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(54) **SHADE STRUCTURE ASSEMBLIES AND COMPONENTS**

(57) A rib end connector, a plug to receive a rib socket, or a rib to be coupled with an upper or lower hub of a shade structure is provided that has a pin connection portion that has a first end configured to be disposed in a channel of an umbrella or other shade structure hub. The apparatus has a second portion opposite the first portion, a first side surface, and a second side surface. A circumferential width of the pin connection portion is defined between the first and second lateral surfaces. A pin channel disposed between the first side surface and the second side surface. The pin channel has a narrowest portion disposed between the first side surface and the second side surface and increases in size between the narrowest portion and the first side surface and/or the second side surface.

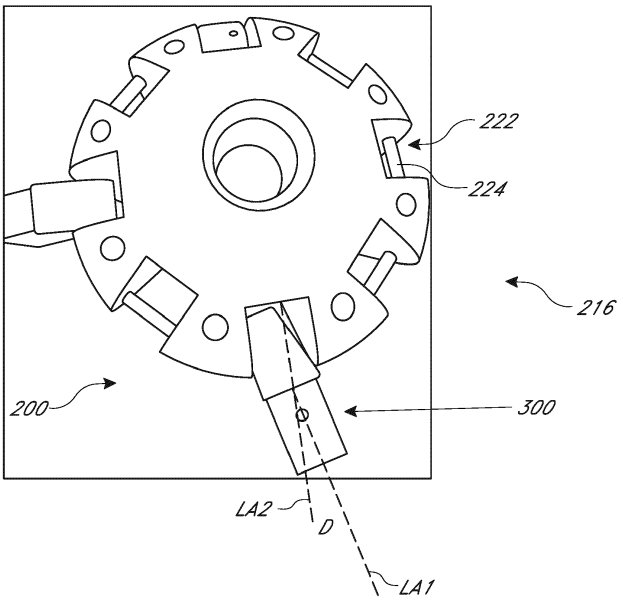

FIG. 4

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Description

BACKGROUND

Field of the Invention

[0001] This application is directed to shade structures, assemblies, and components, including umbrella assemblies and components.

Description of the Related Art

[0002] Umbrellas typically have a symmetrical configuration with an umbrella pole in the center of a canopy assembly. The canopy assembly can include upper and lower hubs with rib members that are foldable and extendable. When extended the umbrella ribs extend a shade-providing canopy over the rib members and pole. The rib members extend radially in a symmetrical manner from the hub or hubs.

SUMMARY

[0003] It is desired to provide shade structures and components therefor that can provide non-symmetrical shade structure and umbrella configurations. For example, a rectangular umbrella can be provided. Ribs can be supported from a central hub. The ribs can extend from the central hub to a periphery of the canopy. Some of the ribs extend radially from the hub to the periphery of the canopy. Some of the ribs extend along a direction angled from a radial direction.

[0004] In one embodiment an umbrella rib apparatus is provided. The apparatus can be a rib end connector, a plug to receive a rib socket, or a rib to be coupled with an upper or lower hub of an umbrella or other shade structure. The apparatus includes a pin connection portion that has a first end configured to be disposed in a channel of an umbrella or other shade structure hub. The apparatus has a second portion opposite the first portion, a first side surface and a second side surface. A circumferential width of the pin connection portion is defined between the first and second lateral surfaces. A pin channel disposed between the first side surface and the second side surface. The pin channel has a narrowest portion disposed between the first side surface and the second side surface. The pin channel increases in size along at least one direction between the narrowest portion and the first side surface and/or the second side surface.

[0005] The pin channel can increase in size in a radial direction. The pin channel can have a constant height from the first side surface to the second side surface. The pin channel can enlarge symmetrically from the narrowest portion to the first side surface and to the second side surface. The pin channel comprises an hourglass shape in longitudinal cross-section.

[0006] At least one of the first side surface and the second side surface can be tapered toward the first end of the pin connection portion. The first side surface and the second side surface can both be tapered toward the first end.

BRIEF DESCRIPTION

[0007] Features of the invention can be better understood from the following detailed description when read in conjunction with the accompanying schematic drawings, which are for illustrative purposes only. The drawings include the following figures:

FIG. 1 is an example of a market umbrella that can include a novel rib end connector;
FIG. 2 is bottom view of a non-symmetrical, e.g., a rectangular, umbrella canopy assembly that can include a novel rib end connector;
FIG. 3 is a view of a rib and hub assembly showing deflection of some ribs thereof to provide different angles of ribs extending from hubs thereof;
FIG. 4 is a top view of one embodiment of a hub assembly that can accommodate different rib orientations aligned with or diverging from radial directions of a hub thereof;
FIG. 5 is a perspective view of the rib end connector shown in FIG. 4;
FIG. 6 is a free end view of the rib end connector shown in FIG. 4;
FIG. 7 is a cross-sectional view of the rib end connector shown in FIG. 6 taken at section plane 7-7 in FIG. 6;
FIG. 8 is a cross-sectional view of the rib end connector shown in FIG. 6 taken at section plane 8-8.

