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(54) **ADJUSTABLE WEIGHT SHOT**

(57) An adjustable weight shot system may include a core, inner and outer weight portions, and a body and cap. The inner weight portion may have two coupling hemispheres configured to receive the core in an inner weight portion cavity. Or the inner weight portion may be a hollow cylindrical portion configured to receive the core. The outer weight portion may have two coupling hemi-

spheres configured to receive the inner weight portion in an outer weight portion cavity. Or the outer weight portion may be a hollow cylindrical portion configured to receive the inner weight portion. The body and cap may be configured to retain the outer weight portion in a weight cavity defined by the body and cap.

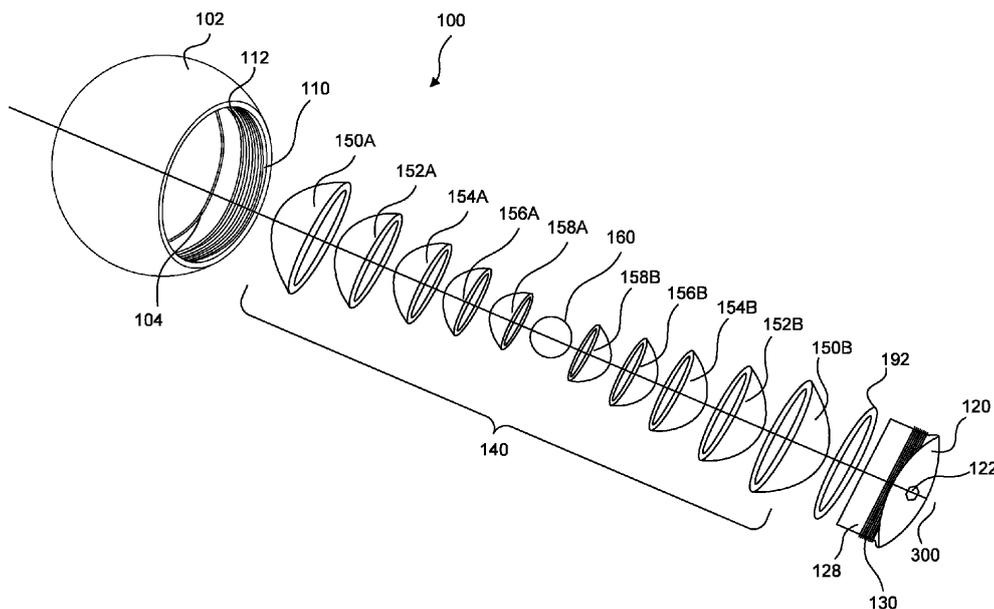


FIG. 1

Description

BACKGROUND

[0001] Shot put is a weight throwing sport. Athletes train with the goal of throwing a heavy, typically spherical, shot as far as possible. As part of the training routine, athletes may use shots of different weights.

Field

[0002] The described embodiments relate generally to an adjustable weight throwing implement, for example, a shot.

SUMMARY

[0003] In some embodiments, an adjustable weight shot system comprises a core, an inner weight portion, an outer weight portion, a body, and a cap. The inner weight portion may be formed of two coupling hemispheres configured to receive the core in an inner weight portion cavity. The outer weight portion may be formed of two coupling hemispheres configured to receive the inner weight portion in an outer weight portion cavity. The body and cap may be configured to retain the outer weight portion in a body weight cavity defined by the body and the cap.

[0004] In some embodiments, an adjustable weight shot system includes intermediate weight portions. Each intermediate weight portion may have two coupling hemispheres configured to receive one of a smaller intermediate weight portion and the inner weight portion in an intermediate weight portion cavity. In some embodiments, there are three intermediate weight portions. In some embodiments, an outer surface of the body is larger than an outer surface of the cap.

[0005] In some embodiments, the body and the cap may couple in a variety of ways. For example, the body and the cap may be coupled with a threaded connection. The cap may include a cap sleeve and cap threads may be formed on the cap sleeve.

[0006] In some embodiments, an adjustable weight shot includes a body that defines a shot cavity. The shot cavity of the adjustable weight shot may be semispherical. A first weight portion may be positioned in the shot cavity. The first weight portion may be formed of two coupling first weight portion hemispheres. The two coupling first weight portion hemispheres may define a first weight cavity. A second weight portion may be positioned in the first weight cavity and formed of two coupling second weight portion hemispheres. The two coupling second weight portion hemispheres may define a second weight cavity. The adjustable weight shot may also include weight portion key holes formed in each removable weight portion. The key holes may aid in separating the two coupling weight portion hemispheres. The key holes may be formed near the boundary of the two coupling

hemispheres. In some embodiments, the hemispheres of the removable weight portions interlock using a snap-fit connection. In some embodiments, the hemispheres of the removable weight portions interlock using threads, pins, bayonet type couplings, or other interlocking devices.

[0007] In some embodiments, an adjustable weight shot includes a cap. The body may be configured to receive the cap at an opening of the body. The cap may include a tool port configured to receive a tool. In some embodiments, the tool port includes a tool port weight disposed in the tool port.

[0008] In some embodiments, the opening in the body has a cap seat and the cap has a cavity sleeve. The cavity sleeve is configured to engage the cap seat. In some embodiments, the shot cavity is semispherical and has a shot cavity diameter. The diameter of the cap seat may be greater than the shot cavity diameter.

[0009] In some embodiments, an adjustable weight shot system includes a body and a cap. The cap is configured to engage an opening formed in the body. The cap may include a tool port. Additionally, an adjustable weight shot system may include a plurality of weight portions, each formed of two coupling hollow hemispheres, may be configured to receive another of the weight portions. In some embodiments, the plurality of weight portions are nested.

DESCRIPTION OF THE DRAWINGS

[0010] The disclosure will be readily understood by the following detailed description in conjunction with the accompanying drawings, wherein like reference numerals designate like structural elements, and in which:

FIG. 1 shows an exploded view of an adjustable weight shot according to some embodiments.

FIG. 2 shows the adjustable weight shot of FIG. 1 in a collapsed view.

FIG. 3 shows a cross section of the adjustable weight shot of FIG. 2 taken through the line 3 - 3'.

FIG. 4 shows a perspective view of a body for an adjustable weight shot according to some embodiments.

FIG. 5 show a cross section of the body for the adjustable weight shot of FIG. 4 taken through the line 5 - 5'.

FIG. 6 shows a perspective view of a cap for an adjustable weight shot according to some embodiments.

FIG. 7 shows a right side view of the cap for the adjustable weight shot of FIG. 6.

FIG. 8 shows a cross section of the cap for the adjustable weight shot of FIG. 7 taken at the line 8 - 8'.

FIG. 9 shows a perspective view of a weight portion for an adjustable weight shot according to some embodiments.

FIG. 10 shows a cross section of the weight portion for the adjustable weight shot of FIG. 9 taken at the line 10 - 10'.

FIG. 11 shows a cross section of a cap for an adjustable weight shot according to some embodiments.

FIG. 12 shows a body of an adjustable weight shot according to some embodiments.

FIG. 13 shows a cross section of the body of the adjustable shot of FIG. 12 taken at the line 13 - 13'.

FIG. 14 shows a perspective view of a weight pin according to some embodiments.

FIG. 15 shows a plan view of the weight pin of FIG. 14.

FIG. 16 shows a cross section of the weight pin 14 taken at the line 16 - 16'.

FIG. 17 shows an adjustable weight shot according to some embodiments.

DETAILED DESCRIPTION

[0011] Reference will now be made in detail to representative embodiments illustrated in the accompanying drawings. It should be understood that the following descriptions are not intended to limit the embodiments to one preferred embodiment. To the contrary, it is intended to cover alternatives, modifications, and equivalents as can be included within the spirit and scope of the described embodiments as defined by the claims.

[0012] The present disclosure is directed to an adjustable weight shot. The adjustable weight shot may be used during athletic training for shot put competitions.

[0013] At a professional and Olympic level, men's shots weigh 7.260 kilograms and women's shots weight 4 kilograms. Other weights are used in other competitions or at different levels, such as college, junior, school, or masters competitions. During competition, shot put athletes throw the shot in a specified target area. The distance of the throw is measured. The goal of the competition is to throw the shot as far as possible.

[0014] As part of the rigorous training routine for shot put, athletes may use shots of different weights to hone technique, improve muscle memory and mass, or avoid stressing muscles during warm ups. Currently, shot put

athletes may rely on several shots of various weights for this complicated training regime. Practice shots may weigh less than competition shots and can be used by the athlete during training and warmup. The practice shots are often the same diameter as the competition shot to aid in developing muscle memory. Often, training implements of differing weights are made inconsistently (in finish and surface quality) and to slightly different size than the competition implements. This inconsistency in training implements can lead to reduced or inconsistent training quality, injury, or generally decreased competition performance.

[0015] When traveling, athletes may travel with both competition and practice shots. Although men's competition shots weigh 7.260 kilograms and women's competition shots weight 4 kilograms, athletes may travel with several times that weight in practice shot when attending competitions. For example, men's practice shots may weigh 4 kilograms, 5 kilograms, and 6 kilograms and women's practice shots may weigh between from 2.5 kilograms to 6.5 kilograms. However, there are no set weight limits that an athlete may use during trainings so training weights may exceed competition weights. For example, men's practice weights may be in excess of 10 kilograms. Because athletes often travel with competition and practice shots, shot put athletes travel with a lot of weight. Additionally, because the practice shots have the same diameter as the competition shots, the numerous shots take up a large volume. The weight and volume increases travel strain and may increase travel costs, including, for example, excess weight or baggage charges.

