

[54] **COLLAPSIBLE AND TILTABLE UMBRELLA**

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A45B 25/02

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135/46 T

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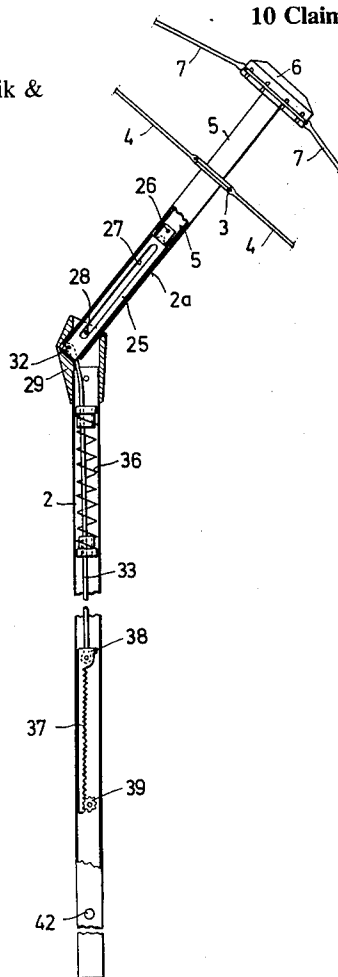
[57] **ABSTRACT**

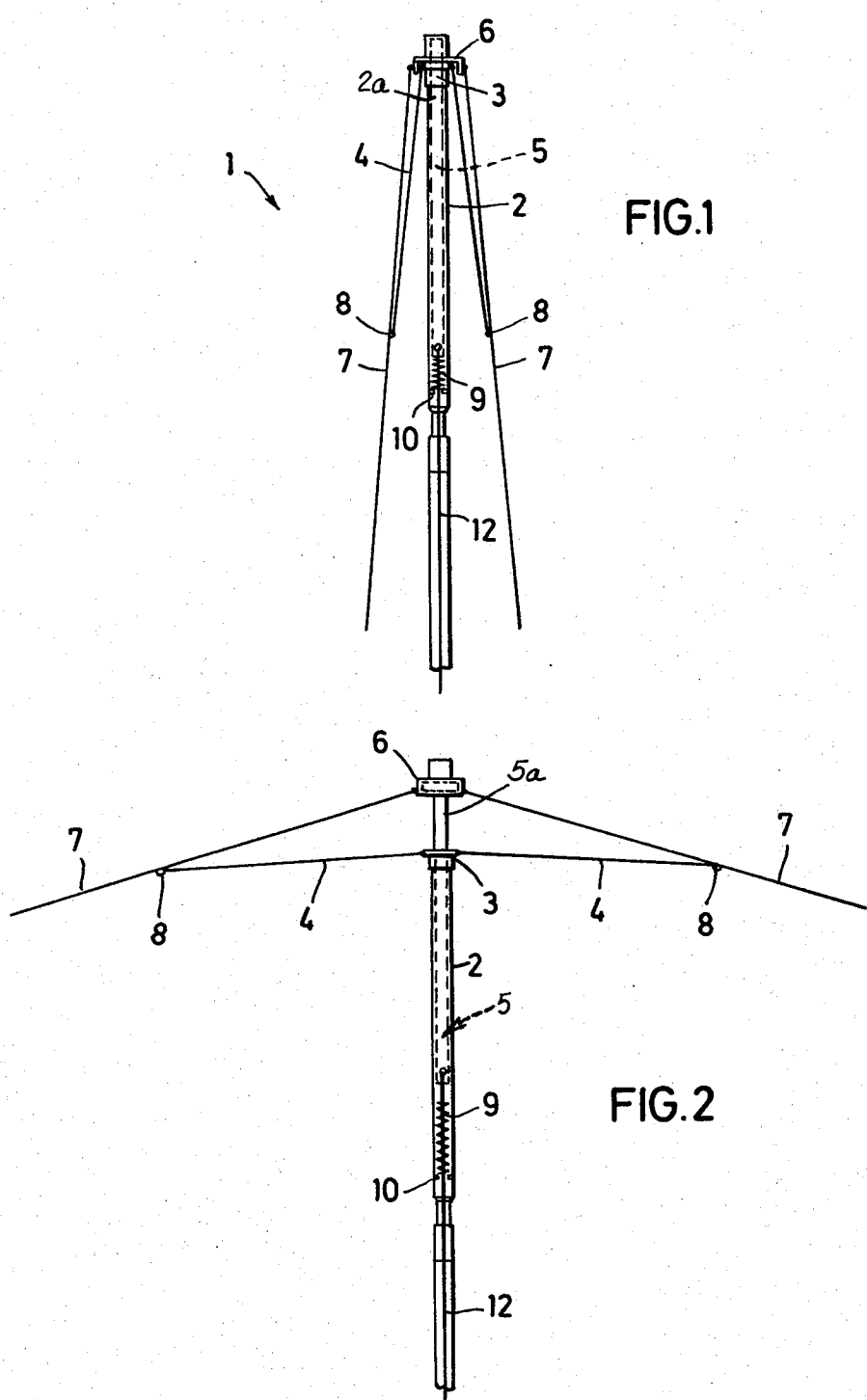
This disclosure relates to an umbrella which includes a plurality of cover ribs having struts hinged thereto with the cover ribs and struts additionally being hingedly connected to a crown carried by a crown shaft and a rim carried by a rim shaft, respectively, and means for imparting sliding movement to the crown shaft whereby the crown and rim are moved away from and toward each other respectively during respective opening and closing operations of the umbrella.

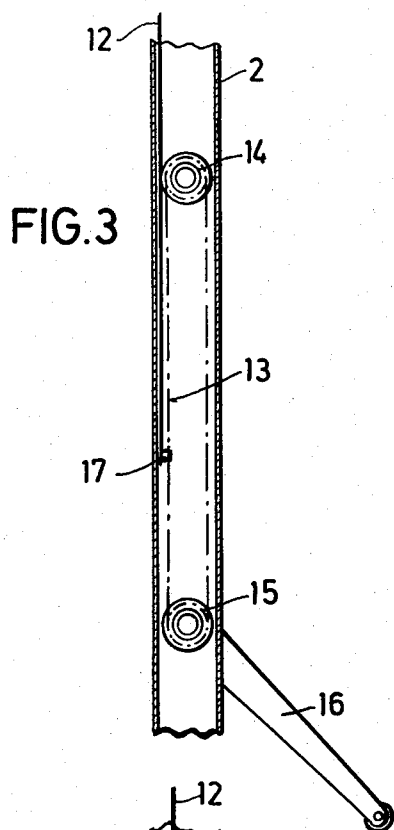
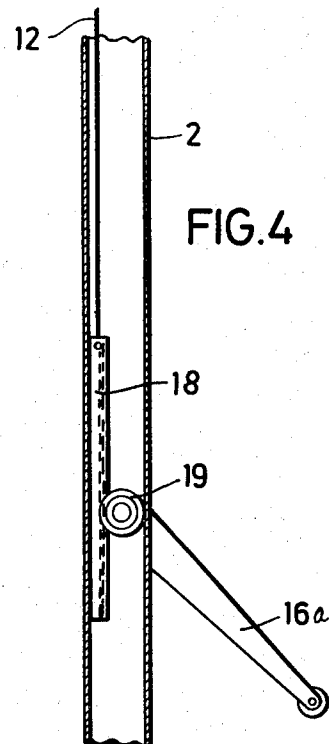
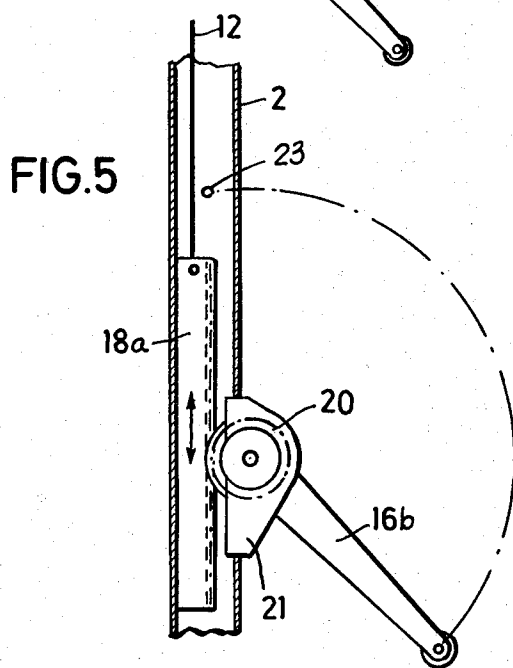
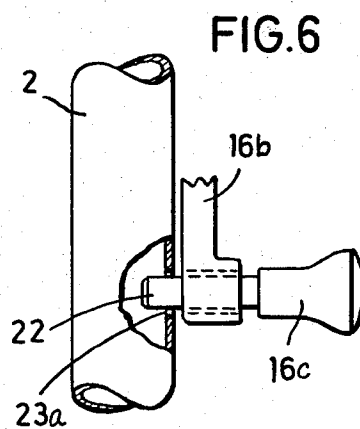
Means are provided for biasing the crown and rim shafts in a direction tending to move the crown away from the rim, the rim shaft being tubular and being in external telescopic relationship to the crown shaft, the sliding movement imparting means being in part defined by a rod connected at one end to the crown shaft, the rod being at least partially housed within the tubular rim shaft, and motion being imparted to the rod through a chain entrained about sprockets, a rack and pinion arrangement, or the like.

