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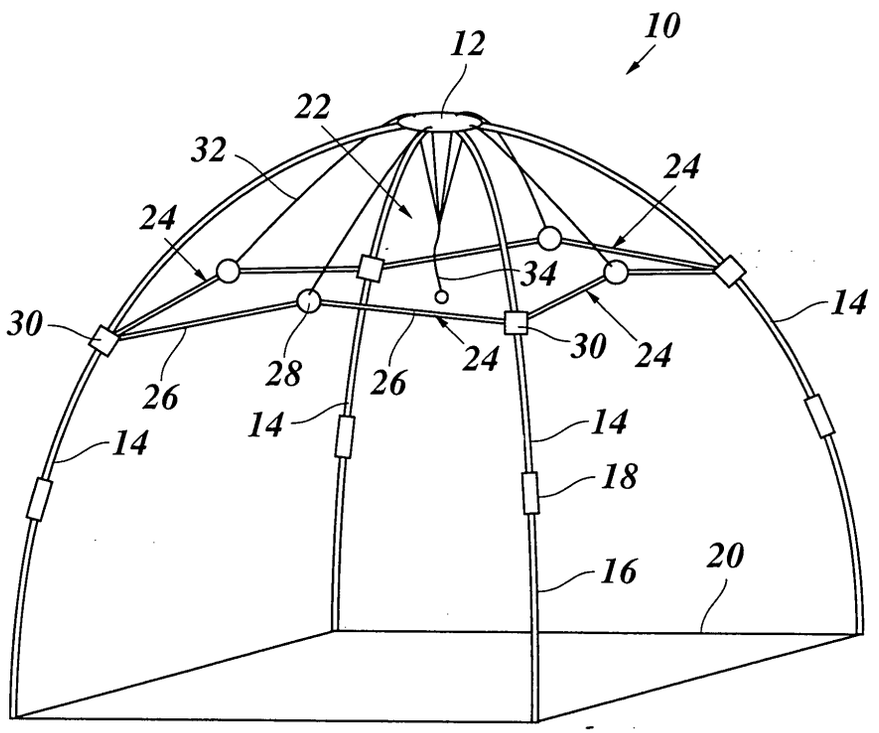
(54) **Expanding mechanism for an umbrella tent**

(57) An expanding mechanism for an umbrella tent having a hub (12) and a number of skeleton poles (14) pivotally connected to said hub, the expanding mechanism (22) comprising a number of stretching elements (24) connecting to said skeleton poles (14) and a drive mechanism (32, 34) connected to the stretching elements (24) for pivoting the skeleton poles (14) into an expanded position in which they extend radially from the hub (12), characterized in that each stretching element (24) is intervening between two neighbouring skeleton poles (14) and is adapted to move towards the hub (12) under the action of the drive mechanism (32, 34), thereby to spread apart said two skeleton poles (14).

*Fig. 1*

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## Description

**[0001]** The invention relates to an expanding mechanism for an umbrella tent having a hub and a number of skeleton poles pivotally connected to said hub, the expanding mechanism comprising a number of stretching elements connected to said skeleton poles and a drive mechanism connected to the stretching elements for pivoting the skeleton poles into an expanded position in which they extend radially from the hub.

**[0002]** EP-A-1 162 331 discloses an expanding mechanism of this type, wherein each stretching element has the form of a straight stretch arm having its outer end pivotally connected to an associated one of the skeleton poles. The inner ends of the stretch arms are pivotally connected to the periphery of a common second hub that is connected to the first hub through a telescopic mechanism and is thus movable relative to the first hub. When the second hub is moved upwardly towards the first hub, the stretch arms exert an outwardly directed force onto the skeleton poles, so that the latter are moved into their expanded position and are then held in this position. In order to stably support the skeleton poles in the expanded position, the second hub must be vertically spaced from the first hub by a certain distance, so that it projects downwardly from the roof into the interior of the tent and thereby reduces the effective internal height of the tent. Moreover, when the number of skeleton poles is increased, the number of stretch arms must be increased accordingly, and it becomes increasingly difficult to pivotally connect the larger number of stretch arms to the periphery of the second hub. As a result, the second hub must have a relatively complex construction and relatively large dimensions.

**[0003]** The expanding mechanism according to the invention, as claimed in claim 1, has the advantage that it does not significantly reduce the internal space of the tent and is nevertheless easy to operate and to manufacture.

**[0004]** According to the invention, each stretching element is intervening between two neighbouring skeleton poles and is adapted to move towards or away from the hub under the action of the drive mechanism, thereby to spread apart said two skeleton poles.

