

July 29, 1969

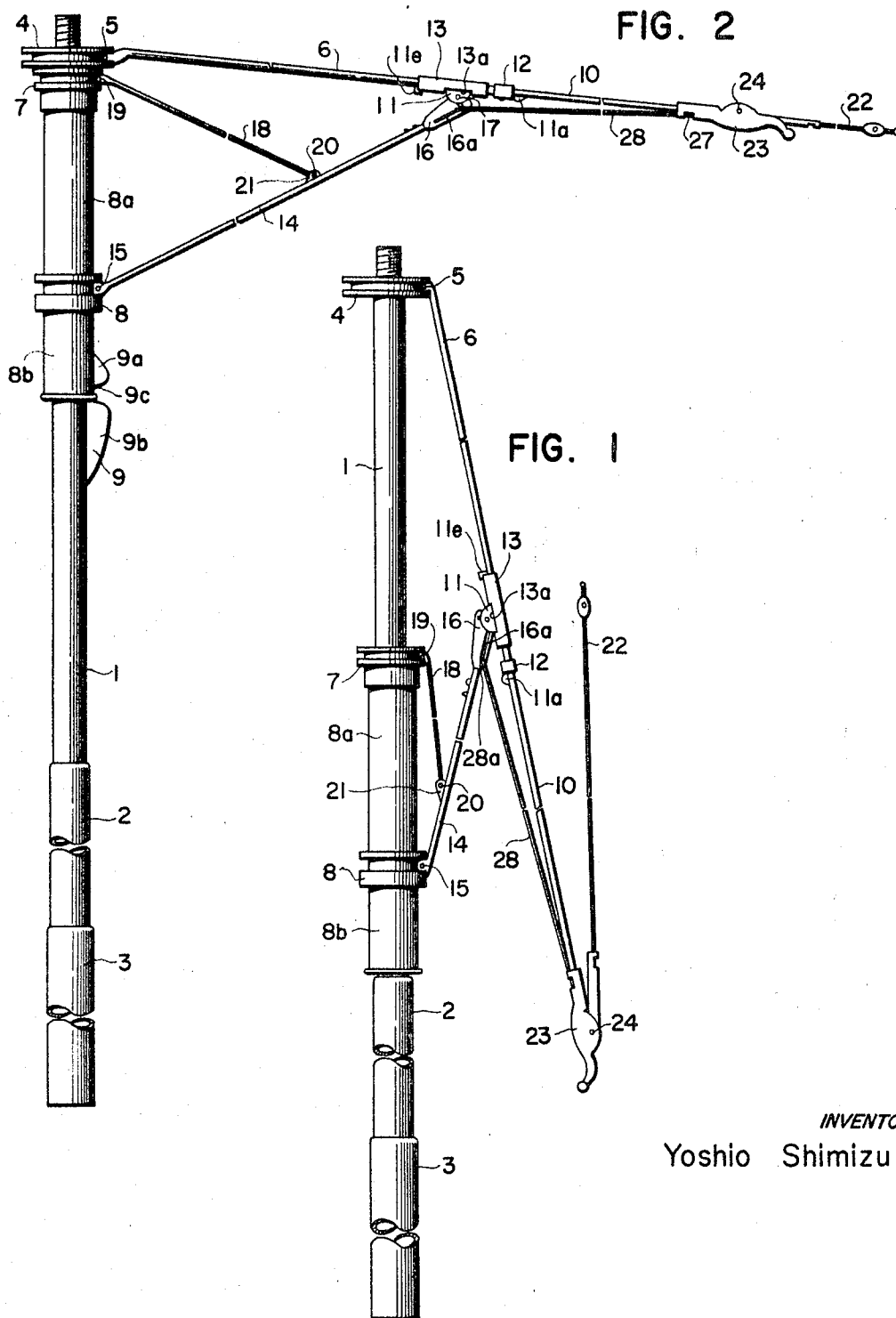
YOSHIO SHIMIZU

3,457,931

THREE-STEP FOLDING UMBRELLA

Filed Aug. 9, 1967

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

FIG. 3

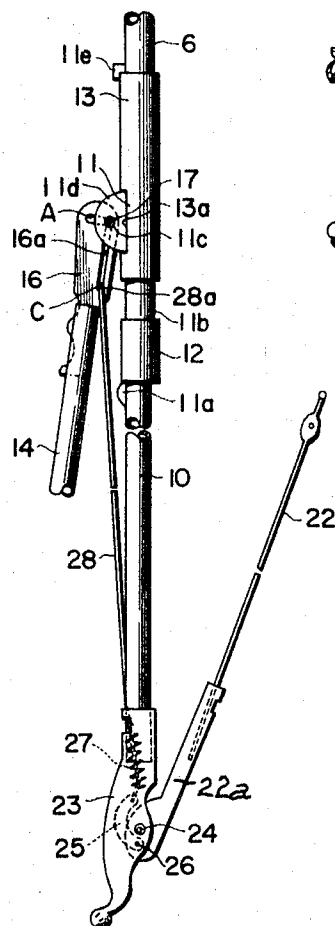


FIG. 4

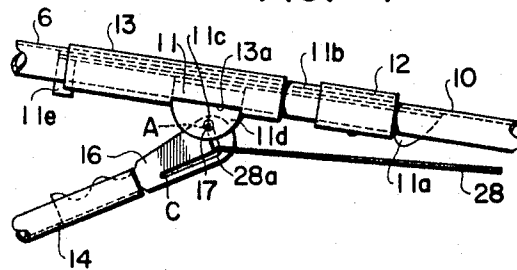
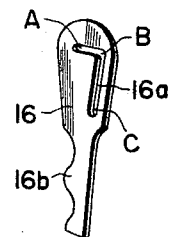


FIG. 5



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THREE-STEP FOLDING UMBRELLA

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5 Claims

ABSTRACT OF THE DISCLOSURE

A folding umbrella comprises a telescoping handle, a flexible fabric cover and a number of rib assemblies, with each of the rib assemblies having three segments. The first segment closest to the handle, is hollow, and has an end pivotally attached to the handle by a fixed pivot. The center segment is slidably disposed within the first segment and the third segment has an end pivotally attached to the center segment. Means are provided for automatically sliding the center rib segment into the first segment and also pivoting the third rib segment to a position forming an acute angle with the first and center rib segments when the umbrella is closed. In the open position the first and center rib segments are extended with respect to each other and the third rib segment is held in alignment with the first and second rib segments by a resilient tension element connected to the third rib segment and to an operating strut that is slidably connected to a universal joint that is slidably mounted on the first rib segment. A stay rib is also connected to the universal joint and to a sliding pivot on the handle. The universal joint is able to vary the tension on the operating strut according to the position of the stay rib by means of a shaped guide slot within which the end of the operating strut connected to the universal joint rides. The umbrella is operated by means of the sliding pivot. To open the umbrella the sliding pivot is first pulled away from the fixed pivot thus extending the sliding center rib segments with respect to the first segments. The sliding pivot is then pushed toward the fixed pivot thus opening the ribs and applying tension to the resilient tension element in the pivoting ribs. Locking means are included on the handle to lock the sliding pivot in the open position. The handle comprises a series of three segments having diameter larger in turn and fitted slidably one in another for the purpose of extending when the umbrella is open and sliding into one another when the umbrella is closed.