[0016] The current solutions to this problem have many drawbacks. Current solutions may use a shot filled with sand or another fluid like medium to change the weight of the shot. Alternatively, the weight may be changed by drilling holes in the shots. These methods are cumbersome and clumsy and can create an unbalanced shot. Of course, this may create a dangerous throwing implement because of the unbalanced shot. An unbalanced shot is dangerous to both the athlete and spectators. An unbalanced shot can create an uneven pressure on the athlete's hand, adding strain to a particular portion of the hand. Moreover, an unbalanced shot may cause the athlete to "miss" the shot causing ballistic and damaging hyperextension of the elbow and an expected trajectory of the shot. Additionally, the current solutions also often use moveable, delicate latch systems that are easily damaged during regular use. Regular use may also cause parts of such shots to become permanently stuck closed and rendered useless.

[0017] The present disclosure is directed to an adjustable weight shot. The adjustable weight shot has a body and a cap. The cap closes a body weight cavity formed in the body. The body and the cap together may define the body weight cavity. The body may include a cap seat configured to receive the cap and body threads. The body threads are configured to engage cap threads on the cap.

[0018] The body weight cavity is configured to receive various weight portions. Each weight portions may be formed of two or more portions. For example, each weight portions may be spherical and formed of two hemispheres. The two hemispheres may be substantially the same size, for example, each substantially half of a sphere. In some embodiments, the two hemispheres may be of unequal size. For example, one hemisphere may be substantially larger than the other hemisphere. The two hemispheres of the weight portions may be coupled together to form a weight portion. In some embodiments, the two hemispheres lock together to form the weight portion. For example, the two hemispheres may lock using a snap fit, threaded connection, pins, bayonet type couplings, or other interference fit or interlocking device techniques. Each weight portion may also include a weight portion cavity configured to receive another weight portion. That is, each weight portion may be configured to receive a weight portion and then be located in a weight portion cavity of another weight portion. In this way, the weight portions may "nest" within one another. The weight portions may also nest within the body weight cavity defined by the body and the cap.

[0019] The cap may include a tool port configured to receive a tool. Using a tool in the tool port allows the athlete to increase the torque on the cap to more easily remove the cap from the body. Additionally, some or all of the weight portions may have key ports that help to separate portions of the weight portions from one another or help separate weight portions from each other.

[0020] In some embodiments, for example as shown in FIG. 1, an adjustable weight shot 100 has a body 102. A cap 120 closes an opening 112 in body 102. In some embodiments, cap 120 and body 102 may be coupled using a threaded connection or other mechanical means. FIG. 1 shows body threads 110 located inside opening 112 of body 102. Cap threads 130 are on a cap sleeve 128 of cap 120. Cap threads 130 are configured to engage body threads 110 to close a body weight cavity 104. In some embodiments, body 102 defines a body weight cavity 104. In some embodiments, body 102 and cap 120 define body weight cavity 104. FIG. 1 also shows a central axis 300. Central axis 300 extends through the center of body 102 and opening 112. In some embodiments, the body 102 and/or the cap 120 are substantially rotationally symmetrical about the central axis 300.

[0021] FIG. 1 shows an exploded view of adjustable weight shot 100. Weight portions 140 are shown. Weight portions 140 are configured to be housed in body weight cavity 104 of body 102. As shown in FIG. 1, each weight portion 140 may be formed of one or more portions, for example, two substantially equally sized portions. For example, weight portions 140 may be formed of coupling shells. As shown in FIG. 1, weight portions 140 are a series of coupling weight shells or hemispheres (corresponding pairs labeled as A and B). FIG. 1 shows a first weight shell member 150 having coupling first weight shell member 150A and first weight shell member 150B.

First weight shell members 150A, 150B interlock to form first weight shell 150. First weight shell 150 is hollow and defines a shell weight cavity 190 (shown in FIG. 10) configured to receive a second weight shell member 152.

5 First weight shell member 150 may be considered an outer weight portion because it is an outer weight portion with respect to one or more other weight portions (i.e. other weight portions are or can be placed inside it). Like first weight shell member 150, second weight shell member 152 is formed of two coupling hemispheres, second weight shell members 152A, 152B. Similarly, FIG. 1 shows third weight shell members 154A, 154B, fourth weight shell members 156A, 156B, and fifth weight shell members 158A, 158B. Fifth weight shell member 158 may be considered an inner weight portion because it is located in the interior with respect to other weight portions 140. In some embodiments, fewer than five weight portions 140 may be used, such as one, two, three, or four sets of weight portions 140. In other embodiments, more than five weight portions 140 may be used, such as six, seven, eight, nine, or ten weight portions 140. Each shell member may form weight cavities configured to receive weight portions. In some embodiments, a core 160 is located inside a weight portion, such as the inner most weight portion 140. Core 160 is also a weight portion and may be considered as an inner weight portion as well. Core 160 may be hollow or solid. In some embodiments, a core 160 may be distinguished from a weight portion in that a core is not formed from separable portions. In other embodiments, an adjustable weight shot 100 does not include a core 160.

[0022] FIG. 2 shows adjustable weight shot 100 with cap 120 secured to body 102 at opening 112. Cap 120 closes opening 112 of body 102. A tool port 122 is formed in cap 120. Tool port 122 is configured to receive a tool that can be used to aid in the release of cap 120 from body 102. In some embodiments the tool is, for example, a hex key. In some embodiments, the opening 112 of the body 102, the cap 120 itself, and/or the tool port 122 are substantially rotationally symmetrical about an axis, such as the central axis 300. In some embodiments, the junction between the opening 112 of the body 102 and the cap 120 is substantially circular latitudinal circumference. In an embodiment, the substantially circular latitudinal circumference is between 200mm and 400mm. In some embodiments, the substantially circular latitudinal circumference is between 300mm and 350mm, for example, 320mm.

[0023] FIG. 3 shows a cross section of adjustable weight shot 100 taken at the line 3 - 3' in FIG. 2. For purposes of clarity, radially adjacent weight portions 140 are shaded differently. FIG. 3 shows weight portions 140 retained in body weight cavity 104 defined by body 102's cavity wall 106 and cap 120's cap cavity wall 126. Cap 120 has cap sleeve 128. Cap sleeve 128 extends into body 102 and is seated in cap seat 108. Cap seat 108 has cap ledge 109. Cap ledge 109 may form a transition between body cavity wall 106 and cap seat 108. Cap

ledge 109 may extend at a right angle relative to cavity wall 106 and cap seat 108. In some embodiments, cap ledge 109 may be formed at an angle other than 90° relative to cavity wall 106 and cap seat 108. For example, cap ledge 109 may be formed at a 45° angle or a 135° angle relative to cavity wall 106. In other embodiments, cap ledge 109 may be formed at an angle between 45° and 90°, or between 90° and 135°. Using the smaller angles between 45° and 90° may ease cleaning debris, such as dirt, from body weight cavity 104. In an alternative embodiment, instead of cap sleeve 128 extending into body 102, the construction may differ such that a portion of body 102 extends into a portion of cap 120. In some embodiments, a washer 192 may be included between cap 120 and body 102. Washer 192 may be made of plastic or other materials and may help seal cap 120 and body 102. Additionally, washer 192 may prevent sticking between cap 120 and body 102. Other features described above could be incorporated into such an embodiment.

[0024] The weight portions 140 illustrated in FIG. 3 are depicted as having varied radial thicknesses. In some embodiments, all weigh portions 140 may have the same radial thickness. In one embodiment, the radial thicknesses of a given weight portion 140 is substantially constant in all radial directions, which is to say the weight portion 140 is substantially symmetrical. In another embodiment, a given weight portion 140 may not be substantially symmetrical. In some embodiments, alternating weight portions 140 arranged radially in a nested fashion may have alternating thinner and thicker radial thicknesses. In other embodiments, a given inner weigh portion 140 may have a thinner or a thicker radial thickness compared to a given outer weight portion 140. Likewise in still other embodiments, a given outer weigh portion 140 may have a thinner or a thicker radial thickness compared to a given inner weight portion 140. In some embodiments, weight portion radial thicknesses may be between 1mm and 5mm, for example 2.5mm.

[0025] FIG. 4 shows a perspective view of body 102 for adjustable weight shot 100. In some embodiments, for example, as shown in FIG. 4, opening 112 may be smaller than a diameter of adjustable weight shot 100, and/or the circumference of opening 112 may be smaller than the equatorial circumference of the body 102 or shot 100. FIG. 5 shows a cross section view of body 102 taken at the line 5 - 5' of FIG. 4. Body 102 has a center 200. Center 200 may be the geometric center of adjustable weight shot 100 when cap 120 is coupled to body 102. In some embodiments center 200 may also be the center of mass of an assembled adjustable weight shot 100.

[0026] As shown in FIG. 5, body weight cavity 104 may have a cavity radius 202. Cavity radius 202 is defined as the distance between center 200 and shot cavity wall 106. In some embodiments cavity radius may be between 30 mm and 50mm. For example, cavity radius may be 45mm. Center 200 may also be used to define a shot radius. A shown in FIG. 5, shot radius 208 is the radius of the shot when assembled and also defines the radius

of curvature of the outer surfaces of shot 102 and cap 120. In some embodiment shot radius 208 may be between 50 and 80mm. In some embodiments, shot radius 208 may be 65.22mm, giving the adjustable weight shot a diameter of 130.44mm. Shot radius 208 may be governed by athletic standards such as those developed under the International Association of Athletics Federations (IAAF).

