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(54) SHORTENABLE UMBRELLA FRAME

(71) We, BREMSHEY AG., 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 and a multi-section rib system extending from the crown for supporting a covering when the frame is open, the rib system being supported by a supporting system comprising main struts connected to a slider which slides along the stick and auxiliary struts pivotally interconnected between a mounting, usually an auxiliary slider, on the stick 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, and a rib system extending from the crown for supporting a covering when the frame is open, the rib system being formed by inner rib sections and outer rib sections of which the movements of the outer rib sections upon opening and closing of the frame are determined solely by a supporting system comprising main struts pivotally interconnected between a slider which slides along the stick and the outer rib sections, auxiliary struts pivotally interconnected between a mounting on the stick and the main struts, and links pivotally interconnecting the auxiliary struts with the outer rib sections, whereby the links form with parts of the main and auxiliary struts and parts of the outer rib sections parallelogram linkages; the inner rib sections bridging between the inner ends of the outer rib sections and the crown and themselves being formed by inner and outer parts pivotally connected end to end with the inner ends of the inner parts pivotally connected to the crown and the outer ends of the outer parts pivotally connected to the inner ends of the outer rib sections, the arrangement being such that when the frame is closed but extended the inner and outer rib sections lie alongside the stick but when the frame is thereafter being shortened the inner and outer parts of the inner rib sections fold relatively to one another to form radially outwardly projecting knee joints at their pivotal interconnections with one another for spreading a mushroom of the covering material adjacent to the crown, the inner rib sections being folded and lying alongside the stick with the knee joints re-

mote from the crown in the completely closed and shortened state of the frame.

This new construction has the advantage that the inner rib sections, which are in any case provided for supporting the covering material when the umbrella is open, also act as the mushroom spreading elements and consequently no extra mushroom spreading elements in addition to the inner rib sections are required. The resulting closed and shortened umbrella is therefore acceptably slim. As the inner rib sections do not sensibly contribute to the closing movements of the outer rib sections, they can be designed solely with the mushroom spreading effect in view as that is their only function during the closing and shortening of the umbrella: thus the spreading of the mushroom can be produced without the covering material being subjected to excessive tension which might damage the covering material.

The inner and outer parts of the inner rib sections preferably have substantially the same length although if the inner parts of the inner rib sections are slightly longer than the outer parts of the inner rib sections, the inner rib sections and the mushroom of covering material which, in use, they have spread, will naturally and automatically fold down parallel to the stick axis as the shortening movement of the closed umbrella is completed.

The outer ends of the inner rib sections are preferably pivotally connected to brackets rigidly fixed to the inner ends of the outer rib sections, the brackets also providing the pivotal connections of the outer rib sections to the main struts and to the links. Each bracket then provides a rigid end to the corresponding parallelogram linkage which determines the movement of the outer rib sections.

Each bracket may be arranged to receive the end for attaching the covering material to the frame. If arrangement is also made for a further thread for attaching the covering material to the frame to be received adjacent to each joint between the inner and outer parts of the inner rib sections, as well, of course, as being connected at the crown, the covering material will be automatically folded down during the closing and shortening of the umbrella frame.

In the simplest construction, there will be one respective inner rib section, formed by one inner and one outer part, bridging between each outer rib section and the crown, the inner and outer rib sections lying substantially in the same radial plane.

The inner and outer parts of each inner rib section are preferably formed integrally with one another from a material which bends to provide the pivotal interconnection between the inner and outer parts. For example, each inner rib section may be made of a plastics material and the pivotal interconnection may be provided by a flexible film hinge.

In an alternative construction there are an equal number of inner parts of the inner rib sections and outer rib sections and for each inner part of the inner rib sections there are two of the outer parts extending in V-shaped fashion from the outer end of the inner part one to the inner end of each of an adjacent pair of the outer rib sections whereby the inner end of each outer rib section is connected by a respective pair of outer parts of the inner rib sections to an adjacent pair of the inner parts. This is an extremely space saving construction as the outer rib sections are angularly offset between the inner rib sections and will lie between them when the frame is completely closed and shortened.