DETAILED DESCRIPTION

[0008] This application discloses an inventive umbrella and other shade structures and components for the same. FIG. 1 shows an assembly 100 of an umbrella. The assembly includes an umbrella pole 104 and canopy frame that includes an upper hub 116 and a lower hub 120. In this umbrella assembly 100 the lower hub 120 is moveable along the umbrella pole 104 between a lowered position (as shown in FIG. 1) and a raised position (not shown but between the lowered position and the position of the upper hub 116). The upper hub 116 and the lower hub 120 are connected to each other by a framework of rib members, including upper ribs 108 and lower ribs 112. The upper ribs 108 are secured at a first end to the upper hub 116 and at an end opposite the first end to a canopy member, e.g., fabric (not shown). The lower ribs 112 are connected to the lower hub 120 at a first end and to a point along the length of the upper ribs 108 at a second end opposite the first end.

[0009] The umbrella assembly 100 is often used for a shade structure that is symmetrical about the umbrella pole 104, e.g., a circular, square, hexagon, or similar shape. FIG. 2 shows a modified embodiment of an um-

brella 100A, which includes a frame structure to be mounted to a pole, similar to that shown in FIG. 1. The umbrella 100A includes a canopy fabric 102. The umbrella 100A differs in providing an asymmetric shape, in this illustrated embodiment a rectangular shape. The umbrella 100A includes the upper hub 116 and a plurality of upper ribs 108 that extend from the upper hub 116 to a periphery of the canopy fabric 102. As can be seen some of the upper ribs 108 extend along a radius of the upper hub 116, e.g., radially relative to the upper hub 116. These hubs are seen at 3, 6, 9, and 12 o'clock in FIG. 2. Four of the upper ribs 108 extend at a different orientation to the upper hub 116. FIG. 2 shows that the umbrella 100A has a connector 130 that is configured to bend along the length thereof at a point between the end of a tubular member of the upper ribs 108 and the radially inner end of the connector 130. The bending of the connector 130 enables the longitudinal axis of the tubular member to be angled relative to a radial direction of the upper hub 116.

[0010] FIG. 3 shows the angulation in more detail. The upper hub 116 can have a hub periphery 121 and a central aperture 123 disposed at a center of the upper hub 116. The hub periphery 121 and the central aperture 123 can be circular and a line extending perpendicularly between these circular structures can be along a radial direction. The upper ribs 108 can be coupled with the upper hub 116 in the channel 122. The upper ribs 108 can be secured to a pin 124 coupled with the body of the upper hub 116. With reference to the upper ribs 108 disposed at the 3 o'clock position, the upper rib 108 can be disposed in the channel 122 at 3 o'clock and can extend radially away from the channel 122 and a longitudinal axis LA1. An angle B can be defined between the channel 122 in which the upper rib 108 at the 3 o'clock position is secured and an adjacent channel 122 located counterclockwise from the 3 o'clock position. The angle B can separate each channel 122 and the channel 122 located adjacent thereto. The connector 130 can bend to allow the upper rib 108 in the channel 122 adjacent to and counterclockwise of the 3 o'clock position to extend along a longitudinal axis LA2. The longitudinal axis LA2 can be disposed at an angle A from the longitudinal axis LA1. As a result, an angle C can be defined between the longitudinal axis LA2 and the radial direction of the channel 122 to which the upper rib 108 having the longitudinal axis LA2 is coupled. The connector 130 is useful but due to the bending at the narrow portion thereof, the connector 130 can be subject to fatigue failure.

[0011] FIG. 4 shows a hub assembly 200 that can provide advantages in eliminating bending while still providing angulation for asymmetric umbrella configurations as in FIG. 3. The hub assembly 200 includes a hub 216 that has a plurality of channels 222 disposed along radial directions of the hub 216. The channel 222 can be provided with pin 224 to connect the upper ribs 108 thereto. The foregoing assumes that the hub 216 is an upper hub, but the hub 216 can be secured to the lower ribs 112 if the hub 216 is a lower hub. The channel 222 can be symmetrically disposed about the hub 216, e.g., extending along radial directions that are separated by equal angular distances, e.g., 45 degrees, 60 degrees, 90 degrees or other equal angular spacing. The channel 222 can have a common circumferential width at each position. The channel 222 can be configured to each receive a rib end connector 300 coupled with an elongate tubular member of a corresponding upper rib 108. FIG. 4 shows that the rib end connector 300 can be positioned along a longitudinal axis LA2 that is angled compared to a longitudinal axis LA1, which corresponds to a direction of a rib aligned with a radial direction of the channel 222. An angle D can be provided between the longitudinal axis LA1 and the longitudinal axis LA2. The angle D allows an upper rib 108 coupled with the channel 222 and angled as shown to reach a corner of a rectangular or other asymmetric umbrella structure, in a manner similar to that shown in FIG. 3 but without requiring bending within the rib end connector 300.

[0012] FIG. 5 shows that the rib end connector 300 can include a rib connection portion 304 and a pin connection portion 308. The rib connection portion 304 can be configured to be coupled with a tubular member of the upper rib 108. For example, the tubular member can be open at the first (radially inner) end. The rib connection portion 304 can be a reduced thickness or reduced profile projection from or compared to the pin connection portion 308 such that the rib connection portion 304 can be inserted into the tubular member. The tubular member wall thickness and the reduced thickness or profile portion can be sized or configured such that the tubular member of the upper rib 108 is flush with the profile of the pin connection portion 308.

