



(12) **United States Patent**
Harrison et al.

(10) **Patent No.:** **US 9,615,636 B2**
(45) **Date of Patent:** **Apr. 11, 2017**

(54) **METHOD FOR MANUFACTURING A CANOPY APPARATUS**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 457 days.

(21) Appl. No.: **14/489,923**

(22) Filed: **Sep. 18, 2014**

(65) **Prior Publication Data**

US 2015/0000101 A1 Jan. 1, 2015

Related U.S. Application Data

(63) Continuation-in-part of application No. 13/730,820, filed on Dec. 28, 2012, now abandoned.

(51) **Int. Cl.**
A45B 11/00 (2006.01)
F16M 11/14 (2006.01)

(Continued)

(52) **U.S. Cl.**
CPC **A45B 11/00** (2013.01); **F16M 11/14** (2013.01); **F16M 11/2078** (2013.01); **F16M 13/02** (2013.01); **A45B 15/00** (2013.01); **A45B 2025/003** (2013.01); **A45F 3/52** (2013.01); **Y10T 29/49826** (2015.01)

(58) **Field of Classification Search**
CPC ... **A45B 11/00**; **A45B 15/00**; **A45B 2025/003**; **A45B 17/00**; **F16M 13/02**; **F16M 11/14**; **F16M 11/2078**; **F16M 11/12**; **Y10T 29/49826**; **A45F 3/52**; **F16C 11/106**
See application file for complete search history.

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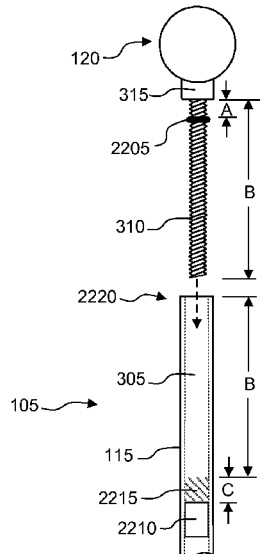
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(57) **ABSTRACT**

Embodiments of the invention provide a canopy system and a method for manufacturing at least a portion of the canopy system. The canopy system may include: a canopy that includes a shaft and a canopy ball coupled to the shaft; a double socket arm connected to the canopy via the canopy ball; and a mount, the mount having a mounting ball, the mount connected to the double socket arm via the mounting ball, the canopy system thus configured for a wide range of canopy articulation with respect to the mount. Alternative embodiments are provided for the shaft, double socket arm and mounts. A manufacturing process is provided for securing the canopy ball to the shaft.

11 Claims, 10 Drawing Sheets



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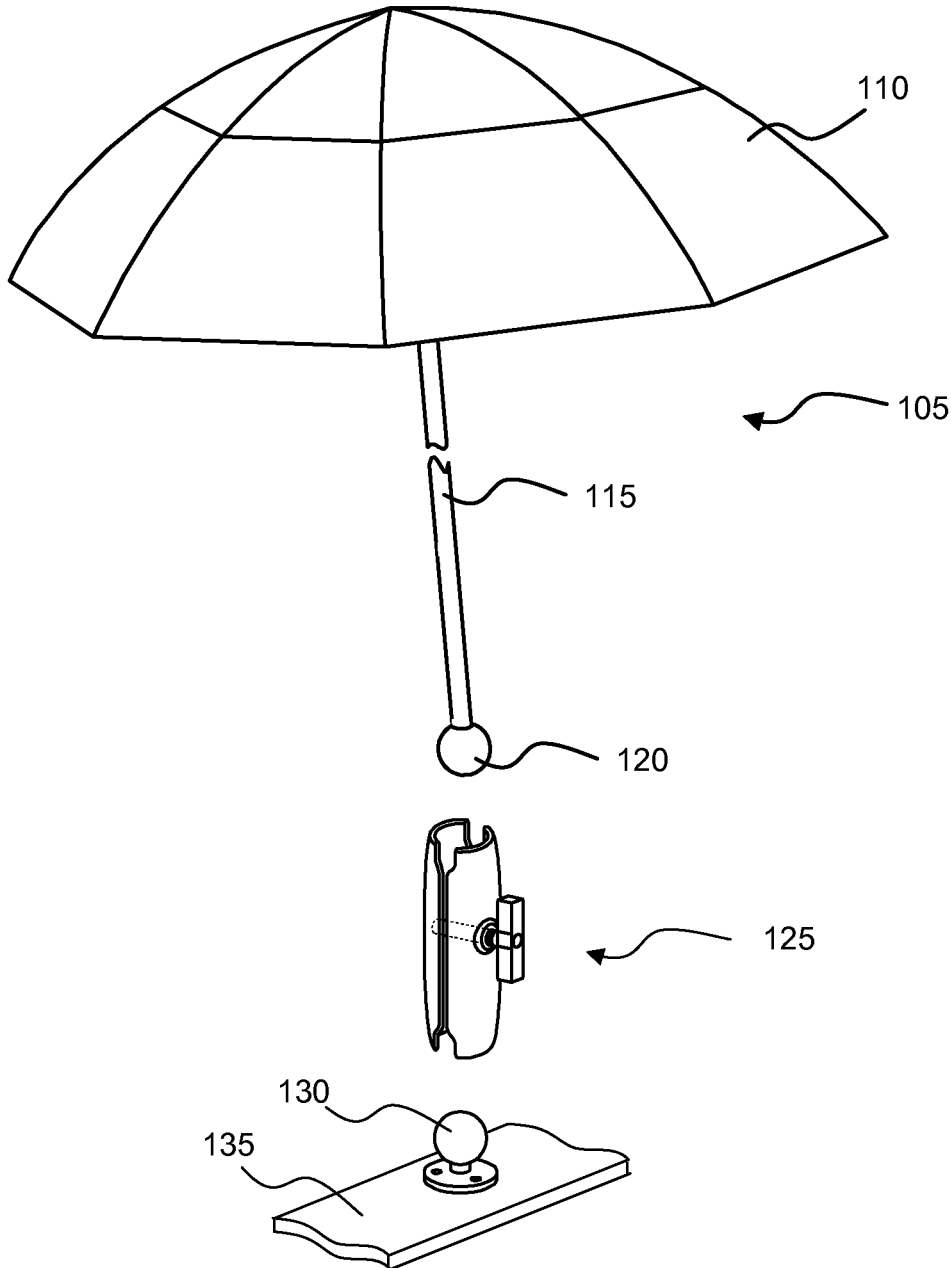


