

June 2, 1964

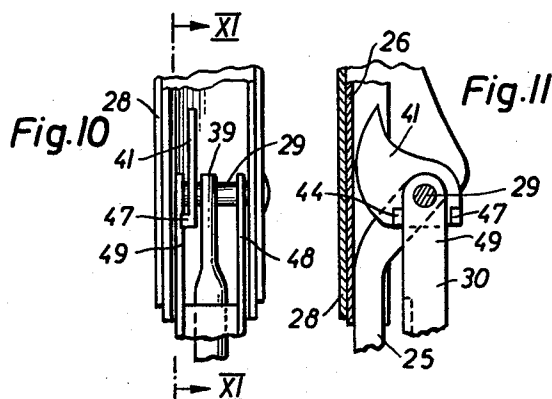
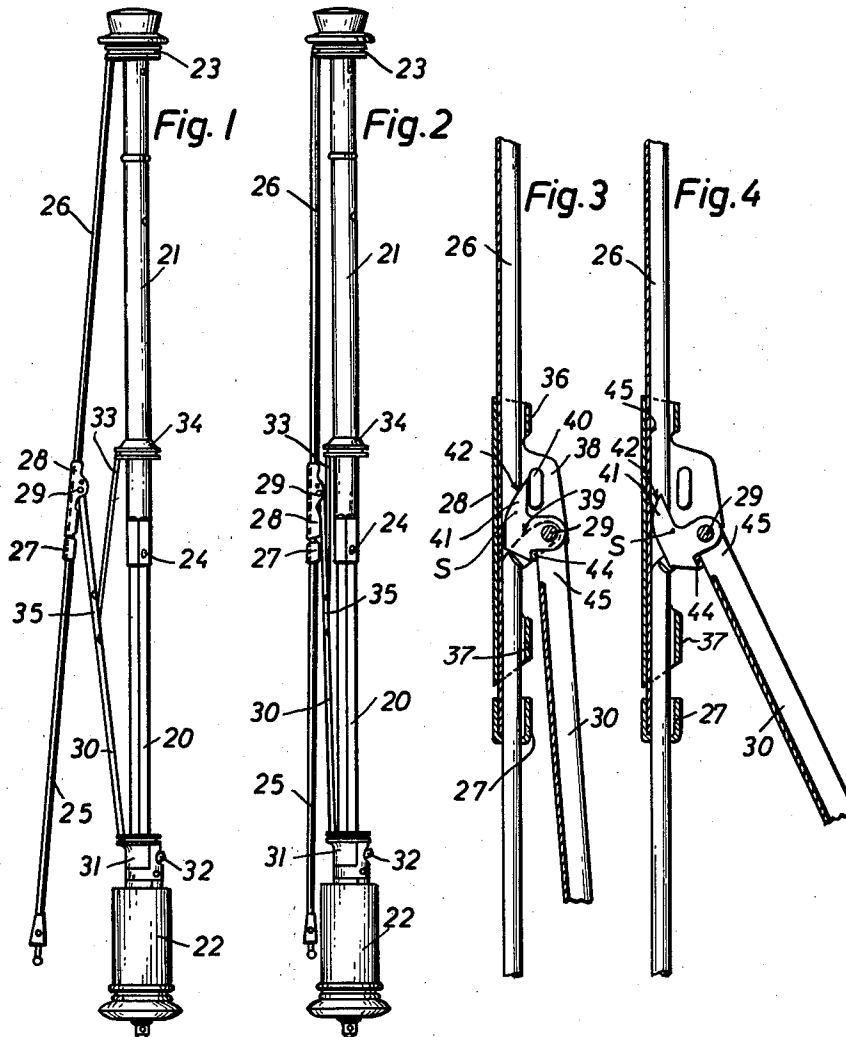
H. WEBER