[0013] FIG. 6 shows that the rib end connector 300 can be tapered such that the end of the pin connection portion 308 opposite the rib connection portion 304 can be reduced profile compared to the location of the pin connection portion 308 adjacent to the rib connection portion 304. Specifically, opposing side surfaces 328 can taper towards each other as they extend away from the connection portion 304 and towards a distal end of the pin connection portion. The pin connection portion 308 can taper to a rounded nose portion that had a profile or size less than the profile or size of the rib connection portion 304.

[0014] FIGS. 7 and 8 shows that the rib end connector 300 has a varying size pin channel 320 disposed therethrough. The pin channel 320 can have a narrowest portion 324 disposed at a central portion of the rib end connector 300, e.g., along a longitudinal central plane of the rib end connector 300. The narrowest portion 324 can be sized to be slip fit over the pin 224 such that the rib end connector 300 can easily rotate about an axis that is perpendicular to the opening at the narrowest portion 324. That is the rib end connector 300 can rotate about the axis 302A (see FIG. 5) as the upper ribs 108 move when an umbrella with the hub assembly 200 is moved

from open to closed. The pin channel 320 can enlarge in at least one direction away from the narrowest portion 324 (e.g., hourglass shaped). The pin channel 320 can enlarge in both directions away from the narrowest portion 324. The pin channel 320 can enlarge along a direction aligned with the rib connection portion 304 and the pin connection portion 308. The radially inner to radially outer dimension of the pin channel 320 can increase between the narrowest portion 324 and an opposing side surfaces 328 of the rib end connector 300. The increase in this dimension can be seen on both sides of the narrowest portion 324. FIG. 7 shows that the increase in this dimension can have an hourglass shape.

[0015] The pin channel 320 can have a constant height in one embodiment. In this context, the height is the dimension perpendicular to the radial dimension. The shape of the pin channel 320 are the opposing side surfaces 328 is oval with a major axis aligned with the radial direction and a minor axis transverse to the radial direction. The minor axis at the opposing side surfaces 328 can be equal to the radius of the opening at the narrowest portion 324.

[0016] In use, the shape of the pin channel 320 allows an upper ribs 108 including the rib end connector 300 coupled to the hub 216 to be angled away from a radial direction. The pin channel 320 can allow a pin orientation P1 (illustrated horizontally by solid lines in FIG. 7) to be transverse to the opening at the narrowest portion 324 and aligned with the axis 302A. The pin channel 320 can allow a pin orientation P2 (illustrated angled by dashed lines in FIG. 7) that provides the angle D seen in FIG. 4. The angle D is provided by rotating the rib end connector 300 about the axis 302B. The angle D can be achieved in the opposite direction by rotating the pin orientation P2 such that the right side portion thereof is above the direction P1.

[0017] The oval shape of the pin channel 320 provides that in some embodiments an upper rib 108 with the rib end connector 300 will tilt in only one direction in addition to open-close rotation about the pin 224. For example the upper ribs 108 disposed in a central portion of the channel 222, e.g., aligned with the horizontal mid-plane of the hub 216 can tilt in the circumferential direction of the hub 216 but will not tilt about the longitudinal axis of the upper rib 108. This one direction tilting allows the upper rib 108 to extend along a direction that can reach a corner portion of a rectangular or other asymmetric shape while another rib can extend along the radial direction to reach another portion of a periphery of a canopy fabric 102. By providing such tilting the rib end connector 300 is able to provide for angling the ribs without relying on bending of a connector.

[0018] In an alternative embodiment, the pin channel 320 lacks the narrowest portion 324. The pin channel 320 can extend from the first opposing side surface 328 to the second opposing side surface 328 forming a slot within the rib end connector having substantially the same cross sectional shape therethrough. The enlarged internal shape of the pin channel 320 can also accommodate the pin orientation P2. The tapered first and second opposing side surfaces 328 can accommodate angling of the connection portion 304 about the axis 302B within the inner walls of the channel 222. The slot formed by the pin channel 320 can accommodate angling of the connection portion 304 about the axis 302B on the pin 224.

Claims

1. A shade-structure rib apparatus, comprising:

   - a pin connection portion (308) comprising a first end configured to be disposed in a channel (222) of a shade structure hub (216), a second portion (304) opposite the first portion, a first side surface and a second side surface (328), a circumferential width of the pin connection portion (308) being defined between the first and second side surfaces (328),
   - a pin channel (320) disposed between the first side surface and the second side surface (328), the pin channel (320) having a narrowest portion (324) disposed between the first side surface and the second side surface (328), the pin channel (320) increasing in size along at least one direction between the narrowest portion (324) and the first side surface and/or the second side surface (328).

2. The rib apparatus of Claim 1, wherein the pin channel (320) increases in size in a radial direction.

3. The rib apparatus of Claim 2, wherein the pin channel (320) has a constant height from the first side surface to the second side surface (328).

4. The rib apparatus of Claim 1, wherein the pin channel (320) enlarges symmetrically from the narrowest portion (324) to the first side surface and to the second side surface (328).

