

ONE-HAND OPENABLE AND CLOSABLE UMBRELLA

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The present invention relates to an umbrella which can automatically be opened through utilization of the elasticity of a spring and, more particularly, to one that can be opened and closed with one hand.

The present inventor proposed an umbrella of this kind using a double shaft composed of an inner shaft and an outer shaft which are smoothly slidable relative to each other. In the prior art, however, when the umbrella is opened in high winds, the main ribs and the cloth spread thereon may become slack, making the umbrella unstable in its open state.

An object of the present invention is to provide a one-hand openable and closable umbrella which is free from the above-mentioned defect of the prior art example and offers a stable feeling in use even in high winds.

According to the present invention, the one-hand openable and closable umbrella comprises: a double shaft composed of an inner shaft and an outer shaft which are smoothly slidable relative to each other; a required number of main ribs which are pivotally secured at one end to a mounting member on the tip of the inner shaft at predetermined angular intervals; a required number of auxiliary ribs the inner ends of which are pivotally secured to the upper end portion of the outer shaft at predetermined angular intervals; a required number of lateral auxiliary ribs the outer ends of which pivotally support the required number of main ribs substantially centrally thereof, the inner ends of which are

pivotally secured to the upper end of the inner shaft, a which are pivotally secured at their intermediate position by the outer ends of the required number of auxiliary ribs; a handle mounted on the lower end portion of the outer shaft; an auxiliary handle attached to the lower end of the inner shaft; a spring for providing an elastic force between the outer shaft and an inner shaft in a direction to cause the upper end portion of the outer shaft to approach to the upper end of the inner shaft; an unlockable locking mechanism which temporarily inhibits the relative sliding movement of the outer shaft and the inner shaft in a first state in which the main ribs have been folded through the action of the auxiliary ribs by moving the handle toward the auxiliary handle against the elastic force of the spring; and a stopper which temporarily inhibits the relative sliding movement of the outer shaft and the inner shaft in a second state in which the elastic force of the spring has been reduced by moving the handle away from the auxiliary handle to unfold the main ribs through the action of the auxiliary ribs.

Embodiments of the present invention will now be described by way of example in comparison with prior art and with reference to the accompanying drawings, in which:

Fig. 1 is a schematic front view, partly in section, showing an embodiment of an umbrella of the present invention in its opened state;

Fig. 2 is a schematic front view, partly in section, showing that embodiment of the umbrella in its closed state;

Figs. 3A and 3B are schematic sectional views showing

other examples of a handle portion of an umbrella of the present invention;

Figs. 4A and 4B are schematic sectional views showing other examples of a stopper for use in the present invention; and

Fig. 5 is a schematic front view showing the arrangement of a prior art example.

To make differences between prior art and the present invention clear, an example of prior art will first be described.

Fig. 5 shows a conventional umbrella of this kind which has previously been proposed by the inventor of the present invention, and has a double shaft composed of an inner shaft 1a and an outer shaft 1b which are smoothly slidable relative to each other. A required number (usually eight) of main ribs 2 are pivotally secured at one end to the top of the inner shaft 1a so that they extend radially thereof at predetermined angular intervals ($360^\circ/8 = 45^\circ$ when the number of main ribs 2 is eight). A required number (equal to the number of main ribs, that is, eight) of auxiliary ribs 4 are pivotally secured at one end to the top of the outer shaft 1b so that they extend radially thereof at predetermined angular intervals (45° when the number of auxiliary ribs is eight), and as indicated by 2a, they pivotally support at the other end of the main ribs 2 near the positions where the main ribs 2 are secured to the inner shaft 1a. A handle 6a is mounted on the lower end portion of the outer shaft 1b and an auxiliary handle 6b is attached to the lower end of the inner shaft 1a. A

coiled spring 5 is mounted on the upper end portion of the inner shaft 1a so that it provides force between the outer shaft 1b and the inner shaft 1a in a direction to cause the upper end portion of the outer shaft 1b to approach the upper end portion of the inner shaft 1a. On the handle 6a a control button 7a is provided as a locking mechanism for temporarily inhibiting the relative sliding movement of the outer shaft 1b and the inner shaft 1a. When the control button 7a is depressed, the temporary inhibition of the relative sliding movement of the shafts is released. The relative sliding movement can be temporarily inhibited again in a state in which the positional relationship between the outer shaft 1b and the inner shaft 1a has been changed while the handle 6a has been brought down to the vicinity of the auxiliary handle 6b, closing the main ribs 2 (a first state).

When the umbrella is held in its folded state, the handle 6a is normally in contact with the auxiliary handle 6b. When depressing the control button 7a with one finger of the hand holding the handle 6a so as to open the umbrella the inner shaft 1a is slid down relative to the outer shaft 1b by the elastic force of the spring 5, by which the auxiliary ribs 4 act to spread out the main ribs 2, opening the umbrella. The umbrella can be used in such a state, but when it is desirable to fix the main ribs at their fully opened position on a windy day, for example, the auxiliary handle 6b mounted on the lower end portion of the inner shaft 1a is pulled down away from the handle 6a with a finger of the hand holding the umbrella, by which the umbrella is put in such a second state as shown in

Fig. 5, in which the outer shaft 1b and the inner shaft 1a are locked to each other.

In order to close the umbrella, the control button 7a is depressed with a finger of the hand holding the handle 6a, the tip of the outer shaft 1b is slightly pulled away from the tip of the inner shaft 1a under the action of the coiled spring 5 and the auxiliary ribs 4 are closed, by which the main ribs 2 are slightly moved in the direction to be closed. The coiled spring 5 is not so stiff, as mentioned previously; so that, by lightly pulling the handle 6a toward the auxiliary handle 6b which is pressed against the user's body, for example, the main ribs, slightly closed as mentioned above, is fully closed with ease, and hence the umbrella is folded up with the outer shaft 1b and the inner shaft 1a locked to each other.