FIG. 1

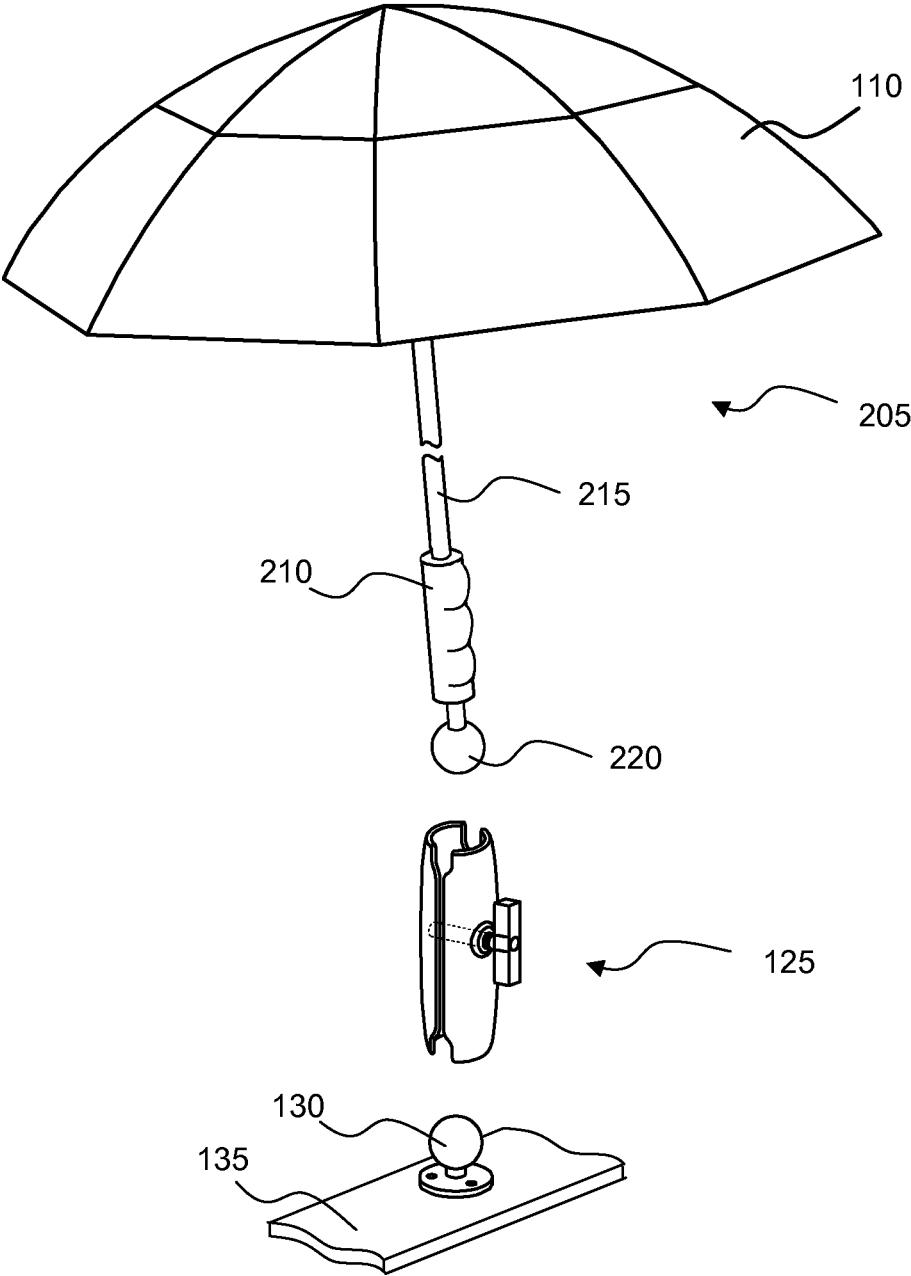
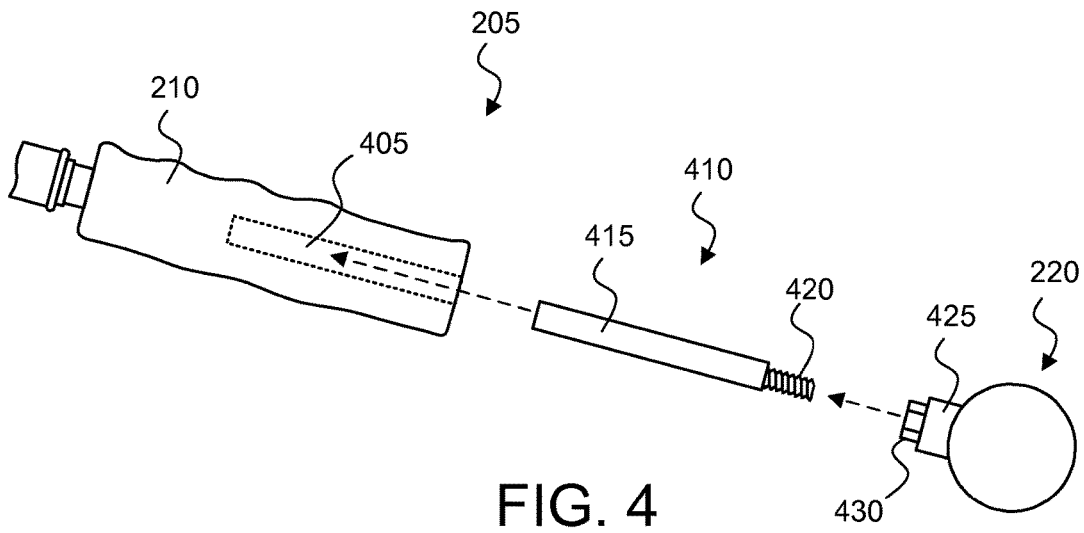
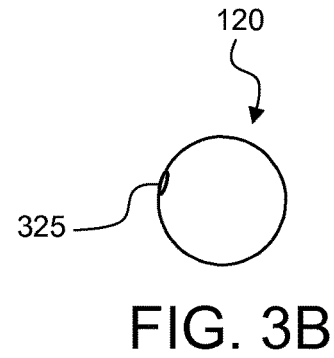
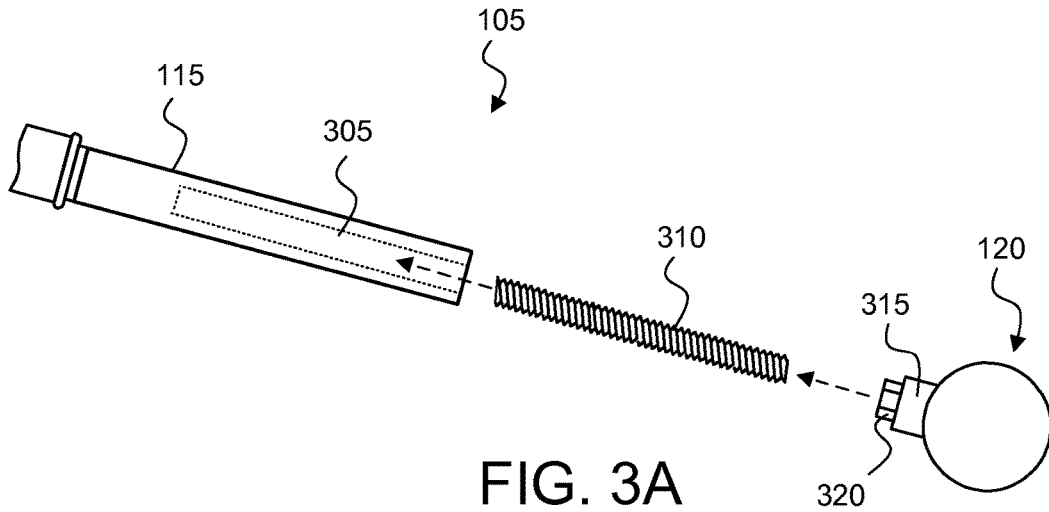


