

UMBRELLA WITH ANTI-INVERSION ASSEMBLY

CROSS REFERENCE TO RELATED APPLICATION

5 The present application claims the benefit of and priority to US patent application serial No. 63/605,633, filed December 4, 2023, which is hereby expressly incorporated by reference in its entirety.

TECHNICAL FIELD

10 The present technology is generally related to umbrellas and, more particularly, to an umbrella with an anti-inversion assembly that prevents inversion of the umbrella canopy.

BACKGROUND

As is well known, an umbrella is a device that protects the user from the elements and in particular from liquid and frozen precipitation or even the sun, etc. A traditional umbrella
15 has the following parts: a pole, a canopy, ribs, a runner, springs and a ferrule. A pole is the metal or wooden shaft that runs between the umbrella's handle at the bottom (or the base stand in the case of a patio model) and the canopy at the top. The canopy is the fabric part of the umbrella that catches the rain, the wind and the sun. The ribs are what give an umbrella its structure and shape. Outer ribs hold up the canopy and inner ribs (sometimes called
20 stretchers) act as supports and connect the outer ribs to the umbrella pole. A runner slides up and down the pole while connected to the ribs/stretchers, and is responsible for the opening and closing of the canopy. Many umbrella designs include a top spring to hold the runner up when the canopy is open, a bottom spring to hold the runner down when the canopy is closed, and sometimes a center ball spring to extend the pole length in telescopic models. Strictly
25 ornamental, the finial (also called the ferrule) is found on the very top of the umbrella, above the canopy.

Umbrella ribs function in a folding construction supporting the umbrella canopy fabric. Under normal operating conditions, the forces acting on the umbrella canopy fabric increase toward peak values when the canopy becomes fully deployed and when wind gusts
30 tend to overturn the canopy. These forces are transmitted from the canopy to the canopy ribs, and can act on the ribs in opposite directions depending on the direction of the wind. The ribs thus have to be strong enough to withstand forces which can act on them from anyone of the two main opposite directions.

In addition to their strength requirements, the shape of the umbrella ribs should change between a substantially straight contour when the umbrella is folded and a curved one, when the canopy is fully deployed. The straight design is aimed to allow the folded ribs to lay parallel to the shaft of the umbrella when the umbrella is folded and the curved design provides for the typical mushroom-like shape (also called bell shaped).

SUMMARY

An umbrella includes a shaft, a rib assembly comprising a plurality of ribs that are pivotally coupled to the shaft, and a plurality of struts that are pivotally coupled to the plurality of ribs and the shaft. The umbrella also includes an anti-inversion assembly to counter inversion of the canopy and rib assembly. The anti-inversion assembly includes a biasing mechanism that is coupled to the shaft and is configured to store energy when a force is applied thereto. The anti-inversion assembly further includes a plurality of elongated bendable members. Each elongated bendable member is coupled at a first end to the biasing mechanism and at a second end to one rib or to a tip of one rib. The elongated bendable member is held taut by the biasing mechanism when the umbrella is in an open position, a closed position and intermediate positions between the open and closed positions.

BRIEF DESCRIPTION OF THE DRAWING FIGURES

The disclosure can be more completely understood in consideration of the following detailed description of various embodiments of the disclosure, in connection with the accompanying drawings, in which:

Fig. 1 is a side elevation view of an umbrella according to the present disclosure and in an open position;

Fig. 2 is a top perspective view thereof;

Fig. 3 is a partial side elevation view of an umbrella showing one rib and strut in a fully open position along with an anti-inversion assembly according to the present disclosure;

Fig. 4 is a partial side elevation view of an umbrella showing one rib and strut in a half open position along with an anti-inversion assembly;

Fig. 5 is a partial side elevation view of the umbrella showing one rib and the strut in a fully closed position;

Fig. 6 is a closeup of a section of the shaft along with an anti-inversion assembly;

Fig. 7 is a closeup of a section of the rib showing an elongated bendable member passing through an opening associated with the rib;

Fig. 8 is a perspective view of a connector for connecting the rib to a distal tip;

Fig. 9A is a top perspective view of a sliding ring to which the elongated bendable member is coupled;

Fig. 9B is a top perspective view of the sliding ring with one elongated bendable member coupled thereto;

Fig. 9C is a top perspective view of the sliding ring showing three elongated bendable members routed through the sliding ring; and

Fig. 10 is an enlarged bottom perspective view of the sliding ring with the three elongated bendable members routed through the sliding ring.

