United States Patent [19]

Brown

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[54] **COLLAPSIBLE CABLE SPOOL**

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[52] **U.S. Cl.** **242/115**

[51] **Int. Cl.**..... **B65h 75/22,** B65h 75/14

[58] **Field of Search**242/115, 118.8, 77, 77.3, 118.5, 242/86

[56] **References Cited**

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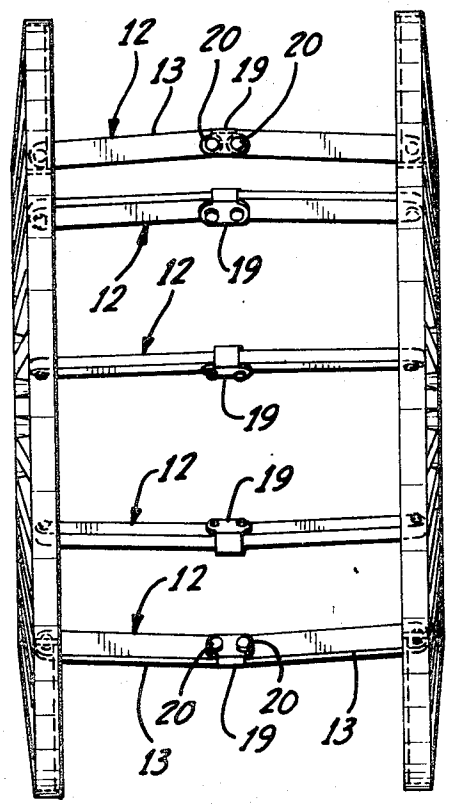
[57] **ABSTRACT**

A collapsible cable spool having radially fluted flanges and a plurality of foldable drum or core sectors pivotally carried in the flutes to permit the spool to be collapsed for storage and shipment.

