled as the securing springs **16** on the straps **18** of the cover are hooked on the anchors **20** around the pool **22**. The pool cover **12** is rolled open by turning and pushing the reel assembly of the present invention **10** by two operators stationed on each end thereof. The pool cover **12** may be of a variety of types, such as, a solid safety cover, a solar cover or a combination.

Turning to FIG. **2**, shown therein is a view of a swimming pool cover roll **14** mounted on the reel of the present invention **10** before the installation. The swimming pool cover roll **14** is stored as a whole when not in use. The roll **14** is mounted on the reel of the present invention **10** for storage. Also shown are securing anchor **20**, strap **18**, spring **16** and the deck **24** of the swimming pool.

Turning to FIG. **3**, shown therein is a view of the pool cover **12** and roll **14** showing installation in progress using the present invention **10**. Unrolling of the pool cover **12** and securing the straps **18** and springs **16** of the cover **12** on the anchors **20** around the swimming pool continues.

Turning to FIG. **4**, shown therein is a view of the completed pool cover **12** installation using the present invention **10**. Shown is the pool cover storage assembly of the present invention **10** after the pool cover installation has been completed. The pool cover **12** was rolled up onto and around the elongated, horizontally disposed tube assembly **26** of the present invention **10**. The multiple straps **18** and springs **16** are also shown.

Turning to FIG. **5**, shown therein is a perspective view of the pool cover reel of the present invention **10**. The two supporting end heads, right **28** and left **30**, and the connecting tube assembly **26** form the pool cover storage assembly. The hand wheels **32** are rotationally attached to the end heads **28**, **30** having multiple caster wheels **40** thereon. The tube assembly **26** comprises one center tube **34** and two end tubes **36**. Cotter pins **64** are installed at each end of the center tube **34** for even weight distribution of solid safety cover **66** and to provide a rigid tube assembly **26** as the cover is being rolled up. Cotter pins **64** must be installed through the center of the inverted splines **48** to ensure nothing protrudes above the surface of the tube. The tube assembly **26** is used to store one set of the safety springs of a pool cover before the cover is rolled around the tube assembly. A plurality of storage holes **38** are bored in the tubes for such a use.

Turning to FIG. **6**, shown therein is an exploded view of the pool cover reel of the present invention. The end caps **42** are secured to the ends of the tube assembly **26**, which are then inserted into the horizontally disposed sleeves **44** in the end heads **28**, **30** with caster **40**. The end caps **42** protrude

out of the end head sleeve **44** to receive the hand wheels **32**. The hand wheels **32**, end caps **42** and the tube assembly **26** form a rotationally rigid body which forms a reel upon which the pool cover is wound.

Turning to FIG. **7**, shown therein is an exploded isometric view of the telescoping tubes **34**, **36**. The three part tube assembly provides for selective adjustment of the tube length to fit various sized pool covers. The larger diameter tube is positioned and used as the center tube **34**, while the two smaller tubes **36** are inserted into each end of the center tube **24** for selective adjustment to the size of the pool cover. The multiple storage holes **38** are also shown.

Turning to FIG. **8**, shown therein is an end view of the tube assembly **26**. Multiple female **46** and male **48** extrusions which mate along the surfaces of the telescoping tubes **34**, **36** provide a keyway for laterally inserting and extending the tubes to a selective length. In addition, the extrusions **46**, **48** ensure joint rotational movement and keep the storage holes properly aligned. Cotter pins **64** are installed into cotter pin apertures **65** at each end of the center tube **34** for even weight distribution of solid safety cover **66** and to provide a rigid tube assembly **26** as the cover is being rolled up. Cotter pins **64** must be installed through the center of the inverted splines **48** to ensure nothing protrudes above the surface of the tube.

Turning to FIG. **9**, shown therein is a perspective view of the pool cover anchor straps **18**. Depicted is the pool cover anchor springs **16** being inserted through hole **38** into a telescoping tube **34**, **36**. The inner cavity provides a convenient and efficient means to store the springs **16** at the end of the cover.

Turning to FIG. **10**, shown therein is a perspective view of a stored pool cover anchor strap **18**. Depicted is the pool cover anchor springs **16** stored within the cavity **50** of the telescoping tubes **34**, **36**. Ideally the holes **38** are elongated to provide case of insertion of the springs **16**, as well as chamfered or affixed with a rubber grommet to ensure safety.

Turning to FIG. **11**, shown therein is an exploded isometric view of the semi-circular end head **28**, **30** assembly. The cylindrical bearing surface of the end cap sleeve **44** allows the tube assembly **26** to revolve with a smooth rotation. Shown are hand wheel **32**, end cap **42**, end tube **36**, and casters **40**. Centrally disposed recess **60** for receiving the end of the end cap **42** is also shown. Also shown are a plurality of supporting frame members **62** which provide strength to the end head **28**, **30** as does the semi-circular shape of the end head.

Turning to FIG. **12**, shown therein is a perspective view of the end head **28**, **30** assembly with hand cranks removed. The cylindrical bearing surface of the end cap sleeve allows the tube assembly **26** to revolve with a smooth rotation. The hand wheel **32** anchors the tube end cap **42** and secures the assembly.

Turning to FIG. **13**, shown therein is an isometric view of the hand wheel **32** and end cap **42** assembly. The hand wheel **32** and end cap **42** are easily assembled and provide the support for the cross member tube assembly.

