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(54) Shelter frame mechanism

(57) A shelter frame mechanism for an outdoor shelter comprising a cover is disclosed. The mechanism has a hub (1) having a threaded axial shaft (2), a multiplicity of spokes (12) pivotally attached to the hub, and a handle (5) engaging the shaft and arranged upon rotation to urge the spokes from a collapsed orientation wherein the cover of the shelter is collapsed to an expanded orientation wherein the cover of the shelter is tensioned. Each spoke has an arm (8) extending radially inwardly from the pivot, and a cam (7) is mounted on the shaft. The cam is driven along the shaft by rotation of the handle so that the collar urges the spokes from the collapsed orientation wherein the spokes are located generally parallel to the hub axis to the expanded orientation wherein the spokes stand outwardly from the hub axis.

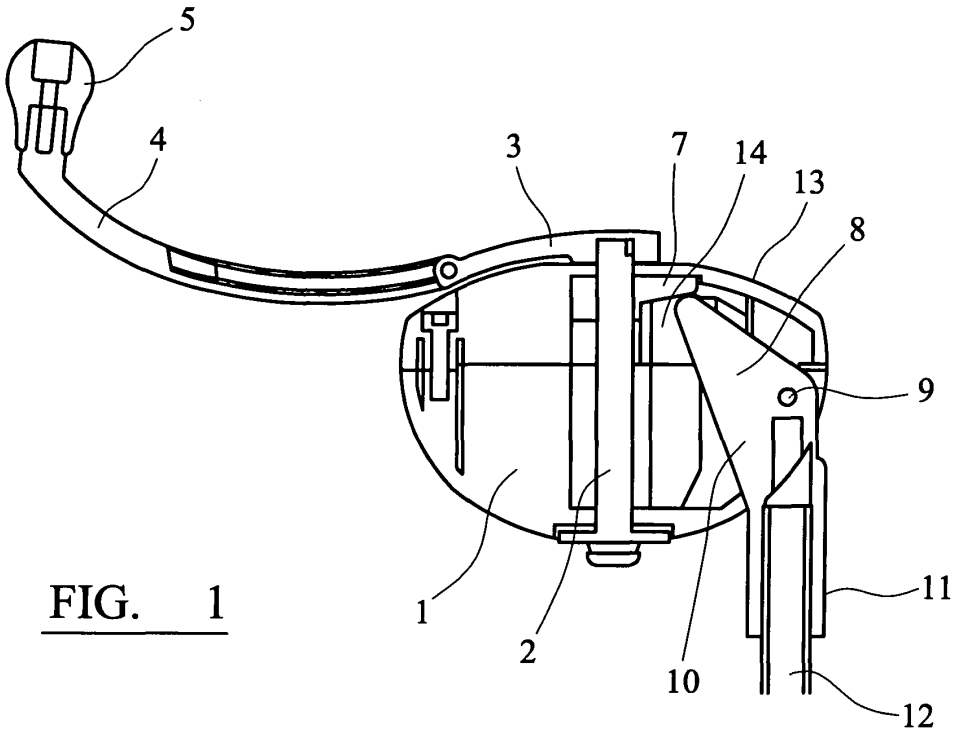

FIG. 1

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Description

[0001] This invention relates to a mechanism for erection of a shelter for use by a fisherman or person engaged in other outdoor activities.

[0002] Outdoor shelters having umbrella-like mechanisms are well-known. Such shelters comprise a fabric cover which is tensioned by collapsible spokes maintained in the erect position by a locking mechanism. An umbrella mechanism usually has an array of lightweight radial spokes pivoted at the top of a central shaft along which a sliding collar can be pushed to engage a second set of shorter radial spokes. In order to overcome the resistance of the fabric being tensioned, umbrella-type frames use shorter intermediate spokes which, when forced upwardly, exert outward pressure on the main spokes at points somewhere along their length. Force is transmitted to the main spokes to tension the fabric. The intermediate spokes may also act upon the main spokes to articulate them and force them into place, for example in a folding umbrella arrangement. When shorter spokes have been pushed beyond the centre of their pivot, the tension in the fabric holds them in place to keep the umbrella structure rigid. The collar may be latched to the shaft. To release the tension the collar is unlatched so that the spokes are allowed to collapse.

[0003] Preferred embodiments of the present invention seek to improve the ease of folding and unfolding of outdoor shelters.