Preferably the rim shaft also includes upper and lower shaft sections, and means mounting the upper and lower shaft sections for pivotal movement relative to each other whereby the shaft sections may be disposed either with the axes thereof coincident or oblique relative to each other.

10 Claims, 26 Drawing Figures







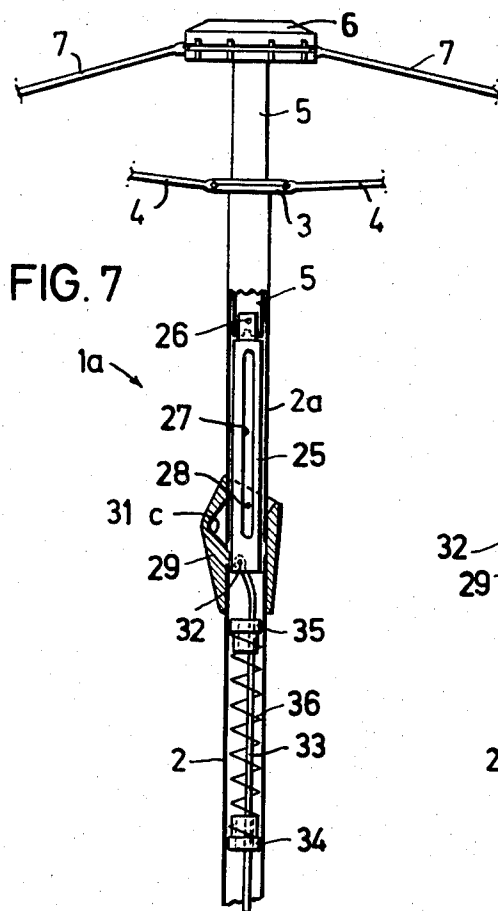
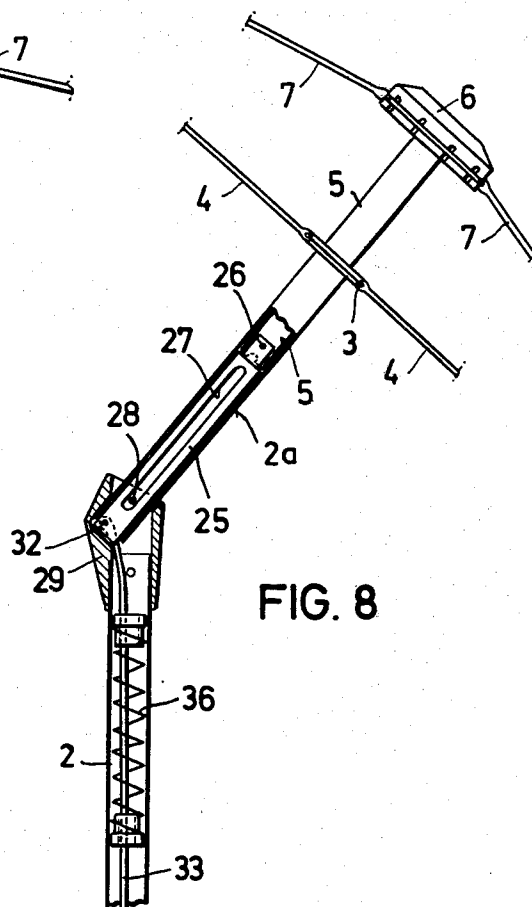
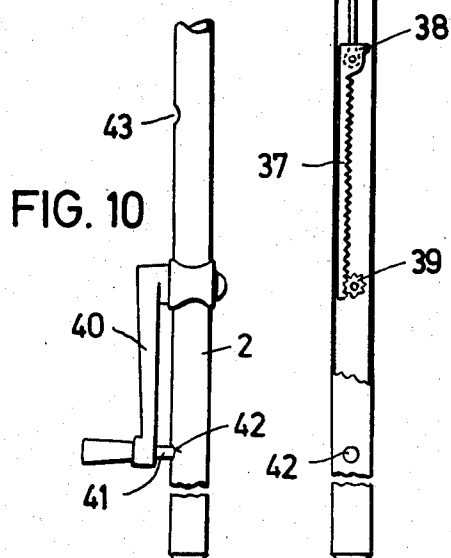
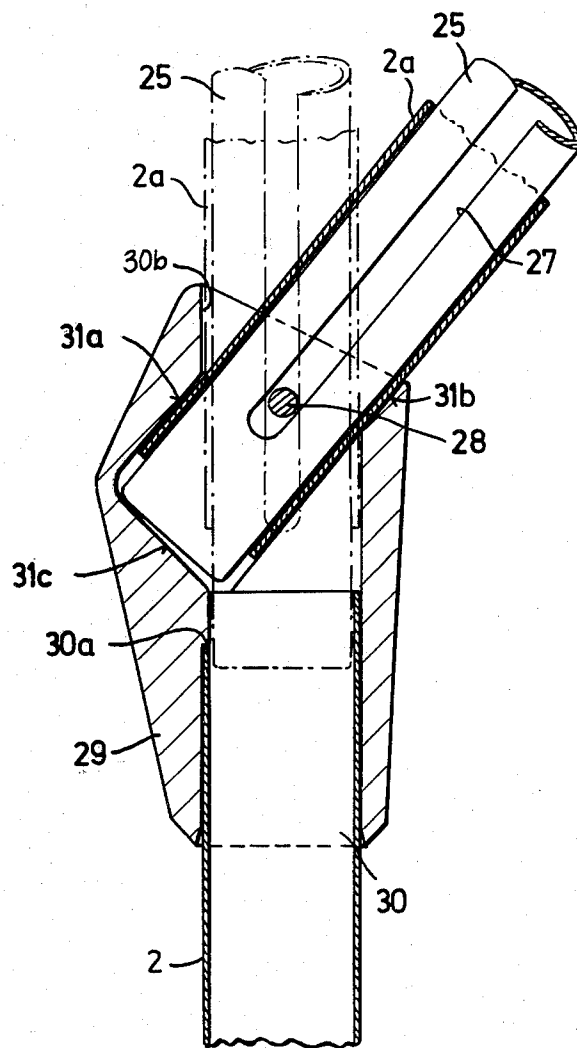
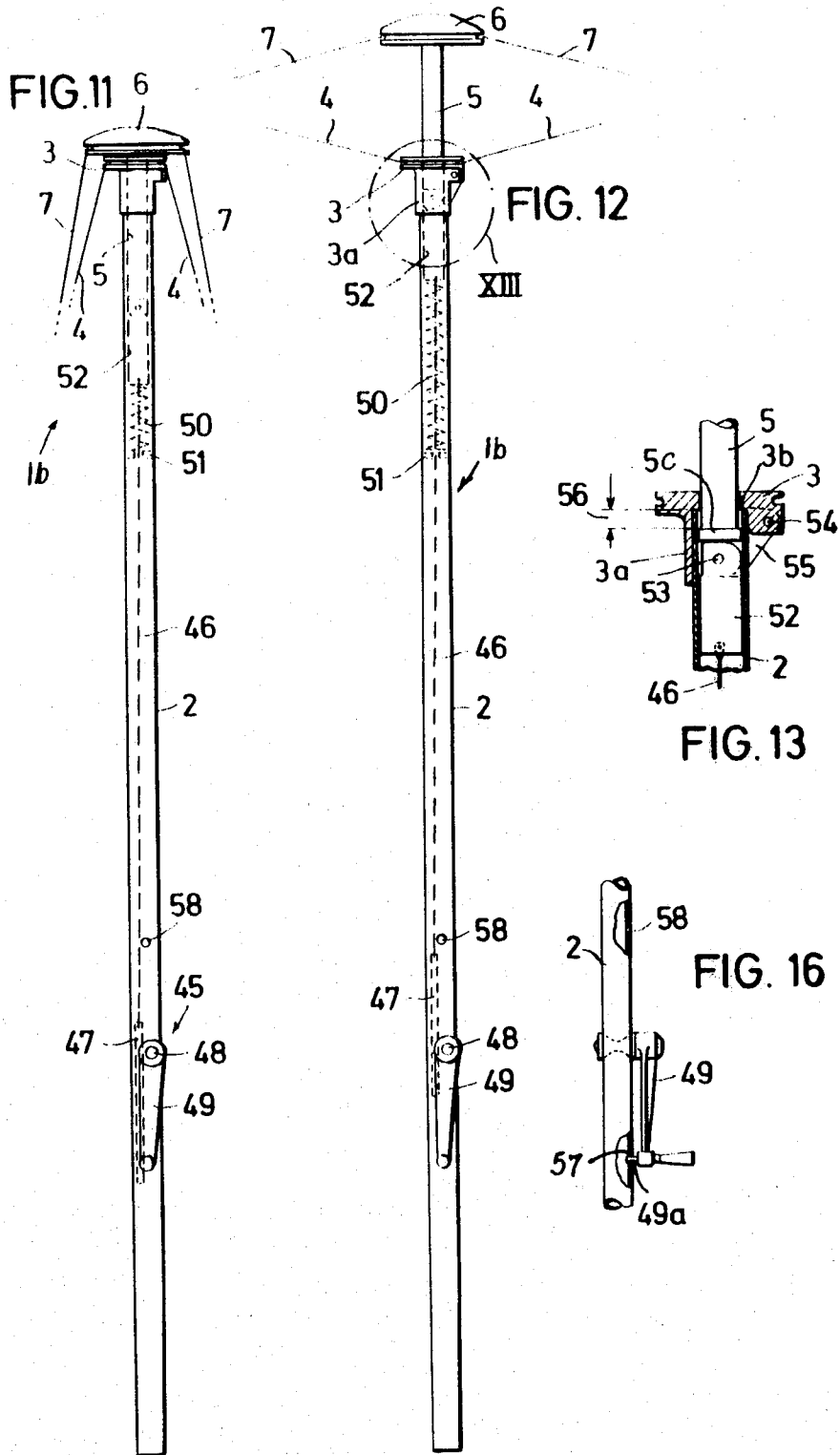