[0027] FIG. 5 also shows a cap seat width 204 and a cap threaded width 206. In some embodiments, the cap seat width 204 and the cap threaded width 206 may be substantially the same, while in other embodiments they will differ. In some embodiments, cap threaded width 206 may be between approximately 12mm and 20mm. For example, cap threaded width 206 may be approximately 15mm. In some embodiments, cap seat width 204 may be between 15mm and 20mm. In some embodiments, seat cap width 204 may be 18mm. Opening radius 214 is a distance between opening 112 and center 200 of body 102. Cap seat width 204 may be greater than twice cavity radius 202.

[0028] FIGS. 6 and 7 shows cap 120 with cap cavity 124. Cap cavity 124 is bounded by a cap cavity wall 126. A cap sleeve 128 surrounds cap cavity 124. In some embodiments, cap sleeve 128 is substantially cylindrical. An upper portion of cap 120 has cap screw threads 130. In one embodiment, when considered in cross section, the cap 120 has five threads. In other embodiments, the cap may have three, four, six, or seven threads. Cap threads 130 are configured to engage body threads 110 by screwing into them to secure cap 120 to body 102.

[0029] FIG. 8 is a cross section of cap 120 taken at the line 8 - 8' of FIG. 7. FIG. 8 shows cap 120 with tool port 122. The shape of tool port 122 may depend on both the tool that tool port is configured to receive and manufacturing considerations. For example, as shown in FIG. 8, tool port 122 may have a hexagonal shape. The hexagonal shape of tool port 122 is configured to mate with a tool (not shown) having a hexagonal shape. For example, the tool may be a standard sized hex key, also known as an Allen wrench.

[0030] Tool port 122 may also include a tool port weight 132 located within the tool port, such as at the bottom of tool port 122 as depicted in FIG. 8. In some embodiments, tool port weight 132 may be a liner or a filling applied to tool port 122. Tool port weight 132 is configured to counter balance the amount of weight removed from adjustable weight shot 100 when tool port 122 is formed. For this reason, in some embodiments, tool port weight 132 may be made of a material having a higher density than the material that makes up cap 120. In some embodiments, tool port weight 132 has a weight equal to approximately the weight of the material removed to from tool port 122. In some embodiments, a tool port plug (not shown) may be used to plug tool port 122. In some embodiments, tool port 122 may have a threaded top or other means to secure the tool port plug to tool port 122. In some embodiments, the tool port plug may have a key

hole, which may be configured to receive the edge of a coin, that can be used to loosen tool port plug from tool port 122.

[0031] FIG. 9 shows an exemplary weight portion 140. Weight portion 140 is formed of two weight portion hemispheres 150. While the weight portion of FIG. 9 is depicted as having two substantially equal half portion hemispheres 150, in some embodiments, one portion may be larger than the other. Weight portions 140 may have a weight portion key port 180 located in or near a seam 174. For example, key port 180 may be near seam 174 when it key port 180 is on seam 174 or when key port 180 is adjacent to key port 180. In some embodiments, key port 180 may be located further from seam 174. Seam 174 is the division between the two weight portion hemispheres. In some embodiments where one of the two parts of weight portion 140 is larger than the other part, the seam 174 may not divide the weight portion 140 approximately in half. Key port 180 may be used to help an athlete separate two weight portion 140 parts, such as hemispheres 150.

[0032] FIG. 10 shows a cross section of a weight portion 140 taken through the line 10 - 10' shown in FIG. 9. FIG. 10 shows two hemispheres 150A and 150B. The hemispheres meet at seam 174. Hemispheres 150A and 150B may have complementary edges at seam 174. For example, as shown in FIG. 10, hemisphere 150A may have a step 170 extending from the edge of the hemisphere which is configured to mate with a corresponding recess 172 formed in the edge of hemisphere 150B. Hemispheres 150A and 150B may come together with a mating mechanism such as those shown in FIG. 10 or by other means. For example, hemispheres 150A and 150B may have threaded edges such that the athlete can screw hemispheres 150A and 150B together. A weight portion cavity 190 is formed inside of weight portion 140 when hemispheres 150A and 150B are brought together. Again, in some embodiments the weight portion 140 may not be formed from substantially equal hemispheres, but may be formed from two or more unequally sized portions.

[0033] The total weight of adjustable weight shot 100 can be varied by adding to or removing weight portions 140 from adjustable weight shot 100, or by using weight portions 140 of materials having different volumes, weights, and/or densities. In some embodiments, a weight portion 140 is made from the same material as body 102, cap 120, and/or core 160. In other embodiments, one or more of any weight portions 140, the body 102, the cap 120, and the core 160 may be made of different materials having different volumes, weights, and/or densities.

[0034] The exploded view of adjustable weight shot 100 in FIG. 1 shows adjustable weight shot 100 with several nesting weight portions 140. At the center is core 160. Core 160 is inside weight portion 158, which is formed from hemispheres 158A and 158A. Weight portion 158 is inside weight port 156, which is formed from

hemispheres 156A and 156B. Weight portion 156 is inside weight port 154, which is formed from hemispheres 154A and 154B. Weight portion 154 is inside weight port 152, which is formed from hemispheres 152A and 152B.

5 This continues until weight portion 150, which is formed from hemispheres 150A and 150B, which holds all the preceding weight portions 158 through 152, and core 160. In this manner, weight portions 140 nest inside each other. Core 160 may be described as an inner weight portion and weight portion 150 may be an outer weight portion. Inner and outer weight portions 140 either may be adjacent to one other or may be separated by another weight portion 140. In some embodiments there are substantially no gaps between adjacent weight portions 140, whereas in other embodiments there are gaps between adjacent weight portions 140.

[0035] Balance may be an important consideration of adjustable weight shot 100. The balance of adjustable weight shot 100 can be considered in two ways. First, the balance of adjustable weight shot 100 can be considered as the stability of adjustable weight shot 100 and portions thereof during the throw. Weight portions 140 should not significantly shift inside adjustable weight shot 100 during the throw. If weight portions 140 do significantly shift during the throw, the athlete could be knocked off balance or the throw's trajectory could be negatively affected. Second, the balance of adjustable weight shot 100 can be considered as an even distribution of weight around a center 200 of adjustable weight portion, as depicted in FIG. 5. In some embodiments, weight should be substantially evenly distributed around the center 200.

[0036] Stability balance means that the tolerances of the components of adjustable weight shot 100 should be tight. For example, a coarse threading may be used for cap threads 130 and body threads 110. In some embodiments, the threading may be an M96x2.5 thread. Coarse threads may reduce the shifting of cap 120 relative to body 102 during a throw or normal use. Additionally, weight portions 140 should be tightly secured in adjustable weight shot 100. When weight portions 140 are nested, such as is shown in FIGS. 1 and 3, each weight portion 140 may fit tightly or snugly in each outer weight portion 140's weight portion weight cavity 190. For example, manufacturing tolerance for the interior and exterior diameters of weight portions 140 (when weight portions are spherical) may be between 0.5 mm and 0 mm, between 0.5 mm and 0.1 mm, between 0.25 mm and 0 mm, between 0.25 mm and 0.1 mm, between 0.1 mm and 0 mm, or the tolerance may be approximately 0.1 mm.

[0037] Adjustable weight shot 100 may maintain balance using several features. In some embodiments, weight portions 140 are spherical. Using spherical weight portions 140 may give a general uniform density at a given distance from center 200 of adjustable weight shot 100. As mentioned above, when tool port 122 is formed in cap 120, a tool port weight 132 may be added to tool port 122 to compensate for the amount of mass absent from the volume of tool port 122. In some embodiments,

additional weight portions may be added to certain portions of adjustable weight shot 100 to add any necessary balance to adjustable weight shot 100.

[0038] Although weight portions 140 are shown in the figures as spherical, other shapes are possible. For example, weight portions could be non-spherical such as cylindrical, ellipsoidal, disc-shaped, or ring shaped. In some embodiments the shape of the weight portion may be dictated by the use of the adjustable weight shot. For example, when an adjustable weight shot 100 is used as a hammer, in the context of the hammer throw sport, the internal balance of the shot may be less important because the weight is swung around the central pivot (i.e., the athlete throwing the hammer). The form, specifically the shape and weighting characteristics, of adjustable weight shot 100 may be different when used as a hammer. For example, the adjustable weight shot 100 may include a swivel attached to adjustable weight shot 100. The swivel may attach to a wire for the athlete to hold. In some embodiments, cylindrical weight portions 140 may be hollow cylinders open on each end in which additional cylinders may be inserted. Cylindrical weight portions 140, even when hollowed out, are typically easier to manufacture than spherical hollow hemispheres. Therefore, when the internal balance is less critical, use of cylindrical weight portions 140, or other shapes, may be desirable because of the reduced manufacturing costs.

[0039] Components of adjustable weight shot 100 may be made of a variety of materials. In some embodiments, all components of adjustable weight shot 100 are made of the same material. In some embodiments, different components of adjustable weight shot 100 are made of different materials. The use of different materials for different components of adjustable weight shot 100 may give the athlete more flexibility in choosing the weight amount for the specific training. In some embodiments, body 102, cap 120, or weight portions 140 are formed of aluminum, cast iron, mild steels, ferrous steels, stainless steels, tungsten, brass, bronze, other alloys, ceramics, natural stones, plastics, rubbers, or a granular load such as sand or shot load.

