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(54) **COLLAPSIBLE AND EXPANDABLE
SPRING-LOADED DISCS**

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H04R 1/10 (2006.01)
H04M 1/15 (2006.01)

(52) **U.S. Cl.**
CPC **F16B 2/06** (2013.01); **H04M 1/15** (2013.01); **H04R 1/1033** (2013.01)

(58) **Field of Classification Search**
CPC combination set(s) only.
See application file for complete search history.

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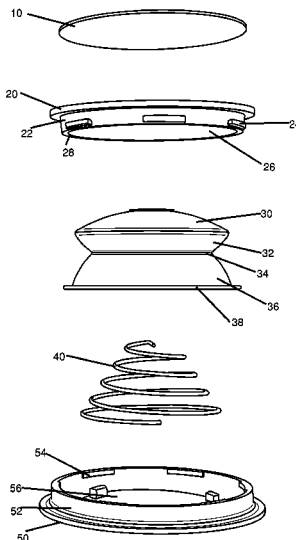
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(57) **ABSTRACT**

Two circular rings or discs which are somewhat rotatable with respect to one another. They are connected by a foldable cover which houses a spring inside. The spring, when collapsed, pushes the discs away from each other while the foldable cover is semi-flexible. When the accessory is collapsed, the foldable cover folds over itself, whereas when the accessory is expanded, the foldable cover becomes unfolded with a smaller-circumference center ridge which is less flexible or non-flexible, and situated between two larger circumference areas. Flanges on the inner and outer rings abut each other, keeping the spring collapsed and discs locked into each other in some embodiments. When the rings are rotated with respect to one another, the flanges become unlocked and the spring separates the discs such that one or both of the foldable cover or spring become the limiting factor in how far apart the discs spread from another.