FIG. 9





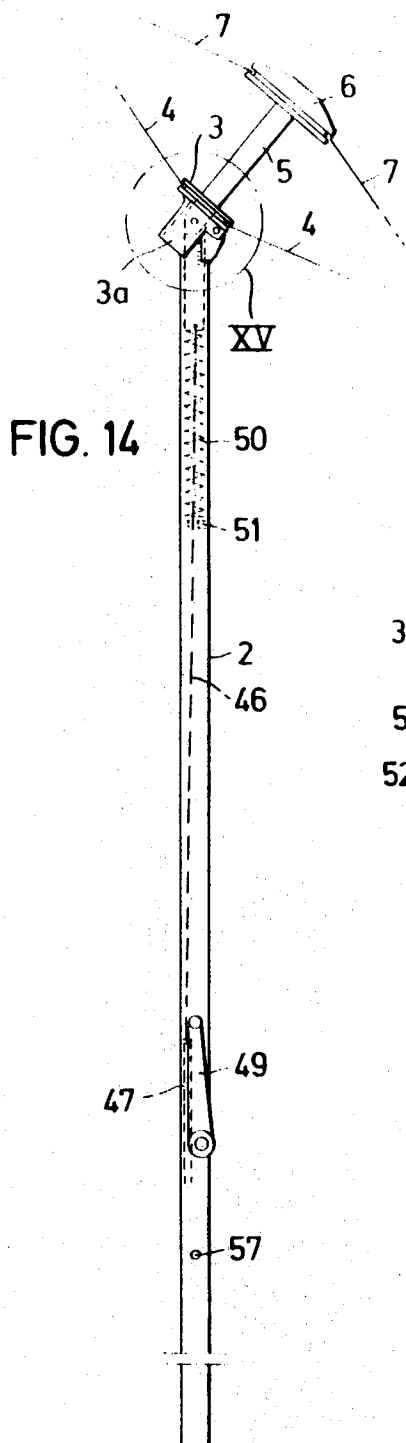
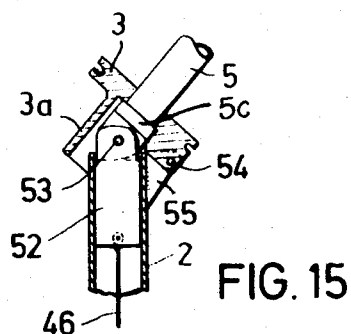


