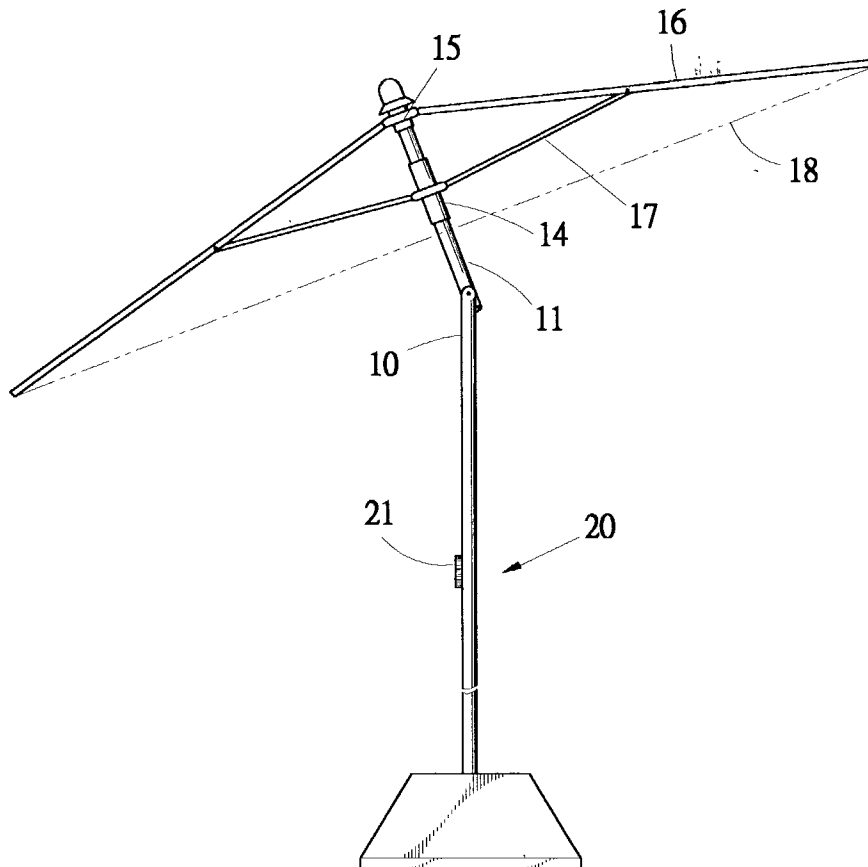


**(12) Patent Application Publication**  
**Ma**

(43) **Pub. Date:** **Feb. 26, 2004**



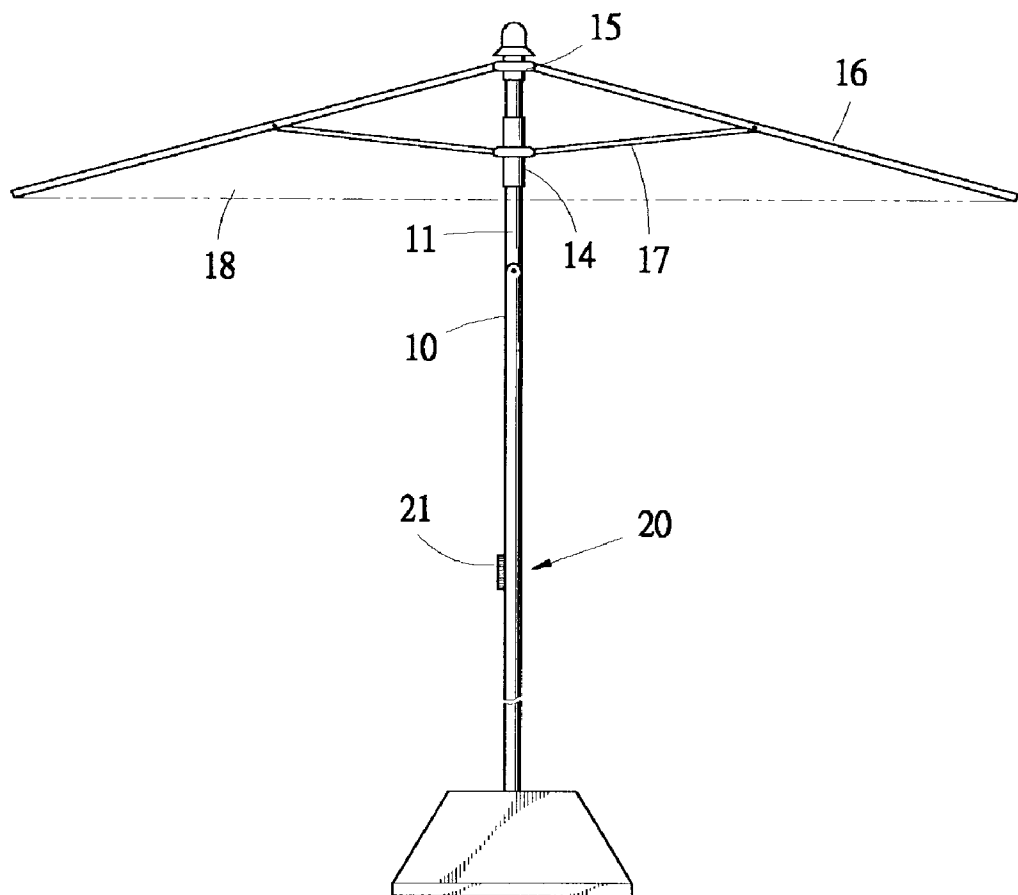


FIG.1

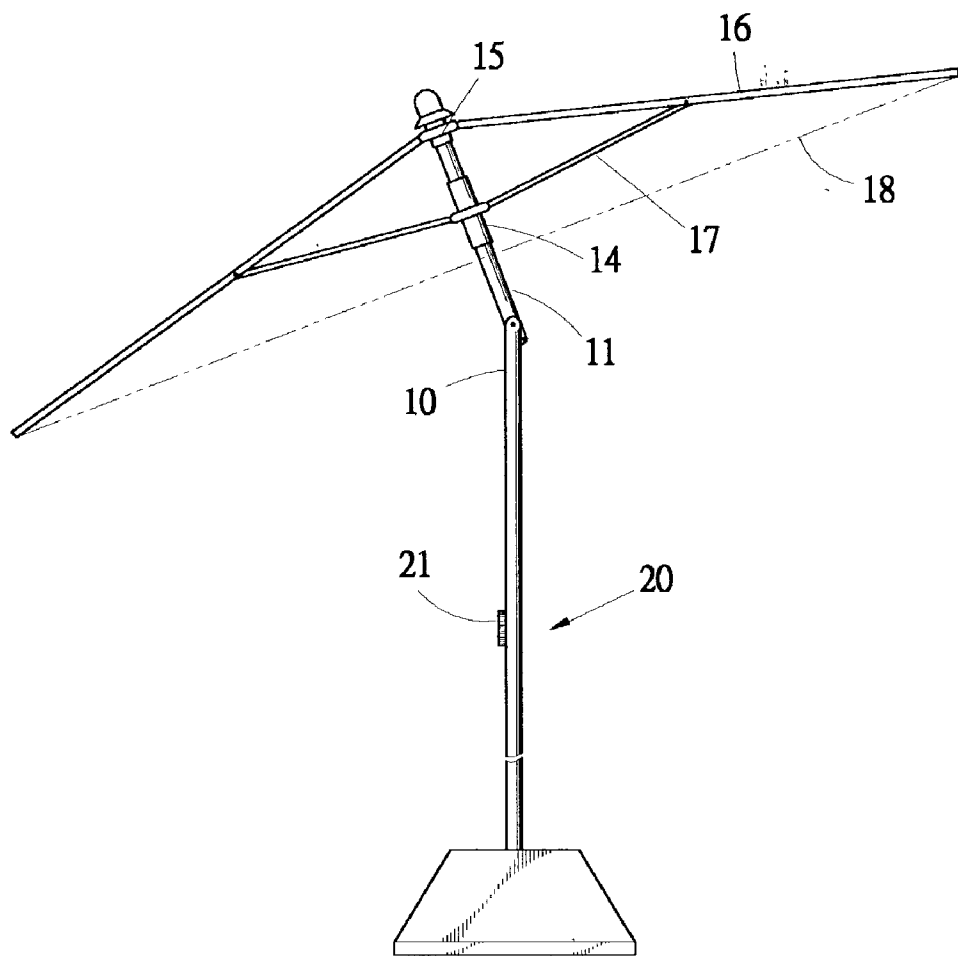


FIG.2

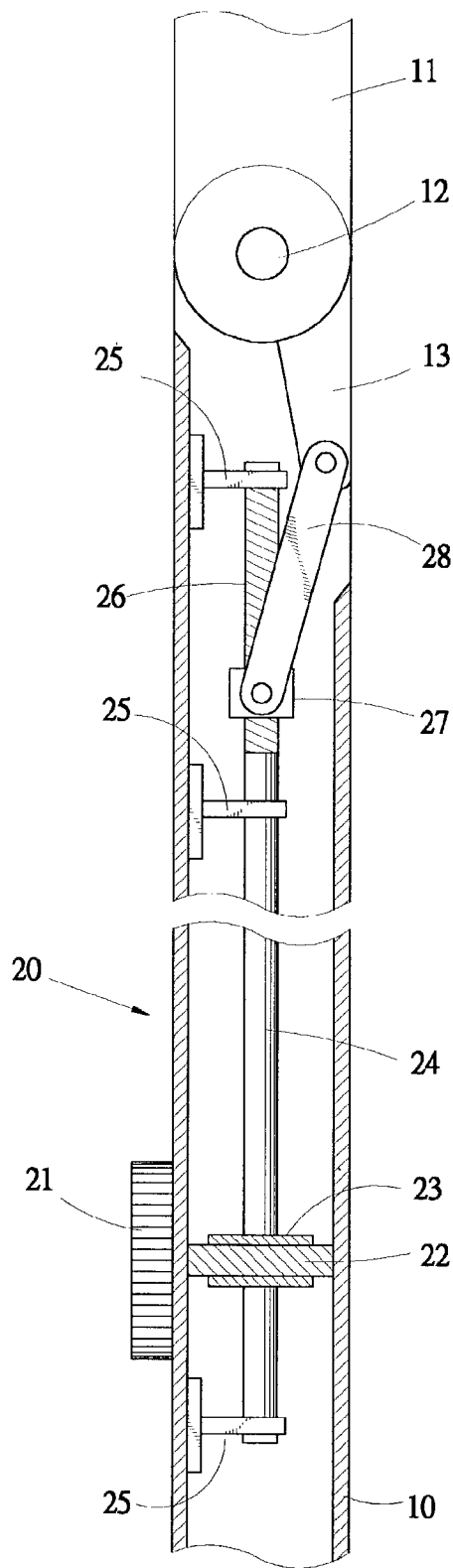


FIG.3

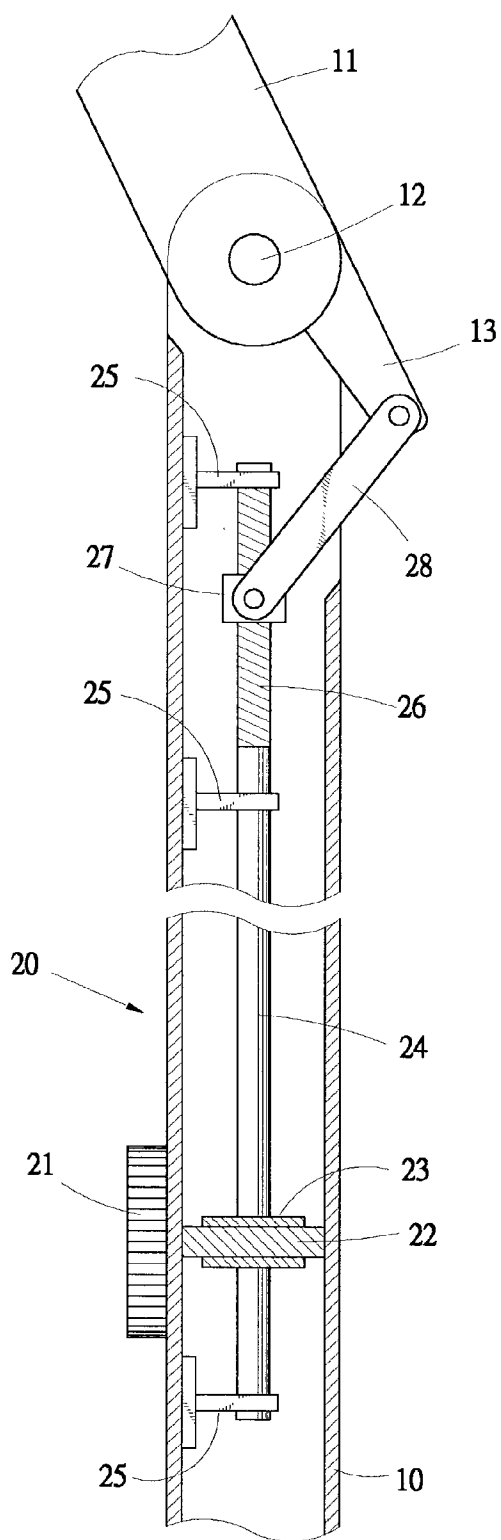


FIG.4

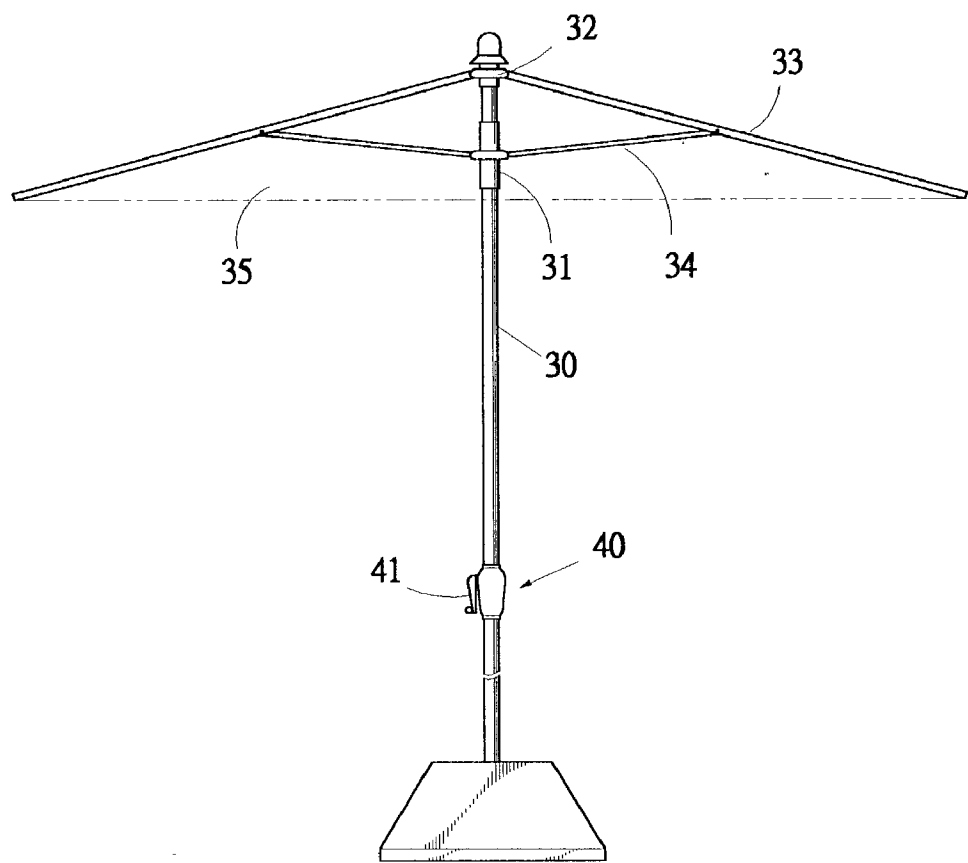


FIG.5

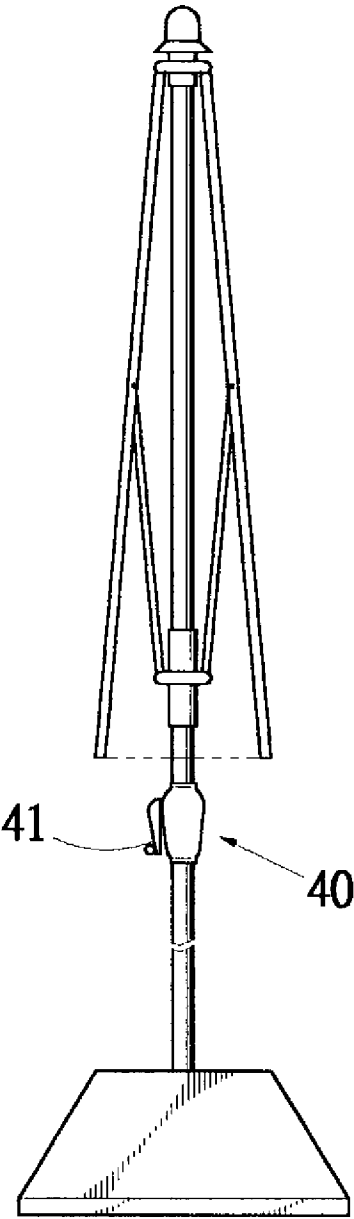


FIG.6

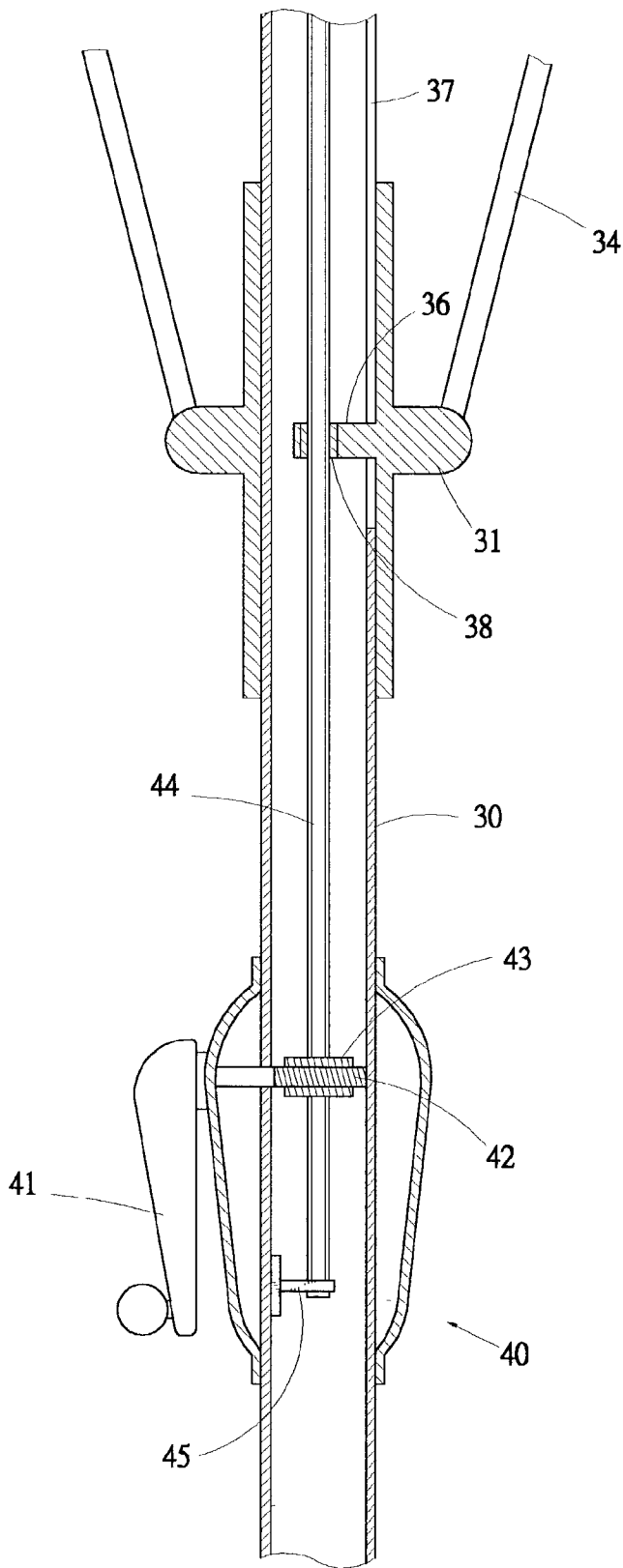


FIG. 7

## UMBRELLA HAVING WORM-GEAR BASED DRIVING SYSTEM

### BACKGROUND OF THE INVENTION

#### [0001] 1. Field of the Invention

[0002] The present invention generally relates to a large-sized umbrella, and in particular to a worm-gear based driving system employed in the large-sized umbrella.