16 Claims, 5 Drawing Sheets



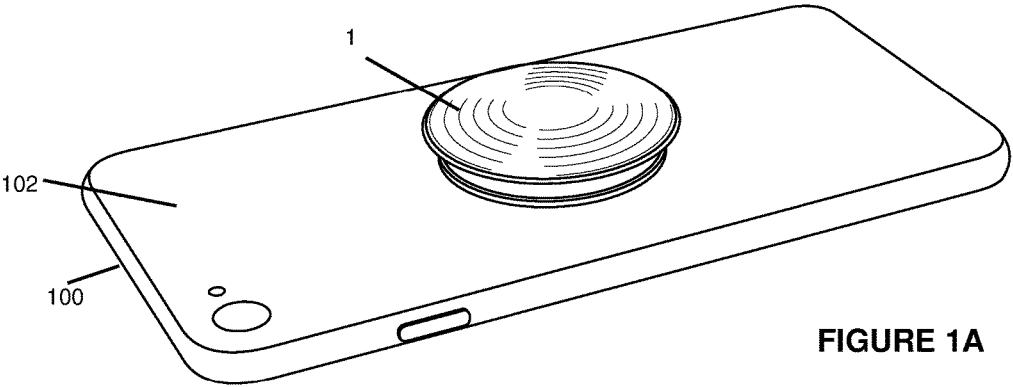


FIGURE 1A

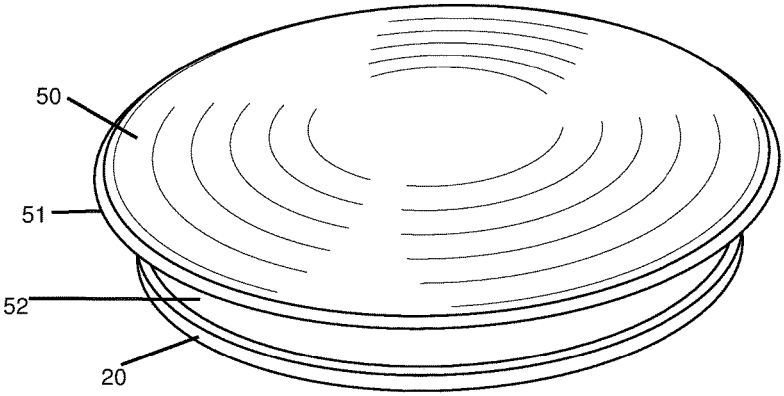


FIGURE 1B

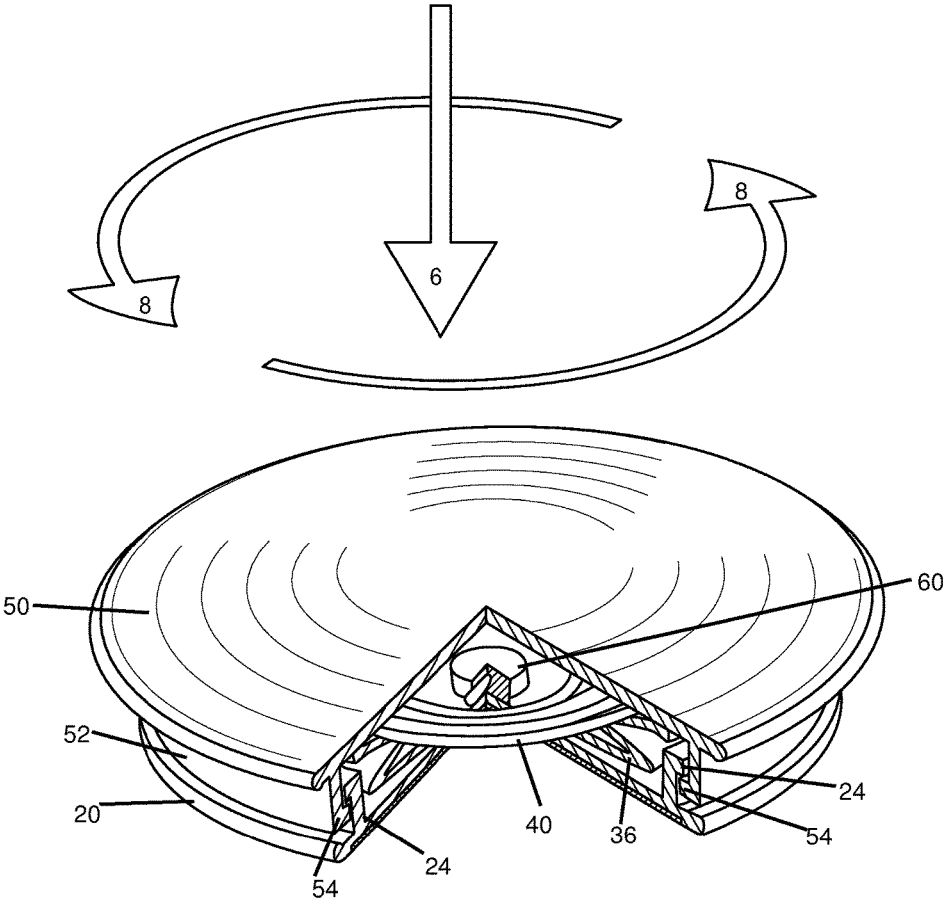


FIGURE 2

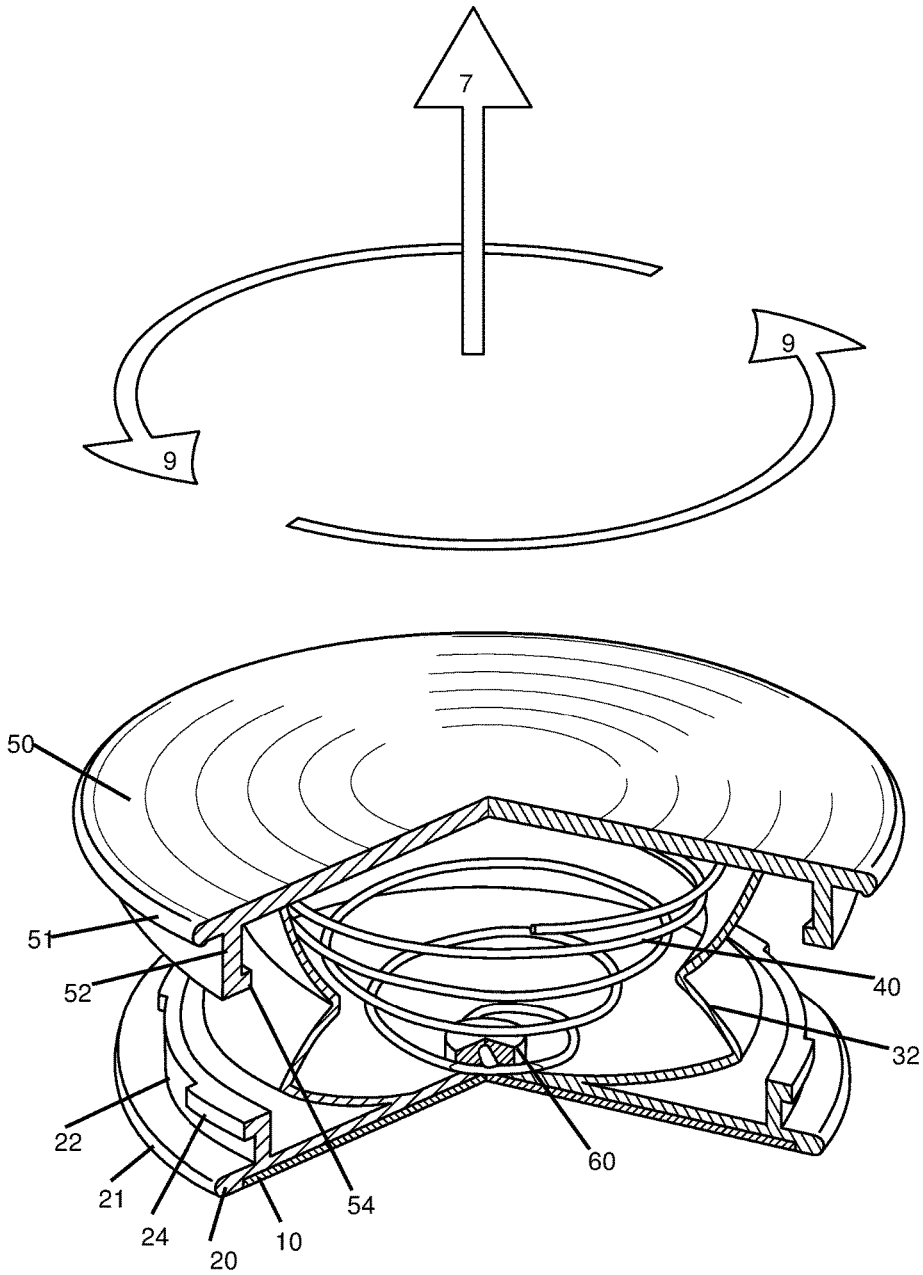


FIGURE 3

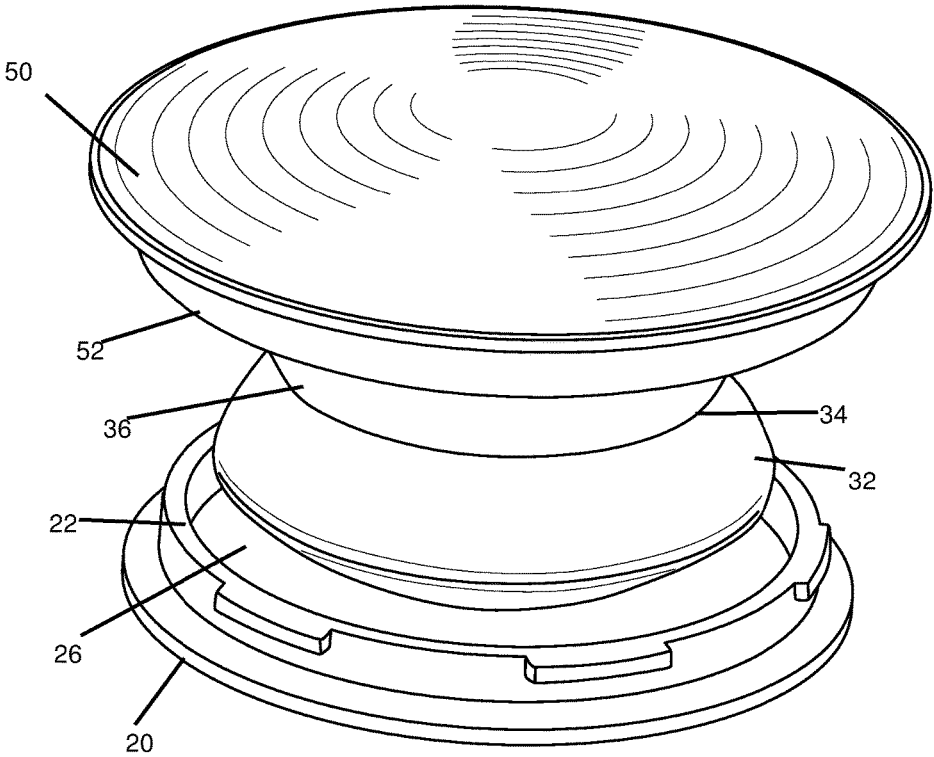


FIGURE 4

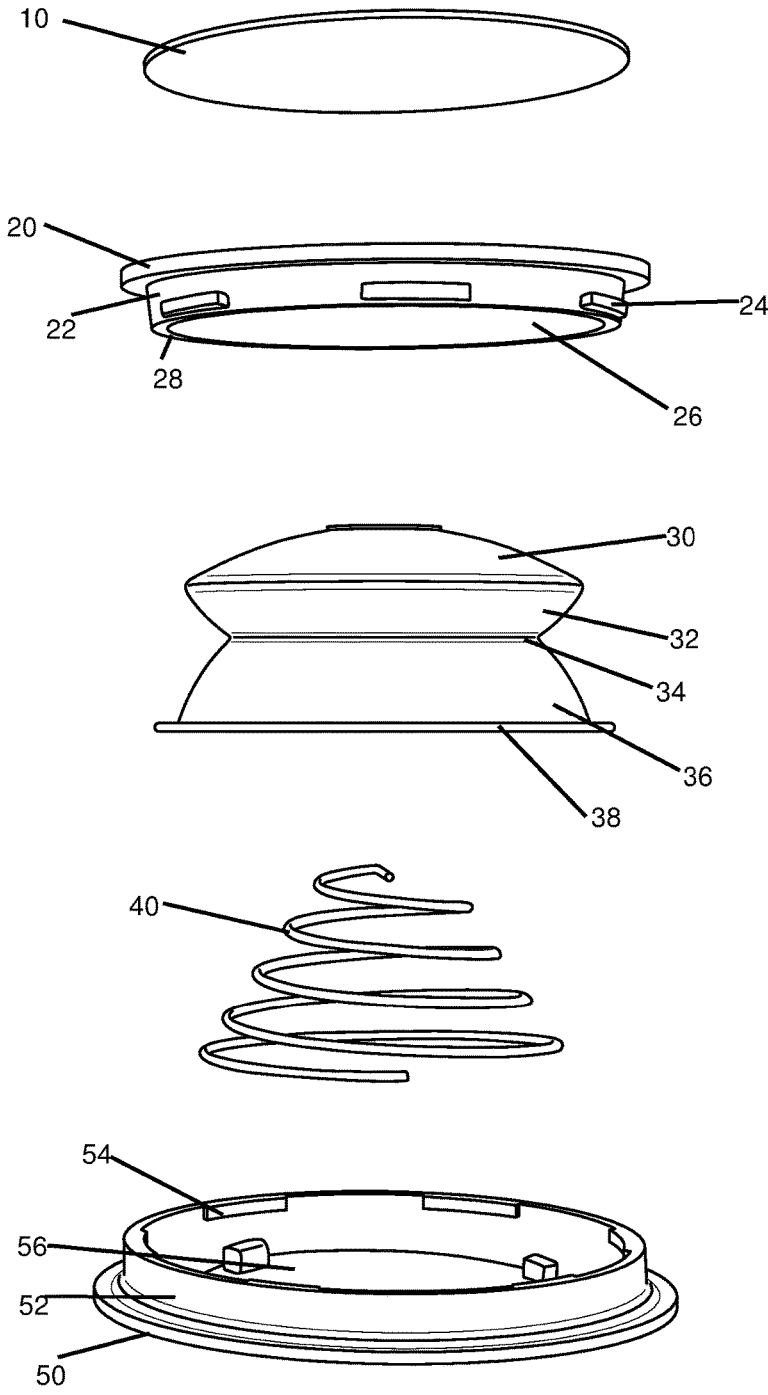


FIGURE 5

COLLAPSIBLE AND EXPANDABLE SPRING-LOADED DISCS

FIELD OF THE DISCLOSED TECHNOLOGY

The disclosed technology relates generally to phone accessories, and more specifically, to phone accessories with changeable sizes.

SUMMARY OF THE DISCLOSED TECHNOLOGY

An expandable and collapsible accessory of embodiments of the disclosed technology has an outer circular disc (“outer” with respect to an “inner” disc) with a circular wall rising therefrom. A “circular disc” for purposes of this disclosure is defined as a shape which has two generally flat and equal sides in the shape of a circle which are on opposite sides from each other. A plurality of flanges extend inwards from the circular wall to the circular disc. A “circular wall” is one which is circular in shape and extends from a circular disc in a direction perpendicular to the elongated flat circular sides. The circular wall can have a diameter/circumference less than or equal to that of the circular disc it rises from.

An inner circular disc (“inner” with respect to the “outer” disc) has a circular wall rising therefrom and a plurality of flanges extending outward from the circular wall of the inner circular disc. The flanges of the inner or outer discs can extend in a direction perpendicular to the most elongated length of the respective wall, which is, in embodiments, parallel to the respective circular disc. The flanges can be spaced apart from each other, so that there are alternating flanges and spaces between each two flanges.