FIG. 17

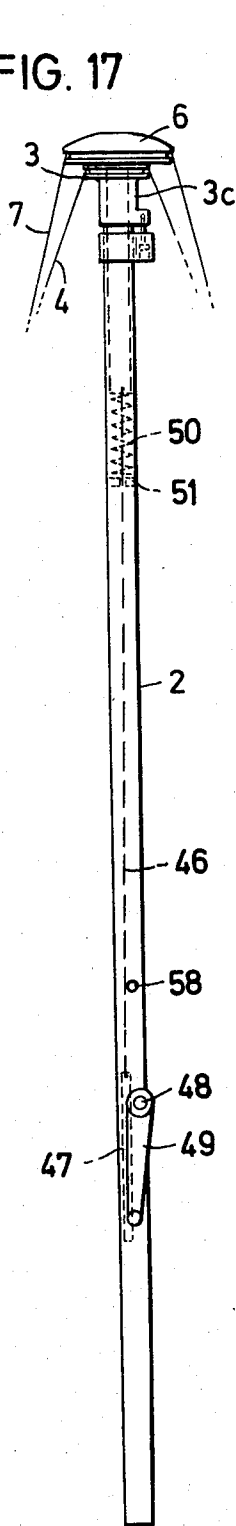


FIG. 18

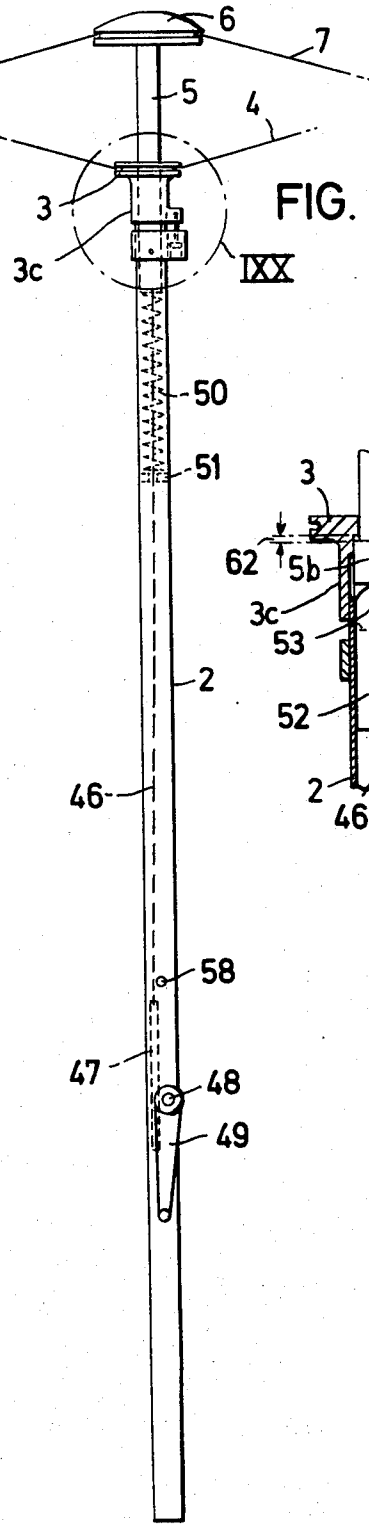


FIG. 19

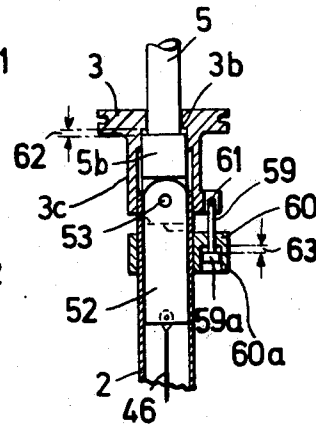


FIG. 20

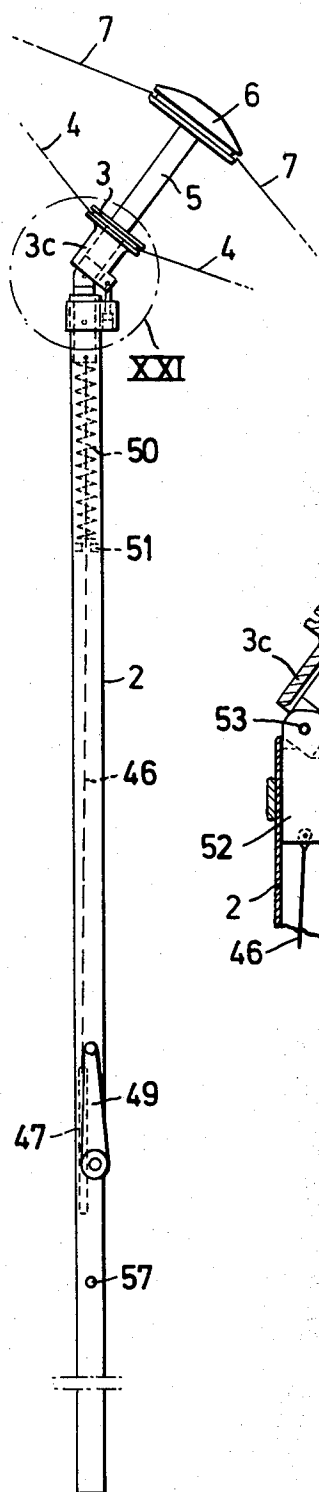
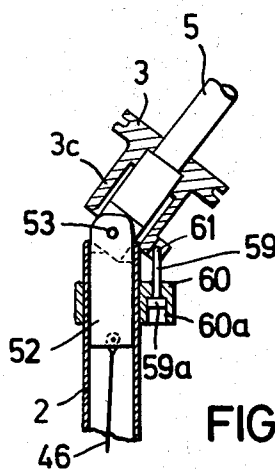
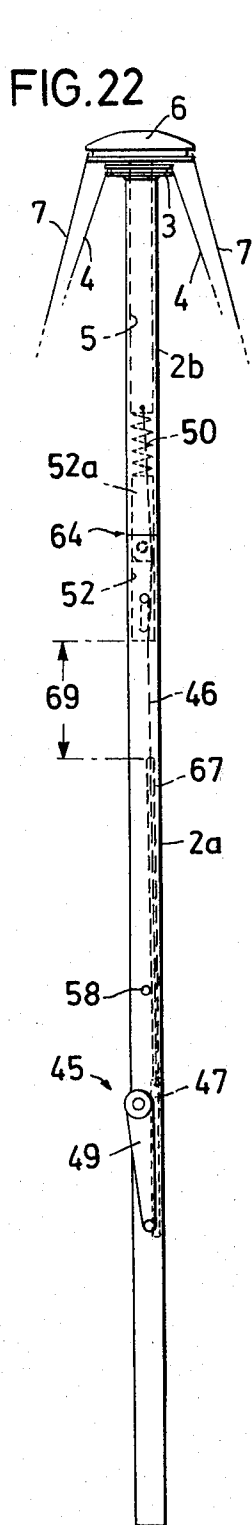
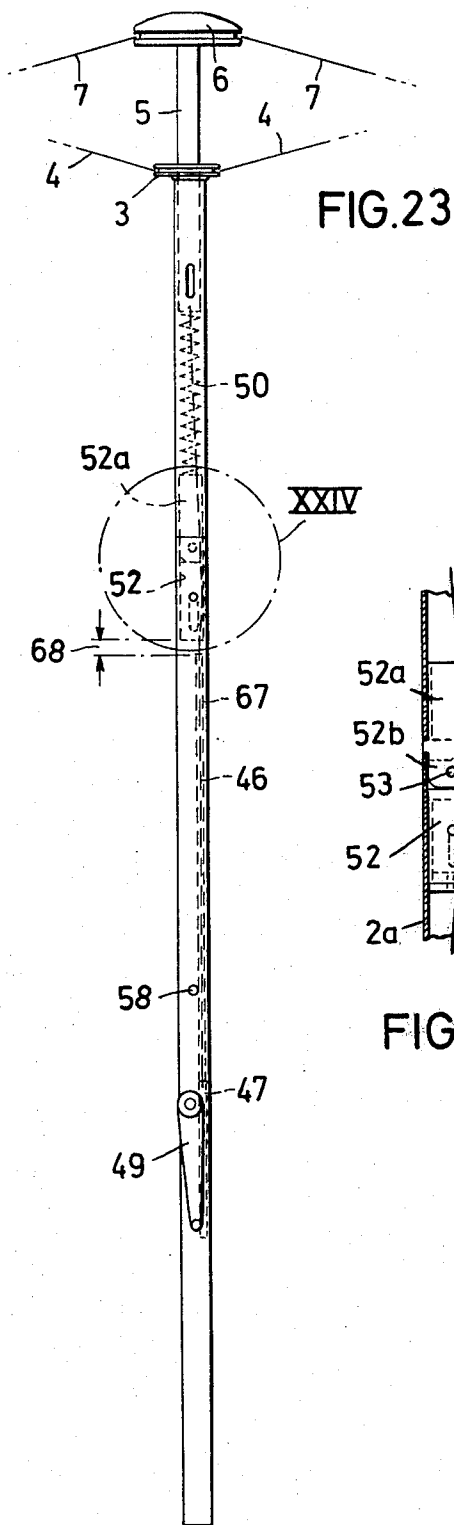
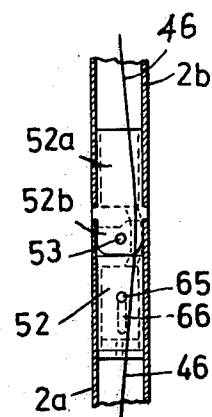
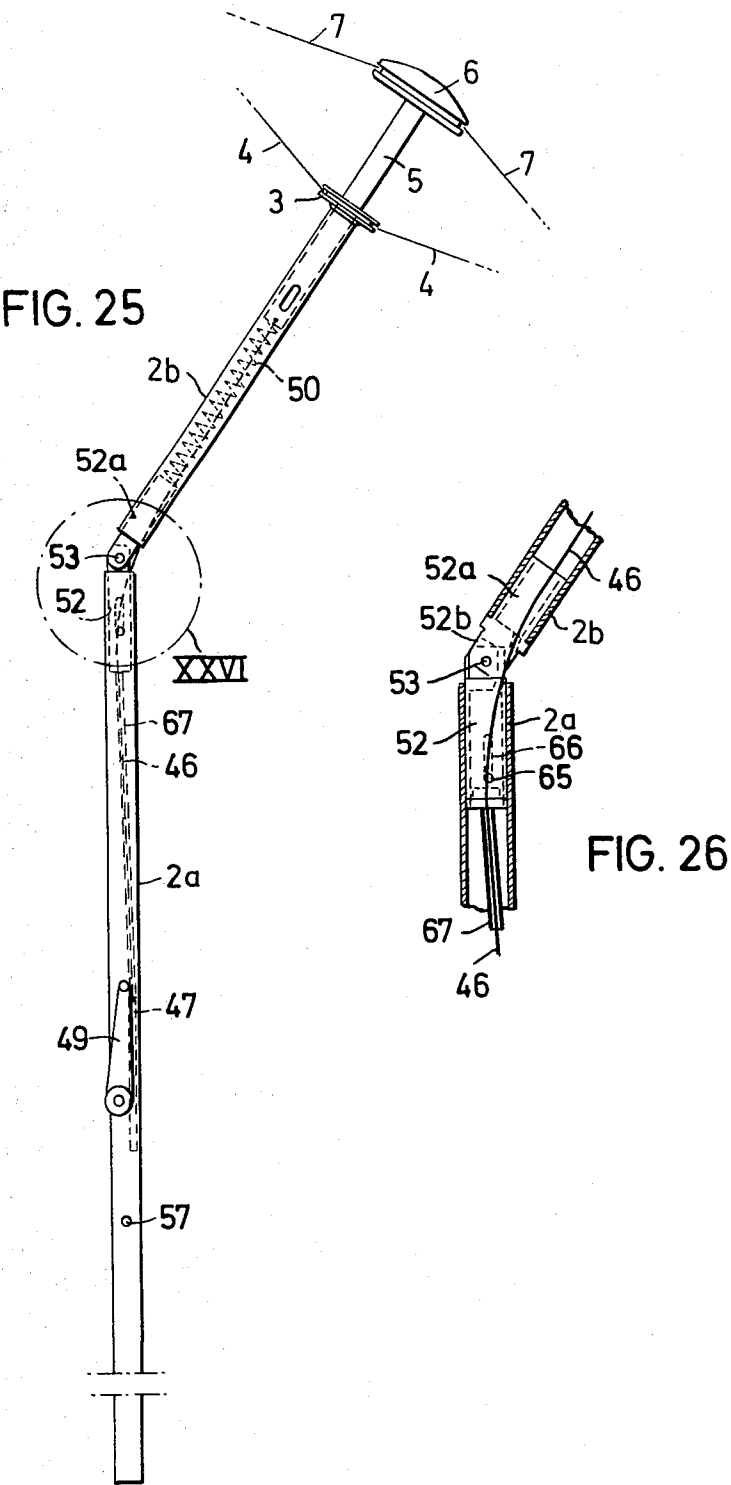


FIG. 21





COLLAPSIBLE AND TILTABLE UMBRELLA

The present invention relates to an umbrella, in particularly a beach umbrella in which cover spreading ribs are hingedly connected to a crown and struts at one end thereof are hingedly connected to the cover spreading ribs and at opposite ends thereof to a strut rim carried by a rim shaft with actuating means being provided for opening and closing the umbrella by displacing the rim shaft relative to a crown shaft carrying the crown.