#### [0003] 2. The Related Art

[0004] Large-sized umbrellas are widely used in a variety of applications, such as beach umbrellas and garden umbrellas. The conventional large-sized umbrella comprises, in general, an upright center post having a lower end mounted to ground and an upper end to which a crown is fixed, a plurality of ribs pivoted to the crown and radially extending from the crown, a runner slidably mounted to the post and a plurality of stretchers arranged between and pivoted to the ribs and the runner. When the runner is moved toward the crown, the ribs are forced to open and expanding a flexible canopy attached thereto. When the runner is moved away from the crown, the umbrella is closed.

[0005] Conventionally, the runner is moved by a rope-pulley system which winds/unwinds a rope connected to the runner for driving the runner toward/away from the crown to open/close the umbrella. A disadvantage of the rope-pulley based driving system is the complicated structure thereof. In addition, the rope may be broken after long term operation.

[0006] Some of the large-sized umbrellas have a multi-section central post that comprises at least upper and lower sections pivotally connected. The pivotal connection between the lower section and the upper section allows the upper section that carries the canopy to swivel to a desired angle with respect to the lower section to direct the canopy toward the sunlight for better shielding effect. Conventionally, the swiveling of the upper section relative to the lower section is controlled by a complicated and not really reliable structure.

### SUMMARY OF THE INVENTION

[0007] Thus, an object of the present invention is to provide a large-sized umbrella comprising a worm-gear based driving system that has a simple and reliable structure.

[0008] Another object of the present invention is to provide a large-sized umbrella comprising a worm-gear based driving system that is easy to operate.

[0009] To achieve the above objects, in accordance with the present invention, there is provided an umbrella comprising a center post having upper and lower sections pivotally connected together. A crown is mounted to the upper section. A number of ribs are pivoted to and radially extend from the crown. A runner is movably mounted to the center post. A stretcher is arranged between and pivoted to the runner and each rib. A canopy is attached to and supported by the ribs. A worm-gear based driving system converts the rotation of the worm caused by manual operation into linear movement of a nut engaging a threaded shaft of the gear. A link is arranged between and pivoted to the nut and the upper section whereby the linear movement of the nut drives the link to swivel the upper section relative to the lower section about the pivotal connection between the

upper and lower sections. The worm-gear based driving system may also be employed to move the runner with respect to the center post for opening/closing the umbrella. The runner has a projection extending through an axially-extending slit defined in the center post and having an inner-threaded member engaging a threaded shaft of the gear whereby the rotation of the worm is converted into linear movement of the inner-threaded member and the runner with respect to the center post for opening/closing the umbrella.

### BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The present invention will be apparent to those skilled in the art by reading the following description of preferred embodiments thereof, with reference to the attached drawings, in which:

[0011] **FIG. 1** is a side elevational view of a large-sized umbrella in which a worm-gear based driving system in accordance with the present invention is embodied, the umbrella being in an open and non-swiveled condition;

[0012] **FIG. 2** is a side elevational view similar to **FIG. 1** but showing the umbrella in an open but swiveled condition;

[0013] **FIG. 3** is a cross-sectional view of a portion of the umbrella showing the worm-gear based driving system of the present invention, the worm-gear based driving system being in a neutral, non-swiveled position;

[0014] **FIG. 4** is a cross-sectional view similar to **FIG. 3** but showing the worm-gear based driving system in a swiveled position;

[0015] **FIG. 5** is a side elevational view of a large-sized umbrella in which a worm-gear based driving system in accordance with another embodiment of the present invention is embodied, the umbrella being in an open condition;

[0016] **FIG. 6** is a side elevational view of the large-sized umbrella in a closed condition; and

[0017] **FIG. 7** is a cross-sectional view of a portion of the umbrella showing the worm-gear driving system in accordance with the present invention.

### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0018] With reference to the drawings and in particular to **FIGS. 1 and 2**, an umbrella constructed in accordance with the present invention comprises an umbrella frame (not labeled) comprising a center post comprised of upper and lower sections **10, 11** pivotally connected at **12** (**FIGS. 3 and 4**). The lower section **11** has a lower end fixed to a stand (not labeled) for standing on the ground. The upper section **10** has an upper end to which a crown **15** is attached. A number of ribs **16** are pivoted to the crown **15** and radially extend therefrom. A runner **14** is movably mounted to the center post. A stretcher **17** has opposite ends respectively pivoted to the runner **14** and each rib **16**. Moving the runner **14** toward the crown **15** drives the stretchers **17** to expand the ribs **16**, thus opening the umbrella, and moving the runner **14** away from the crown **15** allows the ribs **16** to collapse and thus closing the umbrella. A flexible canopy **18** is attached to and supported by the ribs **16**.

[0019] Also referring to **FIGS. 3 and 4**, the umbrella comprises a driving system **20** comprising a worm **22**

rotatably supported by the lower section **10** of the center post and a rotation knob **21** coaxially attached to the worm **22**. The rotation knob **21** is located outside the center post and thus accessible by a user. A gear **23** is rotatably supported inside the lower section **10** and mates the worm **22**. The gear **23** is mounted to a shaft **24** extending substantially parallel to the lower section **10**. Thus, manually rotating the knob **21** causes the shaft **24** to rotate. A plurality of supports **25** are formed inside the lower section **10** and securely attached thereto for rotatably supporting the shaft **24**.

[0020] The shaft **24** has an externally-threaded section **26** which a nut **27** threadingly engages. Thus, the rotation of the shaft **24** is converted into linear translation of the nut **27** along the shaft **24**. A link **28** has opposite ends respectively pivoted to the nut **27** and an extension **13** of the upper section **11**. The pivotal connection between the link **28** and the extension **13** is offset from the pivot **12** that connects the upper section **11** to the lower section **10**. Thus, the movement of the nut **27** along the shaft **24** swivels the upper section **11** with respect to the lower section **10** about the pivot **12** from a neutral, non-swiveled position shown in FIGS. **1** and **3** to a swiveled position shown in FIGS. **2** and **4**.

[0021] FIGS. **5** and **6** show an umbrella constructed in accordance with another embodiment of the present invention comprising an umbrella frame (not labeled) comprising a center post **30** having a lower end mounted to a stand (not labeled) for standing on the ground and an upper end to which a crown **32** is attached. A number of ribs **33** are pivoted to the crown **32** and radially extend therefrom. A runner **31** is movably mounted to the center post **30**. A stretcher **34** has opposite ends respectively pivoted to the runner **31** and each rib **33**. Moving the runner **31** toward the crown **32** drives the stretchers **34** to expand the ribs **33**, thus opening the umbrella, and moving the runner **31** away from the crown **32** allows the ribs **33** to collapse and thus closing the umbrella. A flexible canopy **35** is attached to and supported by the ribs **33**.