6 Claims, 7 Drawing Figures



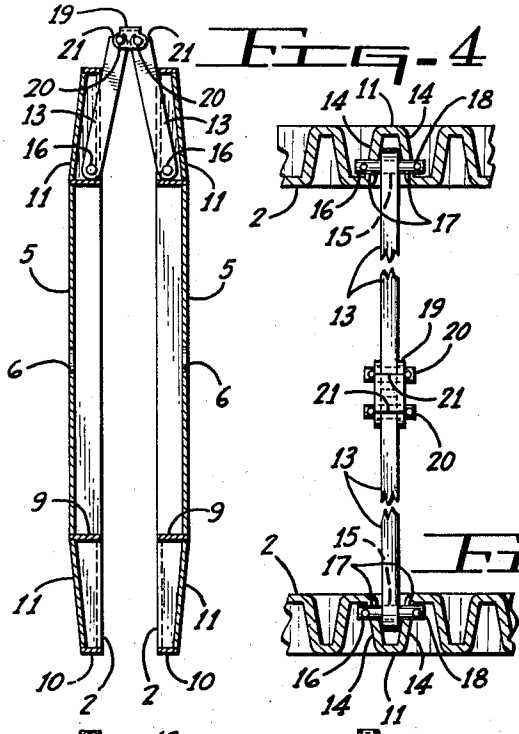


Fig-4

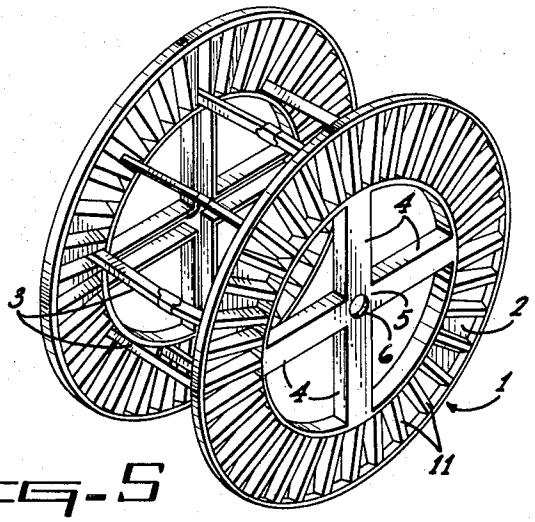


Fig-5

Fig-1

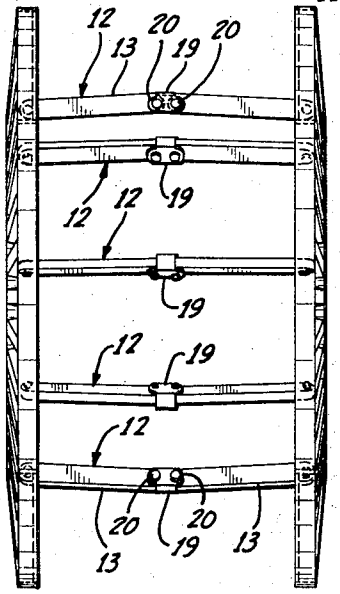


Fig-3

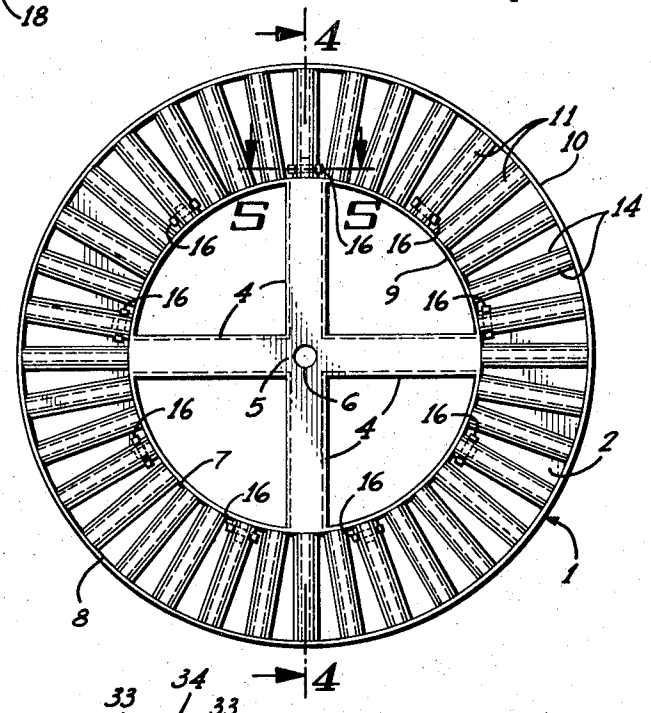


Fig-2

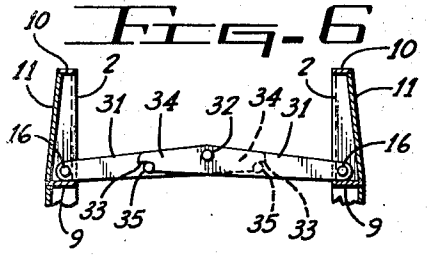


Fig-6

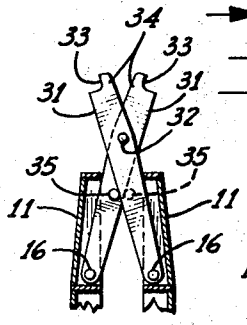


Fig-7

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COLLAPSIBLE CABLE SPOOL

BACKGROUND OF THE INVENTION

This invention relates to collapsible cable spools and has special reference to simplified construction for such spools to facilitate storage and shipment thereof when empty.

FIELD OF THE INVENTION

This invention is directed to a specific construction of spool flanges and drum or core segments which cooperate to provide a rigid spool for carrying cable and which permit the collapsing of the spool when it is empty.