In conventional assemblies of the type associated with this invention for a beach umbrella, the struts are hinged at a slider which is moved upwardly to open the umbrella along a shaft or pole with the struts which are hingedly connected to cover supporting ribs being effective to spread the ribs away from the umbrella shaft to open the cover thereof. Such a sliding or shifting motion of the slider may be facilitated by a cord or rope for hoisting the same with or without a crank or similar winding unit. In the latter case, the slide must be displaced along a relatively long axial path of the shaft or pole. Efforts have been made, of course, to reduce the relative opening and closing movements of beach and like umbrellas by using relatively short struts between the slider and the cover spreading ribs. However, such arrangements entailed considerable losses in stability which could only be compensated for with attendant disadvantages by increasing the length and cross section of the cover supporting ribs as well as the cross section of the struts.

In keeping with the foregoing, it is a primary object of this invention to avoid the latter-noted and other known disadvantages of conventional umbrellas by providing an umbrella constructed in a relatively simple manner such that the path of displacement between a crown and rim for the opening and closing of the umbrella is kept minimal along the umbrella shaft or pole axis. The latter-noted objective is characterized by constructing the novel umbrella of the present invention such that the struts are but only approximately half the length of the cover supporting ribs and the crown carried by a crown shaft is movable toward a strut rim of a stationary rim shaft or pole, and preferably the crown shaft is received in internal sliding telescopic relationship relative to the rim shaft.

Due to the configuration of the elements thus far described a relatively short telescopic motion between the rim and crown shafts is effected to obtain normal full opening and full closing of the umbrella cover. This is in opposition to conventional umbrella frames wherein the distance between the crown and rim in the closed position of the umbrella calls for approximately double the strut length and due thereto the present invention results in an opening and closing with motion of only approximately one-tenth of conventional structures.

In keeping with another object of this invention the umbrella includes an actuating device for imparting relative telescopic sliding motion between the rim and crown shafts, the actuating device being a rod at least partially received interiorly of the rim shaft and having an end connected to the crown shaft through a hinge either directly or through a separate hinge element, and preferably a generally tubular housing is provided having first and second axially aligned bores and a third bore obliquely thereto whereby by suitably actuating

the rod the crown shaft and an upper section of the rim shaft may be moved from a position in axial alignment with a lower section of the rim shaft to a second position oblique thereto at which a lower end of the upper rim shaft section is seated in the third bore, thus supporting the crown shaft obliquely to the lower rim shaft section and maintaining the cover of the umbrella oblique to the horizontal.

The construction of the rod is such that upon pushing the same upwardly the umbrella cover first opens as the crown shaft moves the crown away from the rim after which the upper section of the rim shaft is moved or pivoted until its lower end seats in the third bore. Upon opposite downward motion of the rod the motion is reversed such that the lower end of the upper rim shaft section is first withdrawn from the third bore into the first bore and thereafter the crown shaft is drawn downwardly to draw the crown toward the rim thus resulting in the closing of the umbrella cover.

The pivoting or hinging of the crown shaft relative to the rim shaft or the crown shaft and an upper rim shaft section relative to a lower rim shaft section takes place through several constructions. In the case of the two sectioned rim shaft an upper end of the actuation rod is bent obliquely to the axis of the lower rim shaft section such that upward motion imparted to the rod directly seats the lower end of the rim shaft upper section as well as the lower end of the crown shaft into the third bore. In this case, the crown shaft lower end is provided with a longitudinal slot through which passes a pivot pin with the slot permitting relative sliding motion between the crown shaft and rim shaft during opening and closing operations. Preferably in this arrangement, the upper rim shaft section is normally biased by a compression spring surrounding the rod in a direction tending to move the crown and rim away from each other i.e. toward an open position. A lower end of the biasing means or compression spring is retained in a desired position by a bushing fixed to the interior of the lower rim shaft section whereas an upper bushing is carried or secured to the compression spring and acts against the lower end of the upper rim shaft section. Thus during an opening motion the compression spring provides certain assistance for accelerating the upward stroke of the rod and facilitating the opening of the umbrella.

In keeping with a further object of this invention a novel umbrella of the type heretofore described includes a rim which is pivotally carried by an upper end of the rim shaft which in turn telescopically receives a lower end of the crown shaft with the rod being secured to the latter directly or through a hinge element. As the rod is moved upwardly it directly or through the hinge element bears against a bottom end of the crown shaft causing the same to rise a predetermined distance after which the crown shaft itself contacts the rim and pivots the same until the crown shaft is disposed in oblique relationship to the rim shaft with the latter relationship being maintained a desired angle through the construction of the actuating mechanism such that when the latter is locked in the open position of the umbrella, the oblique angle of the crown shaft cannot be changed except, of course, upon an unlocking action and a return of the crown and rim shafts with their axes coincident.

Still another object of this invention is to provide a novel umbrella of the type immediately heretofore described except the rim is not pivotally secured to the rim shaft but is instead carried by the crown shaft in the oblique position of the latter with means being pro-

vided for precluding relative rotation between the rim and crown shafts so that the oblique angular relationship of the latter is maintained in the absence of rotation of the crown shaft about the axis of the rim shaft.

Still another object of this invention is to provide a novel umbrella of the type heretofore described wherein the upper end of the lower rim shaft and the lower end of the upper rim shaft are pivotally interconnected such that they may be disposed with their axes coincident, and means are provided for locking the rim shaft sections when thus positioned.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims and the several views illustrated in the accompanying drawings.

IN THE DRAWINGS

FIG. 1 is a diagrammatic view of a first novel umbrella constructed in accordance with this invention, and illustrates the closed position of the umbrella with only one cover rib and strut rib being shown at each side of telescopic crown and rim shafts for purposes of clarity.

FIG. 2 is a view similar to FIG. 1, and illustrates the umbrella in its open position at which the crown carried by a crown shaft has been moved away from the rim carried by the rim shaft through an actuating mechanism.

FIG. 3 is an enlarged fragmentary longitudinal sectional view taken through a lower end of the rim shaft, and illustrates a typical actuating mechanism which includes an actuating rod joined to a chain entrained about a pair of sprockets whereupon rotation imparted to either of the latter results in relative telescopic motion between the rim and crown shafts.

FIG. 4 is a similar enlarged fragmentary longitudinal sectional view, and illustrates another actuating mechanism in which motion from a pinion shifts a rack to move a rod for imparting relative telescopic motion between the crown and rim shafts.

FIG. 5 is another enlarged fragmentary longitudinal sectional view illustrating the arrangement similar to that of FIG. 4 except a crank connected to the pinion is rotated through no more than either 180° or 360° degrees between the open and closed positions of the umbrella.

FIG. 6 is a fragmentary sectional view with a portion broken away for clarity of the actuating mechanism of FIG. 5, and illustrates the manner in which a crank of the actuating mechanism is locked by a spring biased pin received in an aperture of the rim shaft.

FIG. 7 is a side elevational view of another umbrella constructed in accordance with this invention with a portion thereof shown in section for clarity, and illustrates a rim shaft formed by upper and lower rim shaft sections, a crown shaft having a slot receiving a pin telescoped within the upper rim shaft section, and an actuating rod connected to a lower end of the crown shaft for opening and closing the umbrella.

FIG. 8 is a view similar to FIG. 7 but illustrates the manner in which the upper rim shaft and the crown shaft have been moved by the rod to an oblique position to the horizontal with the lower ends thereof seated in a bore of a housing carried by an upper end of the lower rim shaft section.

FIG. 9 is a highly enlarged sectional view partially in phantom outline of the housing, the bores thereof, and

portions of the rim shaft sections and the crown shaft, and illustrates the manner in which the upper rim shaft section and the crown shaft are maintained obliquely in solid outline and axially in phantom outline relative to the lower rim shaft section.

FIG. 10 is a fragmentary elevational view of a lower end of the umbrella of FIG. 8, and illustrates the manner in which a crank arm is locked between either of two positions thereof by a pin of the handle being received in either of two openings formed in the lower rim shaft section.

FIG. 11 is a side elevational view of another umbrella constructed in accordance with this invention, and illustrates the closed position thereof at which a crown and rim carried by respective crown and rim shafts are in adjacent relationship to each other.

FIG. 12 is a side elevational view of the umbrella of FIG. 11, and illustrates the same in the open position.

FIG. 13 is a cross sectional view slightly enlarged of the encircled portion indicated by XIII in FIG. 12 and illustrates the manner in which the rim is pivotally secured to an upper end of the rim shaft with the rod being pivotally connected to a separate hinge element which is in turn pivotally connected to a lower end of the crown shaft which has an enlargement or boss.

FIG. 14 is a similar side elevational view of the umbrella of FIGS. 11 and 12, and illustrates the manner in which the crown shaft is disposed obliquely to the rim shaft by virtue of the pivoting of the rim.

FIG. 15 is an enlarged sectional view of the encircled portion indicated by XV in FIG. 14, and more clearly illustrates the manner in which the rim is pivoted to dispose the crown shaft obliquely to the rim shaft.