5. The rib apparatus of Claim 1, wherein the pin channel (320) comprises an hourglass shape in longitudinal cross-section.

6. The rib apparatus of Claim 1, wherein at least one of the first side surface and the second side surface (328) is tapered toward the first end.

7. The rib apparatus of Claim 1, wherein the first side surface and the second side surface (328) are both tapered toward the first end.

8. The rib apparatus of Claim 1, wherein the second portion (304) is configured to be secured to a tubular

member of an umbrella rib (108) to provide a rib assembly.

9. The rib apparatus of Claim 1, further comprising an elongate tubular member having an open end portion having the second portion dispose therein, the elongate tubular member having a free end configured to be coupled with a periphery of an umbrella canopy.

10. The rib apparatus of Claim 1, further comprising an elongate tubular member extending away from the second portion to a free end, the free end configured to be coupled with a periphery of an umbrella canopy.

11. A rib apparatus, comprising:

- a pin connection portion (308) comprising a first end configured to be disposed in a channel (222) of a shade structure hub and a second portion (304) opposite the first portion configured to be disposed within a shade-structure rib, the first end including a first side surface and a second side surface (328) that taper together from the second portion towards a distal end of the first portion;
- a pin slot (320) disposed between the first side surface and the second side surface (328), the pin slot (320) configured to allow angling of a pin (224) received therein.

12. The rib apparatus of Claim 11, wherein the pin slot (320) increases in size from a narrowest portion (324) towards the first side surface and the second side surface (328).

13. The rib apparatus of Claim 11, wherein the pin slot (320) has a constant height from the first side surface to the second side surface (328).

14. The rib apparatus of Claim 11, wherein the pin slot (320) has a constant width from the first side surface to the second side surface (328).

15. The rib apparatus of Claim 11, wherein the pin slot (320) comprises an hourglass shape in longitudinal cross-section.

16. The rib apparatus of Claim 11, wherein the second portion is configured to be secured to a tubular umbrella rib (108) to provide a rib assembly.

17. The rib apparatus of Claim 11, further comprising an the umbrella rib (108) having an open end portion with the second portion dispose therein.