[0022] Also referring to FIG. **7**, the umbrella comprises a driving system **40** for driving the runner **31** toward/away from the crown **32** to open/close the umbrella. The driving system **40** comprises a worm **42** rotatably supported by the center post **30** and a crank handle **41** attached to the worm **42**. The crank handle **41** is located outside the center post **30** and thus accessible by a user. A gear **43** is rotatably supported inside the center post **30** and mates the worm **42**. The gear **43** is mounted to a shaft **44** extending substantially parallel to the center post **30**. Thus, manually driving the handle **41** causes the shaft **44** to rotate. A plurality of supports **45** (only one being visible in FIG. **7**) is formed inside the center post **30** and securely attached thereto for rotatably supporting the shaft **44**.

[0023] The shaft **44** has an external threading (not labeled) which a nut **38** threadingly engages. Thus, the rotation of the shaft **44** is converted into linear translation of the nut **38** along the shaft **44**. The center post **30** forms a slit **37** extending substantially parallel thereto. The runner **31** has an inward projection **36** extending through the slit **37** into the center post **30** and movable along the slit **37**. The nut **38** is mounted to the projection **36**, such as interferentially fit in a bore (not labeled) defined in the projection **36**. Thus, the

movement of the nut **38** along the shaft **44** drives the runner **31** toward/away from the crown **32** to open/close the umbrella.

[0024] Although the present invention has been described with reference to the preferred embodiments thereof, it is apparent to those skilled in the art that a variety of modifications and changes may be made without departing from the scope of the present invention which is intended to be defined by the appended claims.

What is claimed is:

1. An umbrella comprising:

an umbrella frame comprising:

a center post comprising an upper section and a lower section pivotally connected to the upper section,

a crown mounted to the upper section of the center post,

a number of ribs pivotally attached to the crown and radially extending from the crown,

a runner movable along the center post, and

a stretcher extending between and pivotally connected to the runner and each rib; and

a driving system comprising:

a worm rotatably supported in the lower section and rotatable by a manual control device,

a shaft extending substantially in parallel to the lower section of the center post and comprising a gear mounted thereto, the gear mating the worm, the shaft having an external threading,

a nut threadingly engaging the external threading of the shaft whereby the rotation of the worm is converted into linear movement of the nut along the shaft, and

a link having an end pivoted to the nut and an opposite end pivoted to an extension of the upper section and offset from the pivotal connection between the upper and lower section;

whereby rotating the worm by the manual control device drives the link to swivel the upper section relative to the lower section about the pivotal connection between the upper and lower sections.

2. The umbrella as claimed in claim 1, wherein the manual control device comprises a rotation knob located outside the lower section of the center post and mounted to the worm.

3. An umbrella comprising:

an umbrella frame comprising:

a center post defining a slit extending substantially parallel thereto,

a crown mounted to the center post,

a number of ribs pivotally attached to the crown and radially extending from the crown,

a runner movable along the center post, the runner comprising a projection extending through the slit into the center post,

a stretcher extending between and pivotally connected to the runner and each rib; and

a driving system comprising:

a worm rotatably supported in the center post and rotatable by a manual control device,

a shaft extending substantially in parallel to the center post and comprising a gear mounted thereto, the gear mating the worm, the shaft having an external threading, and

a nut mounted to the projection of the runner and threadingly engaging the external threading of the shaft whereby the rotation of the worm is converted into linear movement of the nut and the runner along the shaft toward/away from the crown for opening/closing the umbrella.

4. The umbrella as claimed in claim 3, wherein the manual control device comprises a crank handle located outside the center post and mounted to the worm.

\* \* \* \* \*