FIG. 16 which is on the sheet of drawing containing FIGS. 11 through 13 is a fragmentary elevational view with portions broken away for clarity of the lower end of the rim shaft of the umbrella of FIGS. 11 and 12, and illustrates the manner in which the actuating mechanism is locked between open and closed positions of the umbrella.

FIG. 17 is a side elevational view of another umbrella constructed in accordance with this invention, and illustrates the crown and rim adjacent each other in the closed position of the umbrella.

FIG. 18 is a side elevational view of the umbrella of FIG. 17, and illustrates the open position thereof at which the crown carried by its crown shaft has been telescoped away from the rim carried by an upper end of the rim shaft.

FIG. 19 is an enlarged fragmentary sectional view of the encircled portion XIX of FIG. 18, and illustrates the manner in which with the rim and crown shaft axes coincident the rim is in external telescopic relationship to an upper end of the rim shaft.

FIG. 20 is a side elevational view of the umbrella of FIG. 18, and illustrates the manner in which the crown shaft is in oblique relationship to the rim shaft as a result of the tilting of the rim away from the position shown in FIG. 19.

FIG. 21 is an enlarged fragmentary sectional view of the encircled portion XXI of FIG. 20 and illustrates clearly the manner in which the rim has been tilted from the upper end of the rim shaft and is prevented from being misaligned during motion thereof between the positions shown in FIGS. 18 and 20.

FIG. 22 is a side elevational view of another umbrella of this invention, and illustrates the same in its closed position with a crown and rim thereof most closely ad-

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jacent each other and with upper and lower rim shaft sections in aligned axial relationship.

FIG. 23 is a side elevational view of the umbrella of FIG. 22, and illustrates the open position at which a crown shaft carrying the crown has been telescoped outwardly of the upper rim shaft section.

FIG. 24 is an enlarged fragmentary sectional view of the encircled portion XXIV of FIG. 23, and illustrates a mechanism for maintaining the upper and lower rim shaft sections with their axes in coincident relationship.

FIG. 25 is a side elevational view of the umbrella of FIG. 23, and illustrates the manner in which the upper and lower rim shaft sections may be disposed obliquely to each other and held thereat by an actuating mechanism.

FIG. 26 is an enlarged fragmentary sectional view of an encircled portion XVI of FIG. 25, and more clearly illustrates the details of the connection between the upper and lower rim shaft sections.

Reference is now made to the specific details of a first novel umbrella 1 illustrated in FIGS. 1 and 2 of the drawing which though specifically illustrated as being a beach umbrella may be of any type and includes a rim shaft or pole 2 having an upper end 2a to which is fixedly secured a strut rim 3. The rim shaft 2 is preferably constructed from tubular metallic material and receives therein in internal telescopic relationship a crown shaft or pipe 5 having secured to an upper end portion 5a thereof a crown 6 to which is hingedly connected one end (unnumbered) of each of a plurality of cover ribs 7. The connection between the cover ribs 7 and the crown 6 is either flexible or hinge-like, as are connections 8 between struts 4 and the cover ribs 7 as well as connections (unnumbered) between the same struts 4 and the rim 3. The crown 6 in the closed position (FIG. 1) of the umbrella 1 is closely adjacent the rim 3 but is moved thereaway from toward the open position (FIG. 2) during outward telescopic movement of the crown shaft 5 relative to the rim shaft 2. Opposite motion results in the closing of the umbrella 1 as the crown shaft 5 descends from the position shown in FIG. 2 further into the interior of the rim shaft 2 as shown in the closed position of FIG. 1.

The umbrella 1 further preferably includes interiorly of the rim shaft 2 biasing means in the form of a compression spring 9 having a lower end (unnumbered) which abuts against stationary abutments 10 which may simply be metal of the rim shaft struck internally into the interior thereof. In the closed position (FIG. 1) of the umbrella 1 the compression spring 9 is compressed as the bottom end (unnumbered) of the crown shaft 5 bottoms against and forces the spring 9 downwardly. Thus, as is readily apparent by a comparison of FIGS. 1 and 2, the force of the spring 9 is in a direction normally urging the crown shaft 5 out of the rim shaft 2 or stated otherwise, the biasing force of the spring 9 is such as tending to spread or move the crown 6 away from the rim 3.

Actuation means (unnumbered) are provided in regulating the motion imparted to the crown shaft 5 by the compression spring 9 in the form of a traction and pressure rod 12 having an upper end (unnumbered) passed through the interior of the spring 9 and secured to a lower end (unnumbered) of the crown shaft 5. The rod 12 may be of relatively rigid material or may be constructed from strain-resistant material, such as elastic wire or the like. A downward force applied to the rod 12 as viewed in FIG. 2 results in the drawing of the

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crown shaft 5 further into the interior of the tubular rim shaft 2 and results in the compression of the spring 9 (FIG. 1). Likewise, a release of the rod 12 when viewed in the position shown in FIG. 1 permits the spring force of the compression spring 9 to push the crown shaft 5 outwardly of the rim shaft 2 to the open position of FIG. 2. If the rod 12 is rigid a force may be applied upwardly in FIG. 1 to augment that applied by the spring 9 to open the umbrella and likewise a force may be applied downwardly to the rod 12 as viewed in FIG. 12 to close the same and compress the spring 9.

Preferably, the crown 6 is also of a larger diameter than the rim 3 so that in the closed position (FIG. 1) the angle of the struts 4 relative to the axis of the shafts 2 and 5 is greater than the angle of the cover ribs 7 to the same shafts 2 and 5 thereby avoiding a dead point position at which opening motion would be extremely difficult to the operation of the compression spring 9 and/or the actuating mechanism including the rod 12 associated with the umbrella 1.

FIG. 3 illustrates one typical actuating mechanism which may be provided for imparting sliding movement to the crown shaft for shifting the crown 6 and rim 3 relative to each other to achieve the opening and closing of the umbrella 1 of FIGS. 1 and 2. The actuating mechanism of FIG. 3 may include, for example, a link or sprocket chain 13 entrained about a pair of sprockets 14, 15 which are conventionally journaled for rotation internally of the tubular rim shaft section 2. Either sprocket 14, 15 may be manually rotated, and the sprocket 15 as shown as having secured thereto an arm or handle 16 to impart rotation to the sprocket 15 and thus the chain 13 which in turn rotates the sprocket 14. A lower end of the rod 12 is joined by a connection 17 to the chain 13. Assuming that the handle 16 is rotated clockwise as viewed in FIG. 3, the left-handmost flight of the chain 13 will be moved linearly upwardly urging the rod 12 upwardly therewith resulting in outward telescopic motion of the crown shaft 5 relative to the rim shaft 2. By reversing the direction of rotation of the handle the rod 12 is, of course, drawn downwardly resulting in the drawing of the crown shaft 5 more inwardly into the interior of the tubular rim shaft 2 toward the closed position of FIG. 1.

FIG. 4 illustrates another means for imparting sliding movement to the crown shaft 5 relative to the tubular rim shaft 2 by means of a rack 18 suitably housed within the rim shaft 2 for axial or longitudinal sliding motion through the rotation of a pinion 19 which is in turn conventionally supported internally of the shaft 2 and has connected thereto exteriorly a handle 16a. As in the manner described relative to FIG. 3, clockwise rotation imparted to the handle 16a results in upward motion of the rack 18 through the rotation of the pinion 19 causing the crown shaft 5 to move outwardly of the rim shaft 2. Opposite or counterclockwise rotation imparted to the handle 16a results in the downward motion of the rack 18 which in turn through the rod 12 draws the crown shaft 5 further into the interior of the rim shaft 2 resulting in a closed condition of the umbrella 1 (FIG. 1).

FIG. 5 illustrates another alternative to the motion imparting or actuating means of FIG. 4, and in this case a rack 18a, a pinion 20, and a handle 16b are provided to operate in the manner heretofore described relative to the corresponding element 18, 19 and 16a of FIG. 4. However, in this case the pinion 20 is larger than the pinion 19 and is only partially housed within the inte-

rior of the tubular rim shaft 2 by means of a pair of plates 21 (only one of which is shown) between which the pinion 20 is journaled with the plates being welded or otherwise secured to the tubular rim shaft 2. The rim shaft 2 includes an upper aperture 23 (FIG. 5) and the lower apertures 23a (FIG. 6) into which may be inserted a pin 22 carried by the handle or lever 16b with the pin 22 having an enlarged gripping portion 16c and being preferably biased from right-to-left as viewed in FIG. 6. Depending upon the ratio between the teeth (unnumbered) of the rack 18 and those of the pinion 20 the handle 16b is rotated preferably only through 180° between opening and closing motions. For example, assuming that the pin 22 is in the upper aperture 23, the umbrella would be closed because the rack 18a would be in its lowermost position. If then the pin 22 were retracted from the aperture 23 and the handle 16b were rotated clockwise toward and beyond the position illustrated in FIG. 5 the rack 18a would be shifted upwardly and through the rod 12 the crown shaft 5 would be moved outwardly of the tubular rim shaft 2 resulting in the opening of the umbrella 1 (FIG. 2). Reverse motion imparted to the handle 16b would result in the closing of the umbrella 1. Obviously, if the handle 16b were rotated through 180° to the open position the pin 22 would then be lodged in the aperture 23 to maintain the umbrella 1 open whereas if the handle 16b were rotated through 360° toward the open position of the umbrella the aperture 23a could be eliminated and the pin 22 would be simply locked in the aperture 23 in both the open and closed positions of the umbrella.