DESCRIPTION OF THE PRIOR ART

The problem of storing and shipping empty cable spools is well known in the art. Such spools must be of strong construction to hold and protect from damage many kinds of cable for storage and shipment. Electrical cables, steel cables and the like are made in long lengths and are best stored, shipped, and otherwise handled while carried on a rugged spool.

However, once the cable is removed from the spool, the spool is excessively bulky for storage and shipment. Because of the high initial cost of the spools, it is desirable to return them to the cable manufacturer for reuse, yet there is too little economic advantage in this procedure at the present time.

Many attempts have been made to make a reusable spool which may be readily collapsed for storage and shipment when empty, but none has gained commercial acceptance as yet. Many of the collapsible spools have been too complicated and too expensive to manufacture. Others have not been of strong enough construction to withstand the heavy duty service requirements of protecting cable while being reeled, stored, moved, shipped and unreeled. Others were not foolproof in their design to insure their remaining in rigid open-spool position when carrying cable.

SUMMARY OF THE INVENTION

In accordance with the invention claimed, a new improved and simplified collapsible spool is provided with is capable of withstanding the heavy duty service involved in the handling of cable on a spool and which will collapse to reduce its shipping and storage volume.

Accordingly it is one of the principal objects of this invention to provide an improved and simplified collapsible cable spool which makes use of presently used flanges on the spools which are strong and relatively light weight and well accepted in the commercial trade, and providing a collapsible drum or core for the spool which is easily installed and inexpensive to produce, yet extremely strong and durable.

Another object is to provide such a spool with the least possible modification of standard accepted flanges for such spools.

Another object is to provide a means for converting presently existing spools which are simple and positive in their opening and closing operation.

Another object is to provide such a spool with a positive strong lock arrangement when in open position to insure against accidental collapse when carrying cable.

Another object is to provide such a spool which will easily fold to closed position from open lock position by force being applied to the flanges to move them toward each other.

A more specific object is to provide such a spool wherein the core or drum section thereof is of open construction and comprises a plurality of pairs of bar-like segments pivotally connected at one end and having their opposed ends pivotally mounted within corresponding flutes of the two flanges comprising the spool, and means to limit the pivotal movement of the bar-like segments in one direction to form a rigid drum or core for the spool, yet permitting their pivotal movement in the opposite direction for maximum collapsibility of the spool.

Further objects and advantages of this invention will become apparent as the description proceeds and the features of novelty which characterize this invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

BRIEF DESCRIPTION OF THE DRAWING

The present invention may be more readily described by reference to the accompanying drawing in which:

FIG. **1** is a perspective view of a cable spool made in accordance with my invention.

FIG. **2** is an enlarged side elevational view of the spool shown in FIG. **1**.

FIG. **3** is an end view of FIG. **2**.

FIG. **4** is a sectional view on the line **4—4** of FIG. **2**, but showing the spool in collapsed position.

FIG. **5** is a sectional view on the line **5—5** of FIG. **2** with the spool in open position.

FIG. **6** is a fragmental sectional view of a modified form of locking arrangement for my collapsible spool showing the bar-like core segments locked in open position.

FIG. **7** is a view similar to FIG. **6** showing the bar-like segments in closed or collapsed position.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring more particularly to the drawings by characters of reference, the numeral **1** indicates generally a cable spool having flanges **2—2**, a core or drum **3**, and spokes **4—4** which provide hubs **5—5** having axial openings **6—6** therethrough to permit the spool to be rotated for winding and unwinding by means of any suitable apparatus (not shwon), all of which are well known in the art.

The flanges **2—2** as shown are conventional in the art and are usually made of metal, and are ring-shaped, as shown, with the inner diameter or edge **7** being slightly less than the diameter of the core or drum section **3**. The diameter of the outer rim or edge **8** of the flanges may be of any suitable dimension in accordance with desired use of the spool, or in other words, so that the spool may carry a predetermined amount of cable wound thereon.

The flanges usually are provided with a welded-on perpendicularly disposed ring **9** on the inner edge **7** and a similar ring **10** on the outer edge **8** to strengthen and rigidify the flanges.