FIG. 2



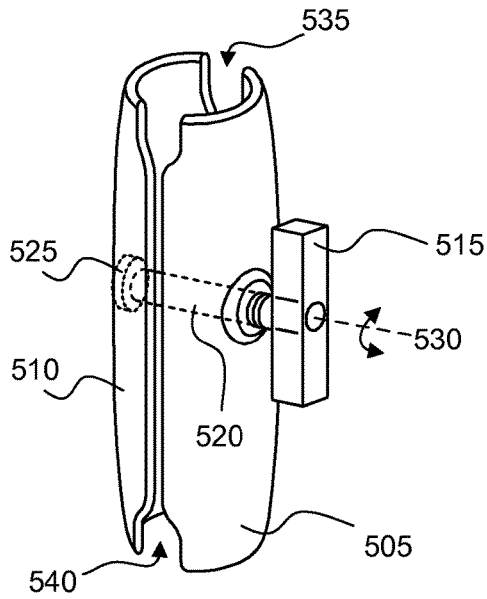


FIG. 5

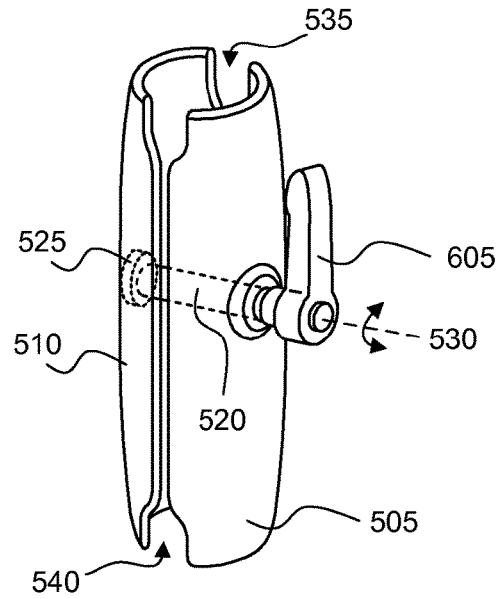


FIG. 6

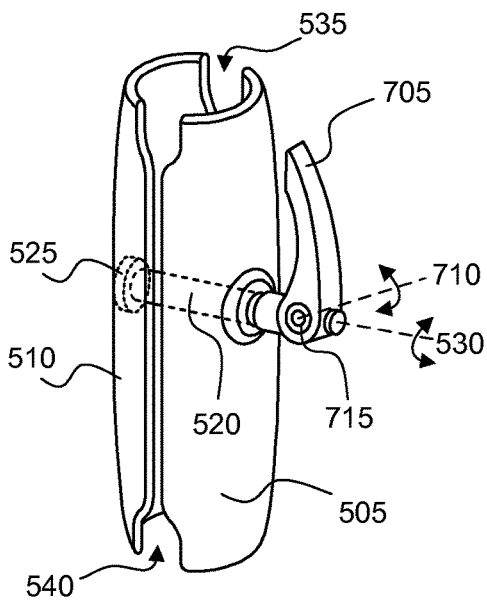


FIG. 7

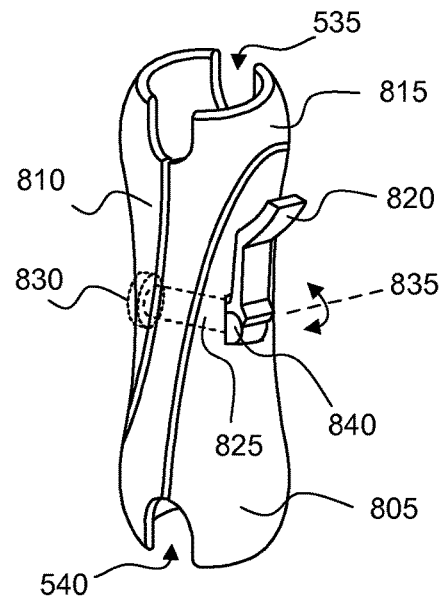


FIG. 8

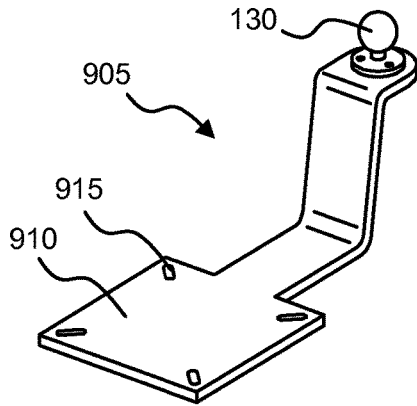


FIG. 9

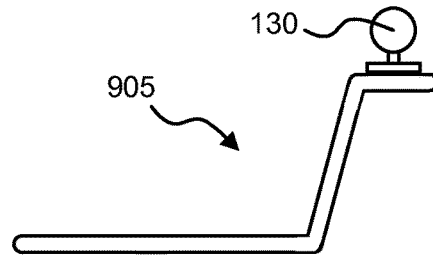


FIG. 10

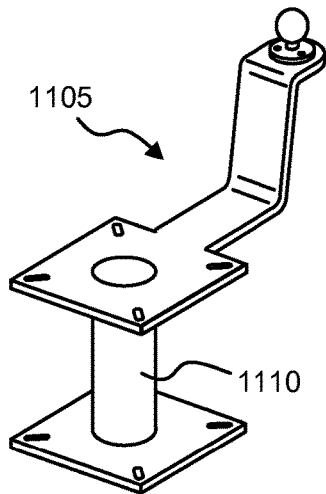


FIG. 11

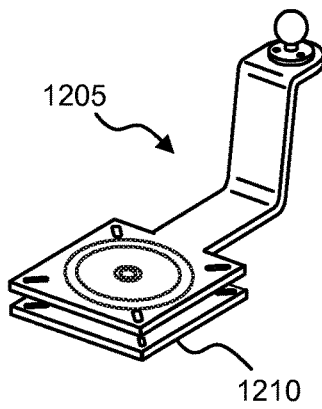