The two parts of the pair of outer parts of the inner rib sections which meet at each corresponding one of the outer rib sections may be formed integrally with one another. Each integral pair of outer parts may be made of resilient material moulded so that the pair naturally form a V-shape with one another. Since the V will be resiliently closed when the frame is shortened, the resilience of the V, tending to open, will assist in the unfolding of the umbrella frame.

Some examples of umbrellas having frames constructed in accordance with the present invention will now be described with reference to the accompanying drawings, in which:—

Figure 1 shows schematically a first example of frame in open position;

Figure 2 is a side view showing the Figure 1 frame is extended, but closed position;

Figure 3 shows the Figure 1 frame in shortened position;

Figure 4 shows the Figure 1 frame with a cover attached illustrating the mushroom-spreading;

Figure 5 shows the Figure 1 frame being closed or opened;

Figure 6 shows the Figure 1 frame in open position;

Figure 7 shows a second example of frame in the extended closed position;

Figure 8 shows the Figure 7 frame in the shortened state;

Figure 9 shows the Figure 7 frame during closing or opening;

Figure 10 is a section in the area of the joint nearest the crown of one element of this second example;

Figure 11 shows in detail the closely packed elements of this second example illustrating the knee;

Figure 12 shows the Figure 7 frame in open position;

Figure 12a shows a third variant of the element construction viewed from above;

Figure 12b shows this third type folded;

Figure 13 is a view from above of a fourth example;

Figure 14 shows the fourth example during

closing or opening illustrating the developing mushroom;

Figure 15 shows the fourth frame and illustrates the developing mushroom shortly before folding of the elements; and

Figure 16 shows one of the brackets used in the fourth example.

In each 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 has a crown 6. On this crown, ribs 7 are fixed with a uniform angular distribution about the crown. The ribs 7 consist of sections 7a and 7b, the inner sections 7a which are nearest the crown being divided into two parts T1 and T2 spanning from the crown 6 to brackets 14 from which extend the outer sections 7b.

The two parts T1 and T2 are of about the same length but, for reasons which are given in greater detail later in the description, the part T1 is very slightly the longer of the two.

The part T1 nearest the crown which, in the first example (Figures 1 to 6) is manufactured from steel wire, is fixed on a crown binding ring 8 at a joint 9 and is bent, near this joint, at 10. A second bend 11 is to be found at the other end of part T1. The outermost part of T1 extends for about half its length into the U-shaped section of the part T2 and it is connected to this part by a pivot pin 12. The section 13 of part T2 extends inwardly past the pin 12, so that when the parts T1 and T2 are in their extended position they cannot fold too far in the direction of arrow x in Figure 6.

The outer end of each rib section 7a, more precisely the outer end of part T2, is attached by a pivot pin 17 to the bracket 14 which is rigidly attached to the outer rib section 7b. These brackets are U-shaped in cross-section and extend over the inner end of the corresponding rib sections 7b and at the same time form pivotal joints 15 and 16 for the support strut system S which supports the ribs 7 and controls their folding action.

The end of part T2 nearest the pivot joint 17 has a bend 18 constructed in such a way that the closed part of the U-sectioned rib abuts the sides 19 of the bracket 14 and also in such a way that the parts T1 and T2 reach a locked position when the umbrella is open.

The three pivotal joints 15, 16 and 17 form a triangle with corners I, II and III. When the frame is open the major part of T2 extends along a line passing through pivotal joints 15 and 16. Because of the bend 18, the

rib section part T2 forms an obtuse angle which is open towards the outside.

The covering 20 of the umbrella (see Figure 4) is tied to the umbrella crown 6, and, in addition, is secured to the bracket 14 which is narrower in its midline so that the sewn loop 21 is safely prevented from being pushed off. Between these two securing points the covering 20 is tied near the pivotal joint 12 by a sewn loop 22 which is tied at the bend 11. Finally the covering 20 is secured at the ends 23 of the outer rib sections 7b.