The invention relates in general to foldable umbrellas and is directed in particular to an umbrella foldable compactly in three parts. Most conventional folding umbrellas have a structure in which the ribs can be folded into two segments. Very few folding umbrellas have a structure in which the ribs slide to stretch or contract or in which the ribs may be folded into three segments. In some folding umbrellas of the type that are folded into two segments the ribs will automatically stretch or bend with the opening or closing of the umbrella so that the trouble of stretching or bending of the ribs by hand is eliminated. However, an automatic mechanism has not been available for umbrellas of the type in which the ribs slide to stretch or contract or in which the ribs may be folded into three segments.

An object of this invention is to provide a folding umbrella having three part ribs with automatic means for opening and closing the ribs.

Another object of this invention is to provide an umbrella having ribs which slide to stretch or contract with an automatic means for opening and closing the ribs.

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Another object of this invention is to provide an extremely compact folding umbrella.

Another object of this invention is to provide an umbrella foldable in three segments wherein the opening and closing operations can be carried out quickly and smoothly by a simple mechanism.

Other objects and a fuller understanding of the invention may be had by referring to the following description and claims, taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a side view of an umbrella incorporating the invention showing a rib in a partially closed position.

FIG. 2 is a side view of an umbrella incorporating the invention showing a rib in the open position.

FIG. 3 is an enlarged fragmentary view showing part of a rib in the partially closed position.

FIG. 4 is an enlarged side view of the upper end part of a stay rib with the umbrella in the open position.

FIG. 5 is an enlarged perspective view of a joint piece to be attached to the upper end part of the stay rib shown in FIG. 4.

In the drawings, the umbrella is shown as having a handle comprising an upper handle 1, an intermediate handle 2 and a lower handle 3. These three handles are of diameters larger in turn and are fitted slidably in one another.