Another umbrella 1a (FIGS. 7 and 8) constructed in accordance with this invention has applied thereto for identical structure the same reference numerals as applied to the umbrella 1 of FIGS. 1 and 2. In this case, the umbrella 1a is constructed such that the crown shaft 5 is not only capable of being in axial alignment with the rim shaft 2 but also may be obliquely supported relative thereto in the manner shown best in FIG. 8. In accordance therewith the crown shaft 5 has connected thereto by a pivot connection 26 a sleeve 25 having a slot 27 through which passes a pin 28. The pin 28 additionally passes through a bore (unnumbered) in the lower end (also unnumbered) of an upper tubular rim shaft section 2a, and opposite ends of the pin 28 are suitably fixed in opposite walls (unnumbered) of a generally tubular or hollow housing 29 which is fixed in external telescopically relationship to the tubular rim shaft or lower rim shaft section 2.

Reference is made specifically to FIG. 9 which shows details of the housing 29 including axially aligned bores 30, 30b which receive respectively the upper end of the lower tubular rim shaft section 2 having a cutout portion which seats against a shoulder 30a and both the crown shaft 25 and the upper tubular rim shaft section 2a, in the manner illustrated in phantom outline in this same figure. The housing 29 further includes a third bore 31a having a bottom seating surface 31c and a surface 31b which is oblique to the axis of the bores 30, 30b and the axis of the lower rim shaft section 2.

Returning to FIGS. 7 and 8, an upper end (unnumbered) of a rod 33 is bent at an oblique angle to the axis of the lower rim shaft section 2 and in the direction of the surface 31c, and passes through tubular bushings 35, 34 which are respectively slidably mounted and fixed relative to the lower rim shaft section 2. The rod 33 further passes through biasing means in the form of

a compression spring 36 which is sandwiched between the bushing 34, 35.

A lower end of the rod 33 is fixed to a cylindrical portion 38 of a rack 37 in mesh with a pinion 39. The diameter of the enlarged head 38 corresponds to the internal diameter of the lower rim shaft section 2 whereupon the head serves as a guide during axial motion of the rack 37 upon the rotation of a handle 40 which is fixed to the pinion 39. The handle 40 carries a spring biased pin 41 which is adapted for receipt in apertures 42, 43 of the lower rim shaft section 2.

Assuming that the umbrella 1a is in its closed position, the rack 37 would be well below the position illustrated in FIG. 8 with the head 38 adjacent the pinion 39. In this same position the spring 36 would be compressed and the sleeve 25 as well as the upper tubular rim shaft section 2a would be in internal telescopic relationship to the bore 30b but, in addition, the sleeve 25 would be further downward in the interior of the lower rim shaft section 2 a distance corresponding to that between the crown 6 and the rim 3. If it were desired to open the umbrella 1a the handle 40 would be rotated to push the rack 37 through the pinion 39 upwardly resulting in the upward motion of the rod 33 which would raise the sleeve 25 upwardly augmented by the spring 36 until the umbrella were fully opened to the position shown in FIG. 7. At this point additional upward motion of the rod 33 results in the sleeve 25 moving upwardly beyond the phantom outline position shown in FIG. 9 and being forced into the bore 31a along with the upper rim shaft section 2a to the solid outline position shown in FIG. 9. During the movement of the shaft 2a and the sleeve 25 between the solid and phantom outline positions of FIG. 9, it is to be noted that the shaft 2a merely pivots about the pivot pin 28 whereas the slot 27 of the sleeve 25 permits the sleeve 25 to move within the upper tubular rim shaft section 2a between the closed position (not shown but earlier described), the fully opened position of FIG. 7, and the fully opened and obliquely inclined position of FIG. 8. Obviously retraction in a downward direction of the rack 37 results in the opposite operation of the umbrella 1a such that the sleeve 25a, the crown shaft 5 secured thereto, and the upper rim shaft section 2a are withdrawn from the bore 31a and are pivoted to the phantom outline position in FIG. 9 in axial alignment with the lower rim shaft section 2. Thereafter, as the rod 33 descends the sleeve 25 is drawn downwardly into the lower tubular rim shaft section 2 causing the downward drawing of the crown shaft 5 into the upper rim shaft section 2a resulting in the closing of the umbrella 1a. Of course, in both the closed and opened positions the pin 41 may be seated in the respective openings or apertures 42, 43 of the lower tubular rim shaft section 2.

It is to be noted that though the sleeve 25 is pivoted at 26 to the crown shaft 5 the sleeve 25 and shaft 5 may be simply an integral single piece of metal or similar material. However, since the crown shaft 5 can be standardized for most all types and sizes of umbrellas, a more universal and economical construction can be achieved by making sleeves 25 of various lengths and diameters and attaching them to the standardized crown shafts 5 by a pivot pin 26 or simply a rigid connection because there is, of course, no need for pivoting motion between the sleeve 25 and the crown shaft 5. Therefore, in keeping with this embodiment of the invention it is to be understood that though the sleeve

25 is illustrated as a separate element it and the crown shaft 5 may be of a single one-piece construction.

Another umbrella 1 constructed in accordance with this invention illustrated in FIGS. 11, 12 and 14 of the drawings, and bears like reference numerals for the parts corresponding to those earlier described relative to the umbrellas 1 and 1a. As in the case of the umbrellas 1 and 1a, the umbrella 1b includes means 45 to impart relative telescopic motion of the crown shaft 5 relative to the tubular rim shaft 2. The mechanism 45 includes a rack 47 internally of the rim shaft 2 in mesh with a pinion (unnumbered) carried by a pin 48 connected to a handle 49 which in turn includes a biased locating pin 49a adapted for insertion into either of a pair of openings 57, 58 formed in the tubular rim shaft 2. An upper end of the rack 47 is connected to a rod 46 which in turn is connected to a separate hinge element 52 (FIG. 13) joined by a pivot pin 53 to a vertical web (unnumbered) of the crown shaft 5 projecting below an enlargement or head 5c of the latter. Thus, the rod 46, the hinge element 52, and the crown shaft 5 are articulated or pivotally interconnected to each other.

The crown shaft 5 passes through a circular opening (unnumbered) in the rim 3 and the latter rests upon an upper terminal face or edge 3b of the tubular rim shaft 2. The rim 3 is also connected by a pivot pin 54 to a pair of brackets 55 which are welded or otherwise secured to the upper end portion of the tubular rim shaft 2. A tubular portion 3a of the rim 3 partially surrounds the upper end of the tubular rim shaft 2 in the manner best illustrated in FIG. 13.

Referring to FIG. 11 of the drawings it will be noted that in the closed position of the umbrella 1b the spring 50 is compressed and the hinge element 52 is well downwardly into the upper end of the tubular rim shaft 2.

Upon withdrawing the pin 49a (FIG. 16) from the aperture 57 and rotating the handle to move the rack 47 upwardly the rod 46 moves in a likewise direction causing like upward motion of the crown shaft 5 augmented by the spring 56 until the elements reach the position shown in FIG. 12, it being noted at this point that the handle 49 has been rotated through 360° as readily apparent from a comparison of FIGS. 11 and 12.

At this position there remains a distance 56 (FIG. 13) between an upper face (unnumbered) of the enlargement 5c and the terminal face 3d of the tubular rim shaft 2. Until this distance is reduced to zero the axes of the crown shaft 5 and the rim shaft 2 will be in coincidence and therefore the condition of the umbrella shown in FIG. 12 will be maintained. However, if it is desired to achieve oblique relationship of the shafts 2, 5 (FIG. 14) the handle 49 is once again rotated to move the rack 47 further upwardly which through the rod 46 and the hinge element 52 force the embossment 5c upwardly further projecting the crown shaft 5 outwardly of the aperture (unnumbered) of the rim 3. When the distance 56 reaches zero further motion of the enlargement 5c upwardly causes the rim 3 to pivot clockwise as viewed in FIG. 13 about the pivot pin 54 until the crown shaft 5 has reached the position shown in FIG. 15. At this point the pin 49a of the handle 49 is seated in the aperture 57 and further oblique motion of the crown shaft 5 relative to the rim shaft 2 is precluded. Obviously, a reversal of the operation heretofore described results in the re-pivoting of the rim 3 in a counterclockwise direction from the position shown in FIG. 15 to that illustrated in FIG. 13 followed by the retrac-

tion of the crown shaft 5 to the final inwardmost position shown in FIG. 11 at which point the umbrella 1a is once again closed.