At each pivot 16 on the bracket 14, a main strut 25 leading to a common main slider 24, is attached as part of the supporting system. The strut 25 is attached to the main slider by the usual binding ring 26.

An auxiliary slider 27 also slides on the stick 1, and auxiliary struts 29 are connected to a binding ring 28 on the auxiliary slider, and are pivotally connected with the main struts 25 at points 30. The pivotal joint 30 is situated at about the middle of this main strut 25.

From the pivot 15 on the bracket 14 a stay 31, which is bent slightly at point 32, extends substantially parallel to the main strut 25. The other end of the stay 31 is pivoted to the corresponding auxiliary strut at a point 33 which is at a distance from the joint 30 substantially corresponding to the distance between the two joints 15 and 16 of the bracket 14. The stay is manufactured from steel wire. The end sections of the stay at the point joints are flattened and punched to form bearing eyelets. The auxiliary strut 29 has a U-profile in section so that the stay 31 dips at least partly into the U-shaped section of this strut when the umbrella frame is closed (see Figure 3). The stay 31 and a section of the main strut 25 form the longer guides, the bracket 14 and a section of the auxiliary strut 29 the shorter guides of a parallelogram linkage P which stabilises the cover and controls the opening and closing movements of the outer rib section 7b, substantially irrespective of the inner rib sections 7a.

The outer rib section 7b is rigidly connected to the bracket 14. The bracket forms a case 34 which closely fits around the outer rib section. The end of the rib section 7b which dips into the U-space of the bracket 14 is then tied by a dimple 35 in the sides 19 of this U-profile part of the bracket.

Between the main slider 24 and auxiliary slider 27 a brake casing 36 is arranged whose position on the umbrella stick is difficult to move.

The two parts T1 and T2 of the element 7a (particularly because of the fact that this section continues like a bridge from the crown 6 to the beginning of rib 7b without attachment of a guide) could alternatively, as shown in the second example, Figures 7 to 12, be

manufactured in the form of a single-piece Sch, made of plastics. This has a substantially U-shaped cross-sectional construction. During extension the U-openings, see Figure 7, point in opposite directions, in such a way that when the parts T1 and T2 are in a parallel position as illustrated in Figure 11, they are closely nested in each other to save space. The way in which the sides of the substantially U-profile run clearly in a divergent manner there, encourages a certain automatic centering and also prevents any jamming action which would hinder opening. The knee joint 12' is obtained by cutting the relatively high U-sides back to the bridge, which means that this non-reinforced sections permits the necessary bending. The slightly curved length of the parts T1 and T2 which here are single-piece, guarantees an automatic locking of these parts when the cover is closed and when the sliders are shifted, so that these parts fold outwards in the desired manner. The joints nearest the crown are also obtained by cutting the U-profile sides there back to the bridge.

To close the umbrella, the usual catch 37 of the main slider 24 has to be disengaged; the catch ensures that the umbrella stays open, by interlocking with the umbrella stick 1. After the catch has been released from the notch Ra (see Figure 2) the main slider 24 can be moved in the direction of the handle 5. While with this movement the supporting system S approaches the stick 1, partly folding in the process, the auxiliary slider 27 is at first prevented by the brake casing 36 from immediately travelling in the direction of the umbrella handle 5. This encourages the preferential closure of the system S. During this movement the part 1 of the inner rib section 7a nearest the crown lifts up (see Figure 5). This keeps the covering in that area away from the supporting system so that it cannot be jammed in it. With increasing movement of the main strut 25 and the secondary strut 29, the partly unfolded position illustrated in Figure 2 and Figure 7 is achieved in which the radially projecting folds of the covering can dry off after the rain is required, if there is no room to open the umbrella in the usual way. In this position the two parts T1 and T2 have come parallel to each other almost to an extended position, that is, they assume a position which spreads the covering away from the umbrella stick, and this advantageous curved position also prevents any self-locking.