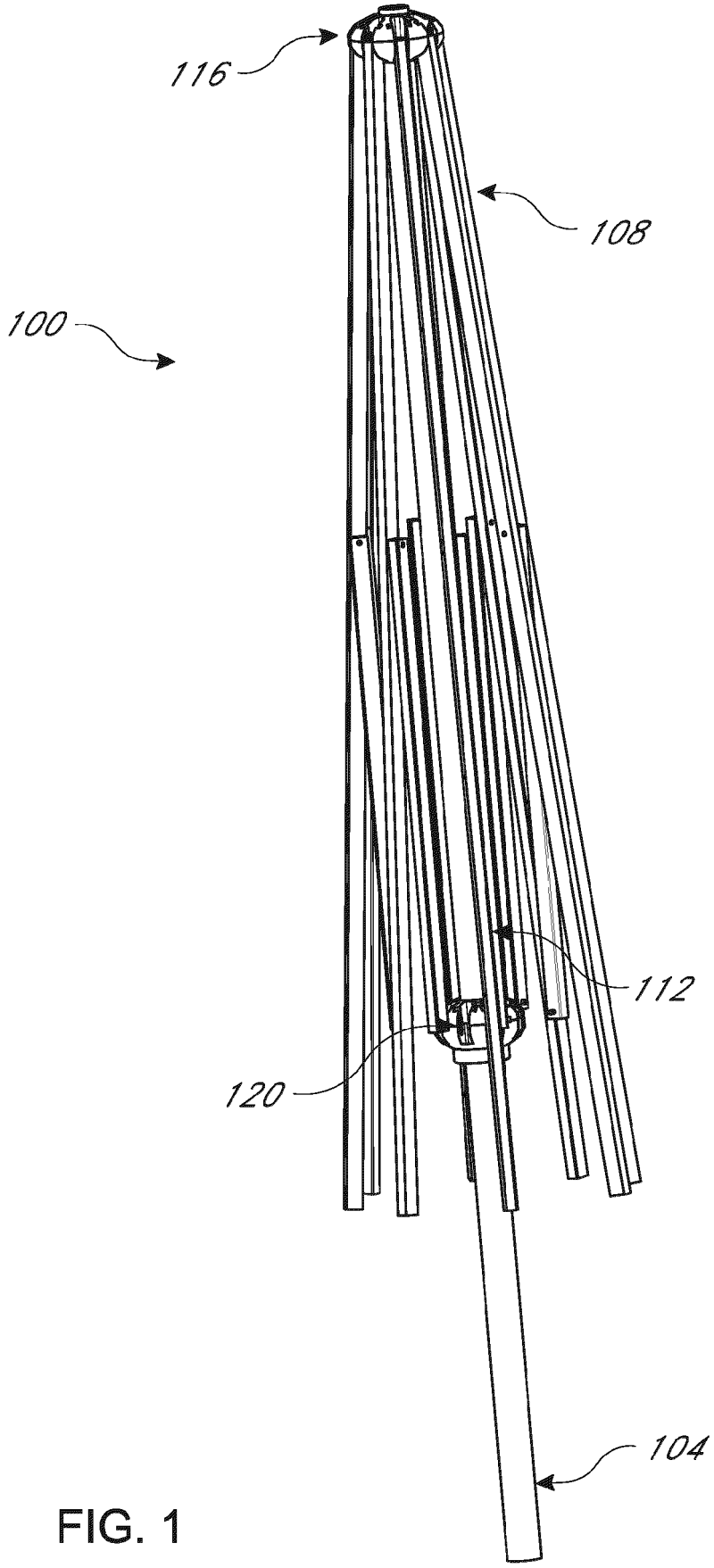

FIG. 1

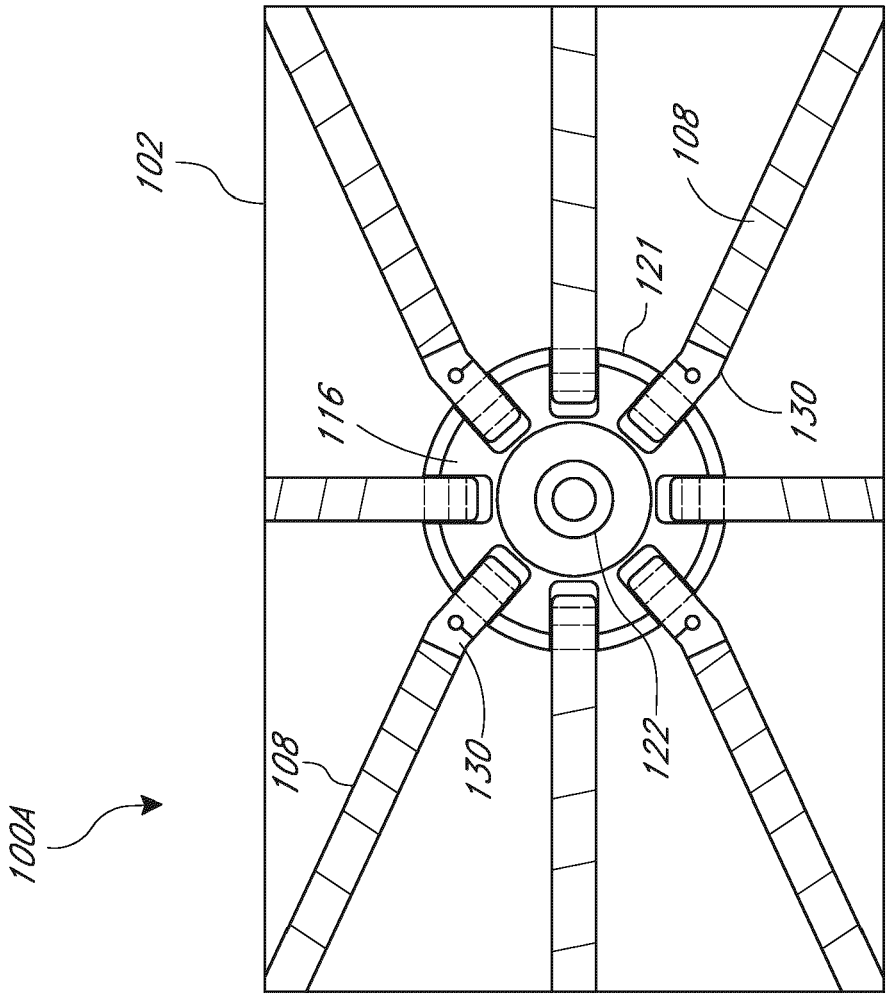

FIG. 2

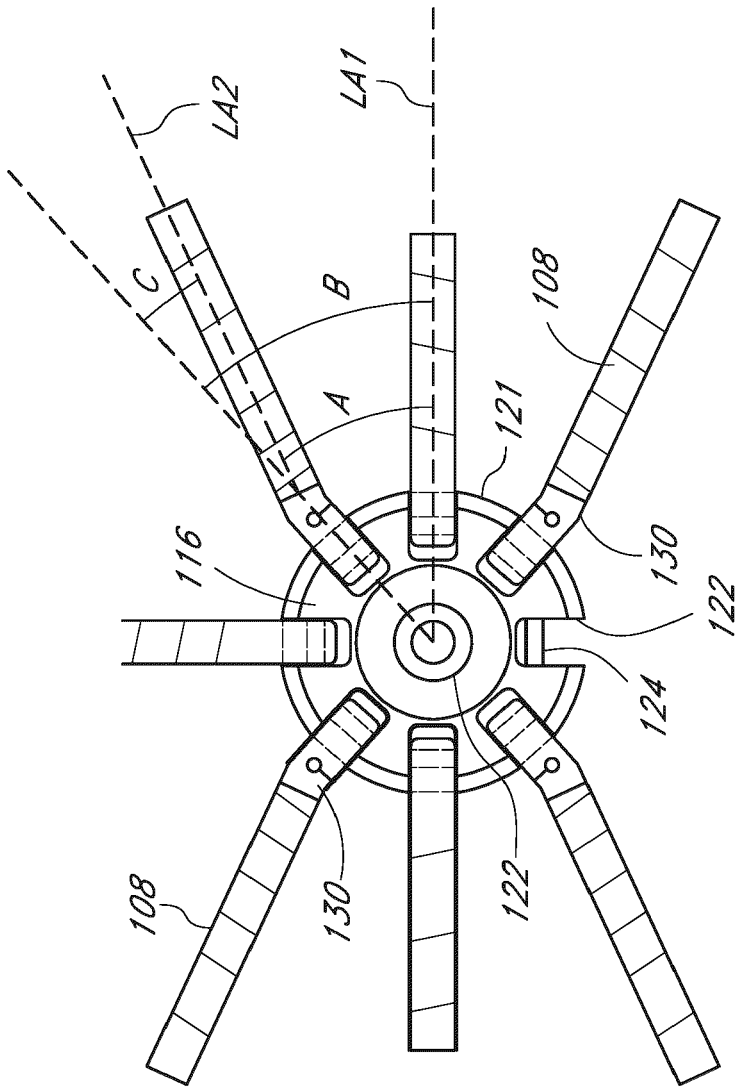

FIG. 3

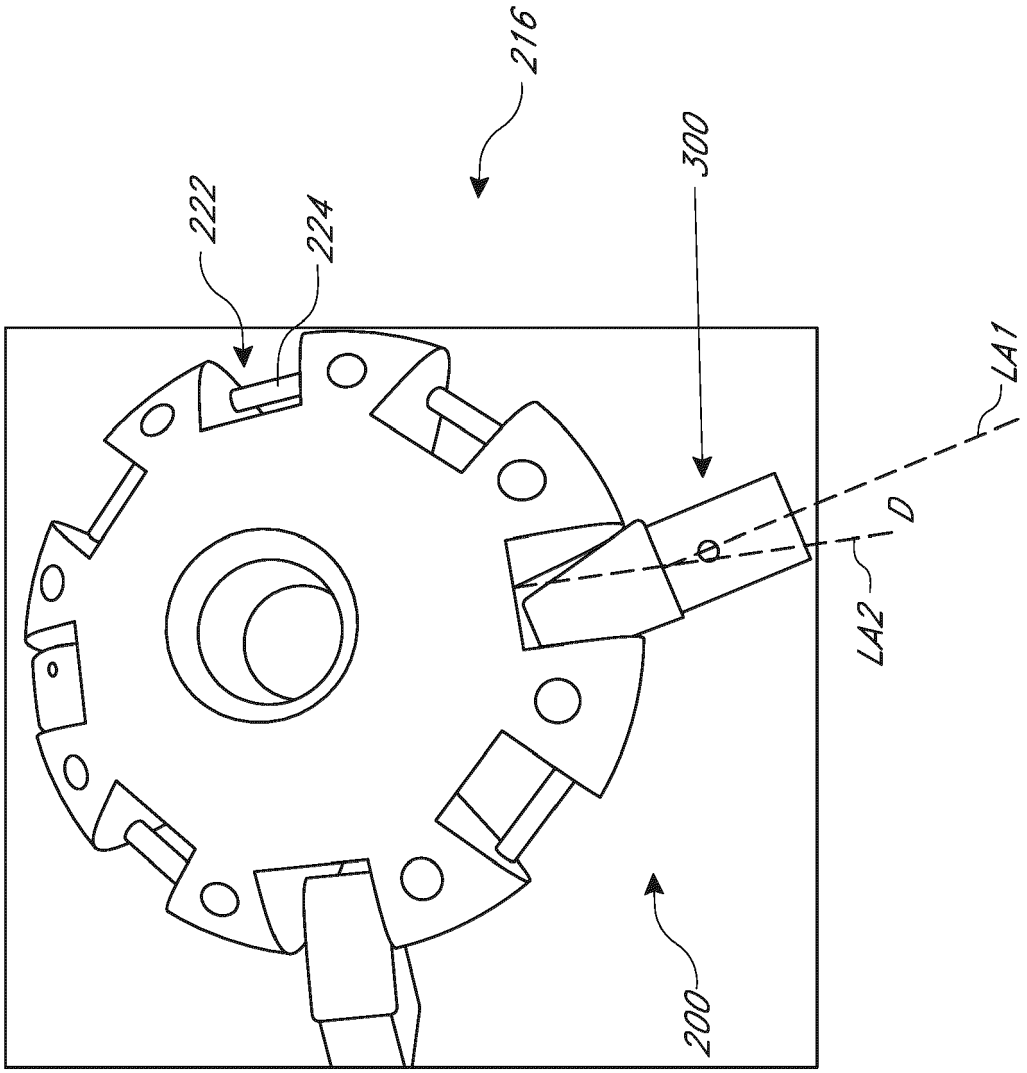

FIG. 4

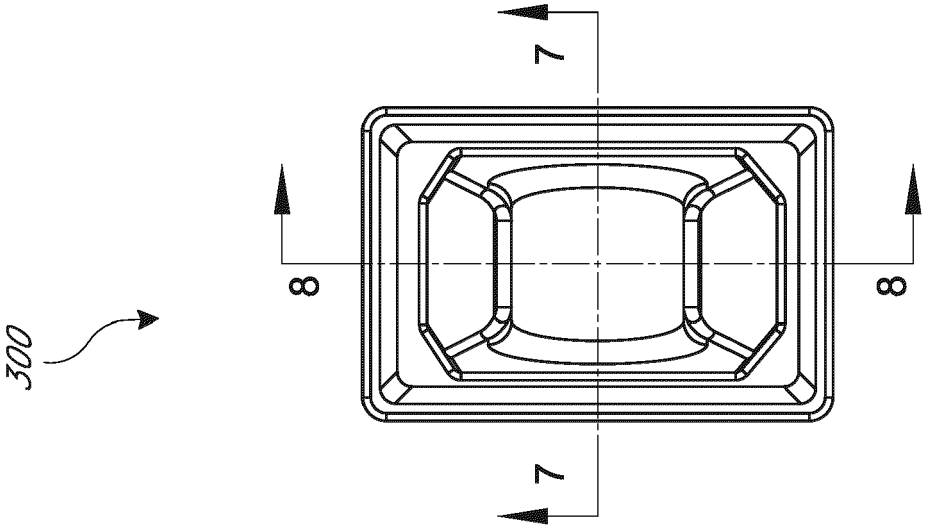

FIG. 6

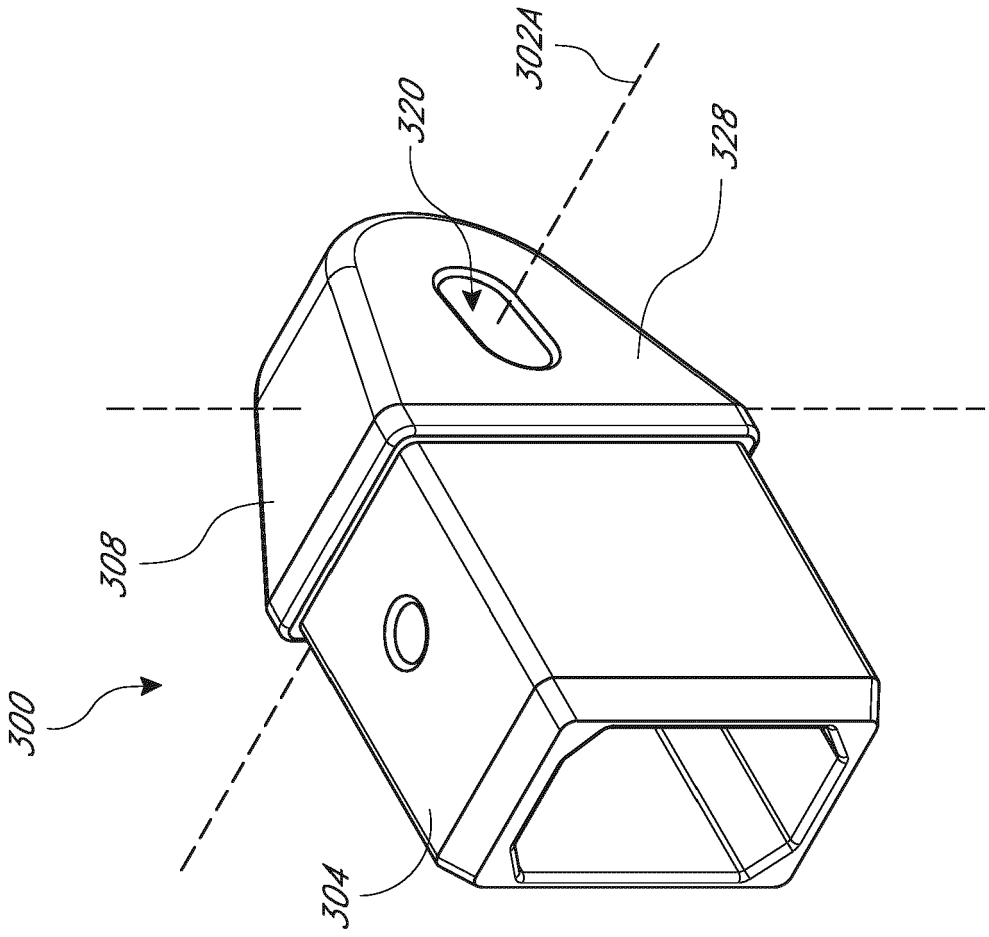

FIG. 5

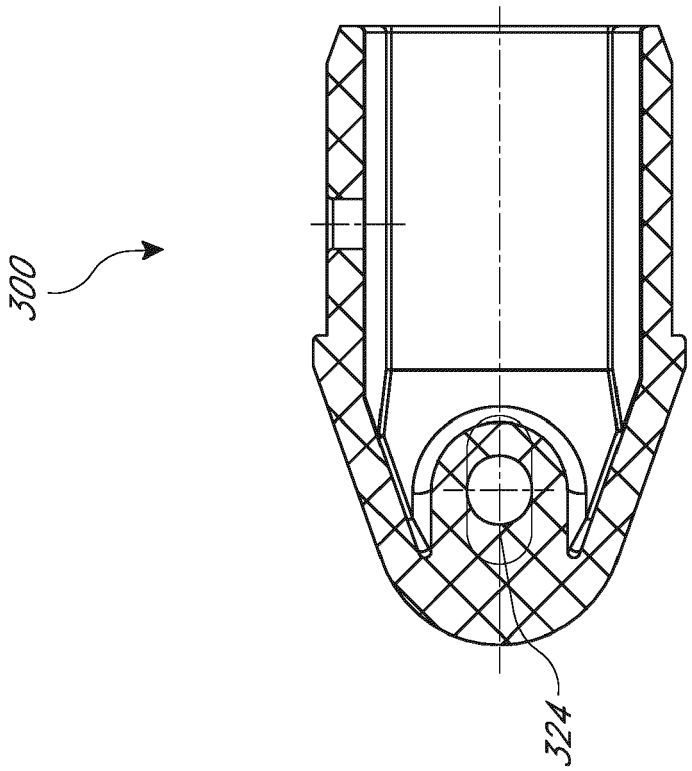

FIG. 8

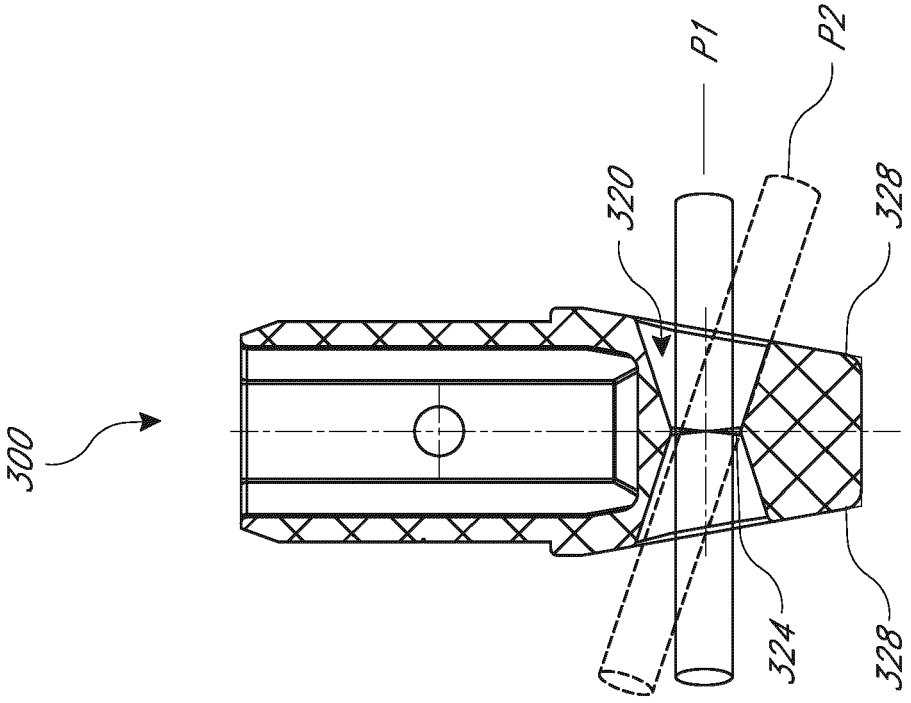

FIG. 7

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PARTIAL EUROPEAN SEARCH REPORT

under Rule 62a and/or 63 of the European Patent Convention. This report shall be considered, for the purposes of subsequent proceedings, as the European search report

Application Number
EP 21 02 0280