[0040] An adjustable weight shot 100 having nesting weight portions 140 made from different materials gives an athlete significant flexibility in selecting the amount of weight for each shot. For example, body 102 and cap 120 may be made of mild steel and have a weight of approximately 2 kilograms. An outer weight portion 140 may fit snugly inside body 102's body weight cavity 104. Outer weight portion 140 may be made of a hard rubber and weight 0.5 kilograms. An inner weight portion 140 may fit snugly inside outer weight portion 140's weight cavity 190. Inner weight portion 140 is formed of aluminum and weighs 1 kilogram. Altogether, the total weight of adjustable weight shot 100 may be approximately 3.5 kilograms.

[0041] Adjustable weight shot 100 may experience stresses during use. The largest stress that adjustable

weight shot 100 may experience during use is the impact with the ground, or other object, after adjustable weight shot 100 is thrown. The large impact forces experienced at impact may cause certain components of adjustable weight shot 100 to become wedged tightly together. In some embodiments, adjustable weight shot 100 minimizes the risks of overtightening. Adjustable weight shot 100 may use cap 120 that has a smaller outer surface area than body 102. This creates a seam between cap 120 and body 102 that is shorter than if the seam 174 were located closer to the largest latitudinal circumference of the shot 100. Since overtightening is more likely to occur when an impact occurs at the seam 174, reducing the length and size of the seam 174 may be important to reducing overtightening events. The outer surface area of body 102 and cap 120 when described in this context means the exposed surface of each when body 102 and cap 120 are assembled into adjustable weight shot 100. For example, FIG. 2 shows the exposed surfaces of each of body 102 and cap 120.

[0042] Should overtightening occur, an athlete can use a tool key in tool port 122 to increase the torque on cap 120 relative to body 102 to release cap 120 from body 102. Additionally, key port 180 in weight portions 140 may function as hinge ports to wedge weight portions 140 apart. In some embodiments, key port 180 may aid in the manufacturing process, such as, aiding in applying painting or electroplating. For example, weight portions 140 may be able to hang from key port 180 during the manufacturing process.

[0043] FIGS. 11-16 show an adjustable weight shot system according to some embodiments. Adjustable weight shot may be used, for example, during a hammer throw competition. Adjustable weight shot includes a cap 520 (shown in cross section in FIG. 11 with a cross section taken at the line 8 - 8' of FIG. 7) and a body 502 (shown in FIG. 12). In some embodiments, cap 520 is configured to engage with and close opening 512 in body 502. FIG. 13 shows a cross section of body 502 taken at the line 13 - 13'. Body 502 has a cap seat 508 configured to receive a portion of cap 520. As shown in FIG. 13, body 502 may have one or more levels of weight seats 509 configured to receive weight portions 140. As discussed above, weight portions 140 may be formed in different shapes. The shape and configuration of weight seats 509 may change depending on the shape and configuration of weight portions 140. For example, FIG. 13 shows weight seats 509 that may be well suited to receive cylindrical weight portions 140. Weight seat 509 may be located opposite of opening 512. In some embodiments, body 502 may also include one or more attachment points 510 on the exterior portion body 502. Attachment points 510 may be configured to engage additional members. For example, FIG. 13 shows attachment point 510 as a threaded member configured to receive a threaded attachment. In this and other embodiments, attachment point 510 may be configured to receive a member to aid that athlete in practicing the hammer throw.

[0044] In some embodiments, a threaded insert 530 may be on the interior side of adjustable weight shot. For example, threaded insert 530 may be on the interior side of cap 520, as shown in FIG. 11. Threaded insert 530 may be configured to receive a weight pin 540 (shown in FIGS. 14-16). Weight pin 540 may be used to organize weight portions 140. Weight pin 540 may be used to secure weight portions 140 in adjustable weight shot. For example, weight portions 140 may be either hollow cylinders or hollow disks and weight pin 540 may pass through the hole in each weight portion 140 to keep weight portions 140 neatly stacked. Weight pin 540 may include slots 542 configured to receive a pin to prevent the movement of the weight portions 140 along weight pin 540.

[0045] FIG. 17 shows an embodiment of an adjustable weight shot system 700. The adjustable weight shot system 700 has cap 510 and body 502. In some embodiments, weight portions 600 are configured to be secured in body 502 with cap 510. Weight portions 600 may include a cylindrical core 602A. A hollow cylindrical inner weight portion 602B is configured to receive a cylindrical core 602A. A hollow cylindrical outer weight portion 602C is configured to receive inner cylindrical weight portion 602B. An athlete may use one or more weight portions 600 to adjust the total weight of the shot. As previously noted, cylindrical weight portions, even when hollowed out, are typically easier to manufacture than spherical hollow hemispheres. Therefore, when the internal balance is less critical, use of cylindrical weight portions, or other shapes, may be desirable because of the reduced manufacturing costs.

[0046] The foregoing descriptions of the specific embodiments described herein are presented for purposes of illustration and description. These exemplary embodiments are not intended to be exhaustive or to limit the embodiments to the precise forms disclosed. All specific details described are not required in order to practice the described embodiments.

[0047] It will be apparent to one of ordinary skill in the art that many modifications and variations are possible in view of the above teachings, and that by applying knowledge within the skill of the art, one may readily modify and/or adapt for various applications such specific embodiments, without undue experimentation, without departing from the general concept of the present invention. Such adaptations and modifications are intended to be within the meaning and range of equivalents of the disclosed embodiments, based on the teaching and guidance presented herein.

[0048] The Detailed Description section is intended to be used to interpret the claims. The Summary and Abstract sections may set forth one or more but not all exemplary embodiments of the present invention as contemplated by the inventor(s), and thus, are not intended to limit the present invention and the claims.

[0049] The phraseology or terminology used herein is for the purpose of description and not limitation, such that

the terminology or phraseology of the present specification is to be interpreted by the skilled artisan.

[0050] The breadth and scope of the present invention(s) should not be limited by any of the above-described exemplary embodiments, but should be defined only in accordance with the claims and their equivalents.

[0051] In accordance with the invention disclosed therein, the following preferred embodiments are disclosed:

1. An adjustable weight shot system comprising:

- a core;
- an inner weight portion comprising two coupling hemispheres configured to receive the core in an inner weight portion cavity;
- an outer weight portion comprising two coupling hemispheres configured to receive the inner weight portion in an outer weight portion cavity; and
- a body and a cap coupled to the body, wherein the body and cap are configured to retain the outer weight portion in a body weight cavity defined by the body and the cap.

2. The adjustable weight shot system of embodiment 1, further comprising:

one or more intermediate weight portions, each intermediate weight portion comprising two coupling hemispheres defining an intermediate weight portion cavity.

3. The adjustable weight shot system of embodiment 2, wherein the number of intermediate weight portions is three.

4. The adjustable weight shot system of embodiment 1, wherein an outer surface area of the body is larger than an outer surface area of the cap.

5. The adjustable weight shot system of embodiment 1, wherein the body and cap are configured to be coupled using a threaded connection.

6. The adjustable weight shot system of embodiment 1,

- the cap comprising a cap sleeve; and
- the cap sleeve comprising cap threads.

7. An adjustable weight shot comprising:

- a body defining a shot cavity
- a weight portion configured to be positioned in the shot cavity and comprising two coupling weight portion hemispheres, the two coupling weight portion hemispheres defining a weight cavity.

8. The adjustable weight shot of embodiment 7, further comprising:

- a cap, wherein the body is configured to receive the cap at an opening of the body.

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9. The adjustable weight shot of embodiment 7, wherein the weight portion is a first weight portion, the weight portion hemispheres are first weight portion hemispheres, and the weight cavities are first weight cavities, further comprising:

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a second weight portion configured to be positioned in the first weight cavity and comprising two coupling second weight portion hemispheres, the two coupling weight portion hemispheres defining a second weight cavity.

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10. The adjustable weight shot of embodiment 7, the weight portion further comprising a weight portion key hole.

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11. The adjustable weight shot of embodiment 10, wherein the weight portion key hole is formed near a boundary of the two coupling weight portion hemispheres.

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12. The adjustable weight shot of embodiment 7, wherein the weight portion hemispheres of the removable weight portion are configured to couple using a snap-fit connection.

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13. The adjustable weight shot of embodiment 7, wherein the shot cavity is semispherical.

14. The adjustable weight shot of embodiment 8, the cap comprising a tool port.

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15. The adjustable weight shot of embodiment 14, the tool port comprising a tool port weight.

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16. The adjustable weight shot of embodiment 8,

- the body comprising a cap seat extending radially inward from the opening; and
- the cap comprising a cavity sleeve, wherein the cavity sleeve is configured to engage the cap seat.

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17. The adjustable weight shot of embodiment 16,

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- wherein the shot cavity is semispherical and has a shot cavity radius,
- wherein the cap seat has a cap seat diameter, and
- wherein the cap seat diameter is greater than the shot cavity diameter.

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18. An adjustable weight shot system comprising:

- a body and a cap, the cap configured to engage an opening formed in the body; and
- a plurality of weight portions, each weight portion comprising two coupling hollow hemispheres, wherein the plurality of weight portions are configured to nest inside the body.

19. The adjustable weight shot system of embodiment 18, wherein the plurality of weight portions is five weight portions.

20. The adjustable weight shot system of embodiment 19, the cap comprising a tool port formed on an exterior surface of the cap.

21. An adjustable weight shot system comprising:

- a body and a cap, the cap configured to engage an opening formed in the body; and
- a plurality of cylindrical weight portions, wherein the plurality of weight portions are configured to nest inside the body.

22. An adjustable weight shot system comprising:

- a cylindrical core;
- a hollow cylindrical inner weight portion configured to receive the cylindrical core;
- a hollow cylindrical outer weight portion configured to receive the hollow cylindrical inner weight portion;
- a body configured to receive the hollow cylindrical outer weight portion; and
- a cap;

wherein the cap is configured to retain the outer weight portion in the body, and wherein the cap and body have a spherical shape when the cap is secured to the body.