**[0005]** Thus, when the skeleton of the tent has been expanded, the stretching elements and the parts of the drive mechanism adjoining the same will be located essentially in or near the plane that is spanned by the two neighbouring skeleton poles, i.e. close to the wall of the tent, and will therefore not project into the interior of the tent. It will be understood that each individual skeleton pole is connected to both its neighbours through two stretching elements, and the skeleton pole is subject to spreading forces from both stretching elements. These forces act in approximately but not exactly opposite directions and, together, create an outwardly directed force which causes the skeleton pole to pivot into its expanded position. The reaction forces acting upon the two spreading elements are supported directly by the neighbouring skeleton poles. Thus, a second hub and a telescopic mechanism are no longer required.

**[0006]** More specific features of the invention are indicated in the depending claims.

**[0007]** Preferably, the drive mechanism comprises a number of tension ropes, one for each stretching element, and these tension ropes are arranged to draw the stretching element towards the hub at the top centre of the tent.

**[0008]** In one embodiment, each stretching element may simply be formed by a single rigid member that is slidingly guided between the adjacent skeleton poles. The spreading action will then be caused by the fact that the skeleton poles converge towards the central hub, so that they will be spread when the stretching element moves closer towards the hub.

**[0009]** In a preferred embodiment, however, each stretching element is formed by two stretch arms that are connected end-to-end by a pivotal central joint, and the outer ends of the two stretch arms are each pivotally connected to one of the skeleton poles through a peripheral joint. The tension rope will then be connected to the central joint. In the collapsed state, when the skeleton poles extend essentially in parallel to one another, the two stretch arms of each stretching element will also extend approximately in parallel with the skeleton poles in an essentially V-shaped configuration and will form an acute angle at the central joint which is then located relatively far away from the hub. When, in order to expand the skeleton, the central joints are drawn towards the hub, while the peripheral joints are fixed at the skeleton poles, the angle included between the two stretch arms will increase and, as a result, the skeleton poles will be spread apart. This embodiment has the advantage that the stretch arms may be relatively long, and the peripheral joints may be arranged at a large distance from the central hub, so that the skeleton poles are stably supported in the expanded condition and are capable of exerting a large tensioning force on the tent square that is internally supported by the skeleton.

**[0010]** When the angle formed between the two stretch arms of each stretching element approaches 180°, the drive mechanism, i.e. the tension ropes, may be locked in position, so that the skeleton is held in the expanded state.

**[0011]** As an alternative, the central joints may be configured to limit the angle between the two stretch arms to slightly more than 180°. Then, when the skeleton poles are forced outwardly against the tension force of the tent square, each stretching element will pass through a dead centre when the angle between the two stretch arms exceeds 180°, and the skeleton will then be self-locked in the expanded state.

**[0012]** The tension ropes forming part of the drive mechanism may be deflected at the central hub and may be connected to a common draw-rope, so that the drive mechanism can be actuated simply by pulling the draw-

rope.

**[0013]** As an alternative, the tension ropes connected to each of the stretching elements may be fixed to the periphery of a common drum that is rotatably supported in the hub. The drive mechanism may then be actuated; for example, by rotating the drum, e.g., by means of a little crank, so that the tension ropes will be wound onto the drum and will thereby draw the spreading elements (or at least the central joints thereof) towards the hub. In order to lock the drive mechanism in the expanded state, the drum may be locked with a ratchet mechanism which can be manually released in order to collapse the skeleton.

**[0014]** While, in the embodiment described above, the central joints are pulled upwardly towards the hub in order to spread the skeleton poles, it is also possible to devise a reverse arragement in which the central joints are originally located close to the hub, so that each pair of stretch arms assumes an A-shaped cofiguration, and the drive mechanism is arranged to pull the central joints downwardly, away from the hub, in order to expand the skeleton poles.

**[0015]** A preferred embodiment of the invention will now be explained on conjunction with the drawings, in which:

Fig. 1 is a schematic perspective view of a skeleton of an umbrella tent having an expanding mechanism according to the invention;

Fig. 2 shows the skeleton of figure 1 in a collapsed state;

Fig. 3 is a view of a peripheral joint as seen from the inside of the skeleton;

Fig. 4 is a top view of the peripheral joint; and

Fig. 5 a view of a central joint, partly in cross-section, as seen from the inside of the skeleton.