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 201 061 309 Y (ZUOXIAN JIN [CN]) 21 May 2008 (2008-05-21) * figure 2 *	1,4-10	INV. A45B25/02 A45B25/10
X	US 5 715 853 A (LIN YAO-CHIN [TW]) 10 February 1998 (1998-02-10) * figures 1, 2 *	1-3	ADD. A45B11/00 A45B23/00 A45B25/00
A	EP 2 460 432 A2 (DI CESARE JOHN DAVID [JP]) 6 June 2012 (2012-06-06) * the whole document *	1	
A	US 3 431 925 A (KRAFT PAUL) 11 March 1969 (1969-03-11) * the whole document *	1	

TECHNICAL FIELDS SEARCHED (IPC)

A45B

INCOMPLETE SEARCH

The Search Division considers that the present application, or one or more of its claims, does/do not comply with the EPC so that only a partial search (R.62a, 63) has been carried out.

Claims searched completely :

Claims searched incompletely :

Claims not searched :

Reason for the limitation of the search:
see sheet C

Place of search	Date of completion of the search	Examiner
The Hague	16 March 2022	Zetzsche, Brigitta

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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INCOMPLETE SEARCH
SHEET C

Application Number
EP 21 02 0280

Claim(s) completely searchable:
1-10

Claim(s) not searched:
11-17

Reason for the limitation of the search:

In reply to the invitation to indicate the claims on which the search is to be based, the applicant failed to supply the requested indication in due time.
Thus, the search report has been drawn up on the basis of the first independent claim of each category (Rule 62a(1) EPC).
As such, claims 1-10 have been searched.
The applicant's attention is drawn to the fact that the application will be further prosecuted on the basis of subject-matter for which a search has been carried out and that the claims should be limited to that subject-matter at a later stage of the proceedings (Rule 62a(2) EPC).

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 21 02 0280

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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16-03-2022

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		US 2012298159 A1	29-11-2012
US 3431925 A	11-03-1969	NONE	

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