23. The adjustable weight shot system of embodiment 22, wherein the cap comprises a tool port.

24. The adjustable weight shot system of embodiment 22, wherein the body further comprises a recess configured to receive a portion of the cylindrical core.

Claims

1. An adjustable weight shot system comprising:

- a core;
- an inner weight portion comprising two coupling hemispheres configured to receive the core in an inner weight portion cavity;
- an outer weight portion comprising two cou-

- pling hemispheres configured to receive the inner weight portion in an outer weight portion cavity; and
 - a body and a cap coupled to the body, wherein the body and cap are configured to retain the outer weight portion in a body weight cavity defined by the body and the cap.
2. The adjustable weight shot system of claim 1, further comprising:
 one or more intermediate weight portions, each intermediate weight portion comprising two coupling hemispheres defining an intermediate weight portion cavity, preferably wherein the number of intermediate weight portions is three.
3. The adjustable weight shot system of claim 1 or 2, wherein an outer surface area of the body is larger than an outer surface area of the cap and/or wherein the body and cap are configured to be coupled using a threaded connection.
4. The adjustable weight shot system of any of the preceding claims,
 - the cap comprising a cap sleeve; and
 - the cap sleeve comprising cap threads.
5. An adjustable weight shot comprising:
 - a body defining a shot cavity,
 - a weight portion configured to be positioned in the shot cavity and comprising two coupling weight portion hemispheres, the two coupling weight portion hemispheres defining a weight cavity, and
 - preferably a cap, wherein the body is configured to receive the cap at an opening of the body.
6. The adjustable weight shot of claim 5, wherein the weight portion is a first weight portion, the weight portion hemispheres are first weight portion hemispheres, and the weight cavities are first weight cavities, further comprising:
 a second weight portion configured to be positioned in the first weight cavity and comprising two coupling second weight portion hemispheres, the two coupling weight portion hemispheres defining a second weight cavity.
7. The adjustable weight shot of claim 5 or 6, wherein the weight portion further comprises a weight portion key hole, preferably wherein the weight portion key hole is formed near a boundary of the two coupling weight portion hemispheres,
 and/or wherein
 the weight portion hemispheres of the removable weight portion are configured to couple using a snap-fit connection..
8. The adjustable weight shot of any of claims 5 to 7, wherein the shot cavity is semispherical and/or wherein
 the cap comprises a tool port, the tool port preferably comprising a tool port weight.
9. The adjustable weight shot of any of claims 5 to 8,
 - the body comprising a cap seat extending radially inward from the opening; and
 - the cap comprising a cavity sleeve,
 - wherein the cavity sleeve is configured to engage the cap seat.
10. The adjustable weight shot of claim 9,
 - wherein the shot cavity is semispherical and has a shot cavity radius,
 - wherein the cap seat has a cap seat diameter, and
 - wherein the cap seat diameter is greater than the shot cavity diameter.
11. An adjustable weight shot system comprising:
 - a body and a cap, the cap configured to engage an opening formed in the body; and
 - a plurality of weight portions, each weight portion comprising two coupling hollow hemispheres,
 - wherein the plurality of weight portions are configured to nest inside the body.
12. The adjustable weight shot system of claim 11, wherein the plurality of weight portions is five weight portions
 and/or wherein
 the cap comprises a tool port formed on an exterior surface of the cap.
13. An adjustable weight shot system comprising:
 - a body and a cap, the cap configured to engage an opening formed in the body; and
 - a plurality of cylindrical weight portions,
 - wherein the plurality of weight portions are configured to nest inside the body.
14. An adjustable weight shot system comprising:
 - a cylindrical core;
 - a hollow cylindrical inner weight portion configured to receive the cylindrical core;
 - a hollow cylindrical outer weight portion configured to receive the hollow cylindrical inner weight portion;

- a body configured to receive the hollow cylindrical outer weight portion; and
- a cap;
- wherein the cap is configured to retain the outer weight portion in the body, and
- wherein the cap and body have a spherical shape when the cap is secured to the body.

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15. The adjustable weight shot system of claim 14, wherein the cap comprises a tool port and/or wherein the body further comprises a recess configured to receive a portion of the cylindrical core.

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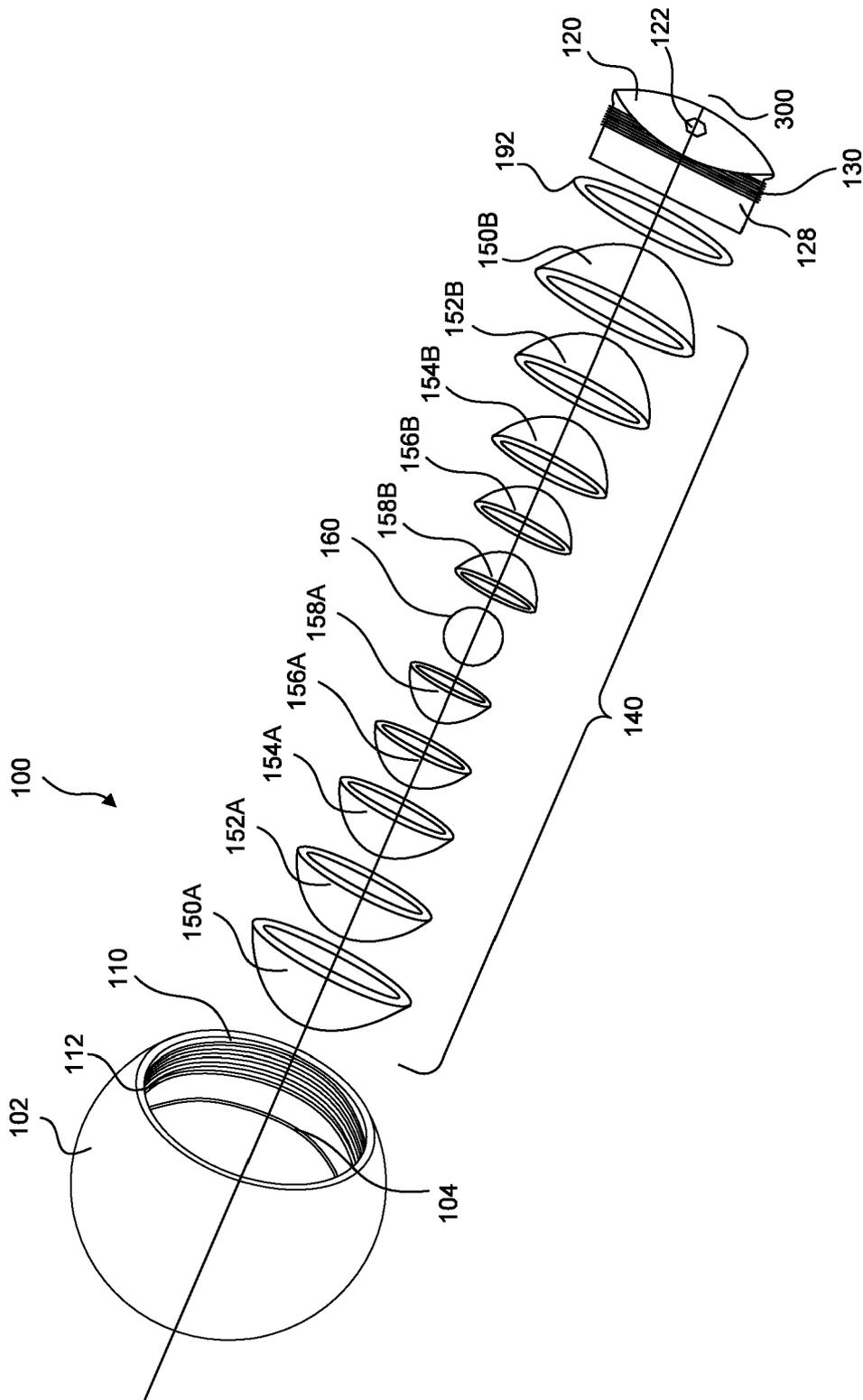