FIG. 12

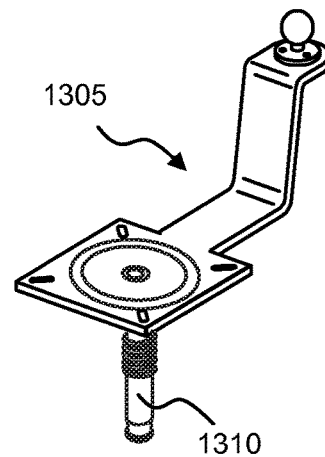


FIG. 13

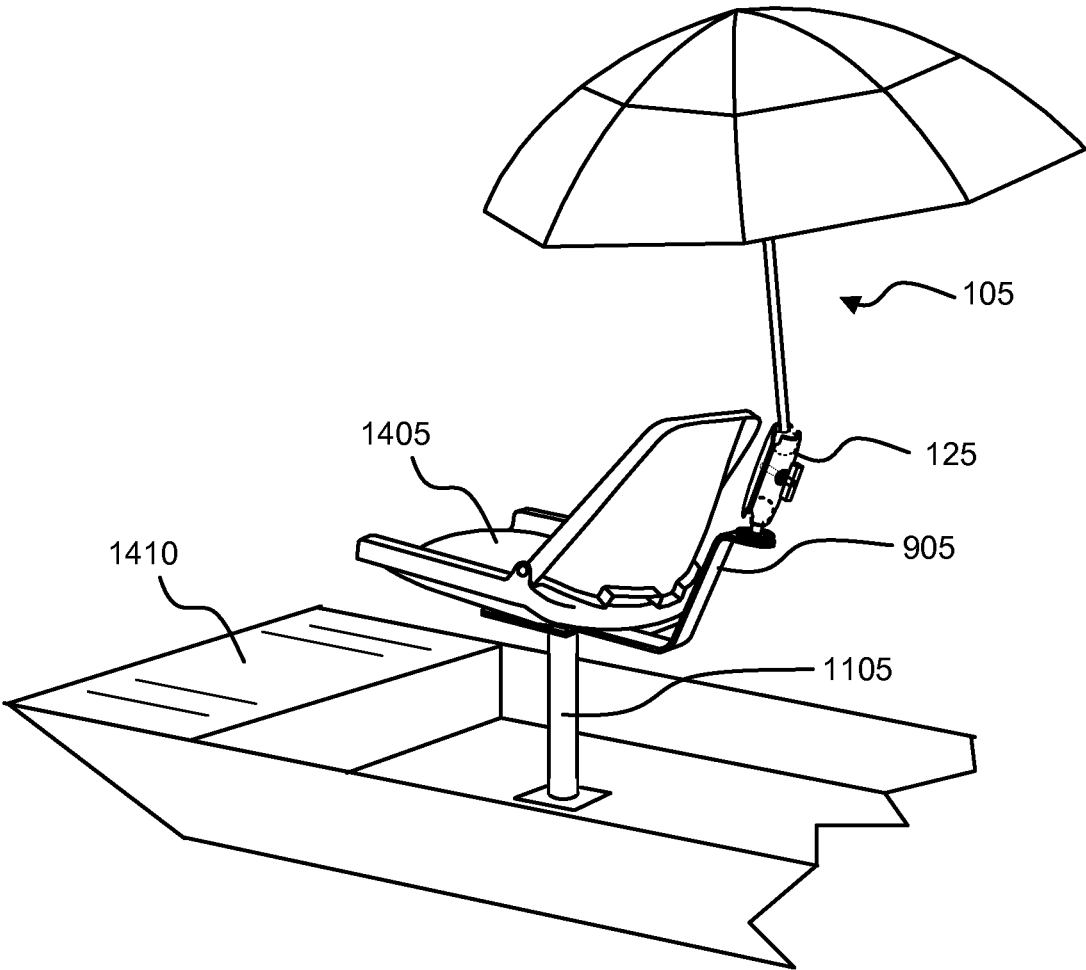


FIG. 14

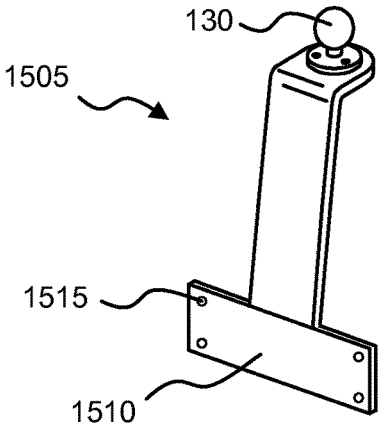


FIG. 15

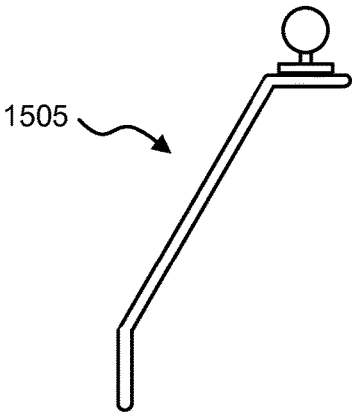


FIG. 16

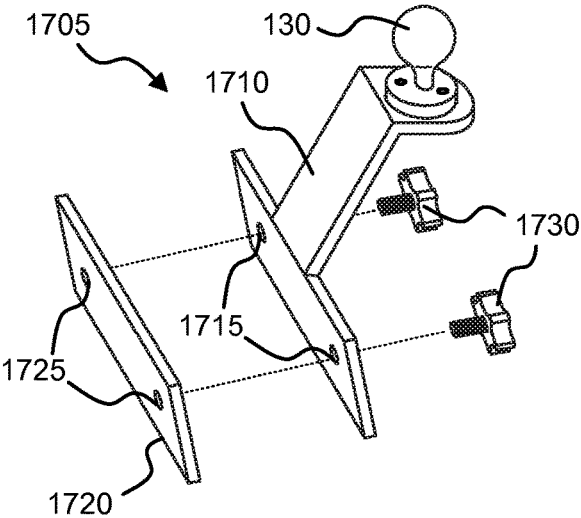


FIG. 17

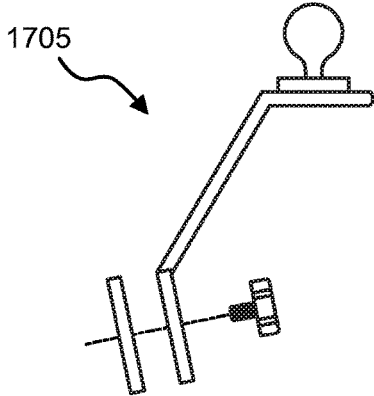


FIG. 18

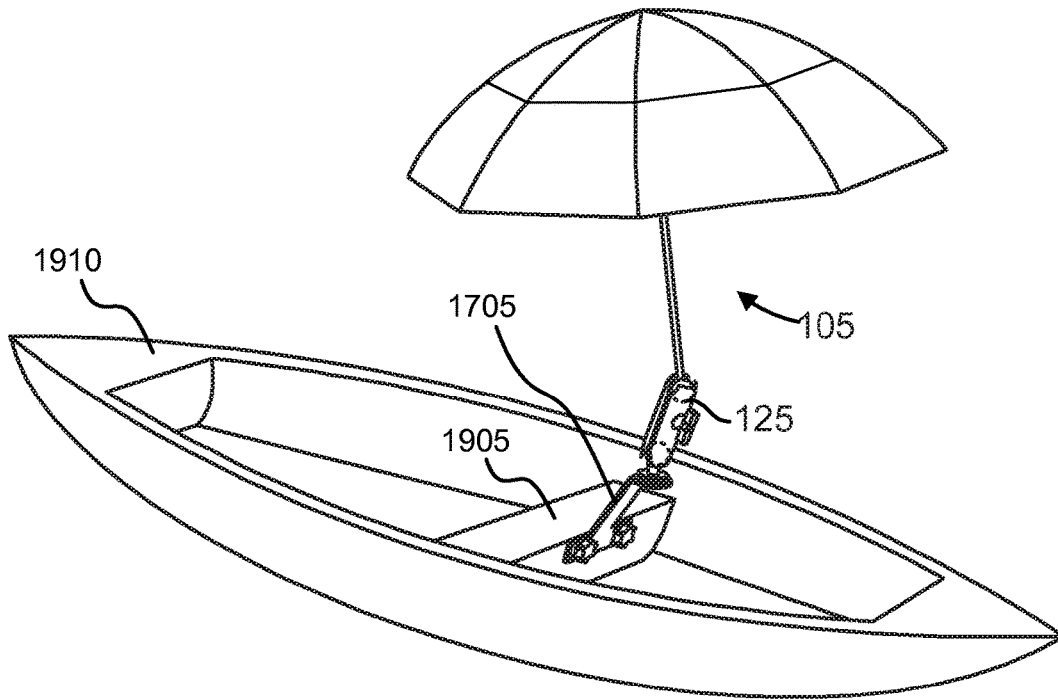


FIG. 19

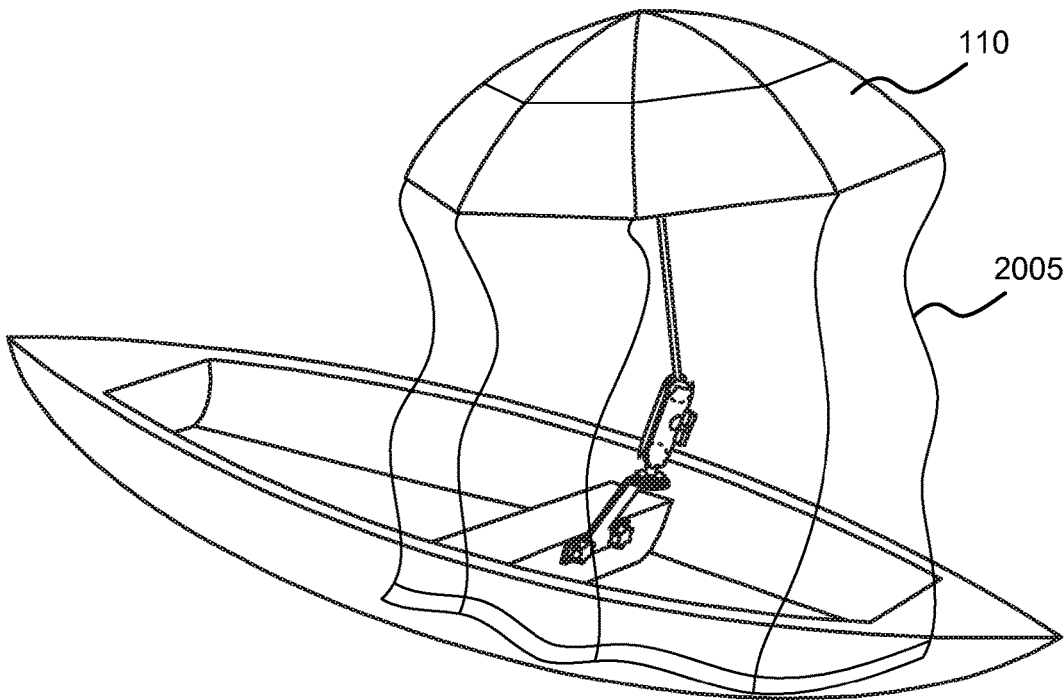