[0004] According to an aspect of the present invention, there is provided a shelter frame mechanism comprising a hub having a threaded axial shaft;
a multiplicity of spokes pivotally attached to the hub;
a handle engaging the shaft and arranged upon rotation to urge the spokes from a collapsed orientation to an expanded orientation, each spoke having an arm extending radially inwardly from the pivot; and
a cam being mounted on the shaft, the cam being arranged to engage the arms;
wherein the cam is adapted to be driven along the shaft by rotation of the handle so that the collar urges the spokes from the collapsed orientation wherein the spokes are located generally parallel to the hub axis to the expanded orientation wherein the spokes stand outwardly from the hub axis.

[0005] The mechanism in accordance with this invention provides several advantages. The collar drives the spokes into position directly without the need for intermediate spokes. Furthermore the collar may be behind the pivot. The force required to move the arms outwardly against the weight and tension of the covering fabric may be substantial. However the rotatable handle transmits power downwardly through a threaded central shaft providing a significant mechanical advantage. This advantage coupled with the short length of the pivot arms provides rapid movement of the spokes to tension the fabric. The spokes may be deformed by the tension in the fabric to form a dome with the threaded collar permanently engaged to the shaft to maintain the structure.

[0006] To release the structure the handle is turned in the reverse direction. The weight and tension of the fabric assists collapse of the shelter in a rapid but controlled fashion.

[0007] Use of a separate locking mechanism may be unnecessary.

[0008] In a preferred embodiment the hub has a central axle mounted on bearing.

[0009] In a preferred embodiment a multiplicity of pivot units are pivotally attached to mountings on the pivot hub, each unit having a socket to receive a spoke and an inwardly facing arm adapted to engage the collar in use.

[0010] Preferably the inwardly facing arms are inclined inwardly from an axis of the respective spoke when in the collapsed orientation.

[0011] In a preferred embodiment the hub has a central chamber into which the arms project and within which the cam can be moved along the axle.

[0012] In a preferred embodiment the collar comprises a circular plate. The collar or plate may have one or more slots adapted to engage ribs on the hub preventing rotation of the plate and guiding the collar as it moves downwardly to open the spokes.

[0013] According to another aspect of the present invention, there is provided a shelter comprising a cover mounted to a shelter frame mechanism as defined above, wherein the cover is collapsed when the spokes are in the collapsed orientation and is tensioned when the spokes are in the expanded orientation.

[0014] The invention is further described by means of example but not in any limitative sense with reference the accompanying drawings of which:

Figures 1 and 2 are cross sectional views of a mechanism in accordance of the invention;

Figure 3 is a perspective view of the mechanism;

Figures 4 and 5 are perspective views showing a single spoke; and

Figure 6 is a perspective view showing the mechanism with the cover removed.

[0015] The mechanism shown in Figures 1 and 2 comprises a hub (1) having an axial shaft (2) mounted on a bearing (6) attached to a lower portion of the hub. A handle (3) secured to the shaft (2) has an articulated portion (4) and a rotatable handle (5), the handle portions (4) and (5) being connected by a pivotal linkage so that the handle can be folded and stowed against the hub when not in use. Rotation of the handle causes rotation of the shaft. The shaft (2) is threaded so that a circular, disc shaped cam (7) is urged upwardly or downwardly along the shaft. The collar (7) moves within the chamber (14) within the hub, rotation of the collar (7) being prevented by engagement of slots in the collar with ribbed forma-

tions extending parallel to the axis of the shaft (2). A multiplicity, for example (8) spokes (12) are pivotally attached to the hub (1). The end of each spoke (12) is received in a cylindrical sleeve (11) attached to a pivot unit (10) pivoted on a pivot (9). Each pivot unit (10) has a generally inwardly facing arm (8) which extends into the chamber (14) within the hub to engage the cam surface of the collar (7). As the collar (7) is driven down by winding the handle (3), (4), (5) the arms (8) are driven downwardly forcing the pivot units (10) to rotate (anticlockwise as shown in Figures 1 and 2) so that the spokes (12) are moved from a stowed position as shown in Figure 1, wherein the spokes are disposed generally parallel to the shaft axis to an extended position shown in Figure 2 wherein the spokes extend outwardly from the hub. In this position a fabric covering extending over the spokes is tensioned the shelter is erect.