While embodiments of the disclosure are amenable to various modifications and alternative forms, specifics thereof shown by way of example in the drawings will be described in detail. It should be understood, however, that the intention is not to limit the disclosure to the particular embodiments described. On the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the subject matter as defined by the claims.

DETAILED DESCRIPTION OF CERTAIN EMBODIMENTS

As discussed herein, the present invention is directed to an improvement with respect to a number of components of an umbrella including but not limited to a shaft construction and a rib assembly thereof. As discussed herein, the features of the present invention can be implemented with both a manual type umbrella and an automatic type umbrella. In addition, the other features can be implemented with other types of umbrellas. Accordingly, the following discussion and figures describe exemplary embodiments that implement the teachings of the present invention.

Figs. 1-2 illustrate an umbrella 100 in accordance with one exemplary embodiment of the present invention with multiple rib assemblies 200 being shown but the canopy is omitted. In the illustrated embodiment, there are six rib assemblies 200; however, this is merely exemplary in nature and not limiting of the scope of the present disclosure in that the anti-inversion assembly (mechanism) disclosed herein can be implemented in different umbrella types and with different types of rib assemblies. For example, each rib assembly 200 can include one or more ribs and is coupled to a shaft 110 using one or more struts.

Figs. 1-7 illustrate a lightweight golf type umbrella that is manually operated to open and close the umbrella 100.

The umbrella 100 includes shaft 110 that has a top end 112 and an opposite bottom end 114. A hand grip 120 is typically disposed at the bottom end 114 to assist in holding the umbrella 100. The shaft 110 itself can be formed of any number of different components to cooperate to provide shaft 110 and may be formed on more than one shaft section.

5 At the top end 112 of the shaft 110, a cap 130 can be provided to close off the shaft 110 and at the second end, the hand grip 120 is provided for grasping by the user. A movable runner 140 is provided along the shaft 110.

The umbrella 100 can be of a single or dual canopy design.

10 The umbrella 100 includes a plurality of rib assemblies 200 that are coupled to both the cap 130 and the runner 140 and this results in the opening and closing of the rib assembly 200 and the attached canopy (not shown) based on the direction of movement of the runner 140. As described herein, each rib assembly 200 is defined by one or more ribs 210 and in the event, that the rib 210 is formed of multiple ribs parts, they are pivotally attached to another to allow for the collapsing and extension of the rib assembly 200 in response to
15 opening and closing of the canopy by the runner 140. In the illustrated large golf umbrella, there is only a single long rib 210 per each rib assembly; however, for more compact designs, there can be multiple rib parts that fold together and define one rib assembly.

Fig. 8 shows an embodiment in which the rib 210 (e.g., single long rib) can be attached to a distal tip member 211. The distal end of the rib 210 can have a first tip
20 connector 213 and the distal tip member 211 can have a second tip member 215. The first and second tip members 213, 215 can be attached using any number of different techniques. For example, a snap-fit, as shown, can be used. One tip member has a female snap fit feature and the other has a male snap fit feature. However, it will be understood that the tip member 211 can be omitted.

25 The connection between the rib assembly 200 and the runner 140 is made by a first strut (stretcher) 220. The strut 220 is an elongated structure that has a first end 222 and an opposite second end 224, with the second end 224 being pivotally attached to the rib assembly 200, as discussed herein, and the first end 222 being pivotally attached to the runner 140. The pivotal connection between the first strut 220 and the runner 140 and between the
30 first strut 220 and the rib assembly can be accomplished with a fastener, such as a rivet or pin, etc. More specifically, a first strut joint (first connection point/pivot) 225 is formed between the first strut 220 and the rib assembly at second end 224 and a similar strut joint can be formed between the first strut 220 and the runner 140 at the first end 222.

The first strut 220 can be formed of any number of different materials including a metal (e.g., a zinc alloy).

In accordance with the present disclosure and as best shown in Fig. 7, the first strut 220 includes a slot or through hole/opening 250 formed therethrough between the ends 222, 224. This opening 250 can be considered to be a bounded window that is formed through the first strut 220. The opening 250 permits passage of an object, as described herein, completely through the first strut 220. The opening 250 extends longitudinally along the length of the first strut 220 and thus, one end of the opening 250 is closer to the first end 222 and the other end of the opening 250 is closer to the other end 224. As shown, the opening 250 can be formed in a part that is coupled to and surrounds the rib 210. This part positions the opening 250 immediately adjacent the body of the rib 210.