FIG. 20

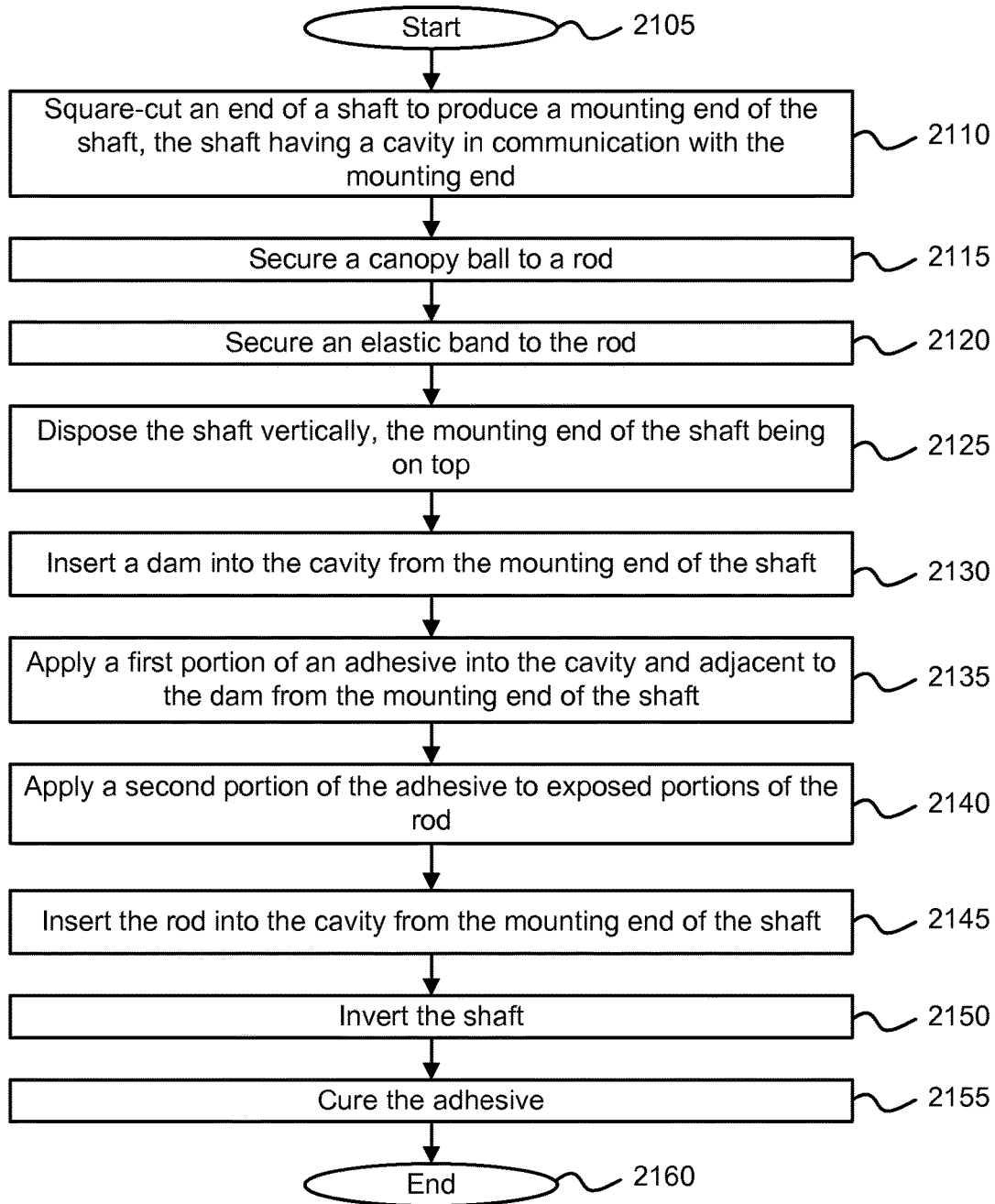


FIG. 21

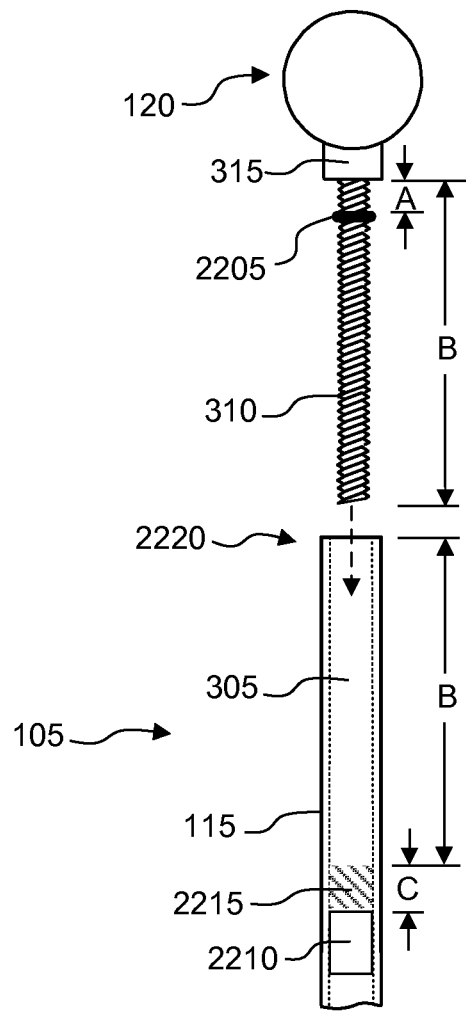


FIG. 22

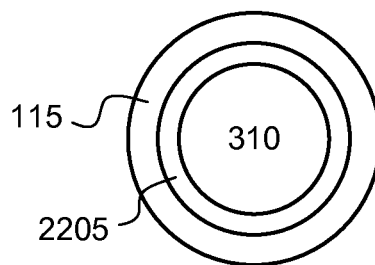


FIG. 23

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METHOD FOR MANUFACTURING A CANOPY APPARATUS

CROSS-REFERENCE TO RELATED APPLICATIONS

This is a continuation-in-part (CIP) of U.S. application Ser. No. 13/730,820, filed Dec. 28, 2012.

