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(54) **FOLDABLE STRUCTURE OF LARGE-SIZED UMBRELLA**

(76) Inventor: **Joen-Shen Ma**, Taipei (TW)

Correspondence Address:
ROSENBERG, KLEIN & LEE
3458 ELLICOTT CENTER DRIVE-SUITE 101
ELLICOTT CITY, MD 21043 (US)

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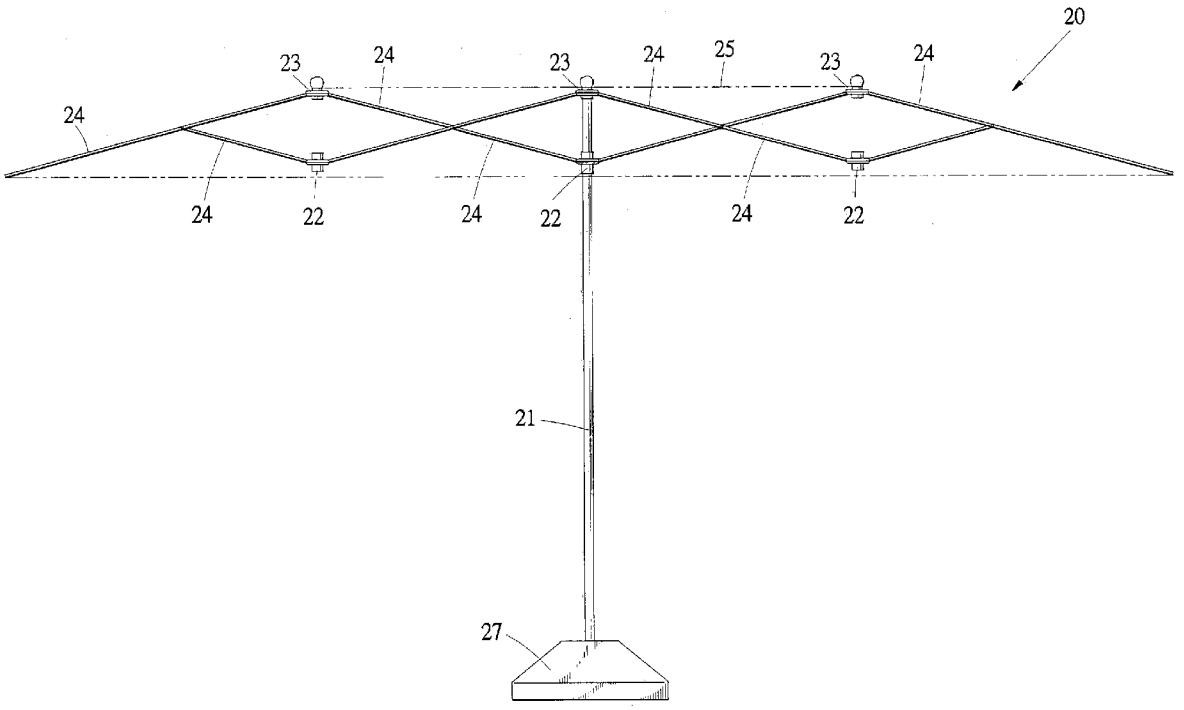
(57) **ABSTRACT**

A foldable umbrella includes a center rod having an upper end to which a primary crown is attached. A primary runner is movable along the central rod toward/away from the primary crown for opening/closing the umbrella. Pairs of secondary crown and runner are equally spaced around the primary crown and runner. A first intermediate bar has opposite ends pivoted to the primary crown and each secondary runner. A second intermediate bar has opposite ends pivoted to the primary runner and each secondary crown. The first and second intermediate bars intersect and are pivoted to each other whereby a parallelogram linkage is formed, which drives the secondary runners simultaneously with the movement of the primary runner in opening/closing the umbrella. A first rib bar extends radially from each secondary crown and a stretcher bar is arranged between and having ends pivoted to each first rib bar and the associated secondary runner. A canopy is attached to the crowns and supported by the rib bars whereby when the umbrella is open, the canopy is expanded by the secondary crowns and the rib bars. If desired, second rib bars may be pivoted to each secondary crown and radially extend therefrom for further supporting the canopy. Corresponding stretcher bars are provided between the second rib bars and the associated runners.