[0016] To collapse the shelter the handle is wound in the reverse direction so that the collar (7) moves upwardly allowing the pivot units (10) to rotate, collapsing the spokes and covering fabric.

[0017] The pitch of the thread on the shaft (2) is selected so that the spokes remain extended with the covering fabric is taut without need for a locking mechanism. In this way the shelter remains erect without requirement for locking, until the handle 3, 4, 5 is rotated to collapse the structure.

[0018] It will be appreciated by persons skilled in the art that the above embodiment has been described by way of example only and not in any limitative sense, and that various alterations and modifications are possible without departure from the scope of the invention as defined by the appended claims.

Claims

1. A shelter frame mechanism comprising a hub having a threaded axial shaft;
   a multiplicity of spokes pivotally attached to the hub;
   a handle engaging the shaft and arranged upon rotation to urge the spokes from a collapsed orientation to an expanded orientation, each spoke having an arm extending radially inwardly from the pivot; and
   a cam being mounted on the shaft, the cam being arranged to engage the arms;
   wherein the cam is adapted to be driven along the shaft by rotation of the handle so that the cam urges the spokes from the collapsed orientation wherein the spokes are located generally parallel to the hub axis to the expanded orientation wherein the spokes stand outwardly from the hub axis.

2. A shelter frame mechanism as claimed in claim 1 wherein the cam comprises a collar.

3. A shelter frame mechanism as claimed in claim 1 or 2 wherein the hub has a central axle mounted on a bearing.

4. A shelter frame mechanism as claimed in any preceding claim wherein a multiplicity of pivot units are pivotally attached to the pivot hub.

5. A shelter frame mechanism as claimed in claim 4 wherein each pivot unit has a socket to receive a spoke and an inwardly facing arm adapted to engage the collar.

6. A shelter frame mechanism as claimed in any preceding claim wherein the inwardly facing arms are inclined inwardly from an axis of the respective spoke when in the collapsed orientation.

7. A shelter frame mechanism as claimed in any preceding claim wherein the hub has a central chamber into which the arms project within which the cam can be moved along the axis.

8. A shelter frame mechanism as claimed in any preceding claim wherein the collar comprises a circular plate.

9. A shelter frame mechanism as claimed in any preceding claim wherein the collar or plate has one or more slots adapted to engage ribs on the hub preventing rotation of the plate.

10. A shelter comprising a cover mounted to a shelter frame mechanism according to any one of the preceding claims, wherein the cover is collapsed when the spokes are
    in the collapsed orientation and is tensioned when the spokes are in the expanded orientation.