An upper pivot ring 4 is fixed to the upper end of the upper handle 1 and has main ribs 6 pivoted thereto through a retaining ring 5. An intermediate pivot ring 7 is fitted slidably on the outer periphery of the upper handle 1. A lower pivot ring 8 is provided with a longer upper tube 8a and a lower tube 8b having an engaging slot. An engaging piece 9 is resiliently fitted on the upper handle 1 and provided with an upper slow sloped projection 9a, a lower slow sloped projection 9b and an engaging notch 9c. The upper slow sloped projection 9a is to fit into the engaging slot in the lower tube 8b when the lower pivot ring 8 is pushed up to the uppermost position.

A slider rib 10 is slidably inserted into the main rib 6 and has a stay rib universal joint 11 disposed at the upper end. The stay rib universal joint 11 is formed of a metal sheet folded into half to provide symmetrical right and left parts including a projection 11a which is to make it easy to pass through a short guide tube 12 fitted to the outer periphery of the lower end of the main rib 6 and to improve the stability, a narrow base part 11b following the projection 11a, a projecting part 11d provided with a pin hole 11c and an engaging projection 11e at the upper end.

A retaining tube 13 encloses the stay rib universal joint 11 and lower end portion of the main rib 6. A slot 13a in the tube 13 receives the projecting part 11d of the stay rib universal joint 11. A notch at the left end of the tube 13 is engaged with the engaging projection 11e of the stay rib universal joint 11.

A stay rib 14 is rockably connected at its lower end with the lower pivot ring 8 through a retaining ring 15. A joint piece 16 provided with an L-shaped slot 16a is fixed to the upper end of the stay rib. A waveshaped part 16b is formed on the lower side of the joint piece 16 so as to make it easy to fix the joint piece to the stay rib by crimping the stay rib. The stay rib is made rockable with respect to the universal joint by fitting the L-shaped slot 16a to a pin 17 extending through the pin hole 11c of the stay rib universal joint 11.

An auxiliary stay rib 18 is rockably connected at its upper end with the intermediate pivot ring 7 through a retaining ring 19 and is pivotally connected at the lower end through a pin 20 to a bearing piece 21 fixed on the stay rib 14.

A tip rib 22 is provided at its upper end with a fitting 22a which is pivoted upward slidably through pivotally connected by a pin 24 to a bearing piece 23 fixed to the lower end of the slider rib 10. A bent connecting piece 25 is connected to the fitting 22a at the upper end of the tip rib 22 through a pin 26. An operating wire 28 is connected at one end to the other end of said bent connecting piece 25 through a tension spring 27. A hook part 28a formed at the other end of the operating wire 28 is slidably fitted in the L-shaped slot 16a.

FIG. 2 shows the umbrella as opened. The hook part 28a of the operating wire 28 is engaged with the elbow part B of the L-shaped slot 16a in the joint piece 16 and one end part A of the L-shaped slot 16a is engaged with the pin 17. In this state, the tip rib 22 is pulled by the tension of the tension spring 27 so as to extend to be aligned with the slider rib 10.

While the umbrella is opened, if the engaging piece 9 is pushed in with a finger, due to the tension of the stretched cloth (not illustrated), the umbrella will move to close. If the lower tackle tube 8b is gripped with fingers and the lower tackle 8 is made to slide downward, toward handle 3, the umbrella will gradually close. At this time, the hook part 28a will slide toward the end part C (see FIGS. 1 and 5) on the stay rib side in the L-shaped slot 16a. Then, if the upper tackle 4 is gripped with one hand and the bottom of the lower handle 3 is strongly pushed with the other hand, the intermediate handle 2 and the lower handle 3 will be moved to cover the outer periphery of the upper handle 1 and at the same time the slider rib 10 will slide upward within the main rib 6. During such operation, the projection 11a will move through the short guide tube 12. While the umbrella is closed, the bent corner part B of the L-shaped slot 16a will engage with the pin 17. While the umbrella is closed as shown in FIGS. 1 and 3, as there will be no force of the tension spring 27, the tip rib 22 will be able to be freely rocked upward to be folded.

When the closed umbrella is to be opened, the lower handle 3 and the intermediate handle 2 should be pulled out downward and the lower tackle 8 should be made to slide to the lowermost position. Then, if the lower tackle 8 is raised, the intermediate tackle 7 will also rise with it, the stay ribs 14 will expand and the umbrella will open. In such case, with the tension of the tension spring 27, the tip rib 22 will extend to be aligned with the main rib and slider rib and the stay rib and auxiliary stay rib 18 will be tensioned.