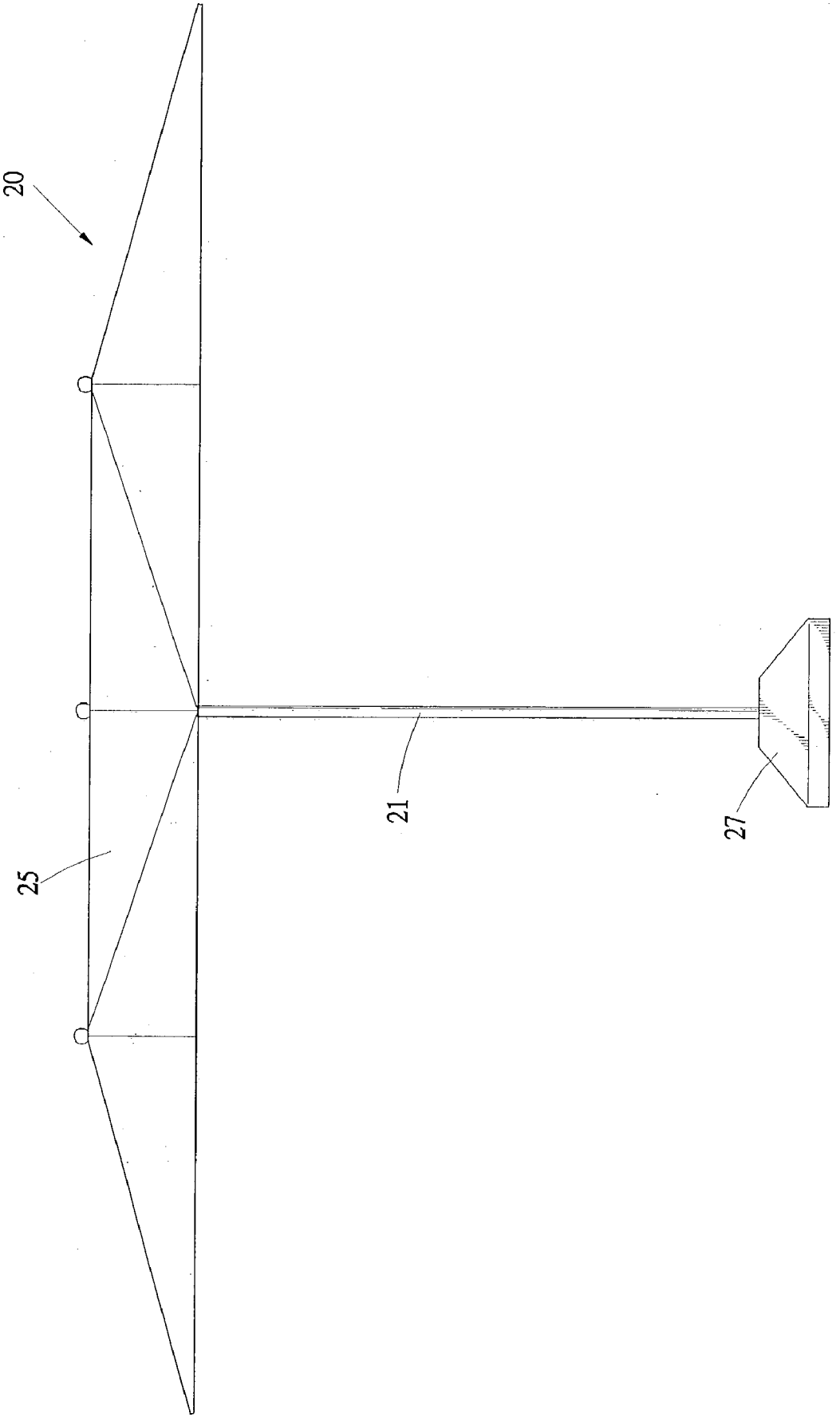


FIG.1

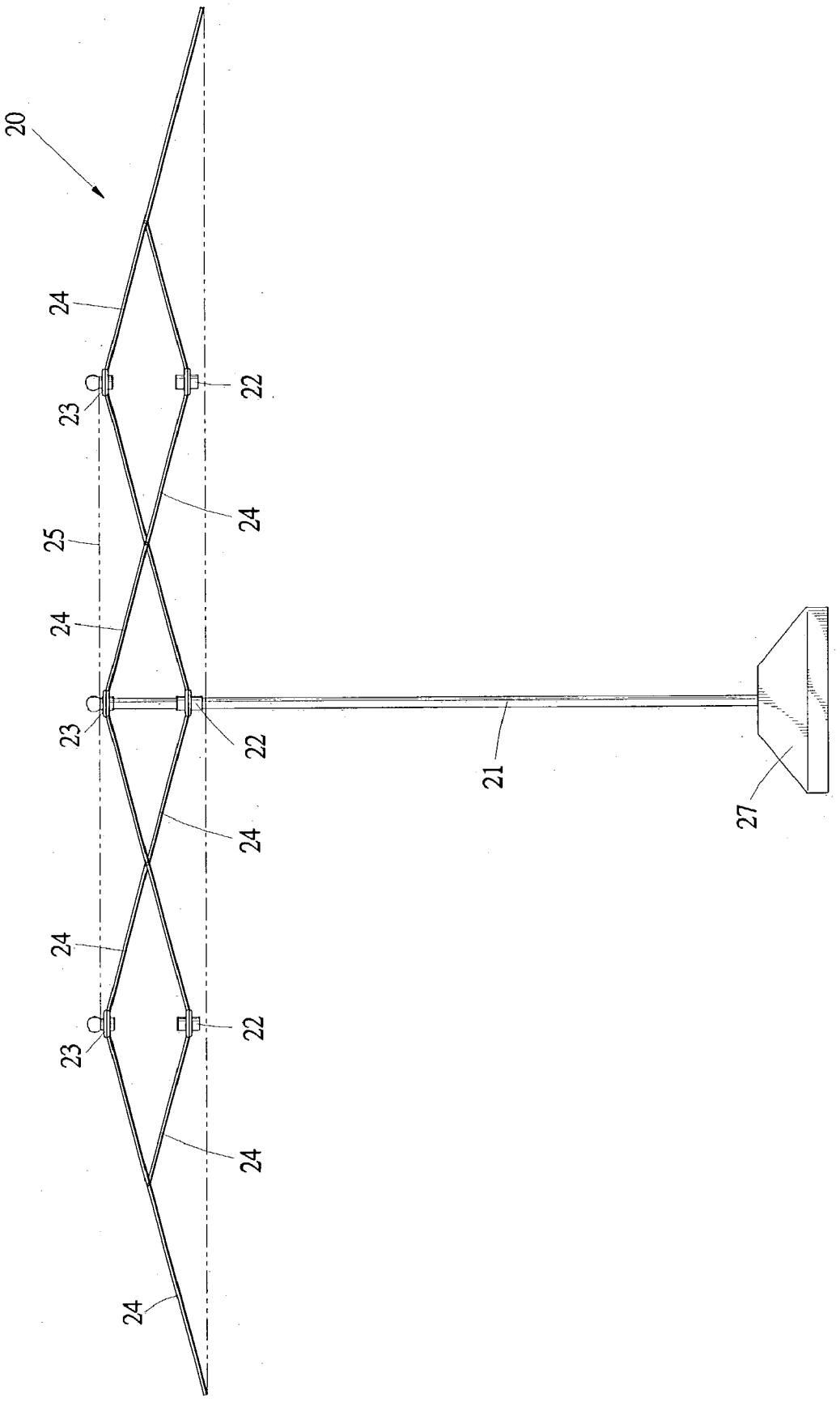


FIG.2

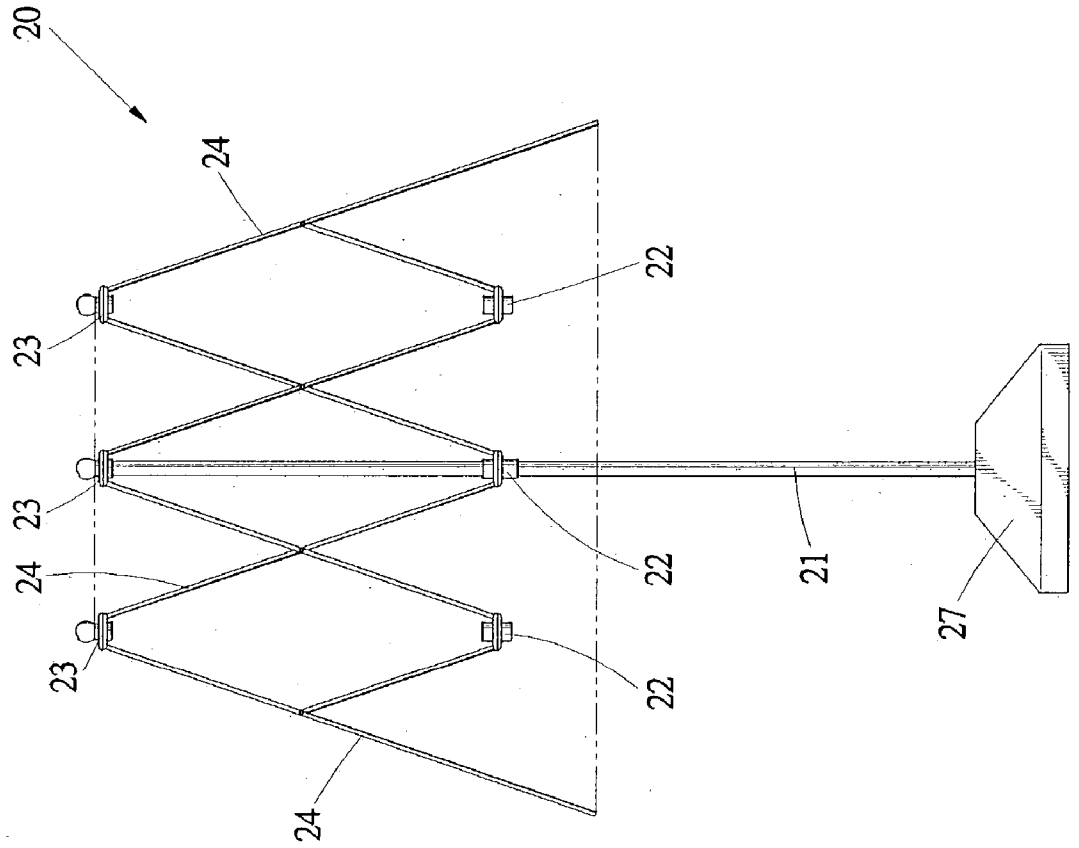


FIG.3

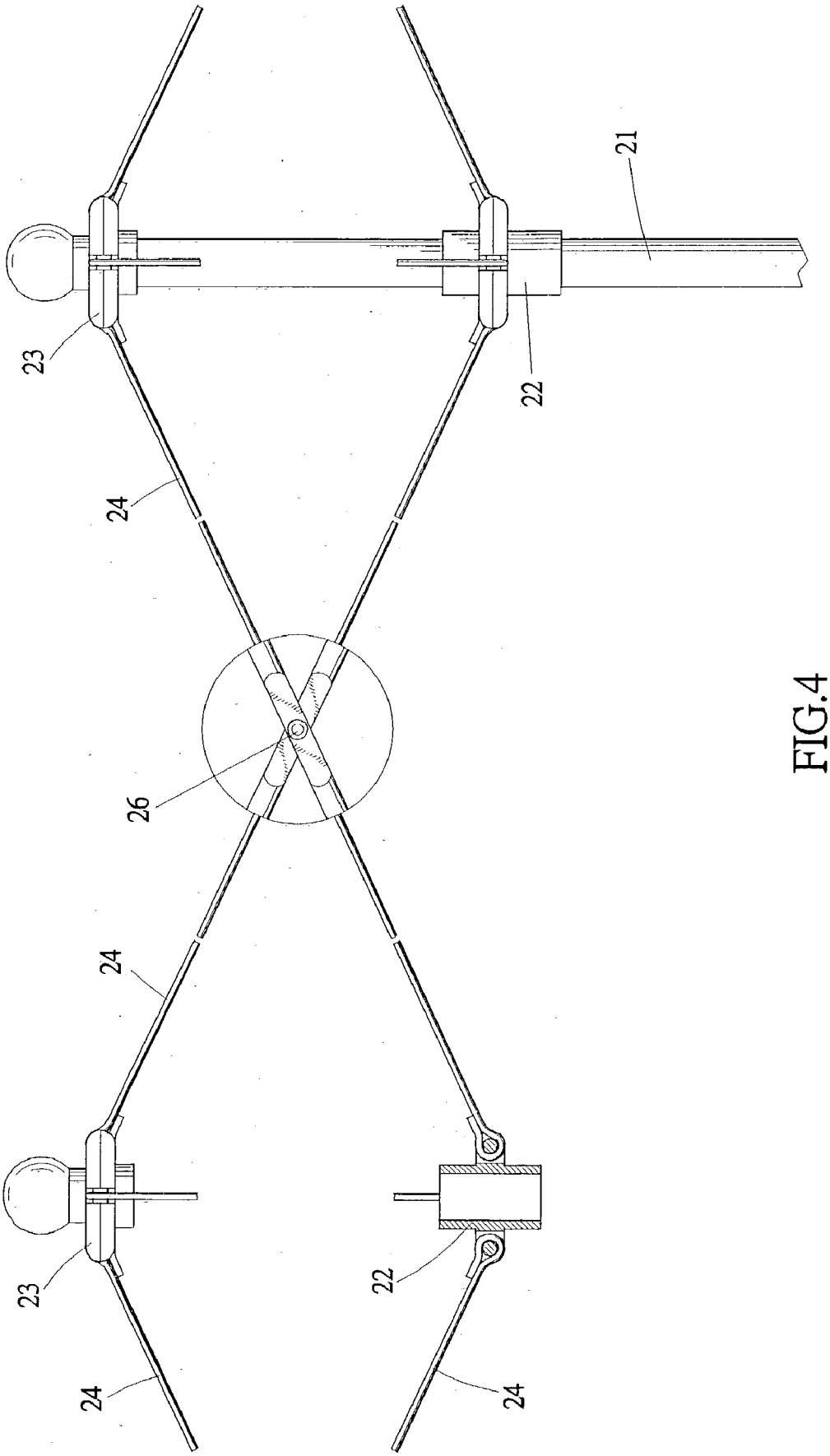


FIG.4

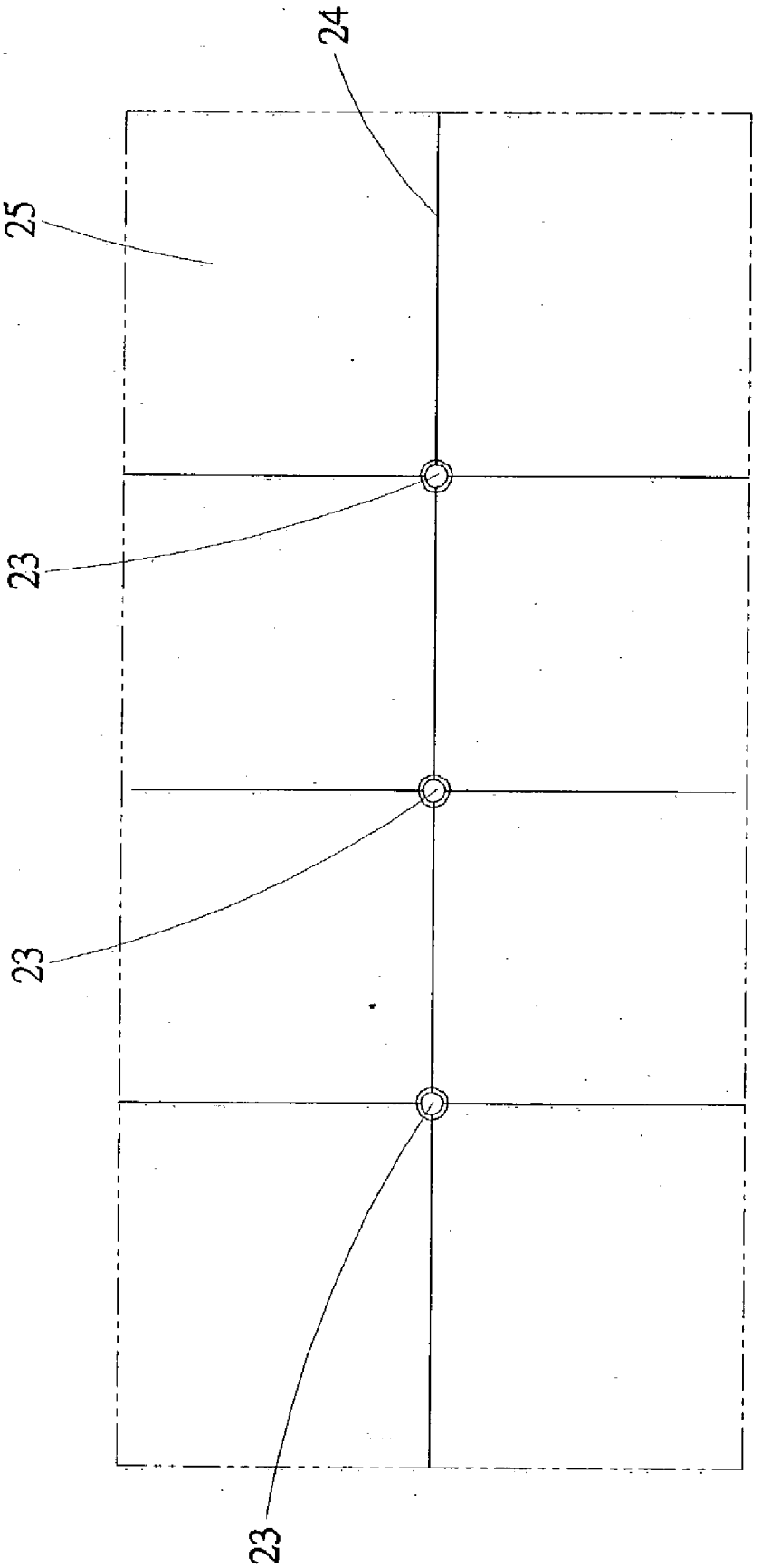


FIG.5

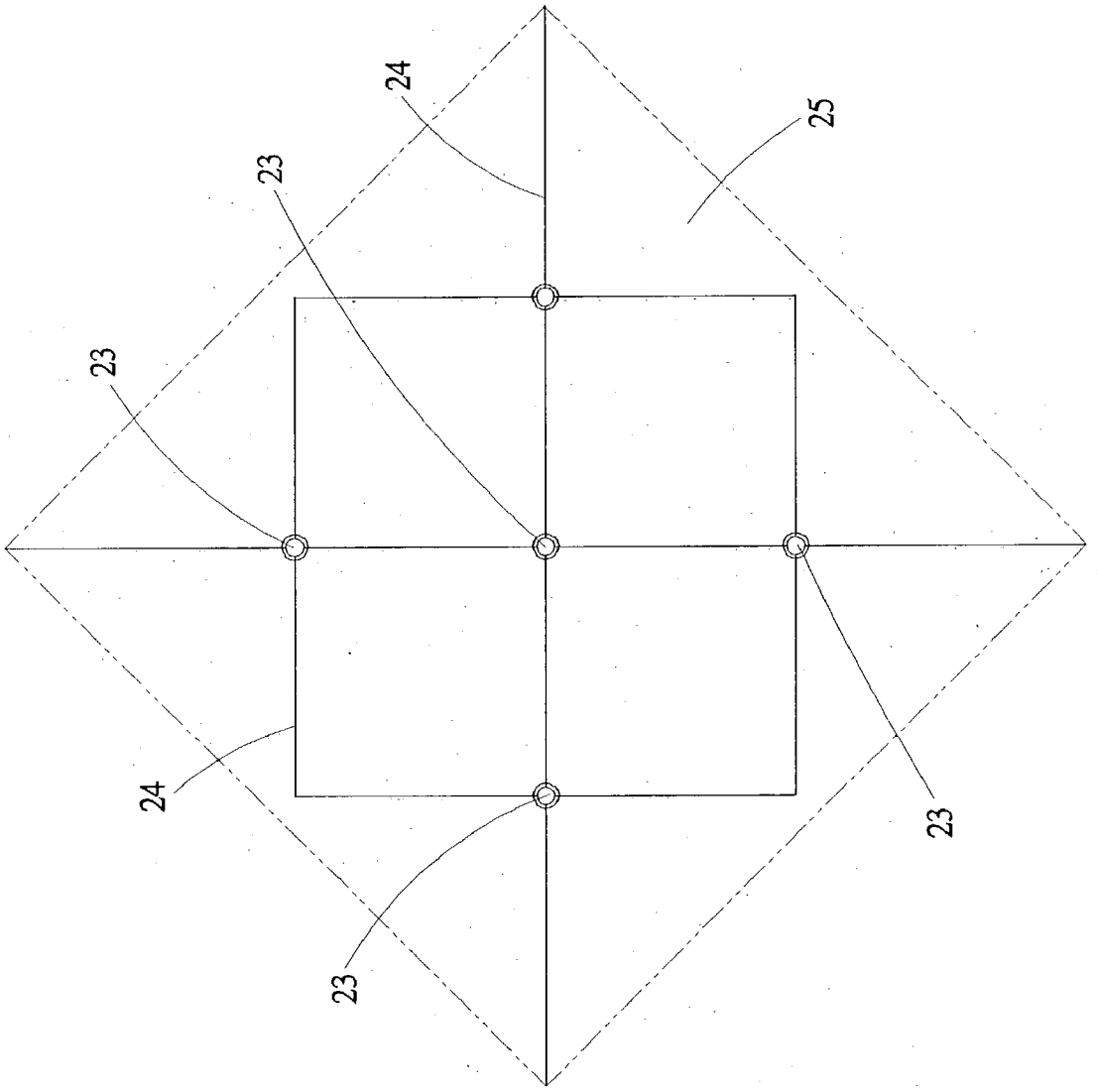


FIG.6

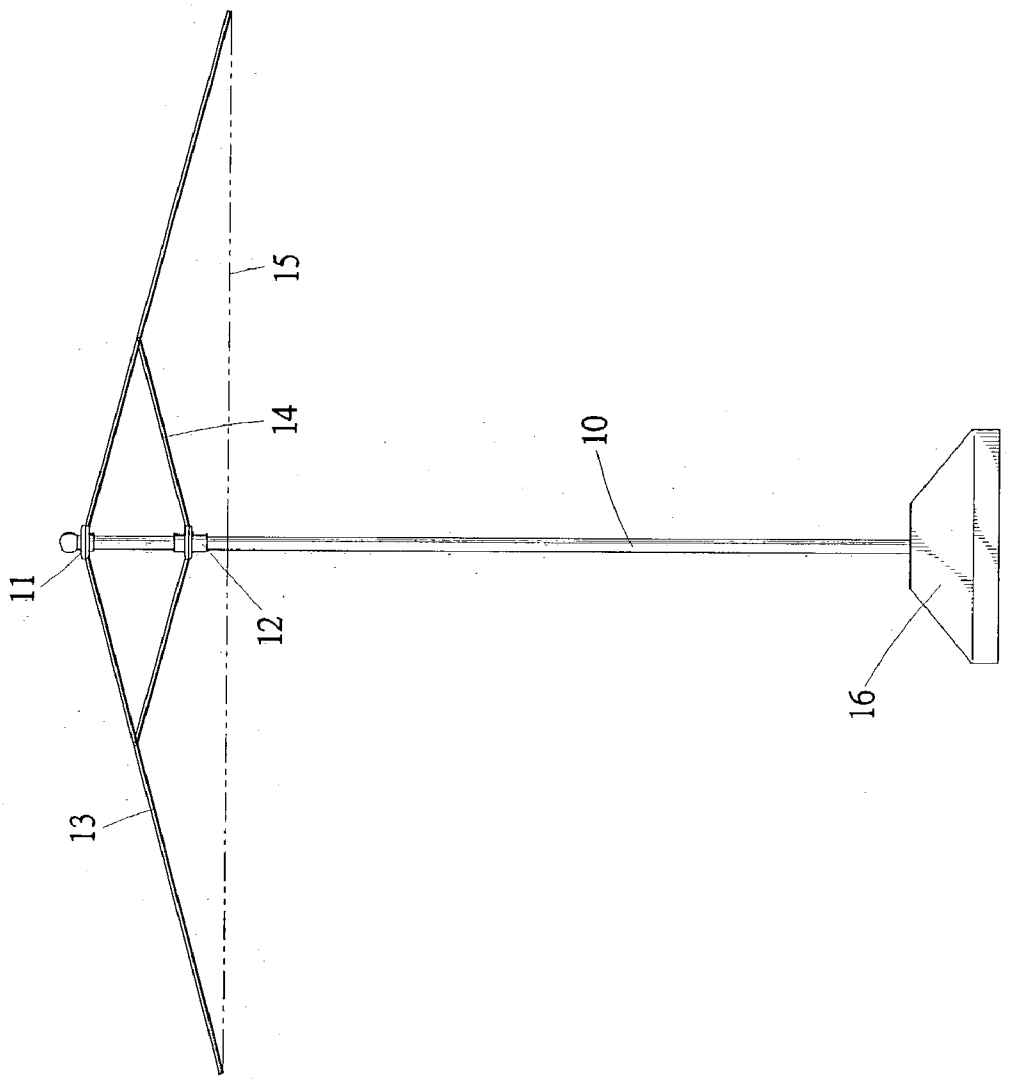


FIG.7
Prior Art

FOLDABLE STRUCTURE OF LARGE-SIZED UMBRELLA

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 foldable frame of 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, for shading intense sunlight. Most of the large-sized umbrellas have the similar structure. A typical example of the large-sized umbrellas is shown in **FIG. 7** of the attached drawings. The large-sized umbrella comprises a central rod **10** along which a runner **12** is movable. A crown **11** is mounted to a top end of the central rod **10**. A base **16** is mounted to a lower end of the central rod **10**. A number of ribs **13** are pivoted to the crown **11** and radially extend therefrom. A stretcher **14** has opposite ends respectively