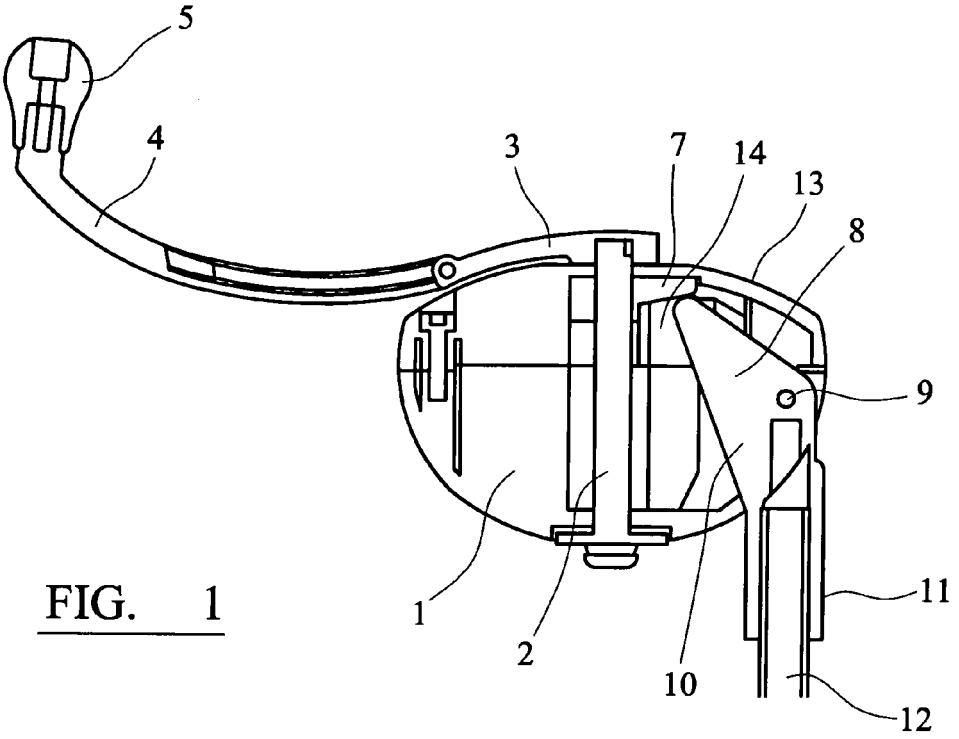

FIG. 1

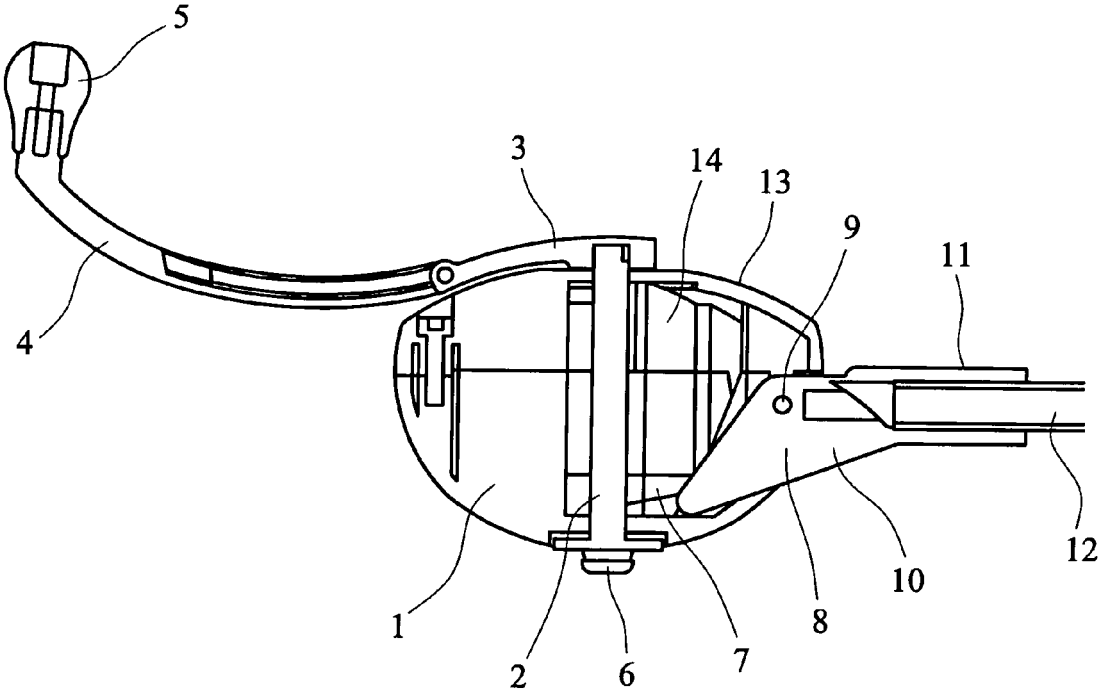

FIG. 2