FIELD OF INVENTION

The invention relates generally to an apparatus that includes a canopy, a/k/a an umbrella or parasol. More specifically, but without limitation, embodiments of the invention include a method for manufacturing at least a portion of the apparatus.

BACKGROUND

Canopies can be utilized to shield a user from rain, sun, or other environmental conditions. Known canopies have many disadvantages, however. For instance, fixed canopies often suffer from limited ranges of articulation. They may, for example, only tilt along a single plane. Although patio table stands are common, fixed canopies typically have limited mounting options for other applications. Improved canopy systems and methods for manufacturing them are therefore needed.

SUMMARY OF THE INVENTION

Embodiments of the invention solve one or more of the shortcomings described above by affixing a canopy ball onto a shaft of the canopy, and coupling a double-socket arm between the canopy ball and a mounting ball. The double-socket arm provides a wide range of articulation in multiple planes. This specification also discloses a method for manufacturing at least a portion of the disclosed apparatus.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the invention are described with reference to the following drawings, wherein:

FIG. 1 is a perspective view of a canopy system, according to an embodiment of the invention;

FIG. 2 is a perspective view of a canopy system, according to an embodiment of the invention;

FIG. 3A is an exploded assembly view of a portion of a canopy, according to an embodiment of the invention;

FIG. 3B is a perspective view of a canopy ball, according to an embodiment of the invention;

FIG. 4 is an exploded assembly view of a portion of a canopy, according to an embodiment of the invention;

FIG. 5 is a perspective view of a double-socket arm, according to an embodiment of the invention;

FIG. 6 is a perspective view of a double-socket arm, according to an embodiment of the invention;

FIG. 7 is a perspective view of a double-socket arm, according to an embodiment of the invention;

FIG. 8 is a perspective view of a double-socket arm, according to an embodiment of the invention;

FIG. 9 is a perspective view of a chair mounting bracket, according to an embodiment of the invention;

FIG. 10 is a side view of the chair mounting bracket illustrated in FIG. 9;

FIG. 11 is a perspective view of a chair mounting bracket, according to an embodiment of the invention;

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FIG. 12 is a perspective view of a chair mounting bracket, according to an embodiment of the invention;

FIG. 13 is a perspective view of a chair mounting bracket, according to an embodiment of the invention;

5 FIG. 14 is a perspective view of a canopy system coupled to a chair, according to an embodiment of the invention;

FIG. 15 is a perspective view of a bench seat mounting bracket, according to an embodiment of the invention;

10 FIG. 16 is a side view of the bench seat mounting bracket illustrated in FIG. 15;

FIG. 17 is a perspective view of a bench seat mounting assembly, according to an embodiment of the invention;

FIG. 18 is a side view of the bench seat mounting assembly illustrated in FIG. 17;

15 FIG. 19 is a perspective view of a canopy system coupled to a bench seat, according to an embodiment of the invention;

FIG. 20 is a perspective view of a canopy system that includes a mosquito net, according to an embodiment of the invention;

20 FIG. 21 is a flow diagram of a manufacturing process, according to an embodiment of the invention;

FIG. 22 is an exploded assembly view of a portion of a canopy, according to an embodiment of the invention; and

25 FIG. 23 is a sectional view of a portion of a canopy, according to an embodiment of the invention.

DETAILED DESCRIPTION

30 Embodiments of the invention are described below with reference to FIGS. 1-23. In the drawings, the same reference designators are used for the same or similar features. The drawings are not necessarily to scale; certain features may be exaggerated for purposes of illustration.

35 FIG. 1 is a perspective view of a canopy system, according to an embodiment of the invention. As illustrated in FIG. 1, a canopy 105 is coupled to a mounting ball 130 on a base 135 via a double-socket arm 125. The canopy 105 includes a cover 110, shaft 115, and a canopy ball 120. The canopy 105 may include vents (not shown) typical in a wind-resistant umbrella. A frame (not shown) of the canopy 105 may be constructed, for example, of metal. A covering on the canopy 105 may be nylon or other fabric as required by application demands. Preferably, the canopy covering provides excellent protection from ultraviolet radiation, for instance with an Ultraviolet Protection Factor (UPF) of >300, blocking 99.99 percent of UV-A radiation and 99.98 percent of UV-B radiation. The shaft 115 is preferably manufactured from Fiber Reinforced Plastic (FRP). But the shaft 115, canopy ball 120, double-socket arm 125, and/or mounting ball 130 may be fabricated using wood, metal, plastic, fiberglass, and/or other rigid material, according to design choice. In embodiments of the invention, the canopy 105 may be collapsible. The shaft 115 may be telescopic.

45 In use, the double-socket arm 125 retains the canopy ball 120 and the mounting ball 130 to provide an articulated coupling between the base 135 and the canopy 105.

50 FIG. 2 is a perspective view of a canopy system, according to an embodiment of the invention. As illustrated in FIG. 2, a canopy 205 may include a contoured handle 210 and canopy ball 220 on a shaft 215. The canopy 205 may include vents (not shown) typical in a wind-resistant umbrella. A frame (not shown) of the canopy 205 may be constructed, for example, of metal. A covering on the canopy 205 may be nylon or other fabric as required by application demands. The shaft 215 and/or canopy ball 220 may be fabricated using wood, metal, plastic, fiberglass, and/or other rigid

material, according to design choice. In embodiments of the invention, the canopy **205** may be collapsible. The shaft **215** may be telescopic.

Advantageously, the canopy **205** may be used in either portable applications or in fixed applications. In portable applications, a user may grasp the canopy **205** using the contoured handle **210**. In fixed applications, the canopy **205** is coupled to the base **135** via the double-socket arm **125**.

FIG. 3A is an exploded assembly view of a portion of a canopy **105**, according to an embodiment of the invention. As illustrated in FIG. 3A, a portion of the canopy **105** may include a cavity **305** in the shaft **115**. The cavity **305** is configured to receive a threaded insert **310**. In the illustrated embodiment, the canopy ball **120** includes a neck **315**, wrench surfaces **320**, and a threaded aperture (not shown). The threaded aperture (not shown) is also configured to cooperate with the threaded insert **310**.

FIG. 3B is a perspective view of a canopy ball, according to an embodiment of the invention. In the illustrated embodiment the canopy ball **120** includes a threaded aperture **325** but does not include a neck or wrench surfaces.