In addition, the flanges are usually made of pressed metal and are provided with a plurality of radially disposed spaced flutes or ribs **11—11** pressed thereinto. The flutes or ribs **11—11** are substantially U-shaped in

cross section and are usually deeper at their inner ends adjacent the rim **9** than they are at their outer ends adjacent the rim **10** as shown, thus providing the maximum strength and rigidity to the flanges near the core or drum section **2** where it is most needed in normal use of the spool, and also, permitting the use of straight panels in the manufacture of the flanges. All of this flange construction is well known in the art, and flanges constructed as shown and described are well accepted in commercial trade and are in common use.

Spools using the flanges above described are presently provided with a rigid cylindrical drum or cone (not shown), which is securely fastened axially between the flanges, as by welding or the like, and these spools are obviously rigid and durable but require too much space for storage and shipment when not carrying cable. Obviously these conventional spools cannot be collapsed for shipment and storage.

In my invention, I have provided a collapsible core or drum **3—3** which is cooperatively associated with the standard spool flanges above described.

My drum or core **3—3** comprises a plurality of foldable drum or core sectors **12—12,** each of the sectors comprising a pair of equal length bar-like segments **13—13** which are pivotally connected at one end and have their opposed ends pivotally mounted within the U-shaped ribs or flutes **11—11,** as will become apparent.

The bar-like segments **13—13** may be of any suitable material, either solid bar stock of rectangular cross section, channel members, or even angle iron, as desired.

In FIGS. **1** through **5,** I have shown a preferred embodiment of my invention. The reference numerals **14—14** indicate the opposed side walls of an individual rib or flute **11.** As is clearly seen in FIG. **5,** the outer ends of the segments **13—13** are each pivotally carried within corresponding flutes or ribs **11—11** of the opposed flanges **2—2** so the side walls **14—14** provide a means to contain the pivotal mount. As shown, the outer ends of the bar segments **13—13** have an opening **15** therethrough, through which a pivot pin **16** extends. The pivot pin extends through suitable openings **17—17** in the opposed side walls **14—14** and has suitable retaining means such as cotter pins **18—18** through each end thereof as shown to insure that the pivotal mounting will remain secure.

As shown more clearly in FIGS. **4, 5** and **6,** the pivotal connection of the bar segments **13—13** to each other comprises a U-shaped clip member **19,** having a pair of pins **20—20** therethrough, one of the pairs of pins being through each adjacent end of the bar segments to permit the pivotal movements of the bar segments, in conjunction with the pivotal mounting **15–16** of the opposed outer ends of the bar segments.

As means to limit the pivotal movement of the segments **13,** each inner end of the segments has a notch **21—21** which abuts against the clip **19** to act as a stop or lock against further pivoting in the direction toward open position.

As shown in FIGS. **1, 2** and **3** a plurality of core sectors **12** are employed in my invention to form the core or drum for my spool. The core sectors are mounted substantially equi-distant apart circumferentially around the inner edge **9** of the flanges **2** and equidistant radially from the center axis of the flanges to form an open core on which cable may be wound. The stop or lock arrangement **19-20-21** insures that the core for the spool will be rigid and non-collapsible in the direction in which crushing pressure would be applied to the core while cable is being wound thereon and while cable is stored thereon.

Rigidity of the drum or core for my spool is also insured by the radially disposition of the core segments circumferentially adjacent the inner rim **9** of the flanges as the pivot pins **16—16** of the various sectors **12** of the core are disposed perpendicularly to each bar segment and, preferably, an odd number of core sectors are employed in making my core so that no two sectors have their pivotal mountings to the flanges in the same plane.