A spring positioned between the outer circular disc and the inner circular disc applies pressure against both the inner and outer circular discs. A flexible cover attached to the outer circular disc at a first end and the inner circular disc at a second end opposite the first end envelopes (defined as “completely surrounds” or “completely covers from view, when looking at the device from the outside) the spring.

Another circular disc can act as a cover with indicia displayed thereon. Such a cover is interchangeable in some embodiments, and covers at least a majority of one side of one of the outer circular discs or the inner circular disc. The cover circular disc, in embodiments of the disclosed technology, has two identically sized circular sides and a width therein less than a width of a widest region of the outer circular disc.

The flexible cover is bifurcated at a narrow region between two wider regions, in some embodiments. The two wider regions each terminate at one of the outer circular discs and the inner circular disc. The narrow region acts as a fold point by which the wider regions fold (defined as “having elongated flat sides move towards each other”) toward each other.

One can rotate the inner circular disc with respect to the outer circular disc to keep the device in a first collapsed/retracted or second expanded condition. In the collapsed condition, at least some of the plurality of flanges of the circular wall of the outer circular disc are aligned with at least some of the plurality of flanges of the circular wall of the inner circular disc. As such, the flanges of the inner circular disc are between the flanges of the outer circular disc and the outer circular disc itself, in such a configuration. Rotate again, such that the flanges of one circular wall align with a space between the flanges of another circular wall,

and the spring causes the outer and inner circular disc to separate from one another into the expanded condition.

The expandable and collapsible accessory is bistable in embodiments of the disclosed technology. In a first of two bistable configurations, the inner circular disc and the outer circular disc are closer together, compared to a second of the two bistable configurations. In this first configuration, the flexible cover has sections which are folded past one another. In the second of the two bistable configurations, the inner circular disc and the outer circular disc are further away from each other compared to the first of the two bistable configurations. Further, in the second configuration, the flexible cover and the sections are unfolded with respect to one another.

Described another way, a complimentary (defined as “one fitting at least partially inside the other”) pair of first and second discs are rotatable with respect to one another and connected by way of a flexible cover extending therebetween. Each has a set of alternating flanges and spaces between the flanges which extend perpendicular to the walls of each of the first and second discs. A spring between the pair of discs exerts force on each of the discs and is covered by a flexible cover.

The spring can be held in a collapsed state such that the set of said alternating flanges of the first disc exert pressure against the set of said alternating flanges of the second disc due to the spring pushing the flanges into each other. The spring can be released into, or is in, an expanded state where the alternating flanges of the first disc are spaced apart when the areas between the alternating flanges of the second disc are aligned.

A removable third disc without flanges is attached to a circular side of the first disc, in some embodiments. At the same time, the circular side of the second disc can be attached to a phone or phone case such that the third disc is in parallel with the side of the phone or phone case attached to the second disc.

The cover folds over itself (defined as “forming a zigzag pattern of material with acute angles less than 15 degrees between each zig and zag”) when the complimentary pair of first and second discs are brought closer together. The cover is unfolded (defined as “lacking acute angles less than 15 degrees within the length of the cover”) when the complimentary pair of first and second discs are brought away from each other. The cover also has, in embodiments of the disclosed technology, a circular central region which is less flexible than regions of said cover which fold over each other, and in said unfolded condition, has a smaller circular circumference than adjacent regions of said cover.

An expandable and collapsible phone accessory of the disclosed technology can also have the circular walls of the outer or inner disc rise perpendicular from the disc (meaning, the most elongated and substantially flat planar surface). There can be a space between the circular disc and the flanges which extend inward or outward from the respective disc. In this space, flanges of the opposite disc can be placed therein, such as when used to hold the device in a collapsed condition. The flanges can be perpendicular to the circular wall of the respective disc, and thus, in parallel to the respective disc in a direction in which they most extend/extend inwards or outwards therefrom. This placement of the flanges extending from one circular wall between the flanges and disc of the other top/bottom or inner/outer device causes, in embodiments of the disclosed technology, the accessory to remain in a collapsed condition. As such,

the circular wall of the inner disc abuts (touches or is within 1 mm or 3 mm of) the outer circular disc around it's circular circumference.

The devices of embodiments of the disclosed technology are spring loaded. A spring, for purposes of this disclosure, is defined as a device which exerts pressure outwards on two ends when it is collapsed from a resting position. The spring can be metal and have a hollow interior space defined by a metal corkscrew. The spring, in some embodiments, applies force simultaneously against both the inner circular disc and outer circular disc such as when the device is in a collapsed condition.