FIG. 4 is an exploded assembly view of a portion of a canopy **205**, according to an embodiment of the invention. As illustrated in FIG. 4, the contoured handle **210** may include a cavity **405**. The canopy ball **220** may include a neck **425**, wrench surfaces **430**, and a threaded aperture (not shown). An insert **410** may include a smooth portion **415** and a threaded portion **420**. The smooth portion **415** of the insert **410** is configured to be inserted into the cavity **405**. The threaded portion **420** is configured to be inserted into the threaded aperture in the canopy ball **220**.

Variations to the configurations illustrated in FIGS. 3A and 4 are possible. For instance, the threaded insert **310** could be substituted for the insert **410** in FIG. 4. Likewise, the insert **410** could be substituted for the threaded insert **310** in the embodiment illustrated in FIG. 3A. Moreover, the canopy ball **120** illustrated in FIG. 3B could be substituted for the canopy ball **120** illustrated in FIG. 3A or the canopy ball **220** illustrated in FIG. 4, according to design choice.

FIGS. 5 through 8 illustrate alternative embodiments for the double-socket arm **125**.

FIG. 5 is a perspective view of a double-socket arm, according to an embodiment of the invention. As illustrated in FIG. 5, a front panel **505** may be coupled to a rear panel **510** via a threaded shaft **520**. One end of the threaded shaft **520** is coupled to a "T" handle **515** and an opposite end of the shaft **520** is affixed to a retainer **525**. In operation, the "T" handle **515** may be rotated about an axis **530** (the longitudinal axis of the threaded shaft **520**). Tightening the "T" handle **515** draws the front panel **505** closer to the rear panel **510**, reducing the size of sockets **535** and **540**.

FIG. 6 is a perspective view of a double-socket arm, according to an embodiment of the invention. As illustrated in FIG. 6, the "T" handle **515** may be replaced with a lever handle **605**. In use, the lever handle **605** may be rotated about the axis **530**. Tightening the lever handle **605** draws the front panel **505** closer to the rear panel **510**, reducing the size of sockets **535** and **540**.

FIG. 7 is a perspective view of a double-socket arm, according to an embodiment of the invention. As illustrated in FIG. 7, the "T" handle **515** illustrated in FIG. 5 may be replaced with a cam lever **705**. In operation, the cam lever **705** may first be extended along the axis **530**. Rotating the cam lever **705** about the axis **530** provides initial tightening. Final tightening may be achieved by rotating the cam lever **705** about the axis **710** into the final closed position illustrated in FIG. 7. The axis **710** may be defined by the pivot

point **715**. Tightening the cam lever **705** draws the front panel **505** closer to the rear panel **510**, reducing the size of sockets **535** and **540**.

FIG. 8 is a perspective view of a double-socket arm, according to an embodiment of the invention. As illustrated in FIG. 8, a front panel **805**, a middle panel **815**, and a rear panel **810** are retained by a threaded shaft **825**. One end of threaded shaft **825** is coupled to a cam lever **820**. An opposite end of the threaded shaft **825** is coupled to a retainer **830**. In operation, the cam lever **820** may be rotated about axis **835**. Axis **835** is defined according to pivot point **840**. Tightening the cam lever **820** draws the front panel **805** closer to the rear panel **810**, reducing the size of sockets **535** and **540**.

Variations to the double-socket arms illustrated in FIGS. 5-8 are possible. For instance, in alternative embodiments, the retainer **525** could be integrated into the rear panel **510**. Similarly, the retainer **830** could be integrated into the rear panel **810**. Moreover, any of the embodiments described with reference to FIGS. 5-8 could also include pivot points and/or springs between opposing panels.

U.S. Pat. No. 5,845,885 issued to Carnevali on Dec. 8, 1998 is hereby incorporated by reference for its description of a universally positionable mounting device that is consistent with a variant of the double-socket arm embodiment illustrated in FIG. 5. U.S. Pat. No. 7,090,181 issued to Biba et al. on Aug. 15, 2006 is incorporated by reference for its description of a ball and socket mounting assembly that is consistent with a variant of the double-socket arm embodiment illustrated in FIG. 8.

FIG. 9 is a perspective view of a chair mounting bracket, according to an embodiment of the invention. As illustrated in FIG. 9, one end of a chair mounting bracket **905** is configured to receive the mounting ball **130**. In addition, the chair mounting bracket **905** has a mounting portion **910** that includes mounting holes **915**. The chair mounting bracket **905** is configured to cooperate with a chair. Alternative chair mounting brackets are discussed below with reference to FIGS. 11-13. FIG. 10 is a side view of the chair mounting bracket **905** illustrated in FIG. 9.

FIG. 11 is a perspective view of a chair mounting bracket **1105** that includes a pedestal mount portion **1110**, according to an embodiment of the invention. FIG. 12 is a perspective view of a chair mounting bracket **1205** that includes a swivel plate **1210**, according to an embodiment of the invention. The swivel plate **1210** is configured to rotate about a normal axis passing through a center of the swivel plate **1210**, such rotation being with respect to other portions of the chair mounting bracket **1205**. FIG. 13 is a perspective view of a chair mounting bracket **1305** that includes a locking pin **1310**, according to an embodiment of the invention. The locking pin **1310** is configured to cooperate with a base plate (not shown) such that the chair mounting bracket **1305** can swivel about a longitudinal axis of the locking pin **1310**. The locking pin **1310** is also configured to be suitably retained in the base plate (not shown) during use.

FIG. 14 is a perspective view of a canopy system coupled to a chair, according to an embodiment of the invention. As illustrated in FIG. 11, a canopy **105** is coupled to the chair mounting bracket **1105** via the double socket arm **125**. A canopy **205** could be substituted in place of the canopy **105**. A portion of the chair mounting bracket **1105** is disposed between a floor of the dinghy **1410** and the chair **1405**. In alternative embodiments, chair mounting brackets **905**, **1205** or **1305** could be used instead of the chair mounting bracket **1105**.

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FIG. 15 is a perspective view of a bench seat mounting bracket 1505, according to an embodiment of the invention. As illustrated in FIG. 15, a bench seat mounting bracket 1505 is configured to receive a mounting ball 130. In addition, the bench seat mounting bracket 1505 has a mounting portion 1515 that includes mounting holes 1515. FIG. 16 is a side view of the bench seat mounting bracket 1505 illustrated in FIG. 15.

FIG. 17 is a perspective view of a bench seat mounting assembly 1705, according to an embodiment of the invention. The arm 1710 includes through-holes 1715 and is configured to receive the mounting ball 130. A retaining plate 1720 includes threaded holes 1725. Handle screws 1730 are configured to cooperate with the through holes 1715 and the threaded holes 1725. In use, a portion of a bench seat (not shown in FIG. 17) is disposed between the arm 1710 and the retaining plate 1720. FIG. 18 is a side view of the bench seat mounting assembly 1705 illustrated in FIG. 17.

FIG. 19 is a perspective view of a canopy system coupled to a bench seat, according to an embodiment of the invention. As illustrated in FIG. 19, a canopy 105 may be coupled to a bench seat mounting assembly 1705 via a double socket arm 125. A canopy 205 could be substituted in place of the canopy 105. The bench seat mounting assembly 1705 is affixed to bench seat 1905 as described above with reference to FIG. 17. In an alternative embodiment, the bench seat mounting bracket 1505 could be used instead. As FIG. 19 illustrates, bench seat 1905 is consistent with seats found, for example, in a canoe 1910. Bench seats may also be found in kayaks or other small watercraft. In embodiments of the invention, bench seat mounting bracket 1505 and/or bench seat mounting assembly 1705 may also be applicable to patio benches, lawn chairs, or other types of furnishings.