As described above, in this three-step folding umbrella, by the joint operations of the L-shaped slot 16a in the joint piece 16 provided at the tip of the stay rib 14, the tension spring 27 connected with the tip rib 22 and contained in the bearing piece 23, the hook part 28a of the operating wire 28 connected with the tension spring and the pin 17 connecting the universal joint 11 and the joint piece 16 with each other, the operations of opening and closing the umbrella can be carried out smoothly and quickly.

Although I have described my invention with a certain degree of particularity, it is understood that the present disclosure has been made only by way of example and that numerous changes in details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

What I claim is:

1. A three-part folding umbrella comprising an elongated telescopic handle, a first pivot means fixed to the upper end of said handle, a plurality of rib assemblies each comprising a hollow first rib having a first end and a second end with the first end pivotally attached to said fixed pivot means, a second rib having a first end and a second end with the first end slidably disposed within the hollow portion of the first rib and capable of an extended position and a closed position, a third rib having a first

end and a second end with the first end pivotally attached to the second end of the second rib and capable of a position aligned with the second rib and a folded position forming an acute angle with the second rib, with said rib assemblies capable of an extended position wherein the first and second ribs are extended with respect to each other and the third rib is aligned with the second rib and a folded position wherein the second rib slides into the first rib and the third rib forms an acute angle with the second rib, a fabric cover attached to the second ends of the third ribs and supported by said rib assemblies when said rib assemblies are in said extended position, tensioning means for aligning said third ribs with said second ribs, a second pivot means slidably mounted on said handle, a plurality of stay ribs each having a first end and a second end with the first end pivotally attached to said second pivot means and with said second end pivotally attached to said rib assembly, with said position and extension of said second ribs responsive to the position of said stay ribs and with said tensioning means responsive to the position of said stay ribs, reversible locking means disposed on said handle for fixing the position of said second pivot means and consequently fixing the position of said stay ribs and thus locking said rib assemblies in the extended position, said tensioning means comprising a bracket mounted on each of the stay ribs having a slotted portion defining a longer slot and a shorter slot meeting the long slot perpendicularly to provide a slot having the form of the letter L, a plurality of resilient elements each having a first end and a second end with the first end attached to said third ribs, a plurality of struts each having a first end disposed to ride within said shaped slotted portion of said respective brackets and having a second end attached to the second end of said respective resilient elements, with each of said shaped slotted portions disposed so that in the folded position of said rib assembly, said first end of said strut is positioned at the end of the longer slot and as the stay is moved to the open position the first end of the strut is forced to ride up the longer slot and lodge in the shorter slot and consequently apply tension to the resilient elements and thus forcing the third rib into alignment with the second rib.

2. A three-part folding umbrella as in claim 1 wherein means for sliding said second ribs into said first ribs are combined with said tensioning means with each of said brackets mounted on said stay ribs pivotally attached to a sliding bracket slidably mounted on the respective first rib so that, starting from the folded position, sliding of the second pivot means away from said first pivot means moves said stay ribs and said sliding brackets and consequently said struts and thus moves said second ribs from said closed position to said extended position and subsequent sliding of the second pivot means toward said first pivot means extends said rib assemblies and applies tension to said tension elements thus aligning said second and third ribs.

3. A three-part folding umbrella as in claim 2 wherein said sliding brackets mounted on said first ribs each have reversible locking means for engaging the second ends of the first ribs when said first and second ribs are extended with respect to each other.

4. A three-part folding umbrella as in claim 3 wherein said reversible locking means comprises an elongated member having a first and a second end disposed on the outside of said first rib having a tang portion disposed on said first end with said tang portion disposed so as to reversibly engage a locking tube positioned at the second end of said first rib, a central portion having a pivot pin pivotally attached to the second end of said first stay rib a short hollow cover tube enclosing the elongated member and a portion of said first rib, with said cover tube having a slotted portion through which said central portion of said inner member protrudes, with said tang portion of said elongated member protruding beyond said cover tube with the second end of said elongated member detained

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in a notched portion of said cover tube with said cover tube and elongated member assembly thus capable of reversibly engaging said second end of said first rib thus locking said first rib and said first stay rib, and, when unlocked, sliding on the outside of said first rib toward the first end of said first rib.

5. A three-part folding umbrella as in claim 1 wherein said second end of said second rib is pivotally attached to an intermediate portion of said third rib, and a curved member having a first end and a second end is provided with the first end attached to the first end of the third rib and the second end attached to a resilient element and with stop means provided on said second end of said second rib with said curved member disposed so that tension on

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said resilient element causes said third rib to be aligned with said second rib and biased against said stop means.

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