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(54) SHORTENABLE UMBRELLA FRAME

(71) We, BREMSHEY A.G., a German company of 5—7 Ahrstrasse, 565 Solingen-Ohligs, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a shortenable umbrella frame having a telescopic stick with a crown at the upper end of the stick, shortenable ribs extending from the crown for supporting a covering when the frame is open, main struts pivotally interconnected between a main slider which slides along the stick and the ribs, and auxiliary struts pivotally interconnected between an auxiliary slider, which slides along the stick between the main slider and the crown, and the main struts.

When a shortenable umbrella having this kind of frame is closed and shortened, a mushroom of the covering material forms adjacent to the crown and this mushroom must be evenly spread and folded down to enable the umbrella to be pushed smoothly into its case. In some previous frames, so-called "mushroom spreaders" have been provided to spread the mushroom of covering material but they have not been entirely satisfactory.

For example, in one known umbrella frame, mushroom spreaders are provided in the form of loops of springy flexible wire which extend from the crown in axial planes of the stick, the elements lying between the rib sections and the covering material. This construction is expensive and assembly is difficult and as the loop-shaped elements are rather wide, a bulky mushroom is formed and the diameter of the closed and shortened umbrella is unacceptably large. As a result the enlarged diameter of the closed umbrella adjacent to the crown makes it difficult to deposit the umbrella in an umbrella stand. The elements also keep the covering under permanent tension when the umbrella is closed

which is undesirable. Finally the spreading effect of the elements is also transmitted to the ribs so that a closed but non-shortened umbrella can easily be pushed accidentally into the half-open position which can cause damage to the covering.

According to the present invention a shortenable umbrella frame has a telescopic stick with a crown at the upper end of the stick, shortenable ribs extending from the crown for supporting a covering when the frame is open, main struts pivotally interconnected between a main slider which slides along the stick and the ribs, auxiliary struts pivotally interconnected between an auxiliary slider, which slides along the stick between the main slider and the crown, and the main struts, and spreader elements each extending between the crown and the auxiliary slider and being formed in two sections connected end to end at a knee joint such that when the auxiliary slider approaches the crown the elements deflect so that the knee joints move radially away from the stick and when the auxiliary slider is at its point of nearest approach to the crown each knee joint is substantially closed and the spreader elements can fold downwards alongside the stick with the knee joints remote from the crown, whereby in use when the frame is covered to form an umbrella and the umbrella is closed and being shortened the spreader elements spread a mushroom of the covering material adjacent to the crown.

With this construction the spreader elements automatically and evenly spread the mushroom of covering material as the auxiliary slider approaches the crown upon shortening of the closed umbrella. The spreader elements do not, however, otherwise interfere with the opening and closing movements of the frame parts.

When the frame is extended but closed the spreader elements preferably extend alongside the stick between the struts and ribs where they are out of the way and neither interfere with the use of the

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umbrella, nor tension the covering material.

The sections of each spreader element may be formed integrally with one another from plastics material, the knee joint being formed by a flexible film hinge.

The spreader elements may be angularly offset around the stick so that each element is located between a respective pair of adjacent ribs so that they nest between the ribs when the frame is closed and shortened so that the elements do not provide any significant increase in the overall cross-section of the frame when closed and shortened so that an umbrella incorporating the frame may be comparatively slim for easy insertion crown first into a case.

In order additionally to minimise the bulk of the spreader elements when the frame is closed and shortened, the sections of each spreader element preferably nest in one another when the element is folded downwards alongside the stick.

In order to ensure that the extended spreader elements do not act in compression to make shortening of the closed frame more difficult, each spreader element is preferably bowed away from the stick when the frame is closed but extended. When the closed frame is then shortened the spreader elements naturally bend their knee joints easily.

Each spreader element may be attached at one end to a collar of the crown and at the other end to a collar of the auxiliary slider. Alternatively, the spreader elements may be formed from individual sections of a longitudinally split tube, the tube sections being integral with end rings of the tube which are mounted around the stick with one abutting the crown and one abutting the auxiliary slider. In this way the spreader elements may be formed integrally with one another from a longitudinally split tube.