FIG. 20 is a perspective view of a canopy system that includes a mosquito net, according to an embodiment of the invention. As illustrated in FIG. 20, a mosquito net 2005 can be connected to the cover 110, for instance by stitching, snaps, zipper or other suitable fastener. Such mosquito netting could be included with any of the canopy systems disclosed herein.

FIG. 21 is a flow diagram of a manufacturing process for at least a portion of a canopy 105, according to an embodiment of the invention. The process may be further understood with reference to FIGS. 22 and 23.

After starting in step 2105, the process square-cuts an end of a shaft 115 in step 2110 to produce a mounting end 2220 of the shaft 115. The shaft 115 has a cavity 305 in communication with the mounting end 2220. Step 2110 may be required, for instance, if the shaft 115 is received with a rough or un-square cut on an end of the shaft 115. In embodiments of the invention, a chop saw or similar saw may be used in step 2110. For instance, step 2110 could be accomplished using an abrasive saw with a 3 inch diameter aluminum oxide abrasive disc, together with a suitable fixture to hold the shaft 115 during cutting.

In step 2115, the process secures a canopy ball to a rod. In the embodiment illustrated in FIG. 22, the canopy ball 120 includes a threaded aperture in a neck 315. In the illustrated embodiment, the rod 310 may be, for example, a stainless steel threaded insert. In this instance, step 2115 includes threading the rod 310 into the canopy ball 120, preferably with the application of Red Loctite™ or other thread locker.

Next, in step 2120, the process secures an elastic band 2205 to the rod 310. The elastic band 2205 is preferably manufactured from relatively soft rubber. For instance, for a

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rod 310 with a $\frac{3}{8}$ inch thread, a suitable elastic band 2205 is an orthodontic elastic band of medium thickness and a $\frac{5}{16}$ inch diameter when in a relaxed state. The elastic band 2205 is preferably disposed on the rod 310 proximate to the canopy ball 120 as illustrated in FIG. 22. Distance A is preferably less than 0.5 inch and more preferably approx. $\frac{1}{8}$ inch. The purpose of the elastic band 2205 is to aid in the alignment of the rod 310 with respect to the shaft 115, which will be discussed further below.

The process then disposes the shaft 115 vertically in step 2125, so that the mounting end 2220 of the shaft 115 is on top. A gluing rack (not shown) may be used to hold the shaft 115 in the desired position.

In step 2130, the process inserts a dam 2210 into the cavity 305 from the mounting end 2220 of the shaft 115. The purpose of the dam 2210 is to restrict the flow of an adhesive (discussed below in step 2135). A 1 inch long cotton roll is a suitable dam 2210 for a wide range of adhesive selections. Step 2130 may include using a ram rod (not shown) to push the dam 2210 down the cavity 305. Preferably, the ram rod includes a stop to position the dam 2210 at a predetermined distance (B+C in FIG. 22) from the mounting end 2220 of the shaft 115. If the ram rod is a threaded rod, locking nuts configured to interfere with the shaft 115 can form a suitable stop.

After the dam 2210 is in place, the process applies a first portion 2215 of adhesive into the cavity 305 and adjacent to the dam 2210 from the mounting end 2220 of the shaft 115 in step 2135. Preferably, the adhesive is a 2-part epoxy. In the case of a 2-part epoxy, a mixing straw (not shown) may be used to dispose the first portion 2215. The mixing straw could be included, for instance, as part of a syringe. Alternatively, the mixing straw could be coupled to a pneumatic pump. The dam 2210 restricts the flow of the first portion 2215 of the adhesive.

Next, in step 2140, the process applies a second portion (not shown) of the adhesive to exposed portions of the rod 310. Preferably, step 2140 includes dipping the rod 310 into a container of adhesive. Alternatively, step 2140 could include, for example, brushing or spraying the second portion of adhesive onto the rod 310. A suitable adhesive for steps 2135 and 2140 is an epoxy that includes Cougeon Brother's Inc. M1007 resin and M2032 hardener with a mix ratio of approx. 1:1 by volume.

As soon as practical after application step 2140, the process inserts the rod 310 into the cavity 305 from the mounting end 2220 of the shaft 115. FIG. 23 is a sectional view through the elastic band 2205 illustrating that, in the final assembly of the canopy ball 120 to the shaft 115, the elastic band 2205 aids in the alignment of the rod 310 with respect to the shaft 115.

The process inverts the assembled shaft 115 (and entire canopy 105) in step 2150. A curing rack (not shown) is preferably used in step 2150 to hold the shaft 115 in a vertical position and retain the rod 310 in the cavity 305. Advantageously, in this inverted position, the elastic band 2205 restricts the gravitational flow of adhesive out of the mounting end 2220 of the shaft 115. The adhesive is cured in step 2155 before the process terminates in step 2160.

Variations to the process flow illustrated in FIG. 21 are possible. For example, step 2110 may not be required if the shaft 115 is received with a suitably square cut on the mounting end 2220 of the shaft 115. Also, the sequence of certain steps illustrated in FIG. 21 and described above can be varied without consequence. For instance, in alternative embodiments, steps 2115 and 2120 could be performed at

any point in the flow prior to step **2140**. And the order of steps **2125** and **2130** could be reversed.

In conclusion, embodiments of the invention provide, among other things, a canopy with an articulating arm, alternative mounting brackets, and a method for manufacturing a portion of the canopy. Those skilled in the art can readily recognize that numerous variations and substitutions may be made in the invention, its use and its configuration to achieve substantially the same results as achieved by the embodiments described herein. Accordingly, there is no intention to limit the invention to the disclosed exemplary forms. In addition, although references are made to embodiments of the invention, all embodiments disclosed herein need not be separate embodiments. In other words, many of the features disclosed herein can be utilized in combinations not expressly illustrated or described.

We claim:

1. A method for manufacturing a canopy comprising:
 securing a canopy ball to a rod;
 securing an elastic band to the rod;
 disposing a shaft vertically, a mounting end of the shaft being on top;
 inserting a dam into a cavity of the shaft from the mounting end, the cavity being in communication with the mounting end;
 applying a first portion of an adhesive into the cavity and adjacent to the dam from the mounting end of the shaft;
 applying a second portion of the adhesive to the rod;
 inserting the rod into the cavity from the mounting end of the shaft;

inverting the shaft; and
 curing the adhesive.

2. The method of claim **1** further comprising, before applying the first portion of the adhesive, square-cutting an end of the shaft to produce the mounting end.

3. The method of claim **1** wherein the rod is threaded and securing the canopy ball to the rod includes threading the rod into a threaded aperture of the canopy ball.

4. The method of claim **3** wherein threading the rod includes applying a thread locker.

5. The method of claim **1** wherein the dam includes cotton.

6. The method of claim **5** wherein the dam is a cotton roll.

7. The method of claim **1** wherein inserting the dam includes disposing the dam at distance from the mounting end that is greater than a length of rod that extends from the canopy ball when the canopy ball is secured to the rod.

8. The method of claim **7** wherein inserting the dam includes using a ram rod with a stop.

9. The method of claim **1** wherein the adhesive is a 2-part epoxy.

10. The method of claim **9** wherein applying the first portion of the adhesive includes disposing a mixing tube in the cavity.

11. The method of claim **1** wherein applying the second portion of the adhesive includes dipping at least a portion of the rod into a container of adhesive.

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