Turning to FIG. **14**, shown therein is an exploded isometric view of the hand wheel **32** and tube assembly **26**. The mating longitudinally disposed extruded contours **52** of the hand wheel **32**, end cap **42** and tube **26** provide for a rotationally rigid body while allowing for easy axial connection and separation.

Turning to FIG. **15**, shown therein is a perspective view of an end head **28**, **30** assembly. The end head **28**, **30** assembly includes casters **40** to allow for transport and ease of movement of the pool cover into proper position. As an additional element, handles **54** can be affixed to the top surface of the end head **28**, **30** to enhance handling. A hand crank **56** is also shown.

Turning to FIG. **16**, shown therein is a perspective view of the pool cover **12** in storage. The rigidity of the tube assembly provides support for the pool cover **12** during storage and can be easily suspended from a proximate object using hangers **58** with fasteners thereby extending the life cycle of the pool cover as well as providing a neat appearance of the pool cover during storage.

Turning to FIG. **17**, shown therein is a perspective view of the telescoping tube assembly **26** in storage. The telescoping tubes are rigid and can be stored in the same configuration as when stored with the cover assembly. Hangers **58** are also shown. By maintaining the outside dimensions of the end cap **42** and either supplying various bore diameters to suit the smaller solar blanket tubes, or using adapter bushings, both a solid safety cover tube assembly and a solar blanket tube assembly can be used with the same end heads **28**, **30** for installation or removal.

Turning to FIG. **18**, shown therein is an exploded isometric view of the hand wheel **32** and tube assembly **26** with end cap **42** modified with an adaptor bushing **70**. The mating longitudinally disposed extruded contours **52** of the hand wheel **32**, end cap **42**, and adaptor bushing **70**, and tube **26** provide for a rotationally rigid body while allowing for easy axial connection and separation. The adapter bushing **70** provides means to maintain the outside dimensions of the end cap **42** and attach a smaller diameter tube **72** for use with installation and removal of a solar cover **68**.

What is claimed to be new and desired to be protected by Letters Patent is set forth in the appended claims:

1. In combination, a swimming pool cover and apparatus for storing said swimming pool cover thereon, comprising:

a) an elongated rotating tube assembly, said tube assembly having a pair of ends, said tube assembly being substantially horizontally disposed for having a swimming pool cover wound thereon, said pool cover having a plurality of straps thereon and a plurality of springs thereon, wherein said straps and springs are for attachment to a plurality of anchors spaced about a deck of a swimming pool so that the pool cover can be secured to the swimming pool;

b) a pair of supporting end heads, each end head for receiving one end of said tube assembly to permit the tube assembly to be supported by the pair of end heads, wherein each end head has a horizontally disposed sleeve therein, wherein each end head is further defined by a top and a bottom;

c) a pair of end caps, wherein each said end cap has a first end and a second end, said first end of said end cap being disposed on each end of said tube assembly, wherein each of said second ends of said end caps passes through said sleeve of said end head and protrudes outwardly through each of said end heads;

d) a pair of hand wheels, each of said hand wheels being disposed on each of said second ends of said end caps, wherein said hand wheel has an inwardly extending centrally disposed recess for receiving each of said end caps;

e) a hand crank disposed on each of said hand wheels to permit a user to turn said tube assembly; and,

f) means for rotationally securing said tube assembly, said end caps, and said hand wheels to each other so that the tube assembly rotates with the hand wheels, wherein

said tube assembly comprises a center tube and a pair of end tubes disposed on each end of said center tube, wherein said center tube is larger in diameter than said pair of end tubes so as to operate telescopically to permit the length of the tube assembly to be varied to accommodate varying sizes of swimming pool covers and said means for rotationally securing said tube assembly comprises:

a) mating longitudinally disposed extrusions disposed in said center tube and said pair of end tubes;

b) mating longitudinally disposed extrusions disposed on said first end of said end cap and said ends of said pair of end tubes; and,

c) mating longitudinally disposed extrusion disposed on said second end of said end caps and said recess of said hand wheel.

2. The apparatus of claim **1**, wherein said tube assembly has a plurality of holes therein, said holes being disposed in the wall thereof, said holes for receiving the springs of the pool cover to permit the springs to be stored on the inside of the tube assembly.

3. The apparatus of claim **2**, wherein said holes are substantially elongated longitudinally along said tube assembly to permit easy insertion of the springs therein.

4. The apparatus of claim **3**, further comprising at least one handle disposed on said top of said end head to permit the end heads to be easily moved about.

5. The apparatus of claim **4**, further comprising a pair of casters disposed on said bottom of said end head to permit the end heads to be easily moved about.

6. The apparatus of claim **5**, further comprising a pair of hangers for attachment to said tube assembly to permit the tube assembly to be attached to a proximate object.

7. The apparatus of claim **6**, further comprising fasteners for attaching said hangers to a proximate object to permit the tube assembly to be attached to a proximate object.

8. The apparatus of claim **7**, wherein said end heads are semi-circular in shape to provide great structural strength.

9. The apparatus of claim **8**, wherein said end heads further comprise supporting frame members disposed between said top and said bottom thereof to provide great structural strength.

10. The apparatus of claim **9**, wherein said extrusions on said center tube are inwardly extending male protrusions and said extrusions of said end tubes are inwardly extending female protrusions for receiving said male protrusions to permit the tubes to be rotationally secured to each other.

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