The cover can be fixed in position to one, both, or neither of the first and second discs. In this manner, when the discs are rotated with respect to one another, the cover can rotate with one of the discs due to friction or it's attachment, such as with a flange extending from one of the discs (or circular wall extending from one of the discs) through the cover, or by way of attachment through an adhesive. Thus, the cover is rotationally fixed to one of the discs as it rotates with the disc but it's rotation is divorced from rotation of the other disc. When both ends of the cover are rotationally fixed to the respective discs, the cover is bent or stretched with the rotation and calibrated such that it has enough rotation, while retaining it's structure, while the discs are both locked and unlocked to each other.

Any device or step to a method described in this disclosure can comprise or consist of that which it is a part of, or the parts which make up the device or step. The term "and/or" is inclusive of the items which it joins linguistically and each item by itself. "Substantially" is defined as "at least 95% of the term being described" and any device or aspect of a device or method described herein can be read as "comprising" or "consisting" thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1A shows an expandable and collapsible accessory in a collapsed condition attached to a phone or phone case in an embodiment of the disclosed technology.

FIG. 1B shows a perspective view of an expandable and collapsible accessory in a collapsed condition in an embodiment of the disclosed technology.

FIG. 2 shows a cutaway perspective view of an expandable and collapsible accessory in a collapsed condition in an embodiment of the disclosed technology.

FIG. 3 shows a cutaway perspective view of an expandable and collapsible accessory in an expanded condition in an embodiment of the disclosed technology.

FIG. 4 shows a perspective view of an expandable and collapsible accessory in an expanded condition in an embodiment of the disclosed technology.

FIG. 5 shows an exploded view of the parts of an expandable and collapsible accessory in embodiments of the disclosed technology.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE DISCLOSED TECHNOLOGY

An expandable and collapsible accessory of embodiments of the disclosed technology has two circular rings or discs which are somewhat rotatable (defined as "only less than 270 degrees without causing damage") with respect to one another. They are connected by a foldable cover which houses a spring inside. The spring, when collapsed, pushes the discs away from each other while the foldable cover is semi-flexible (defined as "able to be bent or moved with a

single finger or two fingers while generally returning to its original shape when force is no longer applied by such a finger or two fingers"). When the accessory is collapsed, the foldable cover folds over itself, whereas when the accessory is expanded, the foldable cover becomes unfolded with a smaller-circumference center ridge which is less flexible or non-flexible, and situated between two larger circumference areas.

Spaced apart and/or alternating ridges or flanges on the inner and outer rings abut each other, keeping the spring collapsed and discs locked into each other in some embodiments. When the rings are rotated with respect to one another, the flanges become unlocked and the spring separates the discs such that one or both of the foldable cover or spring become the limiting factor in how far apart the discs spread from one another.

Embodiments of the disclosed technology will become more clear in view of the following description of the figures.

FIG. 1A shows an expandable and collapsible accessory in a collapsed condition attached to a phone or phone case in an embodiment of the disclosed technology. Here the accessory has indicia **1** shown on a disc which is on an opposite side of the accessory compared to the phone **100** to which it is attached. The accessory is attached to the phone case **102** or the phone directly (in which case **102** represents the phone itself) on an elongated back side of the phone or phone case.

Skipping now to FIG. 5, FIG. 5 shows an exploded view of the parts of an expandable and collapsible accessory in embodiments of the disclosed technology. From bottom to top, there is an outer circular ring **50**, a spring **40**, a foldable cover **30**, an inner circular ring **20**, and a removable ring **10**. The removable ring is shown with the indicia **1** in FIG. 1 and can be as wide as one of the circular sides of the circular ring **20** or **50**, or narrower (having a small circumference/diameter). The ring **10** can also fit within a groove in the ring **20** such that it is flush with the outer most portion of the ring **20**.

From the inner ring **20** is a circular side wall **22** which has a plurality (at least two) exterior extending flanges **24**. The flanges extend perpendicular to the elongated length of the side wall **22**, while the side wall **22** defines a cavity **26** there-between. The cavity **26** is cylindrical or generally cylindrical in embodiments of the disclosed technology. The outer ring **50** also has a side wall, side wall **52**, in embodiments of the disclosed technology. This side wall again forms an integral and non-removable structure with the respective disc **50**. An interior generally cylindrical cavity **56** is created within the sidewall, and a plurality (at least two) of flanges **54** extend from the side wall **52**, though this time, the flanges extend to the interior of the side wall **52** rather than the exterior.

The spring **40** is compressed when the rings **20** and **50** are brought together and twisted such that the flanges **54** and **24** move past each other and then become aligned. The spring expands, or causes the expansion, when the rings **20** and **50** are aligned such that a flange **24** is unaligned with a flange **54** (the flanges of one ring (**50/20**) are aligned with spaces between flanges of the other ring **20/50**).