Anti-inversion assembly/mechanism

In accordance with the present disclosure, an anti-inversion assembly (mechanism) 300 is provided. The anti-inversion assembly 300 is designed to prevent unintended and undesired inversion of the umbrella and in particular, of the canopy and rib assemblies 200.

The anti-inversion assembly 300 includes a biasing mechanism and an elongated bendable member 310.

The elongated bendable member 310 can be in the form of a string or cable that freely bends. The elongated bendable member 310 can be formed of a synthetic material and thus, can be in the form of a synthetic string, such as a nylon string. The elongated bendable member 310 has a first end 312 and an opposite second end 314. As described herein, the elongated bendable member 310 is configured to pass through the opening 250. The elongated bendable member 310 is thus fully contained and captured within the fully bounded opening 250. The first end 312 of the elongated bendable member 310 is coupled to the biasing mechanism, while the second end 314 is coupled to the rib assembly 200. For example, the second end 314 can be coupled to the second tip member 215 as by passing through an opening formed therein.

The second end 314 can be attached directly to one of the ribs 210 or can be attached to a tip member that is itself attached to the distal end of the rib 210. In addition, the location of the connection between the second end 314 and the rib 210 can vary relative to the distal tip. For example, as shown, it can be spaced from the distal tip or can be located closer to the distal tip than as shown or even further away therefrom.

The biasing mechanism comprises a biasing element in the form of a spring 330, such as a tension spring. The spring 330 is coiled and thus can be disposed about the shaft 110. In

other words, the shaft 110 passes through the hollow center of the spring. Along the shaft 110, there is a spring stop in the form of a lower spring ring 340 that is fixedly attached to the shaft 110 at a fixed location. The spring 330 is disposed above the lower spring ring 340 and thus, the lower spring ring 340 defines the bottom degree of travel of the spring 330. Since
5 the lower spring ring 340 is fixed to the shaft 110, any downward force applied to the spring 330 results in compression of the spring 330. The lower spring ring 340 thus does not move along the shaft. It will also be appreciated that instead of a lower spring ring, the shaft can have one or more stops formed along the shaft that function the same way as the lower spring ring in that the spring is above the one or more fixed stops.

10 The biasing mechanism includes a sliding ring 350 that slidably travels over the shaft 110. The sliding ring 350 is located above the spring 330 and thus, the spring 330 is disposed between the sliding ring 350 and the fixed lower spring ring 340. Thus, when the sliding ring 350 moves downward, toward the fixed lower spring ring 340, the spring 330 compresses. In contrast, when the sliding ring 350 moves away from the fixed lower spring ring 340, the
15 spring elongates.

It will also be appreciated that the spring 330 can be broadly interpreted as being a biasing member and therefore, other structures, besides springs, such as webbing, or the like could be used so long as the structure can store and release energy under the motions described herein. Thus, the biasing member can even be a structure formed of a rubber or
20 plastic material that has an elongated rest position and is compressible resulting in energy storage. For example, the biasing member can be an annular shaped rubber body disposed about the shaft 110. When the annular shaped rubber body is compressed by the downward movement of the sliding ring 350, energy is stored and can be released as the umbrella moves between the open and closed positions. Other structures that function in a similar manner can
25 be used.

The first end 312 of the elongated bendable member 310 is coupled to the sliding ring 350 and thus, movement of the elongated bendable member 310 can cause travel of the sliding ring 350 up and down the shaft 110 during the opening and closing of the umbrella as described herein. The first end 312 can be attached to the sliding ring 350 using any number
30 of conventional techniques including having the first end 312 directly molded into the sliding ring 350. Alternatively, the first end 312 can be bonded or otherwise attached to the sliding ring 350 or can be wrapped around the sliding ring 350.

Now referring to Figs. 9A-10, one sliding ring 350 is shown. The sliding ring 350 has a top surface 351 and an opposite bottom surface 352. The sliding ring 350 is designed to

allow looping of the elongated bendable members 310 to define two separate elongated bendable members 310 that are coupled to two different ribs 210. It can be difficult to attach individual ends of the elongated bendable members 310 to the sliding ring 350 (e.g., as by an over molding process) and therefore, the sliding ring 350 construction eliminates the need to directly anchor the ends of the elongated bendable members 310 to the sliding ring 350. As described herein, the sliding ring 310 has channeling that allows for routing of multiple elongated bendable members 310. The sliding ring 350 has a hollow circular shape with a center hole formed therein. The sliding ring 350 has a plurality of inner tabs 353 that have arcuate shapes and surround the center hole and are spaced circumferentially about the center hole (e.g., they can be evenly spaced apart). The illustrated embodiment has three inner tabs 353. The inner tabs 353 contact the shaft 110 which passes through the center hole.