3,135,276

COLLAPSIBLE UMBRELLAS

Filed March 13, 1961

2 Sheets-Sheet 1



INVENTOR:
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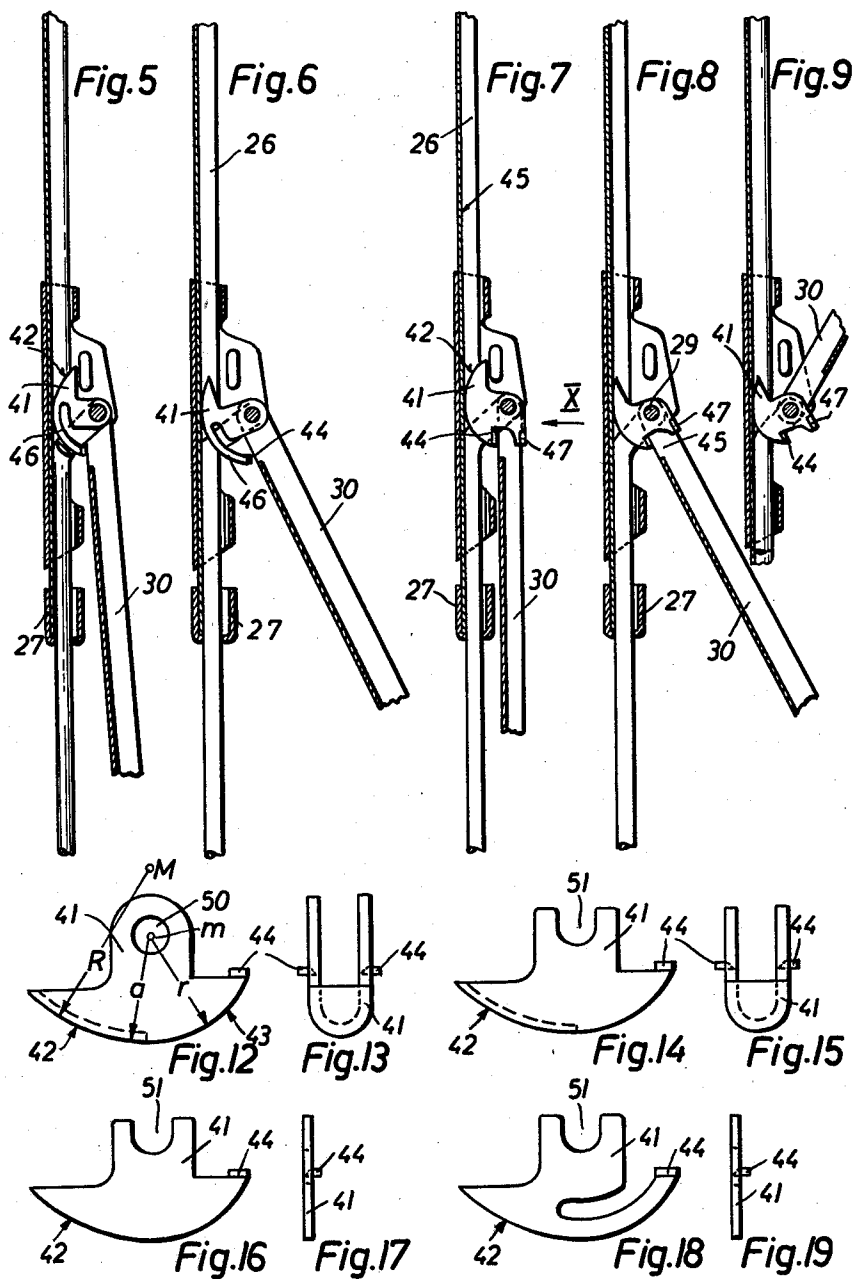
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COLLAPSIBLE UMBRELLAS

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Collapsible umbrellas of the usual construction consist of telescopically interconnected stick or handle parts and rib members, main struts which are pivoted to the inner ends of the outer rib members and to a main slider which is movable along the stick toward and away from the crown, and auxiliary struts which are pivoted to the main struts and to an auxiliary slider which is also movable along the stick. With umbrellas of this kind, it is occasionally observed that the ribs telescope into one another instead of swinging away from the stick when the umbrella canopy is opened.

Numerous devices are known which prevent this undesired collapse of the ribs more or less effectively. Among these devices, for example, is a braking device which is fitted in one or more of the ribs, and is in the form of a wire-spring or leaf-spring which is connected to the outer rib part or to a sleeve which guides it, and has an arm which presses against the inside of the inner tubular rib member. Consequently, a frictional resistance is created which tends to counteract the displacement of the rib members which are equipped with a brake of this kind and assists the opening of the umbrella.

A braking device is also fitted in at least one rib of the umbrella according to the invention. This braking device tends to counteract the relative movement of the rib parts at the beginning of the opening of the umbrella. According to the invention, the braking device consists of an eccentric clamping element which is rotatably mounted on an outer rib member and, when the main strut is at an angle to the rib, places its eccentric surface against the inner rib member, and if the rib members begin to telescope into one another, passes into the clamping position owing to its eccentricity, but is rotated out of its clamping position upon engagement by the main strut when the latter moves into a position parallel to the rib.