**[0016]** As is shown in figure 1, a skeleton 10 of an umbrella tent comprises a hub 12 at the top centre of the tent, and a number (four in this example) of skeleton poles 14 that are pivotally connected to the periphery of the hub 12. Each skeleton pole 14 is prolonged at its lower end by an extension 16 that is detachably connected to the top part of the skeleton pole through a coupling 18. The skeleton poles 14 and their extensions 16 are formed by elastic rods. In order to complete the tent, the skeleton 10 will be covered by a tent square, not shown, which is supported and tensioned by the skeleton poles 14 from the inside. The skeleton poles 14 are slightly bent under the tensioning force of the tent square and/or of a rope 20 that interconnects the lower ends of the extensions 16.

**[0017]** The skeleton poles 14 are pivotable relative to the hub 12 about horizontal axes that form tangents to the periphery of the circular hub 12. An expanding mechanism 22 is provided for expanding the skeleton 10 and holding the skeleton poles 14 in an expanded position in which they extend radially from the hub 12, as is shown in figure 1. This expanding mechanism 22 comprises a plurality of spreading elements 24. The number of spreading elements is equal to the number of skeleton poles, and each spreading element 24 is intervening between two neighbouring skeleton poles 14. Each spreading element 24 comprises two stretch arms 26 that are pivotally connected end-to-end through a central joint 28. The outer ends of each pair of stretch arms 26 are pivotally connected to a respective one of the skeleton poles 14 through a fixed peripheral joint 30.

**[0018]** A drive mechanism for the stretching elements 24 comprises a number of flexible tensioning members, e.g. tensioning ropes 32, that pass from each central joint 28 to the hub 12, where they are deflected downwardly and then connected to a common draw rope 34.

**[0019]** In the expanded condition shown in figure 1, the angle included between the two stretch arms 26 of each stretching element 24 (on the side facing towards the hub 12) is slightly larger than 180°. The bending forces exerted by the tent square or by the rope 20 on the skeleton poles 14 will tend to push the stretch arms 26 towards the central joint 28 and would tend to push the central joint 28 upwards and to increase the angle included between the stretch arms. However, as will be explained later, the central joints 28 form abutments which limit the angle between the stretch arms 26 to the angle shown in figure 1. As a result, the stretching elements 24 behave like rigid members and will hold the skeleton poles 14 spaced apart in the expanded state.

**[0020]** When the skeleton 10 is to be collapsed, the user will manually push downward each of the central joints 28, so that the stretching elements 24 each pass through a dead centre and the angle between the stretch arms 26 becomes smaller than 180°. Then, the skeleton poles 14 may be pivoted inwardly, and the central joints 28 will move down further until the collapsed state is reached, as is shown in figure 2.

**[0021]** When the skeleton 10 is to be expanded again, it will be sufficient to pull the draw rope 34, so that the central joints 28 will be drawn upwardly. As a result, the skeleton poles 14 will be spread apart and pivoted outwardly into the expanded state. In order to reduce the friction of the tension ropes 32 which are deflected at the hub 12, the tension ropes may be guided over small pulleys (not shown) that are rotatably supported in the hub 12.

**[0022]** Figures 3 and 4 show one of the peripheral joints 30 connecting a skeleton pole 14 to the stretch arms 26 of two adjacent stretching elements. The peripheral joint 30 is shaped as a bracket and is fixedly mounted on the skeleton pole 14 and has, on the side facing outwardly of the skeleton, a flat plate 36 for smoothly supporting the tent square. On the inner side, a horizontally projecting rib 38 is formed with two open-

ings 40 in which the stretch arms 26 are hooked-in with eyelets 42. Thus, the stretch arms 26 will be able to pivot relative to the skeleton pole 14 in a plane in parallel with the plate 36, as is shown in figure 3. Since the two planes that are spanned by three of the skeleton poles 14 will form an angle with one another, especially in the collapsed state shown in figure 2, the stretch arms 26 are also able to pivot in a direction normal to the plate 36, as is shown in dashed lines in figure 4.

**[0023]** Figure 5 shows one of the central joints 28 shaped as a circular plate 44 with an eccentric hole 46 for anchoring the tension rope 32. Two pivot pins 48 project from the internal side of the plate 44 and pass through eyelets 50 formed at the ends of the stretch arms 26, so that the ends of the stretch arms 26 are fixed at the plate 44 but are allowed to pivot relative to this plate and also relative to one another. The plate 44 is formed with a platform 52 shaped as a circular sector and serving as an abutment for limiting the pivotal angle of the stretch arms 26 when the expanded position has been reached. In figure 5, the positions of the stretch arms 26 in the expanded condition (figure 1) have been shown in bold lines, and the positions of the stretch arms in the collapsed condition (figure 2) have been shown in dashed lines.