Adjacent and behind each inner tab 353, there is a recessed open space 355 that has an arcuate shape. This open space 355 is intended to receive and hold the looped elongated bendable member 310. The open space 355 can be considered to be a discrete channel section for routing the elongated bendable member.

As shown in Fig. 10, along the bottom surface 352 there are a plurality of notches 360. In particular, there are three pairs of notches 360 to capture the three looped elongated bendable members 310. One inner tab 353 is located between one pair of notches 360. The notches 360 are shaped and sized to receive and hold the elongated bendable member 310.

To couple the elongated bendable members 310 to the sliding ring 350, one elongated bendable member 310 is looped at a middle thereof and this looped end is inserted into the open space 355 behind the inner tab 353. The two sections of the elongated bendable member 310 are then routed downward to and then passing through (exiting) the notches 360. In this case, the elongated bendable member 310 is not fixedly attached to the sliding ring 350, as by molding, but instead, it is captured within the sliding ring 350. The user can simply loop and insert one elongated bendable member 310 into one open space 355 and create two sections of the elongated bendable member 310, each of which is attached to one rib 210. In conclusion, the sliding ring construction permits three elongated bendable members 310 to be used to define six elongated bendable members that connect to six ribs.

Operation of the Anti-inversion assembly 300

As shown in the fully opened position of Figs. 1-3, the elongated bendable member 310 is in a fully extended position and has a generally linear shape. In other words, in the fully open position, the elongated bendable member 310 is in a taut condition and has a linear shape. The elongated bendable member 310 passes through the opening 250. The taut nature

of the elongated bendable member 310 acts as an anti-inversion mechanism since it prevents the canopy and the rib assembly from inverting as by a sudden gust of wind. The elongated bendable member 310 is holding down the rib 210 and thus, the canopy as well.

As shown in the fully open position, the spring 330 is in a semi relaxed position
5 (condition) allowing the elongated bendable member 310 to support the rib mechanism to stop inversion.

To close the umbrella, the user uses the closing mechanism which can be a manual mechanism or automated mechanism. Fig. 4 shows the umbrella 100 in a half-closed position. As the umbrella 100 closes, the rib assembly 200 (rib 210) is drawn towards the
10 shaft 110, the elongated bendable member 310 departs from its linear shape and assumes a bent or angled shape. Since the second end 314 of the elongated bendable member 310 assumes a more lowered position, the entire elongated bendable member 310 is pulled downward. This downward movement of the elongated bendable member 310 causes a downward movement of the sliding ring 350. In other words, the elongated bendable
15 member 310 pulls the sliding ring 350 downward resulting in the spring 330 compressing. In this at least partially or fully compressed condition, the spring 330 stores energy. In this partially closed position of Fig. 2, the angle of the bent elongated bendable member 310 is at a first value and this corresponds to the spring 330 being at its maximum energy storage position.

20 The elongated bendable member 310 is taut in this position as well.

As the closing action of the umbrella continues, the distal end / tip of the rib assembly 200 moves closer to the shaft 110 and assumes a more vertical orientation. This closing action of the rib assembly results in the elongated bendable member 310 not being pulled down and therefore, the sliding ring 350 also is not pulled down. Since the pulling action on
25 the sliding ring 350 is lessened, the spring 330 is free to release its stored energy. As the stored energy is released, the spring 330 elongates and the sliding ring 350 is driven upward along the shaft 110.

Accordingly, when the umbrella 100 is in the closed position (Fig. 5), the spring 330 is fully extended. This stops the anti-inversion elongated bendable member 310 from sagging
30 out of the bottom of the umbrella 100. The elongated bendable member 310 is kept taut at all times due to the tensioning action provided by the spring. As can be seen in Fig. 5, the tensioning action allows the elongated bendable member 310 to be kept in a taut, tensioned state as opposed to being a loose sagging (drooping) structure.