An umbrella constructed in accordance with the invention has the advantage that the relative movement of the rib members on shortening or lengthening the frame proceeds without any braking being applied, because the mainstruts are then parallel to the ribs. It has the further advantage that, even when the main struts are at an angle to the ribs, the rib members can spread apart without being braked as is necessary in the last phase of the opening of the umbrella in order to place the cover of the umbrella under the necessary tension in the radial direction.

The umbrella is also of extremely simple construction especially when the pin which connects the mainstrut to the outer rib part is used as the pivot for the eccentric, as is done in the preferred embodiment of the invention.

Gravity can be used to ensure that the eccentric element moves into the clamping position provided it is not prevented from doing so by the main strut. For this purpose, it is sufficient to dispose its center of gravity outside its pivotal axis, so that gravity tends to rotate at least one eccentric into the clamping position when the umbrella is held in a vertically upward or in a horizontal position. The center of gravity of the eccentric element, when the umbrella is held vertically with its crown upwards, then lies between its pivotal axes and the rib member with which it is engageable but is displaced upwardly

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relative to the pivot. With this particularly simple form of the invention two diametrically opposite ribs are preferably provided with eccentrics, because then at least one of these two ribs always forms an angle with the main strut at the beginning of the opening of the umbrella so that the eccentric is effective.

If the action of gravity is not, or not alone, to be used for operating the eccentric, then, according to a further feature of the invention, the eccentric can be provided with a follower with which one arm of the main strut engages when this moves away from the rib until the eccentric is in its clamping position, after which the arm springs resiliently over the follower. This ensures, independently of the way in which the umbrella is held and of where the rib with the eccentric is located, that the braking action takes place and, in general, it is sufficient to provide only a single rib with an eccentric.

A further possibility for ensuring that the eccentric moves into the clamping position independently of gravity would be the arrangement of a spring which tends to turn it into this position.

Owing to the smallness of all parts, the unavoidable inaccuracies in manufacture have a particularly great effect. Thus, for example, if use is to be made only of gravity to bring the eccentric into contact with the inner rib part, it may happen that it does not arrive in this position. This difficulty can be overcome by providing a resilient extension or finger which extends rearwardly the eccentric clamping surface, and bears elastically against the inner rib when the eccentric element is disposed outside the clamping position. This resilient extension can be so weak that it does not noticeably increase the force necessary for displacing the rib parts in one direction or the other.

Some embodiments of the invention are illustrated, by way of example, in the accompanying drawings, in which—

FIGS. 1 and 2 illustrate an umbrella of the above-mentioned kind in the extended position with the cover closed and with the ribs in two different positions respectively;

FIGS. 3 and 4 are longitudinal sections through the middle portion of a rib with its main strut and guiding elements on an enlarged scale illustrating a first embodiment of the invention, with the parts in two different positions;

FIGS. 5 and 6 illustrate a second embodiment in views similar to FIGS. 3 and 4;

FIGS. 7 to 9 illustrate views of a third embodiment similar to those of FIGS. 3 and 4 but with the parts in three different positions;

FIG. 10 is an elevation on a larger scale viewed in the direction of the arrow in FIG. 7;

FIG. 11 is a section on the line XI—XI in FIG. 10, and

FIGS. 12 and 13; 14 and 15; 16 and 17; and 18 and 19 are respectively, side and end elevations of four different forms of clamping eccentrics which can be used.

Referring to the drawings, the umbrella shown in FIGS. 1 and 2 has, as usual, a stick consisting of two telescopic parts 20 and 21, a handle 22 and a crown 23. The parts 20 and 21 are locked by a detent 24 when the parts are in their extended position. The ribs, which are pivoted to the crown 23 of the umbrella, also consist of two telescopic members, namely an outer solid or rod-shaped member 25 and an inner member 26 which is channel-shaped or U-shaped in cross-section and is pivoted to the crown 23 and into the channel of which the part 25 can be pushed. For guiding the parts 25 and 26 there is provided a sleeve 27 which is mounted on and extends around the outer end of the inner member 26 and an elongated sleeve 28 which is connected to the outer rib member 25

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and is movable on the inner member 26. The inner end of the rib member 25, which is bent slightly inwardly, is pivoted by a pin 29 to the outer end of a main strut 30. All the main struts are pivoted to a main slider 31 which can be moved by hand along the stick and can be fixed in its lower and upper end positions by a detent which is mounted on it and is partly visible at 32. For guiding the main struts 30 during the opening of the umbrella and for supporting the opened umbrella cover, auxiliary struts 33 are employed. The struts 33 are all pivoted to an auxiliary slider 34 and each of them is connected at 35 to a main strut 30.