FIG. 1

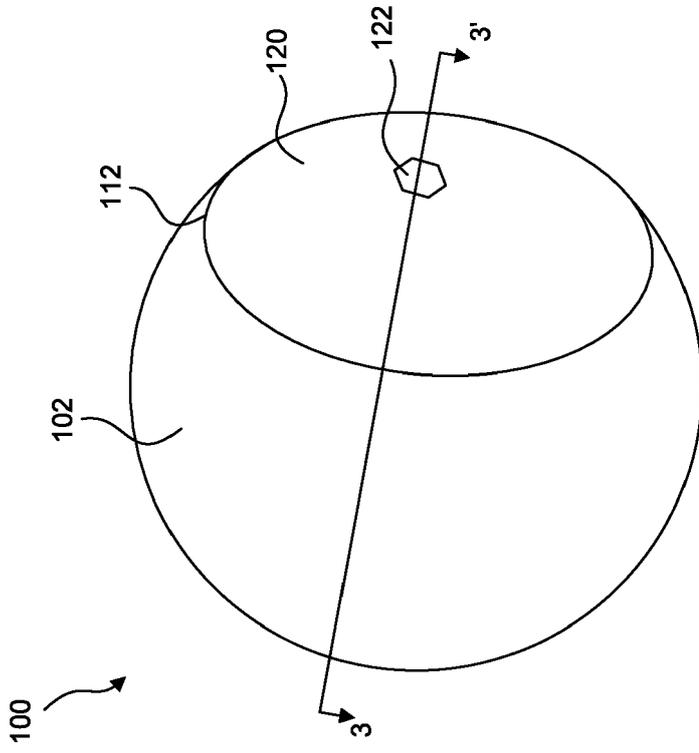


FIG. 2

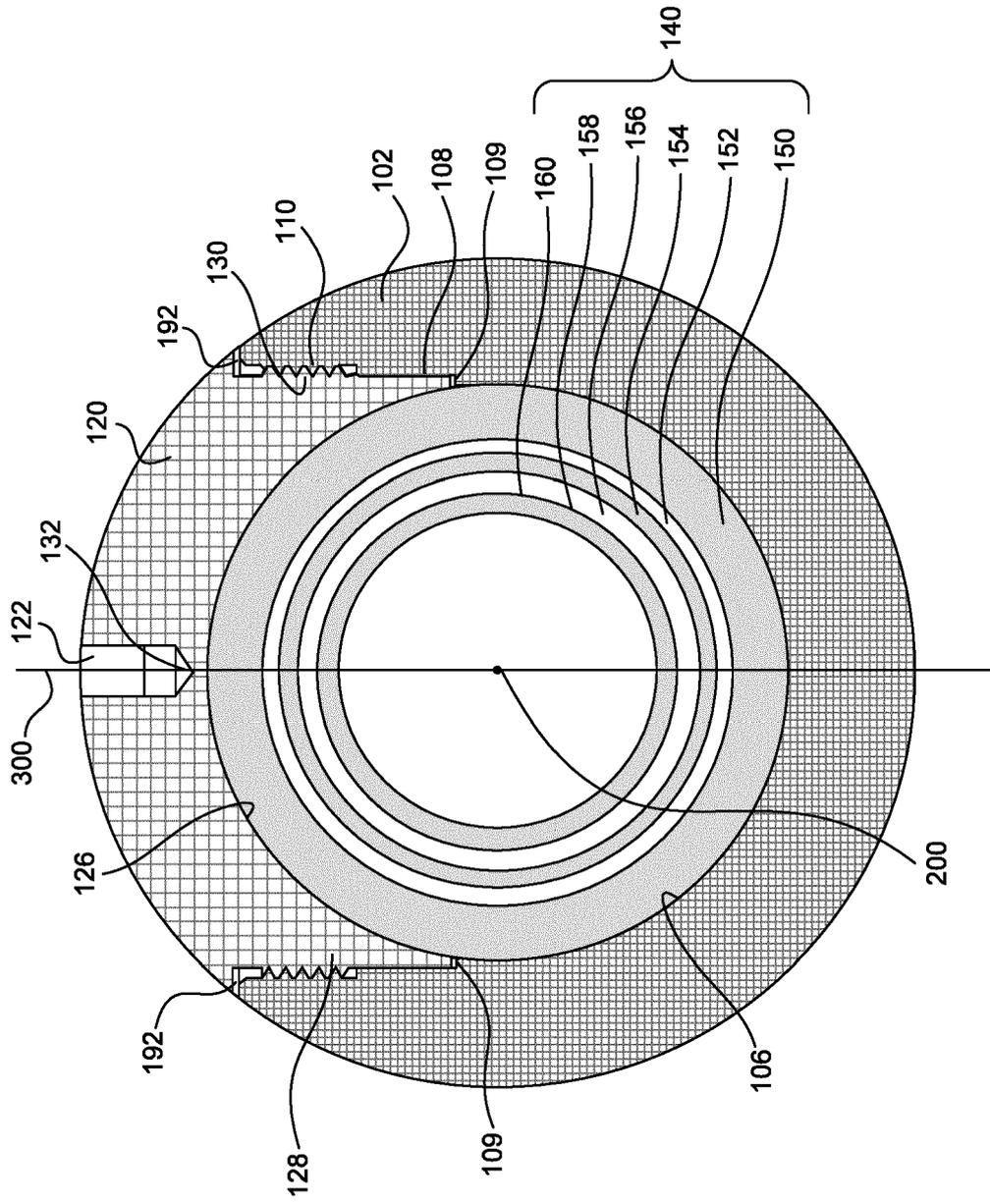


FIG. 3

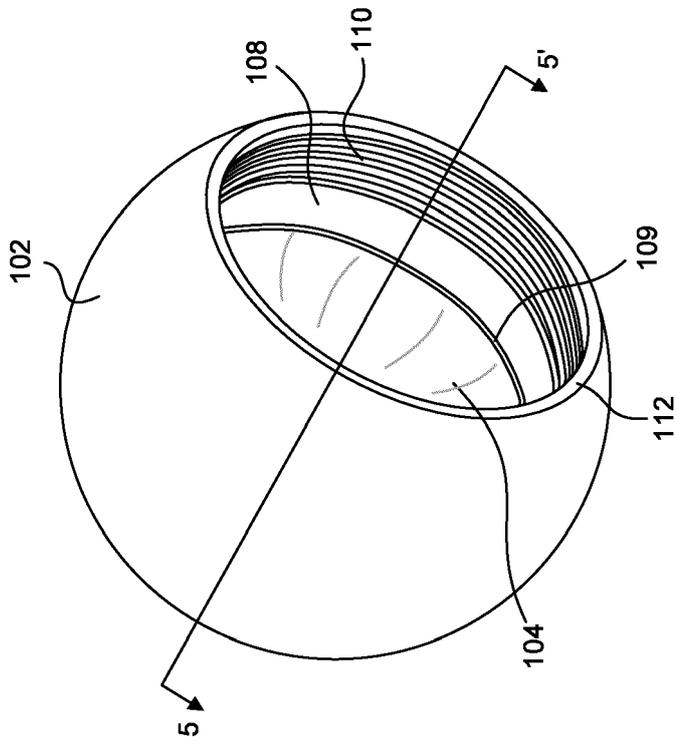


FIG. 4

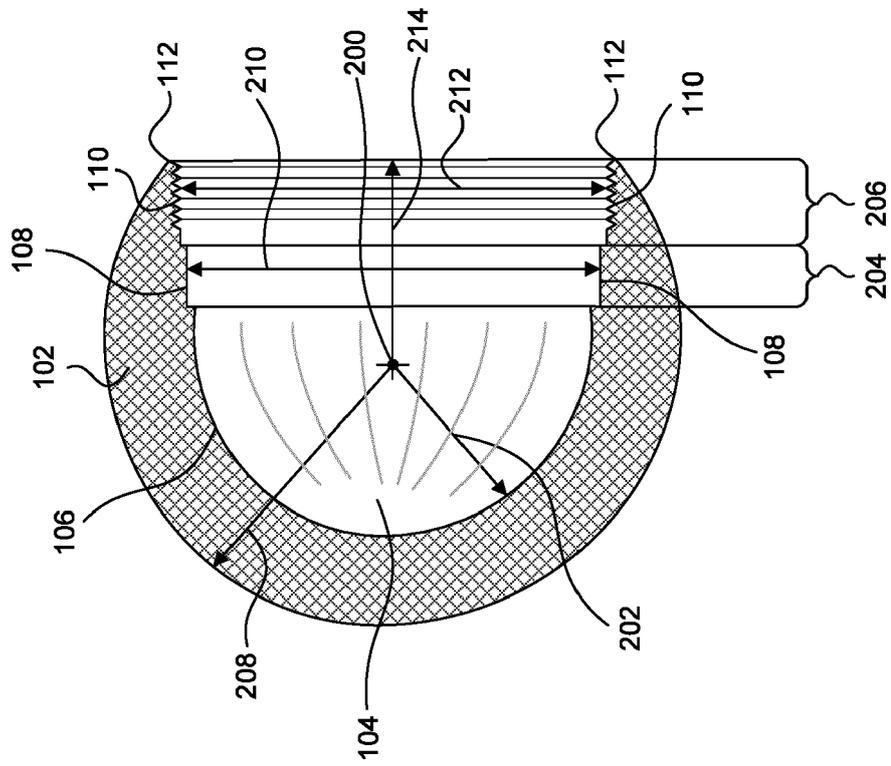


FIG. 5

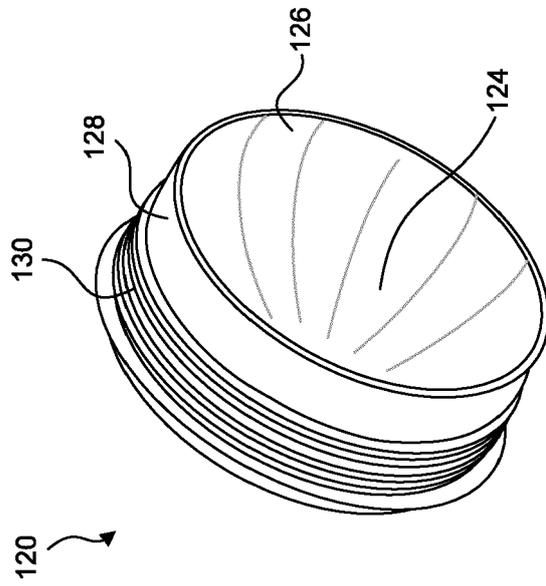


FIG. 6

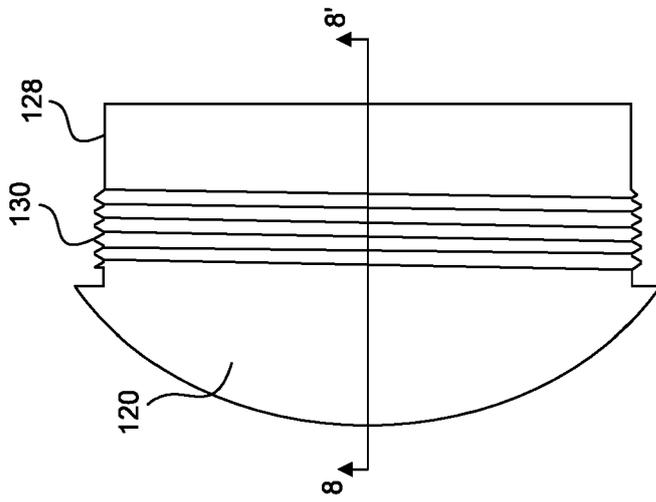


FIG. 7