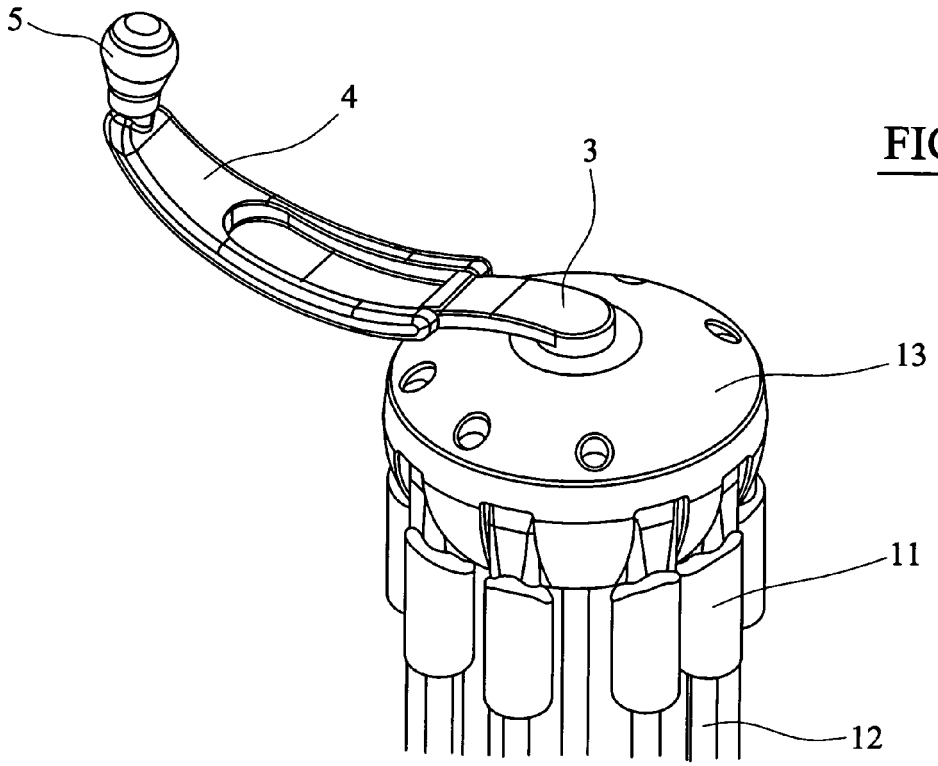

FIG. 3

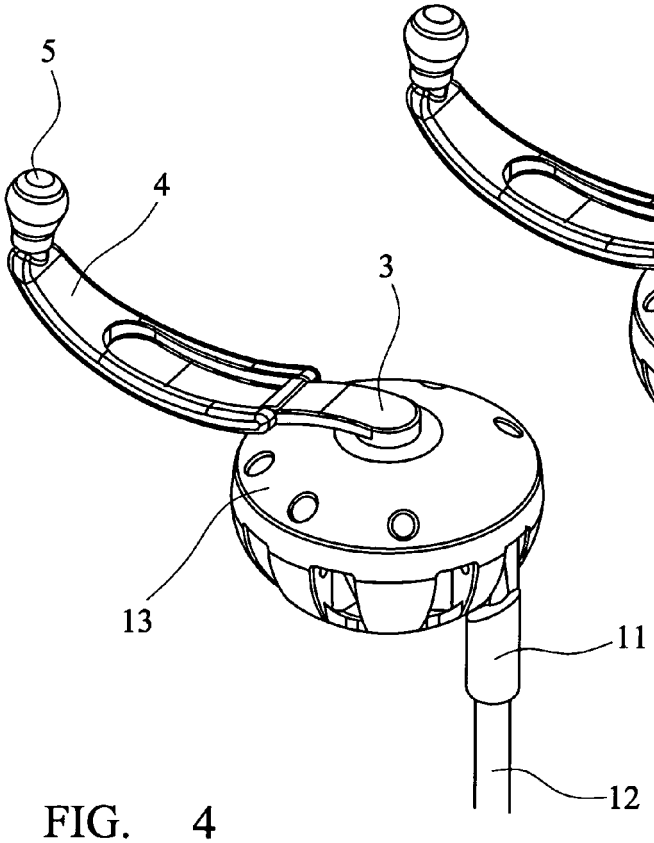

FIG. 4