An example of an umbrella incorporating a frame in accordance with the invention is illustrated in the accompanying drawings, in which:—

Figure 1 is a diagrammatic side view showing the frame open;

Figure 2 shows the umbrella closed;

Figure 3 is a side elevation showing the frame retracted;

Figure 4 is a side elevation showing the frame partly closed but extended;

Figure 5 is a diagrammatic plan of the frame;

Figure 6 is a perspective view of a slit tube from which the mushroom spreading elements may be formed; and,

Figure 7 is a detailed perspective view showing the manner in which the mushroom spreading elements of Figures 3 and 4 nest when folded.

In the illustrated example, the frame has a stick 1 which consists of two tubular stick

parts 2 and 3 that can be telescoped together. The tube 2 has a circular cross-section and the tube 3 a multi-sided cross-section. In the area of a notch 4 which secures the two stick parts in elongated position, the tube 2 has a cross-section similar to that of the tube 3; the latter carries an umbrella handle 5 at its lower end.

The upper end of the stick 1 is fitted with a crown 6. On this crown, ribs 7 are fixed with uniform angular distribution about the crown. Each rib 7 consists of an inner section 7a and an outer section 7b. As far as the opening and closing movements of the ribs are concerned, the umbrella has the features of a conventional so-called "two part" telescopic umbrella frame. Thus each rib 7 is shortened after the frame has been closed, by telescopic action of the rib sections 7a and 7b. For this purpose the inner rib section 7a has a U-shaped cross-section. In this runs the corresponding outer rib section 7b which is preferably manufactured from steel wire. A bracket 42 is fixed to the inner end of each outer rib section 7b and provides a pivotal connection 41 to the end of a corresponding main strut 25. The bracket 42 slides on the inner rib section 7a. Each main strut 25 is pivoted at its other end to a common main slider 24 which slides on the stick. The pivotal connections between the main struts and the main slider 24 may be made by means of a conventional binding ring. Between the main slider 24 and the crown 6, there also slides on the stick an auxiliary slider 27. Auxiliary struts 29 are each pivoted at one end, by means of a conventional binding ring, to the auxiliary slider 27, and at its other end to a corresponding one of the main struts 25 at a point 30. The movement of each bracket 42 relatively to the corresponding inner rib section 7a is restricted by a collar 43 at the outer end of the section 7a.

The covering 20 of the umbrella is tied to the crown 6, and sewn to a loop 44 of each bracket 42, and to the outer ends 23' of the outer rib section 7b.

When closed the frame can be shortened to substantially half the length of the stick owing to the telescopic nature of the stick parts and rib sections. The frame is opened by pulling the crown away from the stick to extend the frame, and then starting substantially from the Figure 4 position, pushing the main slider 24 up the stick away from the handle until the Figure 1 position is reached, that open position being held by engagement of a spring nose of the main slider 24 in a complementary notch in the stick. The umbrella is closed and shortened by reversing these steps.

In conventional fashion when the umbrella is closed and shortened, a mush-

room of the covering material occurs around the crown and a problem normally arises in manually distributing this mushroom around the crown evenly and folding it down around the underlying covering material. The frame of the illustrated umbrella is provided with an equally angularly spaced array of elements 46 which form a mushroom spreading system to mitigate this problem.

The elements 46 extend between the crown 6 and the auxiliary slider 27. The elements are made of resilient material, preferably a plastics material, and have adjacent to their mid-point a knee joint 12¹¹ formed by a flexible film hinge. When the auxiliary slider 27 and the crown 6 approach one another, the sections 46¹ and 46¹¹ on each side of the knee joint of each element deflect at the knee joint and project radially outwards from the stick.

In the extended position shown in Figure 4, the elements 46 each bulge slightly outwards and when the frame is shortened, the spreader elements 46 deflect outwards with an ever-decreasing internal angle α at their knee joints until they extend substantially perpendicularly to the stick axis $y-y$. As they deflect outwards in this way, they cause the covering material between the crown 6 and the brackets 42 to bulge outwards in an evenly spread mushroom. When the retraction of the frame is complete, the spreader elements 46 with the mushroom of covering material are able to pivot downwards in the direction of the arrow z in Figure 3 to lie compactly over the underlying covering material. The umbrella can then readily be pushed crown first into a case.

If the spreader element section 46¹¹ is slightly shorter than the spreader element section 46¹, the folding down of the spreader elements may occur automatically at the very end of the frame shortening movement.