In FIGS. **6** and **7** a modified form of locking or stop arrangement is shown. In this form of my invention, the bar segments **31** are equal in length but they overlap each other and are pivotally connected to each other by a single pivot pin **32.** Each of the bar segments **31** has a notch **33** in its overlapping end **34** which engages against a stop block or pin **35** which is fixed to its companion bar segment **31** to limit the pivotal movement of the segments **31** relative to each other in the open position to a point which does not permit them to reach lineal alignment and they will be therefore biased toward closing position and will not require manual manipulation for closing.

In operation, to collapse an open spool made in accordance with my invention, it is only necessary to apply pressure to the sides of the flanges **2** to push them toward each other, and the core sectors will fold as shown in FIGS. **4** and **7** until they reach the limit.

To open the spool to cable carrying position, all that is required is to pull the two flanges **2** away from each other.

It is deemed apparent that one of the advantages of my invention is that the core segments are pivotally mounted within the U-shaped ribs or flutes **11—11,** and thus they fold into the flutes or ribs when the cable spool is collapsed. Also it is deemed apparent that while I have shown my invention as applied to a spool wherein the bar segments **13—13** are longer than the effective flanges **2** of the spools, a spool employing shorter bar segments **13—13** and providing a narrower core **2** and employing the same height of flange could be made and the core sectors would fold completely into the ribs or flutes and result in a much smaller package than that shown. I have here chosen to show the relationships of the parts of my invention when applied to the most commonly used spool dimensional relationships between core width and flange height.

It is deemed apparent to those skilled in the art that various changes and modifications may be made in the invention shown and described without departing from the spirit of the invention or from the scope of the appended claims.

What I claim is:

1. A collapsible spool having a pair of opposed spaced flanges, each of said flanges having a plurality of corresponding radially disposed flutes of substantially U-shaped cross section, said spool comprising:

a plurality of core sectors, each of said core sectors incluidng a pair of bar segments,

a pivotal connection between said bar segments at their adjacent ends,

means for limiting the movement of said pivotal connection in one direction to prevent the alignment of said bar segments,

pivotal means mounting the opposite ends of said bar segments to said opposed flanges within corresponding flutes thereof,

said core sectors being mounted in circumferentially spaced relationship to each other on said flanges to form an open core,

said bar segments being arranged in end-to-end relationship,

said pivotal connection including a U-shaped clip member arranged to embrace adjacent ends of said bar segments, and

a pivot pin connecting each of said bar segments to said clip member.

2. The collapsible spool set forth in claim **1** wherein said pivotal means includes a pivot pin through said opposite ends of said bar segments,

and means for mounting said pin between the walls of said U-shaped flutes, permitting said bar segments to fold into said flutes.

3. The collapsible spool set forth in claim **1** wherein each segment of said pair of bar segments is of equal length.

4. The collapsible spool set forth in claim **1** wherein:

said means for limiting the movement of said pivotal connection comprises a locking means including a notch in the adjacent end of each of said bar segments to engage against an adjacent portion of said clip member to limit pivotal movement of said bars in one direction.

5. The collapsible spool as set forth in claim **1** wherein said core segments are of an odd number so that none of said pivotal mounting means lies in the same plane.

6. A collapsible spool having a pair of opposed spaced flanges, each of said flanges having a plurality of corresponding radially disposed flutes of substantially U-shaped cross section, said spool comprising:

a plurality of core sectors, each of said core sectors including a pair of bar segments,

a pivotal connection between said bar segments at their adjacent ends,

means for limiting the movement of said pivotal connection in one direction to prevent the alignment of said bar segments,

pivotal means mounting the opposite ends of said bar segments to said opposed flanges within corresponding flutes thereof,

said core sectors being mounted in circumferentially spaced relationship to each other on said flanges to form an open core,

said bar segments being arranged in overlapping relationship, and

said pivotal connection including a single pivot pin extending through the overlapping portion of said bars,

said means for limiting the movement of said pivotal connection comprising a locking means including a notch in each of said overlapping ends of said bar segments, and

a stop block fixed to each of said bar segments adjacent said pivot pin to receive one of said notches.

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