## Claims

1. An expanding mechanism for an umbrella tent having a hub (12) and a number of skeleton poles (14) pivotally connected to said hub, the expanding mechanism (22) comprising a number of stretching elements (24) connecting to said skeleton poles (14), and a drive mechanism (32, 34) connected to the stretching elements (24) for pivoting the skeleton poles (14) into an expanded position in which they extend radially from the hub (12), **characterized in that** each stretching element (24) is intervening between two neighbouring skeleton poles (14) and is adapted to move towards or away from the hub (12) under the action of the drive mechanism (32, 34), thereby to spread apart said two skeleton poles (14).

2. The expanding mechanism of claim 1, wherein the drive mechanism comprises, for each stretching element (24), flexible tension member (32) connected to said stretching element (24) and passing to the hub (12).

3. The expanding mechanism of claim 2, wherein the tension elements (32) are deflected at the hub (12) and are connected to common draw rope (34).

4. The expanding mechanism of any of the preceding claims, wherein each stretching element (24) comprises two stretch arms (26) pivotally connected end-to-end to one another through a central joint (28) to which the drive mechanism (32, 34) is connected, and wherein the free ends of the two stretch arms (26) are pivotally connected to the skeleton poles (14) through fixed peripheral joints (30).

5. The expanding mechanism of claim 4, wherein each of the central joints (28) forms a stop (52) for limiting the angle formed between the two stretch arms (26) on the side facing towards the hub (12) to an angle slightly larger than 180°.