To close the umbrella, all that is required to push the main slider in the direction of the umbrella crown 6, is to treat it like any shortenable umbrella, i.e. to hold the handle end of the umbrella in one hand and to push the crown 6 with the other hand in the direction of the handle 5, thus shortening the umbrella. At the same time the partly folded supporting system also travels in the direction of the crown 6, taking the bulk of the cover-

ing with it. At that time the two parts T1 and T2 of the inner rib section 7a also fold into an outwardly projecting position, of which one intermediate position, at which they form an angle α , is shown in Figures 4 and 9. The section of covering between the tying point nearest the crown and the loop 21 automatically spreads out into a mushroom head shape P1. It can be seen that the joint 12, (or 12' in the Figure 7 example), forms the vertex of the angle α between the parts T1 and T2. A further shift of the crown in the direction of the main slider 24 results in a further advance, or change in height, respectively, of the outside joint 17 in relation to the crown 6.

As the part T2 is of slightly shorter construction than the adjacent part T1, the part T2 is pulled from the position of Figures 4 or 9 into a folded position according to Figure 3 or Figure 8. This is the final closed position. In this position the parts T1 and T2 themselves assume a space-saving, closely packed, folded, adjacent position. (In the case of the version shown in Figures 13 to 16, a laterally adjacent position of these parts is actually achieved).

The version shown in Figure 12a and Figure 12b illustrates well how parts T1 and T2 can be partly folded with the maximum economy of space, by attaching the rib parts T1 and T2 to the side of the bracket 14. The closely packed parcel of the parts T1 and T2 then comes to lie to the side of the bracket 14 and struts (see Figure 12b). In this example, to form the pivot point 17, to which is also attached the stay 31, the U-bridge 60 of the element part T2 has been cut back, see Figure 12a, so that freely protruding U-side flanges 61 are obtained. These latter are cranked in a way which makes them lie flat against each other and, furthermore, adopt a laterally raised position relatively to the side edge of the element part T2 which faces the rib 7b. This results in a free space between the inner rib section 7a nearest the crown and the outer rib section 7b, facilitating a corrugated and tidy storage of the section of covering which has been folded under during the formation of the mushroom, avoiding any damage to the material. The ends of the flanges 61 are chamfered on the side which will engage the covering material.

The bend 10 of the part T1 in the Figures 1 to 6 example lies above the bracket 14 in the closed position, so that a bridge like transition is achieved between the crown 6 and the adjacent frame parts. This also makes the application of a relatively tight case quite easy. The section 14 of part T2 (see Figure 4) which juts out is rounded off. A similar rounding off is found on part T1 of the Figures 7 to 12 example.

In the shortened position (see Figures 3 and 8) the main slider 24 together with the end section (nearest the guide) of the main strut

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25 dips into the pot-shaped umbrella handle. The rib ends arrange themselves against a skirt 38 of the handles 5 and are held together there by the usual band which is not illustrated.

5 The opening of the umbrella occurs mainly in the reverse order. First of all the position as in Figure 2 is produced. Then follows the upward shift of the main slider 24 during
10 which the ribs 7b are pushed lightly away from the shaft by hand if the umbrella does not possess a so-called opening aid, for example in that the auxiliary slider is stopped for a short time in its movement on the stick
15 when the cover is being opened.

The auxiliary struts 29 can also be firmly attached to the frame by joints near the crown, instead of to a mobile auxiliary slider 27.

20 The version according to Figures 13 to 16 is an umbrella of essentially similar construction to the previously described examples. The same reference numerals have therefore been used where applicable, and where needed
25 for comprehension. In this version, however, the outer rib sections 7b are now angularly offset between the parts T1 of the inner rib sections 7a and are connected to them by the parts T2 which run in a fork shape from the parts T1 (see Figure 13). This causes adjacent parts T2, one from each of two adjacent parts T1, to meet in a joint 17.