Another umbrella constructed in accordance with this invention which is similar to that of FIGS. 11 through 16 and including like reference numerals for like structure is shown in FIGS. 17 through 21 of the drawings. The umbrella of the latter figures includes at an upper end of the tubular rim shaft 2 a rim 3 which has a full tubular portion 3c in exterior telescopic relationship to the upper end of the rim shaft 2. However, as opposed to being pivotally connected to the shaft 2 as at 54 in FIGS. 13 and 15 the rim 3 carries a pivot pin 61 which engages the end (unnumbered) of the pin 59 which in turn has an enlarged head 59a slidable axially in a recess 60a of a collar 60 or otherwise fixed to the tubular rim shaft 2.

Referring to FIGS. 18 and 19, illustrated therein is the open position of the umbrella at which the rack 47 has been moved from the position shown in FIG. 17 to that shown in FIG. 18 resulting in the hinge element 52 moving upwardly and therewith moving upwardly the crown shaft 5 sufficiently to open the umbrella.

At this point an enlarged head 5b is spaced a distance 62 from an underside 3b of the rim 3 whereas the head 39a of the pin 59 is spaced a distance 63 from the blind end of the bore 60a. Since the tubular portion 3c still telescopically surrounds the end of the tubular rim shaft 2 and since the hinge pin 53 is still below an end face (unnumbered) of the tubular rim shaft 2 the latter and the shaft 5 remain with their axes in coincident or aligned relationship. However, upon further upward motion imparted to the rod 46 the distances 62, 63 are reduced to zero, the pivot pin 53 moves outboard of the end face of the rim shaft 2 and the rim 3 hinges about the pivot 61 to the position shown in FIG. 21. Thus, by this construction there is both a hinging action of the rim 3 and the crown shaft 5 by virtue of the pivot connection 61 as well as a longitudinally sliding action of the rim 3 and crown shaft 5 relative to the shaft 2 by virtue of the guidance of the head 59a within the recess 60a. Of course, reverse operation to that described results in the pivoting, axial motion, and closing, respectively, of the umbrella beginning at the condition shown in FIG. 1 to that of FIG. 17.

Another umbrella constructed in accordance with this invention is illustrated in FIGS. 22 through 26 of the drawings and there is like reference characters corresponding to those for identical structure heretofore described. The umbrella includes an upper tubular rim shaft section 2b and a lower tubular rim shaft section 2c interconnected to each other by a joint 64 which, as is best illustrated in FIGS. 24 and 26, includes a sleeve 52a fixed into a lower end of the rim shaft section 2b and being joined by a flange 52b and a pivot pin 53 to a like flange (unnumbered) of a sleeve 52 slidably mounted within the upper end of the tubular rim shaft section 2a. The sleeve 52 includes a slot 66 through which passes a pivot pin 65. The pivot pin 65 is fixed into diametrically opposite portions of the wall of the rim shaft section 2a. A rod 46 passes through a compression spring 50 which is sandwiched between the crown shaft and the sleeve 52a with a lower end of the rod 46 being connected to the rack 47. Another rod 67 (FIGS. 25 and 26) in the closed position (FIG. 22) of the umbrella has its upper end spaced a distance 69 below the lower end of the slidable sleeve 52 and is also in external telescopic relationship to the rod 46 (FIG. 6).

In order to open the umbrella 22, the handle 49 is rotated causing the rack 47 to move upwardly which in turn to the connection thereof with the lower end of the rods 46, 67, urges both of the latter rods upwardly. The motion imparted to the rod 46 is augmented by a spring 50 to drive the crown shaft 5 outwardly of the upper tubular rim shaft section 2b resulting in the opening of the umbrella (FIG. 23). At this point the distance 69 of FIG. 2 has been reduced to the distance 68 of FIG. 23 which in effect is the distance that the pivot pin 53 must move to be outwardly beyond the end face (unnumbered) of the lower tubular rim shaft section 2a. Upon continued upward motion of the rack 47 the end of the rod 67 bears against the sleeve 52 and forces the same upwardly until the pivot pin 53 passes outwardly of the lower rim shaft section 2a reducing the distance 68 to zero resulting in the pivoting of the upper rim shaft section 2b and the crown shaft 5 carried thereby relative to the lower rim shaft section 2c (FIGS. 25 and 26). Inasmuch as the rods 46, 67 are both secured to the rack 47 the rod 46 is preferably constructed of flexible material so that it may deflect as further upward motion is imparted thereto to reduce the distance 68 to zero without moving the shaft 5 further outwardly of the upper rim shaft section 2b. A reversal of the operation of the rack 47 will, of course, result in the pivoting of the elements from the position shown in FIGS. 25 and 26 to the aligned relationship of FIGS. 23 and 24 followed by the closing of the umbrella respectively, in the finally closed position of FIG. 22.

While preferred forms and arrangements of parts have been shown in illustrating the invention, it is to be clearly understood that various changes in details and arrangement of parts may be made without departing from the spirit and scope of this invention.

What is claimed is:

1. An umbrella frame comprising a plurality of cover ribs, hinge means for articulately connecting each cover rib to a crown, a crown shaft carrying said crown, a rim, a rim shaft carrying said rim, said crown shaft being mounted for linear sliding motion relative to said rim shaft, a plurality of struts, hinge means for articulately connecting each strut between said cover ribs and said rim, means for imparting sliding movement to said crown shaft whereby the crown and rim are moved away from and toward each other respectively during respective opening and closing operations of said umbrella, said rim shaft including upper and lower shaft sections, and means mounting said upper and lower shaft sections for pivotal movement relative to each other whereby said shaft sections may be disposed either with the axes thereof coincident or oblique relative to each other.

2. The umbrella frame as defined in claim 1 including means for biasing said crown and rim shafts in a direction tending to move said crown away from said rim.

3. The umbrella frame as defined in claim 1 wherein said rim shaft is tubular, said crown shaft is in internal telescopic relationship thereto, said sliding movement imparting means is in part defined by a rod connected at one end to said crown shaft, and said rod is at least partially housed within said tubular rim shaft.

4. The umbrella frame as defined in claim 1 wherein said pivotal mounting means includes a sleeve housed within an upper end of said lower rim shaft section, a longitudinal slot in said sleeve, a pin passing through

said slot and secured to said lower rim shaft section whereby said sleeve may move axially, and a pivotal connection between said sleeve and a lower end of said upper rim shaft section.

5. The umbrella frame as defined in claim 1 wherein said pivotal mounting means includes a pivot pin passing through a lower end of said upper shaft section and through a longitudinally extending slot in a lower end of said crown shaft.

6. The umbrella frame as defined in claim 5 wherein said lower shaft section is tubular, said sliding movement imparting means is in part defined by a rod connected at one end to said crown shaft lower end, and said rod is at least partially housed within said lower shaft section.

7. An umbrella frame comprising a plurality of cover ribs, hinge means for articulately connecting each cover rib to a crown, a crown shaft carrying said crown, a rim, a rim shaft carrying said rim, said crown shaft being mounted for linear sliding motion relative to said rim shaft, a plurality of struts, hinge means for articulately connecting each strut between said cover ribs and said rim, means for imparting sliding movement to said crown shaft whereby the crown and rim are moved away from and toward each other respectively during respective opening and closing operations of said umbrella, said rim shaft including upper and lower shaft sections, means mounting said upper and lower shaft sections for pivotal movement relative to each other whereby said shaft sections may be disposed either with the axes thereof coincident or oblique relative to each other, said pivotal mounting means includes a generally hollow housing carried by an upper end of said lower shaft section, said hollow housing having first and second axially aligned bores for respective receipt of said upper and lower shaft sections, a third bore obliquely disposed relative to said first and second bores, a pin carried by said housing spanning said first bore and an imaginary projection of said third bore, and said pin passes through an opening in a lower end of said upper shaft section whereby said upper and lower sections may be disposed axially aligned or obliquely relative to each other.

8. The umbrella frame as defined in claim 7 wherein said crown shaft includes a longitudinally extending slot, and said pin passes through said slot whereby said crown shaft may slide axially relative to said upper shaft section.

9. The umbrella frame as defined in claim 7 wherein said sliding movement imparting means includes a rod connected at one of its ends to said crown shaft, and said rod is bent obliquely relative to the axis of said rim shaft for receipt into said third bore when said upper shaft section is disposed obliquely to said lower shaft section.

10. The umbrella frame as defined in claim 7 wherein said sliding movement imparting means includes a rod connected at one of its ends to said crown shaft, said rod is bent obliquely relative to the axis of said rim shaft for receipt into said third bore when said upper shaft section is disposed obliquely to said lower shaft section, said lower shaft section is tubular, respective upper movable and lower fixed bushings within said lower shaft section slidably receiving said rod, and said housing means is sandwiched between said bushings.

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