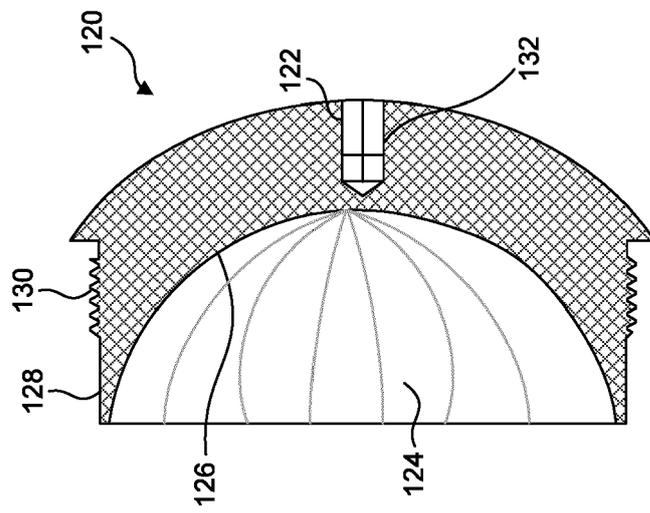


FIG. 8

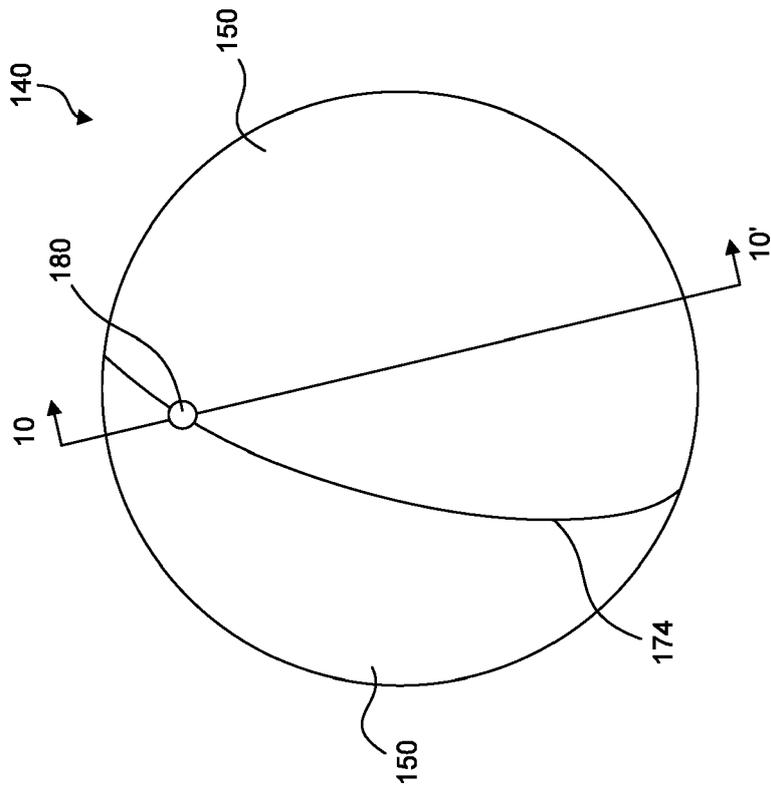


FIG. 9

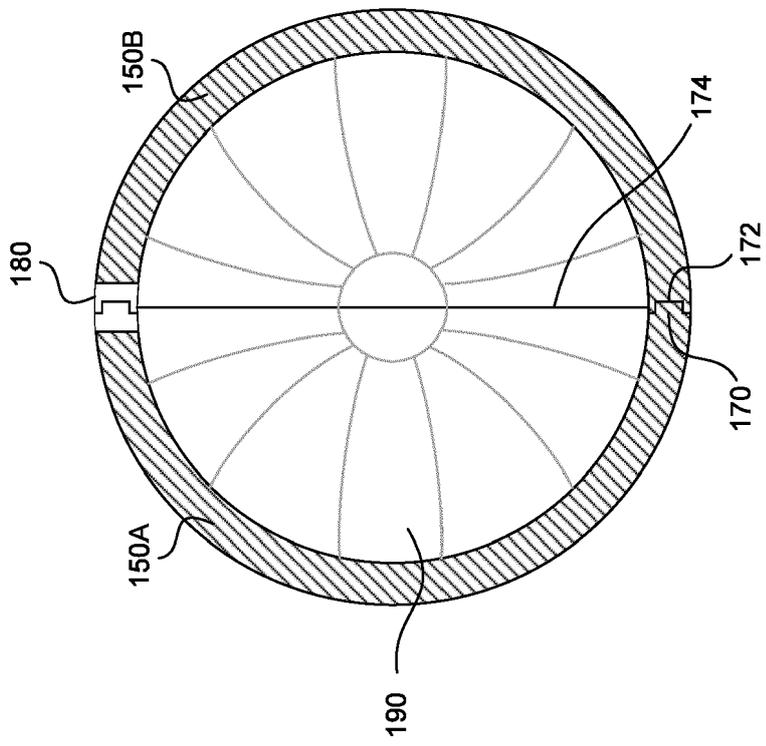


FIG. 10

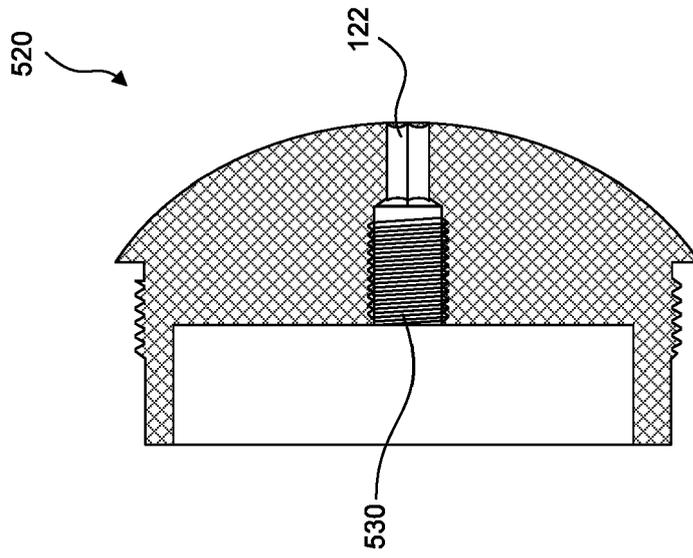


FIG. 11

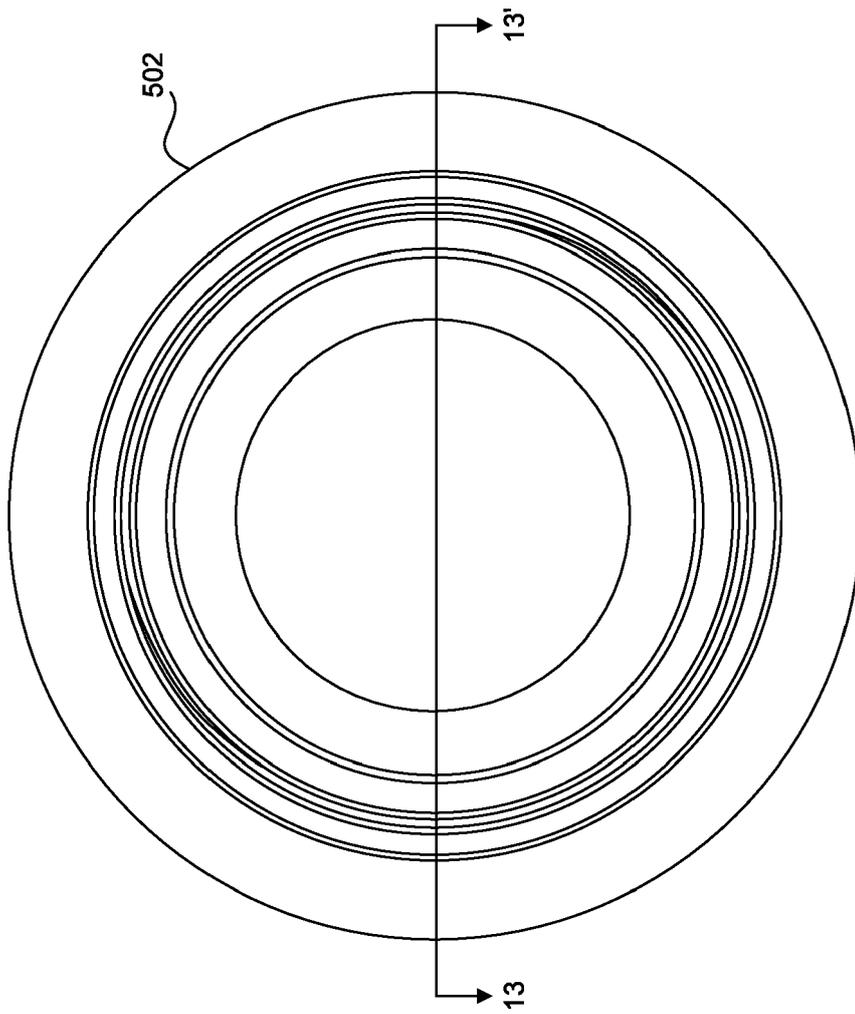


FIG. 12

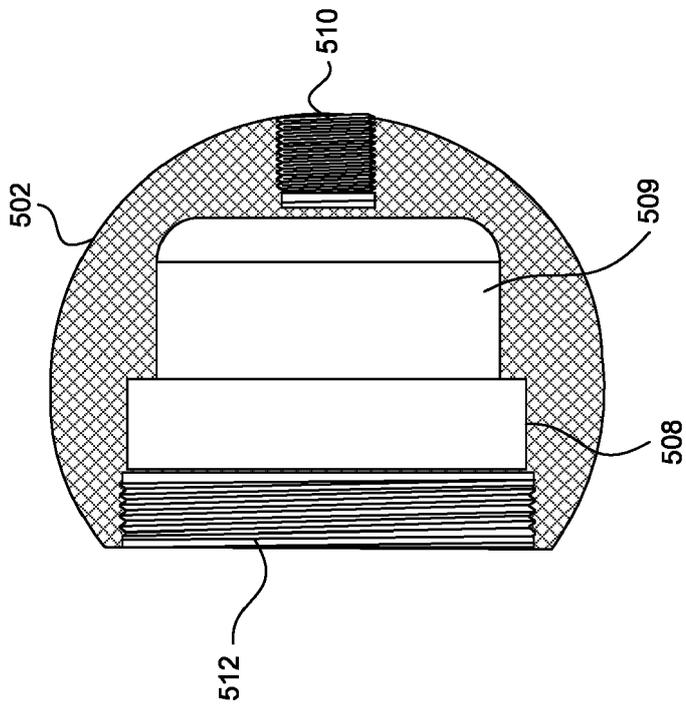


FIG. 13