30 Two adjacent parts T1 and two adjacent parts T2 together form the outline of a lozenge-shaped "area" F. This area F, in view of the curvature of the cover, is also curved at least longitudinally. As shown in Figure 13, there results a star-shaped supporting framework for the covering 20 which extends into
35 the middle area of the ribs, and which is evenly distributed, that is, it partly lies in the angles between the outer rib sections. The attachment of the parts T1 to the crown is again via binding ring 8. The parts T1 nearest the crown, made in this version from flat material, also have bends 10 and 11. They can be made from resilient plastics. The same applies to the parts T2. The latter are connected with the elements T1 via pivotal joints
40 12. The parts T2 form forks G1 which are attached at their outer ends to the bracket 14. From the bracket 14 also extends the outer rib sections 7b. For the sake of expediency, two adjacent elements T2 may be combined as an integral piece G2 (see Figure 16).

45 The brackets 14 remain essentially the same as those in the previous versions. Only the joint 17 has been shifted slightly outwards. Also, the bridge of the U-shaped bracket is partly slit at the end opposite the case 34 which is formed by turning in the U-sides 19, so that together with the sides 19 and the U-bridge, broad flat areas 40 are obtained which have the bearing eyelets for the joint
50 17. These broad areas facilitate the folding

down of the pair of parts T2 against the outer rib section 7b in such a way that these two parts T2 lie next to each other at least for part of the length, by which a space-saving folding-down position is achieved. Further, because the two fork-forming parts T2 are naturally splayed in the area of the joint 17, the Figure 15 position of these parts is facilitated when the frame is shortened after being closed.

70 The closing process is the same as was explained in detail for the first version, but with the difference that the parts T1 and T2 come to lie side by side. The brackets 14 dip into the angle spaces between the first parts T1. Equally, the parts T2 with the parts T1
75 dip into the free spaces between the main struts 25, or outer rib sections 7b, respectively. This results in the desired reduction in the diameter of the frame when the umbrella is closed. The mushroom spreading process is very gentle on the covering 20, because in each case a part T1 and two parts T2 form a very obtuse-angled pyramidal shape at first, which changes into the more acute-angled pyramidal form illustrated in Figure 15 only in the final
80 phase of the shortening, that is, when the bulk of the covering is near the crown. The opening of the umbrella takes place essentially in reverse order, with the parts T1 and T2 again lifting away from the stick 1, taking the covering 20 with them, while the main slider is shifted and the open angle towards the stick is formed.

WHAT WE CLAIM IS:—

1. A shortenable umbrella frame having a telescopic stick with a crown at the upper end of the stick, and a rib system extending from the crown for supporting a covering when the frame is open, the rib system being formed by inner rib sections and outer rib sections of which the movements of the outer rib sections upon opening and closing of the frame are determined solely by a supporting system comprising main struts pivotally interconnected between a slider which slides along the stick and the outer rib sections, auxiliary struts pivotally interconnected between a mounting on the stick and the main struts, and links pivotally interconnecting the auxiliary struts with the outer rib sections, whereby the links form with parts of the main and auxiliary struts and parts of the outer rib sections parallelogram linkages; the inner rib sections bridging between the inner ends of the outer rib sections and the crown and themselves being formed by inner and outer parts pivotally connected end to end with the inner ends of the inner parts pivotally connected to the crown and the outer ends of the outer parts pivotally connected to the inner ends of the outer rib sections, the arrangement being such that when the frame is closed but extended the inner and outer rib sections lie alongside the stick but when the frame is thereafter being



25 dips into the pot-shaped umbrella handle. The rib ends arrange themselves against a skirt 38 of the handles 5 and are held together there by the usual band which is not illustrated.

The opening of the umbrella occurs mainly in the reverse order. First of all the position as in Figure 2 is produced. Then follows the upward shift of the main slider 24 during which the ribs 7b are pushed lightly away from the shaft by hand if the umbrella does not possess a so-called opening aid, for example in that the auxiliary slider is stopped for a short time in its movement on the stick when the cover is being opened.

The auxiliary struts 29 can also be firmly attached to the frame by joints near the crown, instead of to a mobile auxiliary slider 27.