The flexible cover **30** has flexible material which covers the entirety of the spring **40** for both safety and providing a place to wrap a flexible cord there-around, such as headphones. One wraps such a cord around the circular and less-flexible or non-flexible ring **34** which has a smaller circumference and diameter than the surrounding regions, a lower region **32** and an upper region **36** which are curvilinear.

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ear and have greater width as they move away from the ring 34, in embodiments of the disclosed technology. The extreme sides 38 at number 30 attach to the respective adjacent circular discs 20 and 50 respectively. As the spring becomes compressed and expands, so too the flexible cover flexes and expands. As it flexes, the different regions 32 and 36 fold over one another and form very acute angles (less than 15 degrees, or in some embodiments, less than 20, 25, or 30 degrees) with respect to one another and the ring 34 becomes a point of inflection or folding. As the flexible cover 30 expands, the regions 32 and 36 become more straight (towards 180 degrees) with respect to one another.

FIG. 1B shows a perspective view of an expandable and collapsible accessory in a collapsed condition in an embodiment of the disclosed technology. Here, in the collapsed condition, the rings 20 and 50 are closer together to each other than in the expanded condition and the flanges are pushing against each other, due to the force exerted by the spring. A lip 51 of the outer ring 50 is the largest circumference of the device, on which a removable disc can be placed therein. In the collapsed condition, the flexible cover 30 is hidden from view, in some embodiments, with the side walls 50 of the outer, larger ring 50 covering the space, or substantially covering the space, between the discs 20 and 50.

FIG. 2 shows a cutaway perspective view of an expandable and collapsible accessory in a collapsed condition in an embodiment of the disclosed technology. The flanges 24 and 54 are seen abutting one another. The spring 40 is compressed such that some of the rings are concentric to each other and lie partially or fully in the same plane. The cover is folded over itself at region 36, with a point of inflection at the ring 34. A support post 60 is used to attached the spring to the disc 50 and/or 20. One can twist the discs 50 and 20 with respect to one another in a counter-clockwise or clockwise direction 8 while pressing the rings towards each other in direction 8 such that the flanges 24 and 54 move past one another in the vertical direction, and then in the horizontal direction (with respect to the directions shown on the page with FIG. 2 printed thereon). When one continues to rotate, the flanges 24 and 54 eventually become unaligned, or each aligned with a space between flanges of the other disc 20 or 50, and upon release of the downward force 9, the spring 40 causes the discs 20 and 50 to move away from one another as shown in FIG. 3.

FIG. 3 shows a cutaway perspective view of an expandable and collapsible accessory in an expanded condition in an embodiment of the disclosed technology. Here, by way of rotation in the direction 9 (or a direction opposite this direction), and due to a force 7 exerted upwards by the spring, the two circular discs 20 and 50 separate from each other. The spring continues to separate the discs from each other until: either the spring is fully expanded and/or the cover 30 provides greater force which keeps the discs 20 and 50 together; or the ring provides greater force separating the discs.

FIG. 4 shows a perspective view of an expandable and collapsible accessory in an expanded condition in an embodiment of the disclosed technology. Here, the cover is expanded such that the regions 32 and 36 are unfolded with respect to one another while the ring 34, of harder and less flexible construction, has a smaller cross-section compared to substantially all, or all of the regions 32 and 36. One can now wrap a cord or other pliable device around the cover 30 and then, if desired, compress the circular discs 20 and 50 back towards one another, if desired.

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Further, it should be understood that all subject matter disclosed herein is directed at, and should be read only on, statutory, non-abstract subject matter. All terminology should be read to include only the portions of the definitions which may be claimed. By way of example, "computer readable storage medium" is understood to be defined as only non-transitory storage media.

While the disclosed technology has been taught with specific reference to the above embodiments, a person having ordinary skill in the art will recognize that changes can be made in form and detail without departing from the spirit and the scope of the disclosed technology. The described embodiments are to be considered in all respects only as illustrative and not restrictive. All changes that come within the meaning and range of equivalency of the claims are to be embraced within their scope. Combinations of any of the methods, systems, and devices described hereinabove are also contemplated and within the scope of the disclosed technology.