The opposite is true for the opening action in that the spring 330 begins in the fully extended position shown in Fig. 5 (umbrella fully closed position) and then as the rib assembly opens, the distal end or tip of the rib assembly moves away from the shaft 110 and also begins to move upward. The elongated bendable member 310 pulls downward and since
5 the first end 312 of the elongated bendable member 310 is attached to the sliding ring 350, the sliding ring 350 is pulled downward as well, thereby compressing the spring 330 as described above. However, as the rib assembly 200 moves from the half open to the fully opened position, the elongated bendable member 310 moves from its bent position to the generally straight (linear) position. As mentioned, this transition of the elongated bendable
10 member 310 to this position results in the sliding ring 350 not being pulled down and therefore, the spring 330 releases its energy and assumes a semi relaxed position. Movement from the closed position to the open position results in the spring 330 moving from an extended position to compressed position back to an extended position. As shown in the figures, the spring state in the fully closed and fully open umbrella positions is slightly
15 different in that in the closed umbrella position, the spring is fully extended, while in the fully open umbrella position, the spring is in a semi relaxed position which allows the anti-inversion spring to support the rib 210 to stop inversion thereof.

Accordingly, the elongated bendable member 310, which can be in the form of a string, rope, cable, wire, etc. functions as an anti-inversion support to the rib assembly 200.
20 Distinguishing features are that the elongated bendable member 310 passes from the rib tip (or rib end) through the first strut 220 to the spring-loaded slider (ring 350) located above the spring along the main shaft 110. During opening of the umbrella 100, the spring 330 compresses due to movement of the sliding ring 350 along the shaft in a direction toward the fixed lower ring 340.

25 The reason the sliding ring 350 is provided on (above) the spring, is that when a user closes the umbrella 100, if there was no spring 330, the anti-inversion string (elongated bendable member 310) would droop below the bottom canopy when folded. So in its folded (closed) position, the spring 330 pushes the slider (slider ring 350) up which is attached to the anti-inversion spring 330 keeping it taut at all times through the opening and closing
30 movement.

Various embodiments of systems, devices, and methods have been described herein. These embodiments are given only by way of example and are not intended to limit the scope of the claimed inventions. It should be appreciated, moreover, that the various features of the embodiments that have been described may be combined in various ways to produce numerous

additional embodiments. Moreover, while various materials, dimensions, shapes, configurations and locations, etc. have been described for use with disclosed embodiments, others besides those disclosed may be utilized without exceeding the scope of the claimed inventions.

5 Persons of ordinary skill in the relevant arts will recognize that the subject matter hereof may comprise fewer features than illustrated in any individual embodiment described above. The embodiments described herein are not meant to be an exhaustive presentation of the ways in which the various features of the subject matter hereof may be combined. Accordingly, the embodiments are not mutually exclusive combinations of features; rather, the various
10 embodiments can comprise a combination of different individual features selected from different individual embodiments, as understood by persons of ordinary skill in the art. Moreover, elements described with respect to one embodiment can be implemented in other embodiments even when not described in such embodiments unless otherwise noted.

 Although a dependent claim may refer in the claims to a specific combination with one
15 or more other claims, other embodiments can also include a combination of the dependent claim with the subject matter of each other dependent claim or a combination of one or more features with other dependent or independent claims. Such combinations are proposed herein unless it is stated that a specific combination is not intended.

 Any incorporation by reference of documents above is limited such that no subject
20 matter is incorporated that is contrary to the explicit disclosure herein. Any incorporation by reference of documents above is further limited such that no claims included in the documents are incorporated by reference herein. Any incorporation by reference of documents above is yet further limited such that any definitions provided in the documents are not incorporated by reference herein unless expressly included herein.

25 For purposes of interpreting the claims, it is expressly intended that the provisions of 35 U.S.C. § 112(f) are not to be invoked unless the specific terms “means for” or “step for” are recited in a claim.

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What is claimed is:

1. An umbrella comprising:
a shaft;
5 a rib assembly comprising a plurality of ribs that are pivotally coupled to the shaft;
a plurality of struts that are pivotally coupled to the plurality of ribs and the shaft; and
an anti-inversion assembly comprising:
a biasing mechanism that is coupled to the shaft and is configured to store
energy when a force is applied thereto and release energy when the force is removed;
10 and
a plurality of elongated bendable members, each elongated bendable member
being coupled at a first end to the biasing mechanism and at a second end to one rib or to a tip
of one rib, wherein the elongated bendable member is held taut by the biasing mechanism when
the umbrella is in an open position, a closed position and intermediate positions between the
15 open and closed positions.
2. The umbrella of claim 1, wherein each strut has a through associated therewith at a
location between first and second ends thereof and one corresponding elongated
bendable member passes through the through hole.
3. The umbrella of claim 2, wherein the through hole comprises an elongated opening
20 formed through the strut or an opening formed in a part that is coupled about and
surrounds the strut to position the opening adjacent the strut.
4. The umbrella of claim 1, further including a runner that moves along the shaft, the
plurality of struts being coupled to the runner.
5. The umbrella of claim 1, wherein the biasing mechanism comprises a fixed stop
25 that is fixedly attached to the shaft at a fixed location; a biasing member disposed
above the fixed stop and about the shaft and a sliding ring disposed about the shaft
above the biasing member, the sliding ring being slidable along the shaft and the
biasing member being disposed between the sliding ring and the fixed stop.
6. The umbrella of claim 5, wherein the biasing member comprises a coiled tension
30 spring through which the shaft passes.
7. The umbrella of claim 5, wherein first ends of the elongated bendable members are
coupled to the sliding ring.
8. The umbrella of claim 6, wherein in a fully open position of the umbrella, the coiled
tension spring is in a semi relaxed position; wherein in a fully closed position of the