FIG. 1 shows the position which the parts take up at the beginning of the opening movement. Then, at least some of the ribs 25 and 26 always make an acute angle with the axis of the stick, so that the main struts 30 are also at an angle to the ribs associated with them. This is due to the fact that, when the umbrella is held vertically, the fingers of the hand of the person carrying the umbrella, which hold the handle 22 and release the detent 24, enter between the umbrella and the stick and, therefore, push the ribs slightly away from the stick. Alternatively, if the umbrella is held horizontally, the ribs below the stick swing slightly away from the stick owing to their weight. FIG. 2 on the other hand, shows the position which the parts take up when the umbrella is to be collapsed and the ribs are held close to the handle 22 either by the usual rubber band or by the hand, so that the main struts 30 are also parallel to the ribs.

Details of the construction of the middle section of the ribs are illustrated in FIGS. 3 to 11 on a larger scale. In particular, it will be seen from these figures that the sleeve 28 is closed only at its ends 36 and 37, and between the ends has a channel- or U-shaped profile similar to that of the rib part 26. The sleeve 28 therefore has two arms 38 between which the bent end 39 of the rib part 25 projects. Oblong holes 40 are provided in the arms for enabling the umbrella cover, which is not illustrated, to be sewn on.

As shown in FIG. 3 an eccentric clamp 41 which is stamped out of flat material is mounted on the pin 29. This eccentric clamp may also be of the type illustrated on a larger scale in FIGS. 12 and 13. Its clamping surface 42 need not be circular. If it is circular its centre M is displaced relative to the axis of rotation m of the eccentric. The important feature is that its distance from the axis m , which is illustrated by the vector a , increases with clockwise rotation of this vector. Adjoining the right-hand side (e.g. as shown in FIG. 12) of the eccentric surface 42 is a surface 43 which is so shaped that it cannot act as a clamping surface. This surface can be planar (FIG. 3) or may be arcuate and centered on the axis of the pin 29 (FIG. 3). In the latter case, its radius R of the clamping surface 42 is centered on M.

The eccentric clamp 41 has a projection 44 against which one arm of the forked end 45 of the main strut 30 abuts when the main strut, turning clockwise about the pin 29, arrives in the position shown in FIG. 4. When the main strut 30 moves out of this position into the position shown in FIG. 3, it rotates the eccentric 41 out of the position shown in FIG. 4 into the position shown in FIG. 3.

In the position shown in FIG. 4 the clamping surface 42 of the eccentric 41 bears against the inner surface of the rib part 26. The angular position of the main strut 30 corresponds to the condition shown in FIG. 1. If now, in order to open the cover of the umbrella, the main slider 31 is pushed along the stick towards the crown 23, the rib parts 25 and 26 under the action of the pushing force transmitted by the main strut 30 have the tendency to telescope into one another. However, even a slight or incremental displacement in this direction results in a counterclockwise rotation of the eccentric, its clamping surface 42 being in contact with the inner surface of the rib part 26, even in the frictional engagement of the

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clamping eccentric with rib 26 is a minimum. The eccentric, therefore, clamps the rib parts together and prevents any further relative displacement. The opening of the cover of the umbrella is thereby ensured even if only one of the ribs which, at the beginning of the opening movement is at a slight angle to the axis of the stick, is provided with the eccentric clamping means.

The eccentric 41, therefore, owing to its eccentricity prevents relative movement of the rib members 25 and 26 only in one direction. If these parts tend to move apart the eccentric rotates clockwise and its clamping effect is removed. Therefore, the rib parts, which in a practical telescopic umbrella need never be fully drawn-out at the beginning of the opening of the umbrella, are pushed in the last phase of this movement by the main struts 30, the auxiliary struts 33 and the auxiliary slider 34 which bears against the crown 23 as far apart as is necessary to place the material of the cover under radial tension without being hindered by the eccentric 41.

When the main strut 30 is in the position shown in FIG. 3, the rib is approximately parallel, as is illustrated in FIG. 2, and then one arm of its forked end 45 engages the stop 44 and rotates the eccentric 41 into the position shown in FIG. 3 in which it no longer makes contact with the inner surface of the rib member 26. The eccentric can then no longer exert any clamping effect and the umbrella can be collapsed and extended without hindrance.