The invention claimed is:

1. An expandable and collapsible phone accessory comprising:

an outer circular disc with a circular wall rising perpendicular from said outer circular disc, and a plurality of flanges extending inwards from said circular wall which are spaced apart from said outer circular disc;

an inner circular disc with a circular wall rising therefrom and a plurality of flanges extending perpendicular to and outwards from said circular wall of said inner circular disc;

a spring positioned between said outer circular disc and said inner circular disc;

a flexible cover, physically independent from said spring, attached to said outer circular disc at a first end and said inner circular disc at a second end opposite said first end, said flexible cover enveloping said spring;

wherein said phone accessory is held in a collapsed condition by placing said plurality of inward extending flanges of said outer circular disc longitudinally between said plurality of flanges of said inner circular disc and said inner circular disc.

2. The expandable and collapsible accessory of claim 1, further comprising:

a circular disc covering at least a majority of one side of one of said outer circular disc and said inner circular disc, said cover disc having indicia thereupon which is observable by a user observing said accessory, said cover circular disc having two identically sized circular sides and a distance there-between less than a largest diameter of a widest region of said outer circular disc.

3. The expandable and collapsible phone accessory of claim 2, wherein said cover disc covers an exterior surface of at least one of said outer disc or said inner disc, such that said cover disc is observable by a person seeing said phone accessory.

4. A method of using the expandable and collapsible accessory of claim 1, comprising a step of rotating said inner circular disc with respect to said outer circular disc until at least some of said plurality of flanges of said circular wall of said outer circular disc are longitudinally aligned with at least some of said plurality of flanges of said circular wall of said inner circular disc causing said accessory to remain in a collapsed condition with said circular wall of said inner disc abutting said outer circular disc.

5. The method of using the expandable and collapsible accessory of claim 4, wherein said rotating is until said flanges of said inner circular disc are situated between said

outer circular disc and said flanges of said circular wall of said outer circular disc, causing said outer circular disc and said inner circular disc to remain in a stationary, first-retracted position, while said spring applies force simultaneously against both said inner circular disc and outer circular disc.

6. The method of using the expandable and collapsible accessory of claim 5, comprising a further step of rotating said inner circular disc with respect to said outer circular disc and said flexible cover until said flanges of said wall of said inner circular disc are situated adjacent to spaces between said flanges of said circular wall of said outer circular disc causing said outer circular disc and said inner circular disc to be pushed away from each other by said spring until reaching a stationary second expanded position.

7. The expandable and collapsible accessory of claim 1, wherein said expandable and collapsible accessory is bistable and:

- in a first of two bistable configurations a wall extending perpendicularly from said inner circular disc, and said outer circular disc, are abutted against each other,
- in said first of said two bistable configurations, said flexible cover is folded, such that an exterior surface of first and second sections of said flexible cover abut one another; and
- in said second of two bistable configurations, said inner circular disc and said outer circular disc are further away from each other, compared to said first of said two bistable configurations, and said first and second sections of said flexible cover are unfolded with respect to one another.

8. The expandable and collapsible phone accessory of claim 1, wherein said spring is a helical spring.

9. An expandable and collapsible phone accessory, comprising:

- a complimentary pair of first and second discs, said first disc rotatable within said second disc and each of said first and second disc having a set of alternating flanges and spaces there-between said alternative flanges, said alternative flanges of each of said first and second disc extending perpendicular to walls of each said first and second disc; and wherein the walls rising perpendicular from each of said first and second disc;

a hollow metal spring exerting force on each of said first and second discs;

a cover extending between said first and second disc which is physically independent from said spring and completely surrounds said spring and which is rotatable with respect to at least one of said first and second discs.

10. The expandable and collapsible accessory of claim 9, wherein:

- said spring is held in a collapsed state; and
- said set of said alternating flanges of said first disc exert pressure against said set of said alternating flanges of said second disc due to said spring.

11. The expandable and collapsible accessory of claim 9, wherein:

- said spring is an expanded state, and
- said set of alternating flanges of said first disc are spaced apart from said alternating flanges of said second disc.

12. The expandable and collapsible accessory of claim 9, wherein a removable third disc without flanges is attached to an exterior circular side of said first disc, such that said third disc is observable by a user observing said accessory.

13. The expandable and collapsible accessory of claim 12, wherein a circular side of said second disc is removably attached to a phone or phone case, said third disc being in parallel with a side of said phone or said phone case which is attached to said second disc.

14. The expandable and collapsible accessory of claim 9, wherein said cover folds over itself when said complimentary pair of first and second discs are brought closer together, and is unfolded when said complimentary pair of first and second discs are brought away from each other.

15. The expandable and collapsible accessory of claim 14, wherein said cover has a circular central region which is less flexible than regions of said cover which fold over each other, and in said unfolded condition, has a smaller circular circumference than adjacent regions of said cover.

16. An expandable and collapsible accessory of claim 9, wherein said cover is rotationally fixed to one of said second and first discs.

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