In the prior art example described above, the positions 2a of the auxiliary ribs 4 supporting the main ribs 2 are relatively close to the inner shaft 1a (about 7 to 10 cm) when the umbrella is opened, and consequently, when the wind is high, the main ribs 2 and cloth spread thereon may become slack, making the umbrella unstable in its opened state.

By locating the positions 2a away from the centre of the umbrella, the main ribs 2 can be made stable in its opened state, but the auxiliary handle 6b further extends downwardly of the handle 6a accordingly, making the umbrella cumbersome to use and unshapely.

Fig. 1 illustrates an embodiment of the present invention, which is provided with lateral auxiliary ribs 4a in

addition to the auxiliary ribs 4 of the prior art example shown in Fig. 5. The outer ends of the lateral auxiliary ribs 4a pivotally support the main ribs substantially centrally thereof as indicated by reference 2b, and the inner ends are pivotally secured to the inner shaft 1a as indicated by reference 4b. Furthermore, the lateral auxiliary ribs 4a are each pivotally supported by the upper end of the corresponding auxiliary rib 4 at a position of about 1/3 of the entire length of the rib 4a from the inner end thereof as indicated by reference 4c. With such an arrangement, the lateral auxiliary ribs 4a are substantially horizontal as shown when the main ribs 4 are fully opened. The spring 5 is shown to be in its contracted state, and its expanding elastic force is utilized for opening and closing the umbrella. The upper end of the spring 5 is fixed to the inside of a mounting member 8.

Fig. 2 shows the state of the umbrella immediately after the tip of a pin 7b has come out of a hole 9a upon depression of the control button 7a when the umbrella was closed. At this time the spring 5 is still contracted, and by its expanding elastic force, the main ribs 4 begin to spread out. At the time when the main ribs reach their fully opened position as depicted in Fig. 1, that is, when the lateral auxiliary ribs 4a assume their substantially horizontal position, the elastic force of the spring 5 is great, by which the main ribs 2 are pressed against the cloth tied thereto. At this time, the relative sliding movement of the inner shaft 1a and an outer shaft 1b is inhibited by a stopper 10.

A hole for locking the umbrella in its opened state

needs only to be provided, if necessary. Where the umbrella is manufactured for use under special conditions, for example, as a golf umbrella, the provision of such a hole in the inner shaft 1a will make the umbrella more stable when it is put up.

In the case of closing the umbrella, however, the control button 7a must be pressed.

Figs. 3A and 3B show other examples of the handle 6a and the auxiliary handle 6b, Fig. 3A depicting the case of using a rod-like auxiliary handle 6b in place of the L-shaped one shown in Figs. 1 and 2 and Fig. 3B the case of using a disc-shaped auxiliary handle 6b.

Figs. 4A and 4B illustrate other specific operative examples of the stopper 10. In Fig. 4A the stopper 10 is mounted on the tip of the outer shaft 1b and operates to block the inner ends of the lateral auxiliary ribs 4a. In Fig. 4B the stopper 10 is disposed in the mounting member 8 and is arranged to prevent downward movement of the inner shaft 1a at the upper end of an elongate groove 11 cut in its upper end portion.

As described above in detail, according to the present invention, the provision of the lateral auxiliary ribs in addition to the auxiliary ribs 4 permits the force of the spring 5 effectively to provide force for spreading out the main ribs 2 when they are slightly opened, and consequently, the umbrella can be opened into a stable state. In addition, since the elastic force of the spring 5 acting on the inner shaft is weak when the main ribs are held closed, the main ribs can easily be opened and closed with one hand.

CLAIMS

1. A one-hand openable and closable umbrella comprising:
 - a double shaft composed of an inner shaft and an outer shaft which are smoothly slidable relative to each other;
 - a required number of main ribs which are pivotally secured at each one end to a mounting member on the tip of the inner shaft at predetermined angular intervals;
 - a required number of auxiliary ribs, inner ends of which are pivotally secured to an upper end portion of the outer shaft at predetermined angular intervals;
 - a required number of lateral auxiliary ribs the outer ends of which pivotally support the required number of main ribs substantially centrally thereof, inner ends of which are pivotally secured to an upper end portion of the inner shaft, and which are pivotally supported at their intermediate portion by outer ends of the required number of auxiliary ribs;
 - a handle mounted on a lower end portion of the outer shaft;
 - an auxiliary handle attached to a lower end portion of the inner shaft;
 - a spring for providing an elastic force between the outer shaft and the inner shaft in a direction to cause the upper end portion of the outer shaft to approach to the upper end of the inner shaft;
 - an unlockable locking mechanism which temporarily inhibits the relative sliding movement of the outer shaft and the inner shaft in a first state in which the main ribs have been folded through the action of the auxiliary ribs by moving



the handle toward the auxiliary handle against the elastic force of the spring; and

a stopper which temporarily inhibits the relative sliding movement of the outer shaft and the inner shaft in a second state in which the elastic force of the spring has been reduced by moving the handle away from the auxiliary handle to spread out the main ribs through the action of the auxiliary ribs.

2. An umbrella according to claim 1, in which the stopper is mounted on the tip of the outer shaft so as to block the inner ends of the lateral auxiliary ribs.

3. An umbrella according to claim 1, in which the stopper is disposed in the mounting member at the tip of the inner shaft to prevent downward movement of the inner shaft.

4. A one-hand openable and closable umbrella substantially herein described with reference to Figures 1 and 2, with or without reference to any of Figures 3A, 3B, 4A and 4B of the accompanying drawings.