The version according to Figures 13 to 16 is an umbrella of essentially similar construction to the previously described examples. The same reference numerals have therefore been used where applicable, and where needed for comprehension. In this version, however, the outer rib sections 7b are now angularly offset between the parts T1 of the inner rib sections 7a and are connected to them by the parts T2 which run in a fork shape from the parts T1 (see Figure 13). This causes adjacent parts T2, one from each of two adjacent parts T1, to meet in a joint 17.

Two adjacent parts T1 and two adjacent parts T2 together form the outline of a lozenge-shaped "area" F. This area F, in view of the curvature of the cover, is also curved at least longitudinally. As shown in Figure 13, there results a star-shaped supporting framework for the covering 20 which extends into the middle area of the ribs, and which is evenly distributed, that is, it partly lies in the angles between the outer rib sections. The attachment of the parts T1 to the crown is again via binding ring 8. The parts T1 nearest the crown, made in this version from flat material, also have bends 10 and 11. They can be made from resilient plastics. The same applies to the parts T2. The latter are connected with the elements T1 via pivotal joints 12. The parts T2 form forks G1 which are attached at their outer ends to the bracket 14. From the bracket 14 also extends the outer rib sections 7b. For the sake of expediency, two adjacent elements T2 may be combined as an integral piece G2 (see Figure 16).

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down of the pair of parts T2 against the outer rib section 7b in such a way that these two parts T2 lie next to each other at least for part of the length, by which a space-saving folding-down position is achieved. Further, because the two fork-forming parts T2 are naturally splayed in the area of the joint 17, the Figure 15 position of these parts is facilitated when the frame is shortened after being closed.

The closing process is the same as was explained in detail for the first version, but with the difference that the parts T1 and T2 come to lie side by side. The brackets 14 dip into the angle spaces between the first parts T1. Equally, the parts T2 with the parts T1 dip into the free spaces between the main struts 25, or outer rib sections 7b, respectively. This results in the desired reduction in the diameter of the frame when the umbrella is closed. The mushroom spreading process is very gentle on the covering 20, because in each case a part T1 and two parts T2 form a very obtuse-angled pyramidal shape at first, which changes into the more acute-angled pyramidal form illustrated in Figure 15 only in the final phase of the shortening, that is, when the bulk of the covering is near the crown. The opening of the umbrella takes place essentially in reverse order, with the parts T1 and T2 again lifting away from the stick 1, taking the covering 20 with them, while the main slider is shifted and the open angle towards the stick is formed.

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1. A shortenable umbrella frame having a telescopic stick with a crown at the upper end of the stick, and a rib system extending from the crown for supporting a covering when the frame is open, the rib system being formed by inner rib sections and outer rib sections of which the movements of the outer rib sections upon opening and closing of the frame are determined solely by a supporting system comprising main struts pivotally interconnected between a slider which slides along the stick and the outer rib sections, auxiliary struts pivotally interconnected between a mounting on the stick and the main struts, and links pivotally interconnecting the auxiliary struts with the outer rib sections, whereby the links form with parts of the main and auxiliary struts and parts of the outer rib sections parallelogram linkages; the inner rib sections bridging between the inner ends of the outer rib sections and the crown and themselves being formed by inner and outer parts pivotally connected end to end with the inner ends of the inner parts pivotally connected to the crown and the outer ends of the outer parts pivotally connected to the inner ends of the outer rib sections, the arrangement being such that when the frame is closed but extended the inner and outer rib sections lie alongside the stick but when the frame is thereafter being