No matter what angular position the main strut 30 takes up relative to the rib 25, 26, the eccentric 41 does not oppose relative displacement of the rib members to draw them apart, because it reacts clockwise in FIG. 3 or 4 to such a movement and thereby its clamping effect is removed. The rib parts can therefore be drawn apart in the last phase of the opening movement under the action of the main struts 30 supported by the auxiliary struts 33 without being hindered by the eccentric 41 in order to place the cover of the umbrella under the necessary radial tension.

In FIGS. 3 and 4 the center of gravity of the eccentric 41 is approximately at the point S. Therefore, when not prevented by the main strut 30, the eccentric element already places itself under the action of gravity against the inner surface of the rib part 26 provided the umbrella, on being opened, is held vertically with the crown 23 upwards. The same applies when the umbrella is held horizontally provided the rib with the eccentric element 41 is not directly above the stick and parallel to the axis of the stick. This unfavorable possibility can, however, easily be avoided by providing the rib situated diametrically opposite to the detent of the main slider with the eccentric or, with still greater certainty, by providing the eccentric on two ribs situated diametrically opposite to one another.

Inaccuracies in manufacture can have a considerable effect upon the effectiveness of the eccentric clamp owing to the smallness of the part. It may, therefore, happen that the eccentric 41, although released by the strut 30, does not move into a position in which it comes into contact with the inner surface of the rib member 26. In the construction illustrated in FIGS. 5 and 6 this is prevented by providing the eccentric 41 with an extension 46 which is a continuation of the clamping surface 42. This continuation can, at the same time, act as the carrier of the projection 44, and, even when the main strut 30 is in the position shown in FIG. 5, the extension 46 bears against the inner surface of the rib member 26 but with such slight pressure that the extension and collapse of the rib members is not made noticeably more difficult. The pressure is sufficient, however, to ensure in all cases that the eccentric 41 moves into the clamping position shown in FIG. 6 when the umbrella cover is to be opened and the main strut 30 is consequently in the position shown in FIG. 6.

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In the construction shown in FIGS. 7 to 11, the eccentric 41 is not only released by the main strut 30 but is positively returned into the position in which its clamping surface bears against the inner surface of the rib part 26. For this purpose, in addition to the projection 44 a follower 47 is formed on the eccentric and the main strut 30 engages this follower when it turns counter-clockwise about the pivot 29. The details of this construction are shown in FIGS. 10 and 11. The forked end 45 of the main strut 30 has two resilient arms 48 and 49. In the position shown in FIGS. 7, 10 and 11 the follower 47 overlaps the arm 49, whereas on the opposite side the projection 44 bears against the arm 49 and holds the eccentric 41 in released position. If the main strut 30 is turned counter-clockwise out of the position shown in FIGS. 7 and 11 it strikes the follower 47 and rotates the eccentric element until its clamping surface bears against the rib member 26. This position is illustrated in FIG. 8. On its further rotation in which the eccentric 41 can no longer take part, the main strut 30 passes over the follower 47 because the arm 49 springs slightly outwardly. When the umbrella is opened the parts take up the position shown in FIG. 9. The main strut 30 rotates clockwise when the umbrella is closed, and the above-mentioned processes take place in the reverse sequence until after passing through the position shown in FIG. 8 the position shown in FIG. 7 is again reached.

Details of the construction of the eccentric are illustrated in FIGS. 12 to 19. FIG. 13 shows in end elevation the eccentric of FIG. 12 which has already been described. It will be seen that in order to obtain symmetrical conditions the eccentric may be of U-shape, in which case both arms carry projections 44 which coact with the arms of the forked end of the main strut 30. FIGS. 15 and 16 show similar views of the eccentric 41, instead of having a closed eye 50, has a semi-circular recess by which it is mounted on the pin 29. Assembly is thereby facilitated. The eccentric elements shown in FIGS. 16 to 19 are of similar form in this respect. These eccentrics, however, are not U-shaped but consist of stamped flat pieces. Whereas the eccentric shown in FIGS. 16 and 17 is rigid, that shown in FIGS. 18 and 19 has a resilient extension 46 as has already been described in connection with FIGS. 5 and 6.