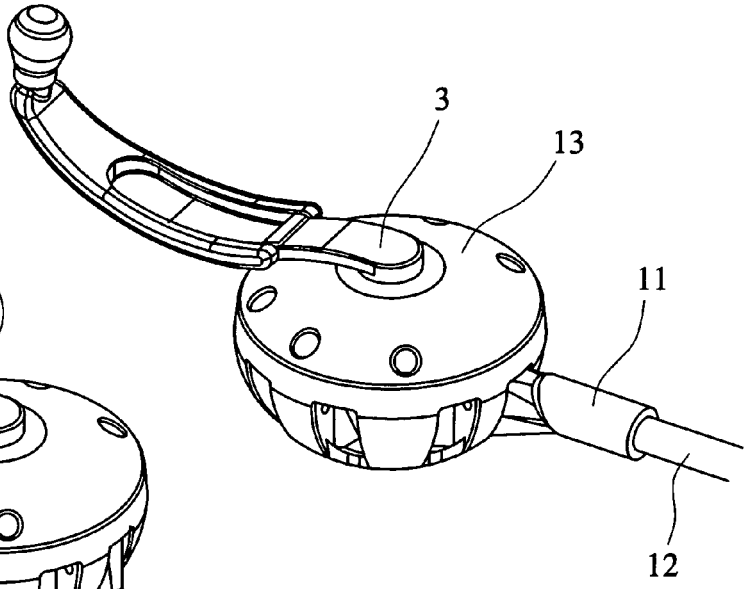

FIG. 5

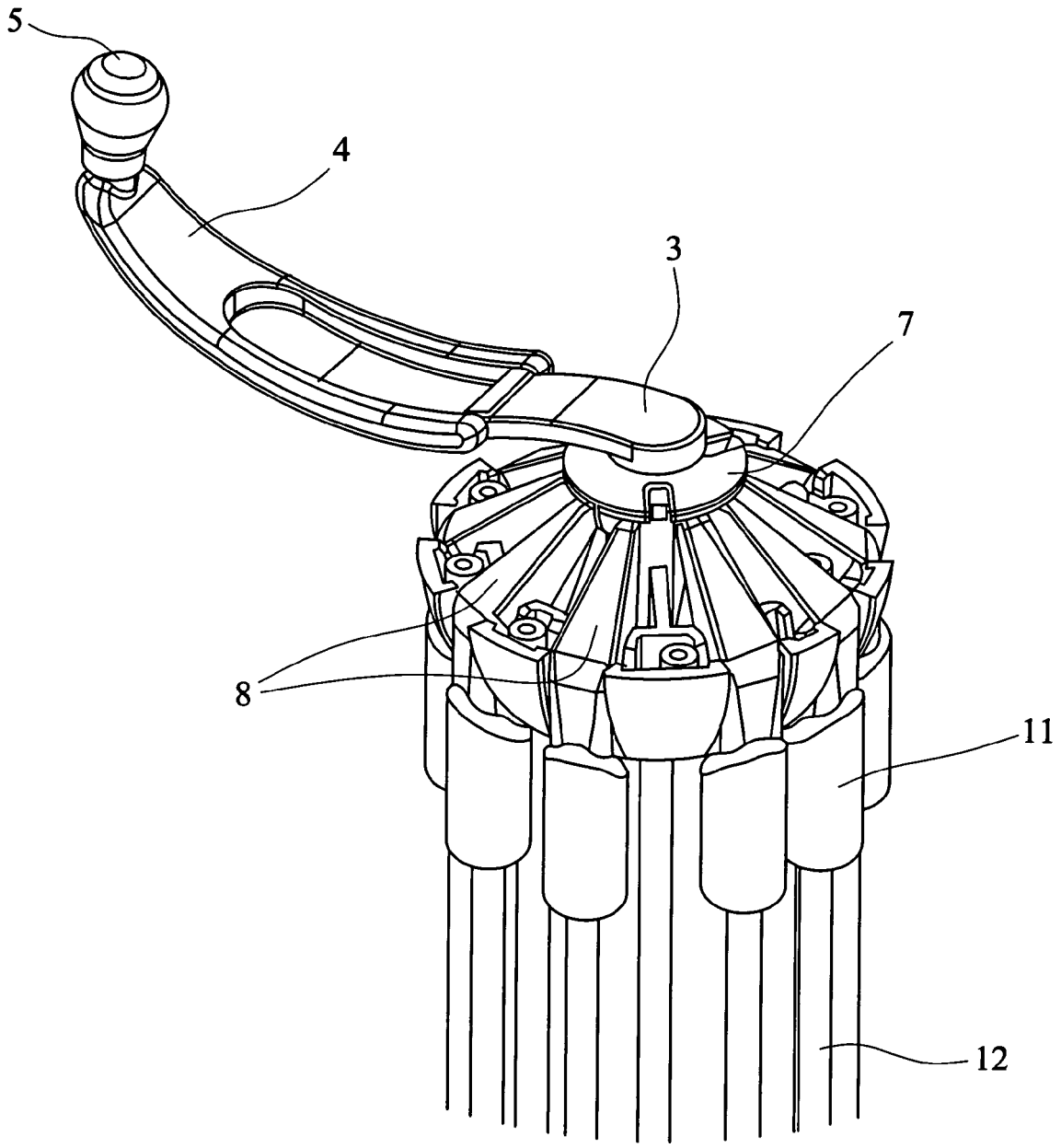

FIG. 6