pivoted to each rib **13** and the runner **12**. A canopy **15** is attached to the ribs **13**. Moving the runner **12** toward the crown **11** forces the stretchers **14** to drive the ribs **13** and thus the canopy **15** upward and thus opening the umbrella and moving the runner **12** downward away from the crown **11**, the canopy **15** is closed.

[0005] The central rod **10** supports the ribs **13** and the canopy **15** in an expanded condition. However, the presence of the central rod **10** limits the utilization of the area shielded by the canopy **15** because the central rod **10** is in general located at a center position of the area shielded by the canopy **15**. To make more exploitation of the shielded area, the size of the canopy **15** may be increased. However, the increase of the size of the canopy **15** requires a corresponding increase of the length of the ribs **13**, which is, however, subject to the limitation of the overall length of the central rod **10**.

[0006] Thus, it desired to have a foldable structure of large-sized umbrellas that overcomes the above problems.

SUMMARY OF THE INVENTION

[0007] An object of the present invention is to provide a large-sized umbrella having a foldable frame for supporting a large canopy.

[0008] Another object of the present invention is to provide a foldable structure of large-sized umbrellas capable of carrying canopies of different shapes.

[0009] To achieve the above objects, in accordance with the present invention, there is provided an umbrella comprising a center rod having an upper end to which a primary crown is attached. A primary runner is movable along the central rod toward/away from the primary crown for opening/closing the umbrella. Pairs of secondary crown and runner are equally spaced around the primary crown and runner. A first intermediate bar has opposite ends pivoted to the primary crown and each secondary runner. A second intermediate bar has opposite ends pivoted to the primary runner and each secondary crown. The first and second intermediate bars intersect and are pivoted to each other whereby a parallelogram linkage is formed, which