*Fig. 1*

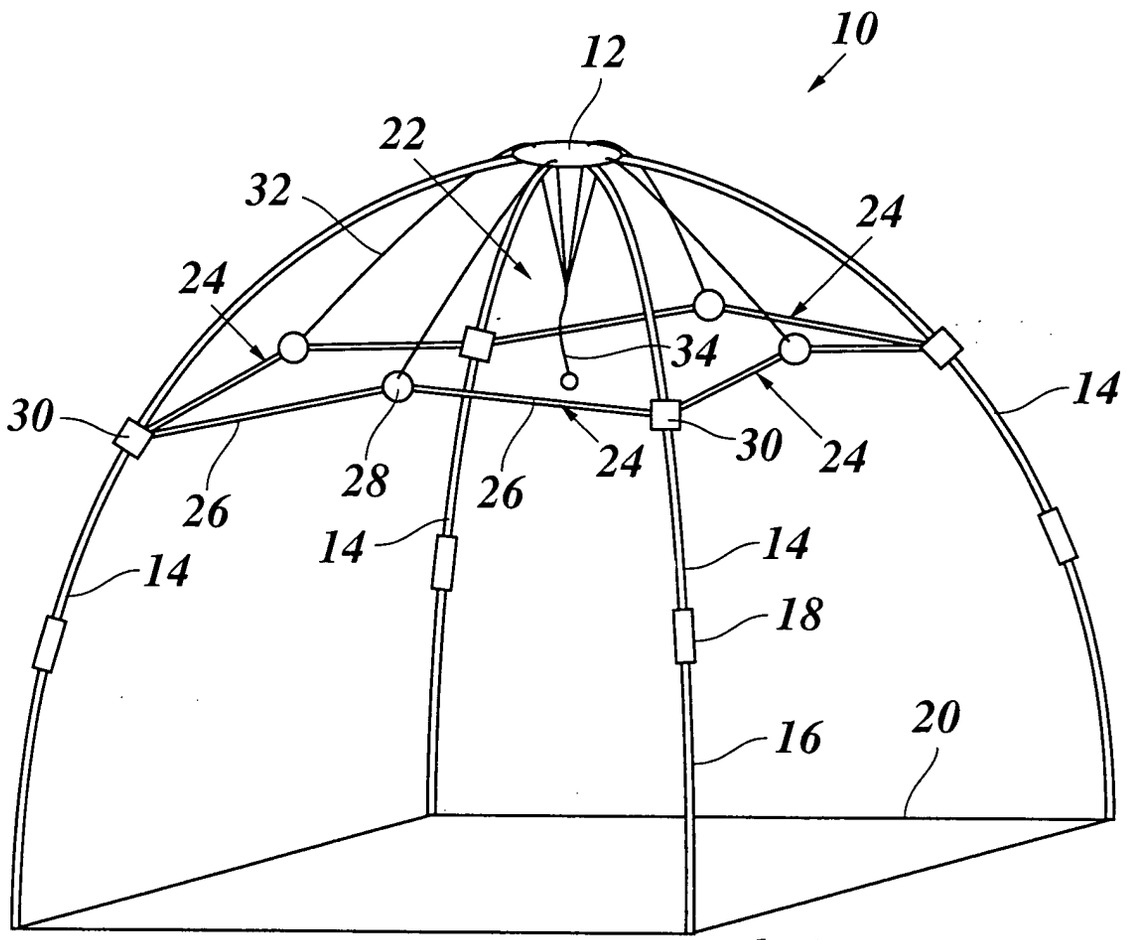


Fig. 2

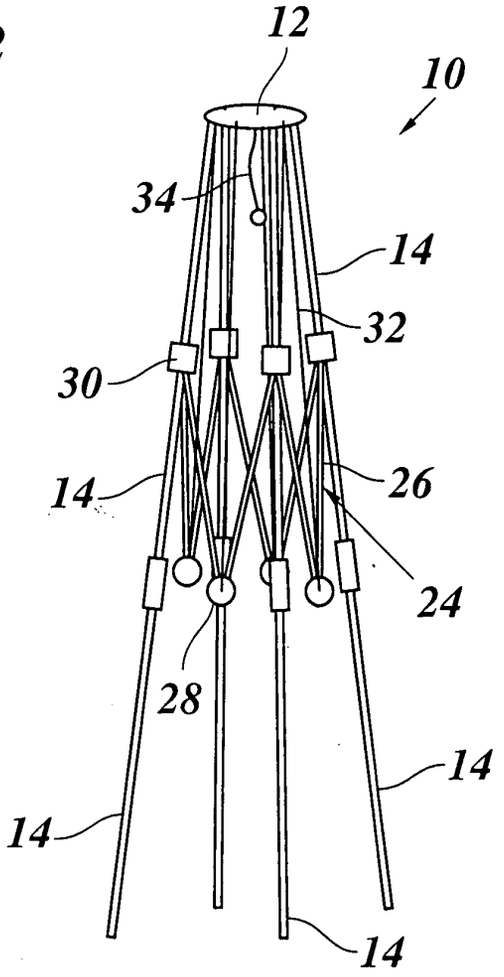



Fig. 3

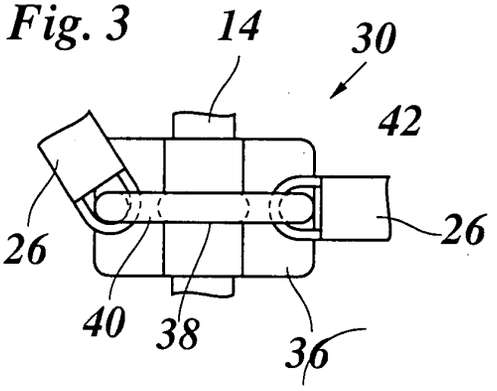



Fig. 4

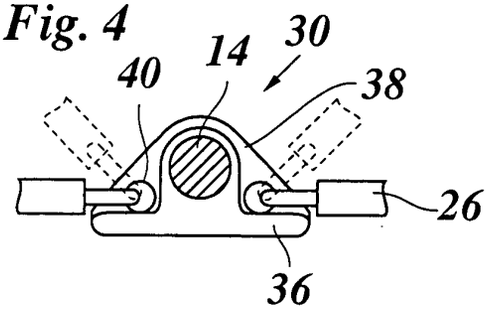
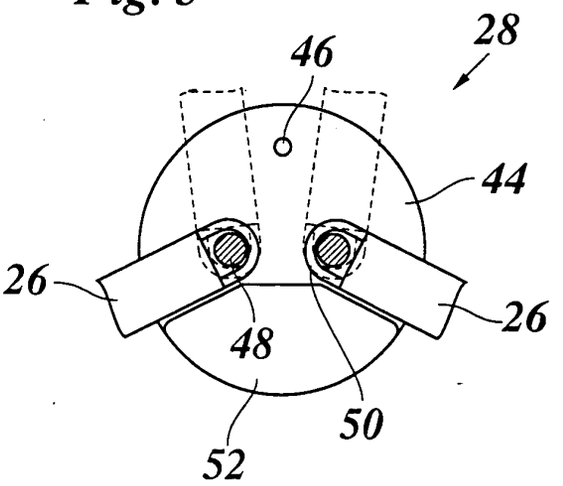



Fig. 5



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# EUROPEAN SEARCH REPORT

Application Number
EP 03 01 6476

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| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.7) |
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*The present search report has been drawn up for all claims*

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| MUNICH | 14 October 2003 | Stefanescu, R |

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82