I claim:

1. In a telescoping umbrella frame comprising a stick having a crown, a plurality of angularly spaced telescopic ribs each pivoted at one extremity to said crown, each of said ribs having a first member pivoted to said crown and a second member slidable relatively to said first member, a main slider movable along said stick toward and away from said crown, a plurality of angularly spaced main struts each articulated at one extremity to said main slider and at its other extremity to a respective one of said ribs, an auxiliary slider movable along said stick and disposed between said main slider and said crown, and a plurality of angularly spaced auxiliary struts each pivoted to said auxiliary slider at one end and at its other end to a respective main strut whereby simultaneous displacement of said sliders toward said crown from respective extreme positions remote therefrom will effect a telescoping of said members of each rib; the combination therewith of a clamping element pivoted to one of said members of at least one of said ribs for locking said members against relative displacement, said element being swingable about a pivotal axis transverse to the direction of relative displacement of the members of said one rib while being formed with an arcuate clamping surface eccentric with respect to said axis and engageable with the other member of said one rib for entrainment thereby to wedge the members of said one rib against each other and restrain said auxiliary slider from movement along said stick simultaneously with said main slider in one operative position of element, and abutment means on said element engageable by the associated main strut for swinging and main-

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taining said clamping surface out of engagement with said other member in another operative position of said element upon said associated main strut being disposed substantially parallel to said one rib for permitting said simultaneous displacement of said sliders, said element having a center of gravity located between said axis and said other member whereby said clamping surface may be urged by gravitational force against said other member.

2. In a telescoping umbrella frame comprising a stick having a crown, a plurality of angularly spaced telescopic ribs each pivoted at one extremity to said crown, each of said ribs having a first member pivoted to said crown and a second member slidable relatively to said first member, a main slider movable along said stick toward and away from said crown, a plurality of angularly spaced main struts each articulated at one extremity to said main slider and at its other extremity to a respective one of said ribs, an auxiliary slider movable along said stick and disposed between said main slider and said crown, and a plurality of angularly spaced auxiliary struts each pivoted to said auxiliary slider at one end and at its other end to a respective main strut whereby simultaneous displacement of said sliders toward said crown from respective extreme positions remote therefrom will effect a telescoping of said members of each rib, the combination therewith of a clamping element pivoted to one of said members of at least one of said ribs for locking said members against relative displacement, said element being swingable about a pivotal axis transverse to the direction of relative displacement of the members of said one rib while being formed with an arcuate clamping surface eccentric with respect to said axis and engageable with the other member of said one rib for entrainment thereby to wedge the members of said one rib against each other and restrain said auxiliary slider from movement along said stick simultaneously with said main slider in one operative position of element, and abutment means on said element engageable by the associated main strut for swinging and maintaining said clamping surface out of engagement with said other member in another operative position of said element upon said associated main strut being disposed substantially parallel to said one rib for permitting said simultaneous displacement of said sliders, said pivotal axis coinciding with the axis of the articulation of said associated main strut to said one rib, said element being formed with a follower, said associated main strut being provided with a resilient arm engageable with said follower for swinging said element upon angular displacement of said associated main strut, thereby wedging said surface against said members, said arm being cammed out of engagement with said element by said follower upon locking of said members against relative displacement.

3. The combination according to claim 1 wherein said element is formed with a resilient finger having an arcuate further surface forming an extension of said clamping surface, said further surface bearing resiliently against said other member in said other position of said element.

4. In a telescoping umbrella frame comprising a telescopic stick having a crown, a plurality of angularly spaced telescopic ribs each pivoted at one extremity to said crown, each of said ribs having a first member pivoted to said crown and a second member slidable relatively to said first member, a main slider movable along said stick toward and away from said crown, a plurality of angularly spaced main struts each articulated at one extremity to said main slider and at its other extremity to a respective one of said ribs, an auxiliary slider movable along said stick and disposed between said main slider and said crown, and a plurality of angularly spaced auxiliary struts each pivoted to said auxiliary slider at one end and at its other end to a respective main strut whereby simultaneous displacement of said sliders toward said crown from respective extreme positions remote therefrom will effect a telescoping of said members of each rib, the combination therewith of a clamping element pivoted to said second

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member of each of at least two ribs for locking the members thereof against relative displacement, each of said elements being swingable about a pivotal axis transverse to the direction of relative displacement of the members of said respective rib while being formed with an arcuate clamping surface eccentric with respect to its axis and engageable with the first member of the respective rib for entrainment thereby to wedge the members of the respective rib against each other and restrain said auxiliary slider from movement along said stick simultaneously with said slider in one operative position of element, each of said elements having a respective center of gravity located between its pivotal axis and the respective first member whereby the respective clamping surface may be brought by gravitational force against the respective first member, and abutment means on said element engageable by the

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associated main strut for swinging and maintaining said clamping surface out of engagement with the respective first member in another operative position of said element upon said associated main strut being disposed substantially parallel to said one rib for permitting said simultaneous displacement of said sliders.

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