drives the secondary runners simultaneously with the movement of the primary runner in opening/closing the umbrella. A first rib bar extends radially from each secondary crown and a stretcher bar is arranged between and having ends pivoted to each first rib bar and the associated secondary runner. A canopy is attached to the crowns and supported by the rib bars whereby when the umbrella is open, the canopy is expanded by the secondary crowns and the rib bars. If desired, second rib bars may be pivoted to each secondary crown and radially extend therefrom for further supporting the canopy. Corresponding stretcher bars are provided between the second rib bars and the associated runners. The number and the arrangement of the pairs of the secondary crown and runners can be arbitrary and the shape of the canopy can be changed in accordance therewith.

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 constructed in accordance with the present invention;

[0012] **FIG. 2** is similar to **FIG. 1** but showing details of a foldable frame of the large-sized umbrella of the present invention in an expanded condition;

[0013] **FIG. 3** is similar to **FIG. 2** but showing the umbrella in a partially collapsed condition;

[0014] **FIG. 4** is side elevational view of a foldable frame of the large-sized umbrella of the present invention;

[0015] **FIG. 5** is a plan view showing a first example of a canopy of the umbrella of the present invention;

[0016] **FIG. 6** is a plan view showing a second example of the canopy of the umbrella of the present invention; and

[0017] **FIG. 7** is a side elevational view of a conventional large-sized umbrella.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0018] With reference to the drawings and in particular to **FIGS. 1 and 2**, a large-sized umbrella constructed in accordance with the present invention, generally designated with reference numeral **20**, comprises a central rod **21** having a lower end mounted to a stand or base **27** for supporting the central rod **21** and thus the umbrella **20** in a substantially upright manner and an upper end (not labeled) supporting a foldable frame carrying a canopy **25**.

[0019] Also referring to **FIG. 4**, the foldable frame comprises a primary runner **22** movable along the central rod **21** and a primary crown **23** mounted to the upper end of the central rod **21**. A pair of secondary runner, also designated with reference numeral **22** for simplicity, and secondary crown, also designated with reference numeral **23** for simplicity, is arranged on one side of and radially spaced from the central rod **21** (or the primary crown **23**). The primary and secondary crowns **23** are substantially at the same altitude and the same applies to the primary and secondary runners **22**. A first intermediate bar **24** extends between the

primary crown **23** and the secondary runner **22** and similarly a second intermediate bar **24** extends between the secondary crown **23** and the primary runner **22**. Both ends of each intermediate bar **24** are pivoted to the crown **23** and the runner **22**. The intermediate bars **24** intersect and are pivoted to each other by means of such as a rivet **26**.