At their upper ends the spreader elements 46 extend from a collar 47 of the crown 6 and at their lower ends they extend from a collar 48 of the auxiliary slider 27. The connection between the spreader elements and the crown and auxiliary slider may be direct as shown in Figures 3 and 4, or it can be provided by means of a ring 49 in each case which is integrally connected with the spreader elements as shown in Figure 6. In the latter case, the elements and rings may be provided by a tube R formed with longitudinal slits 50 which divide the tube wall into sections 51 forming the individual spreader elements 46. The axially slit tube R can be manufactured by a plastics spray method.

Upon assembly the tube R is mounted between the auxiliary slider 27 and crown

6 around the stick 1. When the rings 49 are stressed upon movement of the auxiliary slider 27 towards the crown, the wall sections 51 which are transversely curved and therefore can bend only outwards, spread outwards as described with reference to Figures 1 to 4. The point of bending, that is the position of the knee joint, can be determined by means of an annular groove in the wall of the tube R, this being indicated in dot-dash lines on one of the elements in Figure 6.

To achieve the closest possible approach between the collars 47 and 48 in Figures 3 and 4, or between the two rings 49 in Figure 6, and therefore the maximum reduction in frame length, the pivotal joints at the ends of the spreader elements are preferably formed by flexible film hinges at points where plastics material from which the elements are made has a reduced section. These are indicated at 52 in Figure 4.

As shown in Figure 5, the spreader elements 46 extend in each case midway in the angle β between the ribs 7. As the elements have a relatively small width B, and as the sections 46¹ and 46¹¹ deflect in axial planes of the stick, the spreader elements are not bulky and interfere to a minimum extent with the actions of the ribs and rib supporting system.

In order to strengthen the spreader elements against bending, but to maintain the desirable minimum diameter when the frame is closed and shortened, the element sections 46¹ and 46¹¹ may be provided with a substantially U-shaped cross-section allowing them to nest into each other. In the extended position the U-openings face in opposite directions as shown in Figure 4. However, when the knee joint is closed as shown in Figure 7, the divergent flanges 53 and 54 of the U's nest with one another and provide an automatic centring as the nesting takes place. The divergent flanges also avoid any jamming upon deflection of the element sections out of one another. As shown in Figure 7 the flanges of the U's are not present at the knee joint 12¹¹ so as not to impede the hinge action at the joint.

WHAT WE CLAIM IS:—

1. A shortenable umbrella frame having a telescopic stick with a crown at the upper end of the stick, shortenable ribs extending from the crown for supporting a covering when the frame is open, main struts pivotally interconnected between a main slider which slides along the stick and the ribs, auxiliary struts pivotally interconnected between an auxiliary slider, which slides along the stick between the main slider and the crown, and the main struts, and spreader elements each extending between the crown and the auxiliary slider and being formed

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- in two sections connected end to end at a knee joint such that when the auxiliary slider approaches the crown the elements deflect so that the knee joints move radially away from the stick and when the auxiliary slider is at its point of nearest approach to the crown each knee joint is substantially closed and the spreader elements can fold downwards alongside the stick with the knee joints remote from the crown, whereby in use when the frame is covered to form an umbrella and the umbrella is closed and being shortened the spreader elements spread a mushroom of the covering material adjacent to the crown.
2. A frame according to claim 1, in which the sections of each spreader element are formed integrally with one another from plastics material and the knee joint is formed by a flexible film hinge.
3. A frame according to claim 1 or claim 2, in which the spreader elements are angularly offset around the stick so that each element is located between a respective pair of adjacent ribs.
4. A frame according to any one of the preceding claims, in which the sections of each spreader element nest in one another when the element is folded downwards alongside the stick.
5. A frame according to any one of the

preceding claims, in which each spreader element is bowed away from the stick when the frame is closed but extended.

6. A frame according to any one of the preceding claims, in which each spreader element is attached at one end to a collar of the crown and at the other end to a collar of the auxiliary slider.

7. A frame according to any one of claims 1 to 3, in which the spreader elements are formed from individual sections of a longitudinally split tube, the tube sections being integral with end rings of the tube which are mounted around the stick with one abutting the crown and one abutting the auxiliary slider.

8. A frame according to claim 1, substantially as described with reference to Figures 1 to 5 and Figure 7 of the accompanying drawings, or to Figures 1 to 5 as modified in accordance with Figure 6 of the accompanying drawings.

9. An umbrella comprising a frame according to any one of the preceding claims with covering material attached to the crown and ribs.

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