- shortened the inner and outer parts of the inner rib sections fold relatively to one another to form radially outwardly projecting knee joints at their pivotal interconnections with one another for spreading a mushroom of the covering material adjacent to the crown, the inner rib sections being folded and lying alongside the stick with the knee joints remote from the crown in the completely closed and shortened state of the frame.
2. A frame according to claim 1, in which the mounting for the auxiliary struts is an auxiliary slider which slides on the stick between the main slider and the crown.
3. A frame according to claim 1 or claim 2, in which there is one respective inner rib section, formed by one inner and one outer part, bridging between each outer rib section and the crown, the inner and outer rib section lying substantially in the same radial plane.
4. A frame according to any one of the preceding claims, in which the inner and outer parts of the inner rib sections have substantially the same length.
5. A frame according to any one of claims 1 to 3, in which the inner parts of the inner rib sections are slightly longer than the outer parts of the inner rib sections.
6. A frame according to any one of the preceding claims, in which the outer ends of the inner rib sections are pivotally connected to brackets rigidly fixed to the inner ends of the outer rib sections, the brackets also providing the pivotal connections of the outer rib sections to the main struts and to the links.
7. A frame according to claim 6, in which each bracket is arranged to receive thread for attaching covering material to the frame.
8. A frame according to claim 6 or claim 7, in which the points of pivotal attachment to each bracket for the corresponding inner rib section, main strut, and link, are arranged in a triangular configuration.
9. A frame according to any one of claims 6 to 8, in which the outer parts of the inner rib sections are each bent upwardly, as seen when the frame is open, adjacent to its pivotal connection to the bracket.
10. A frame according to claim 3, in which the inner and outer part of each inner rib section lie adjacent and touching one another when the umbrella is completely closed and shortened.
11. A frame according to claim 3, in which the inner parts of the inner rib sections are each provided adjacent to their pivotal interconnections to the outer parts of the inner rib sections with means for receiving thread for attaching covering material to the frame.
12. A frame according to claim 3, in which the inner and outer parts of each inner rib section are formed integrally with one another from a material which bends to provide the pivotal interconnection between the inner and outer parts.
13. A frame according to any one of claims 1 to 3, in which the inner and outer parts of the inner rib sections lie adjacent corresponding outer rib sections when the frame is completely closed and shortened.
14. A frame according to claim 1 or claim 2, in which there are an equal number of inner parts of the inner rib sections and outer rib sections and for each inner part of the inner rib sections there are two of the outer parts extending in V-shaped fashion from the outer end of the inner part one to the inner end of each of an adjacent pair of the outer rib sections whereby the inner end of each outer rib section is connected by a respective pair of outer parts of the inner rib sections to an adjacent pair of the inner parts.
15. A frame according to claim 14, in which when the frame is completely closed and shortened, a bracket at the inner end of each outer rib section, which bracket provides pivotal attachments for the corresponding outer parts of the inner rib sections, link and main strut, comes to rest between an adjacent pair of the inner parts of the inner rib sections.
16. A frame according to claim 14 or claim 15, in which the pivotal attachment between each of the pairs of outer parts of the inner rib sections and the corresponding outer rib section is provided on a flat portion of a bracket at the inner end of the outer rib section.
17. A frame according to any one of claims 14 to 16, in which the two parts of the pair of outer parts of the inner rib sections which meet at each corresponding one of the outer rib sections are formed integrally with one another.
18. A frame according to claim 17, in which each of the integral pairs of outer parts are made of resilient material and naturally form a V-shape with one another.
19. A frame according to claim 3, in which each outer part of the inner rib sections has a U-shaped cross section and is pivotally attached to the side of a bracket which is fixed to the inner end of a corresponding one of the outer rib sections such that when the frame is completely closed and shortened, the outer parts lie adjacent to the corresponding outer rib sections.
20. A frame according to claim 19, in which the side flanges of the U of each outer part of the inner rib sections are extended beyond the web of the U at the outer end of the part, the extensions being cranked laterally and lying flat against one another and against the side of the bracket at the pivotal connection to the corresponding outer rib section.
21. A frame according to claim 19 or claim 20, in which at the outer end of each outer part of the inner rib sections the flanges of the U are extended beyond the web of the U and the extensions are chamfered on the side

which will engage covering material for the frame.

- 5 22. A frame according to any one of claims 19 to 21, in which each outer rib section is pivotally connected to a corresponding one of the links and a corresponding one of the outer parts of the inner rib sections at a common point.

- 10 23. A frame according to claim 1, substantially as described with reference to any one of the examples illustrated in the accompanying drawings.

24. An umbrella having a frame according to any one of the preceding claims with covering material attached to the rib sections.

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