[**0020**] It is noted to have a balanced structure, it is desired to have a symmetrical configuration for the umbrella **20**. Namely, another pair of secondary crown **23** and runner **22** is located on the opposite side of the central rod **21** as shown in **FIG. 2**. If desired, a number of pairs of secondary crowns and runners are equally spaced around the central rod **21** (or the primary crown **23**). Similarly, intermediate bars **24** are connected between the primary crown and runner and the secondary crown and runner. This forms a number of parallelogram linkages, allowing the secondary crowns **23** and secondary runners **22** to move simultaneously between an open condition as shown in **FIG. 2** and a closed condition as shown in **FIG. 3**. It is noted that the movement of the secondary crowns **23** is in a substantially radial direction with respect to the primary crown **23**, while that of the secondary runners **22**, in addition to the synchronous movement in a direction parallel to the central rod **21** with the primary runner, is in the substantially radial direction also. The canopy **25** is attached to the secondary crowns **23** whereby the radial movement of the crowns **23** expands the canopy **25**.

[**0021**] A first rib bar, also designated with reference numeral **24** for simplicity, is pivoted to and extends from each secondary crown **23** radially and outwards for supporting the canopy **25** that is shown in phantoms in **FIGS. 2 and 3**. A stretcher bar, also designated with reference numeral **24**, is arranged between and having ends pivoted to each first rib bar and the associated secondary runner. The stretcher bars and the rib bars are such that they form parallelogram with the adjacent intermediate bars **24**. In this respect, all the bars **24** are pivoted to each other and the crowns **23** and the runners **22** and form parallelogram linkages. The foldable frame of the umbrella **20** is thus comprised of a number of parallelogram linkages. If desired, addition rib bars can be pivoted to and extend radially from each crown **23** for further supporting the canopy **25**.

[**0022**] When the primary runner **22** is moved toward the primary crown **23**, the parallelogram formed by the intermediate bars drives the secondary runners **22** and the secondary crowns **23** to simultaneously move with the primary runner **22** and the primary crown **23**. The rib bars **24** and the stretcher bars **24** are also caused to move simultaneously thereby opening the umbrella **20** and expanding the canopy **25**. When the primary runner **22** is moved away from the primary crown **23**, the secondary runners **22** and the secondary crowns **23** are moved simultaneously due to the parallelogram linkages. Thus, the umbrella **20** is closed and the canopy **24** is collapsed.

[**0023**] In this way, the size of the canopy **25** can be effectively increased as compared to the conventional large-sized umbrellas without increase the length of the rib bars or intermediate bars.

[**0024**] **FIG. 5** shows a top plan view of the umbrella **20** of the present invention wherein two pairs of secondary runners and crowns **23** are arranged on opposite side of the central rod **21** (namely the primary runner and the primary crown **23**). The canopy **25** is rectangular and is supported by the rib bars **24** in the open condition.

[**0025**] **FIG. 6** shows a top plan view illustrating a different arrangement of the secondary runners and crowns wherein four pairs of secondary runners and crowns are equally-spaced around the central rod **21** (and thus the primary crown **23**) to support a square canopy **25**. It is apparent other arrangements of the secondary crowns and runners are possible for supporting canopy of different shape.

[**0026**] In addition, the primary runner can be moved manually or by a power device. For example, a rope-pulley system driven by a manual crank arm can be employed to move the primary runner toward/away from the primary crown for opening/closing the umbrella. Other transmission system, such as rack-gear based system and other gear train based system, can also be employed.

[**0027**] 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:

a central rod having an upper end;

a primary crown mounted to the upper end of the central rod and a primary runner movable along the central rod toward/away from the primary crown for opening/closing the umbrella;

at least one pair of secondary runner and secondary crown respectively corresponding in position to the primary runner and crown and radially spaced therefrom;

a first intermediate bar having opposite ends respectively pivoted to the primary crown and the secondary runner and a second intermediate bar having opposite ends respectively pivoted to the secondary crown and the primary runner;

at least one first rib bar pivoted to each secondary crown and radially extending therefrom;

a stretcher bar having ends respectively pivoted to each rib bar and the associated secondary runner; and

a canopy attached to the crowns and supported by the rib bar.

2. The umbrella as claimed in claim 1 comprising two pairs of secondary crowns and runners arranged on opposite sides of the primary crown and runner, second rib bars pivoted to the primary and secondary crowns and radially extending therefrom for supporting a rectangular canopy.

3. The umbrella as claimed in claim 1 comprising four pairs of secondary crowns and runners equally spaced around the primary crown and runner for supporting a square canopy.

4. The umbrella as claimed in claim 1, wherein the first and second intermediate bars intersect and are pivoted to each other.

5. The umbrella as claimed in claim 4, wherein the bars form at least one parallelogram linkage.

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