umbrella, the coiled tension spring is in a fully extended position; and wherein in a partially open position of the umbrella, the coiled tension spring is in a fully compressed position.

- 5 9. The umbrella of claim 1, wherein the elongated bendable member comprises a string.
10. The umbrella of claim 5, wherein the fixed stop comprises a ring fixedly attached to the shaft.
11. The umbrella of claim 5, wherein each of the elongated bendable members is attached to the sliding ring by being wrapped therearound, by being integrally
10 molded therewith, or by being bonded thereto.
12. The umbrella of claim 5, wherein one elongated bendable member is looped through the sliding ring such a first length of the one elongated bendable member extends from the sliding ring to one rib and a second length of the one elongated bendable member extends from the sliding ring to one rib.
- 15 13. The umbrella of claim 12, wherein the sliding ring has a top surface and an opposing bottom surface, wherein along the top surface there are a plurality of recessed channels that are open along the top surface and along the bottom surface there are a plurality of corresponding notches, wherein a looped end of the one elongated bendable member is received within one recessed channel and the first length of the
20 one elongated bendable member passes through one notch and the second length of the one elongated bendable member passes through another notch.
14. The umbrella of claim 13, wherein the sliding ring has a plurality of inner tabs that are circumferentially spaced apart, each inner tab being inward and adjacent one corresponding recessed channel.
- 25 15. The umbrella of claim 13, wherein there are three recessed channels with each recessed channel has an arcuate shape and there are three elongated bendable members that connect to six ribs.
16. The umbrella of claim 2, wherein the through hole is located approximately at a midpoint of the strut.
- 30 17. The umbrella of claim 1, wherein each rib assembly includes a single rib that is coupled to the shaft and extends to a distal end or distal tip to which the elongated bendable member is attached, wherein one corresponding strut is attached to the corresponding single rib.
18. An umbrella comprising:

a shaft;

a rib assembly comprising a plurality of ribs that are pivotally coupled to the shaft;

a plurality of struts that are pivotally coupled to the plurality of ribs and the shaft; and

an anti-inversion assembly comprising:

5 a fixed stop that is fixedly attached to the shaft at a fixed location;

 a tension spring that surrounds the shaft and is configured to store energy when
a compressive force is applied thereto, the tension spring being disposed above the fixed
stop;

 a sliding ring disposed about the shaft above the tension spring, the sliding ring
10 being acted on by the tension spring; and

 a plurality of strings, each string being coupled at a first end to the sliding ring
and at a second end to one rib or to a tip of one rib, wherein the string is held taut by the tension
spring when the umbrella is in an open position, a closed position and intermediate positions
between the open and closed positions.

15 19. The umbrella of claim 18, wherein one string is looped through the sliding ring such
a first length of the string extends from the sliding ring to one rib and a second
length of the one string extends from the sliding ring to one rib.

 20. The umbrella of claim 19, wherein the sliding ring has a top surface and an opposing
bottom surface, wherein along the top surface there are a plurality of recessed
20 channels that are open along the top surface and along the bottom surface there are
a plurality of corresponding notches, wherein a looped end of the one string is
received within one recessed channel and the first length of the string passes through
one notch and the second length of the string passes through another notch.

 21. The umbrella of claim 20, wherein the sliding ring has a plurality of inner tabs that
25 are circumferentially spaced apart, each inner tab being inward and adjacent one
corresponding recessed channel.

 22. The umbrella of claim 20, wherein there are three recessed channels with each
recessed channel has an arcuate shape and there are three elongated bendable
members that connect to six ribs.

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