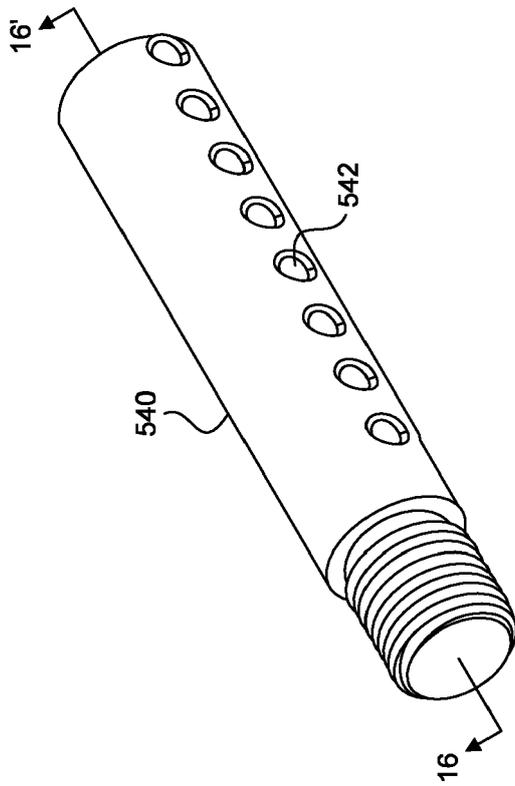


FIG. 14

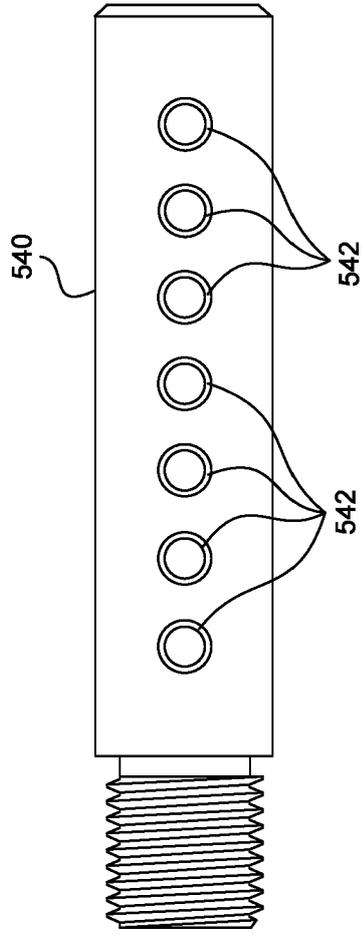


FIG. 15

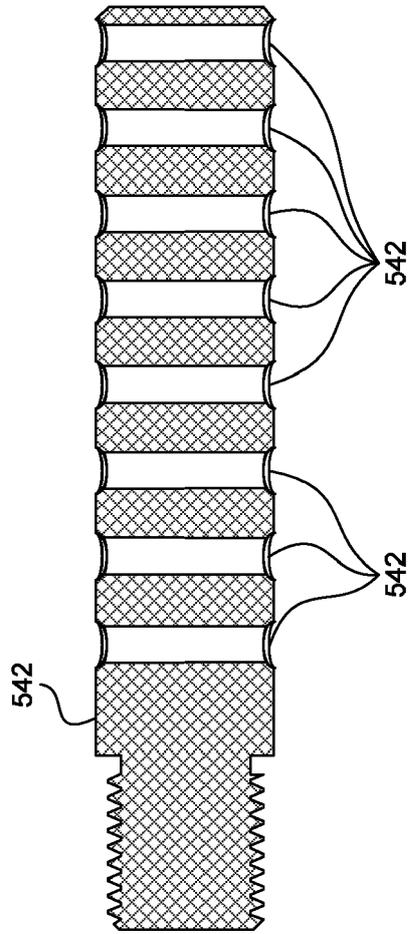


FIG. 16

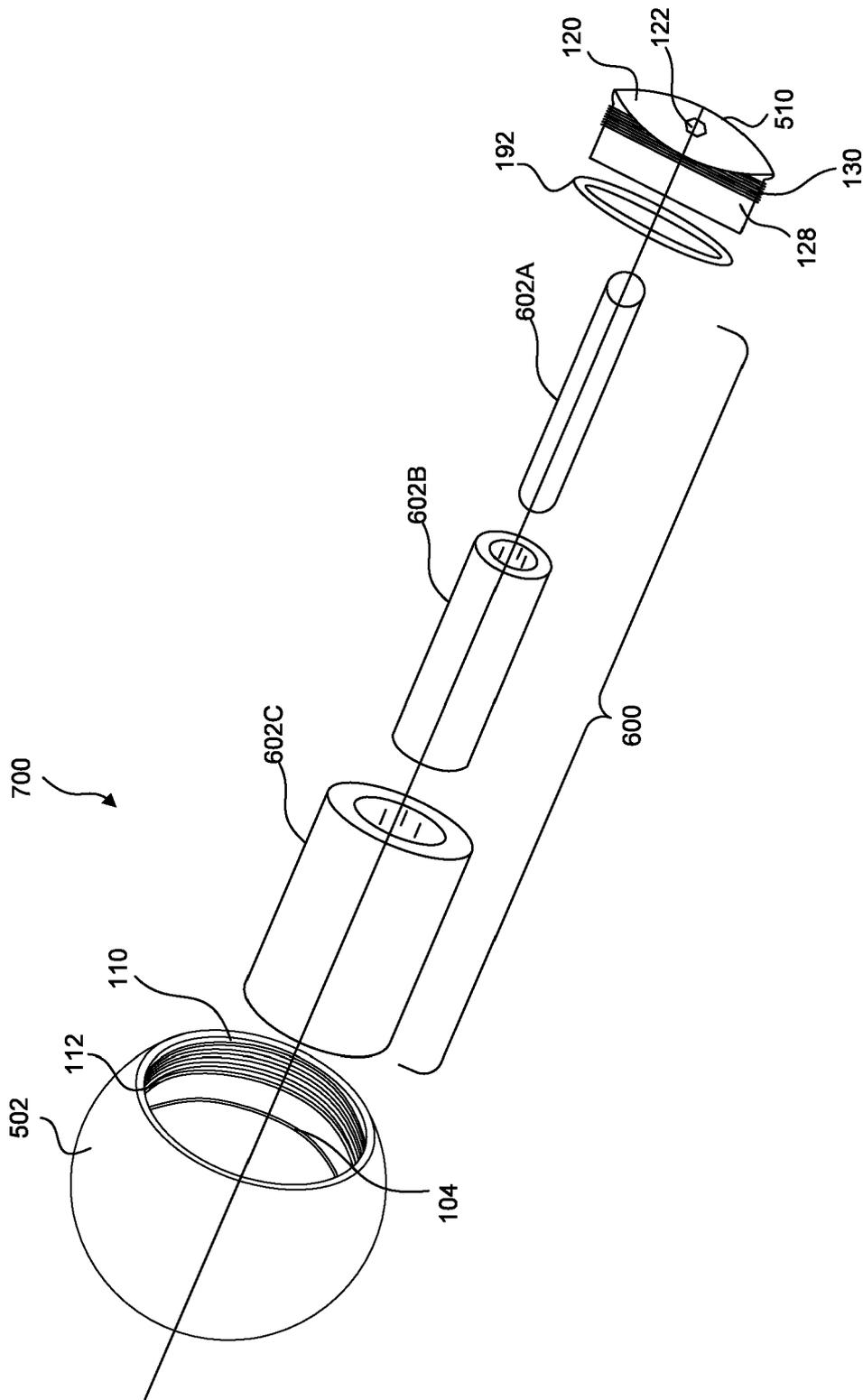


FIG. 17



PARTIAL EUROPEAN SEARCH REPORT

Application Number

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

EP 20 15 8666

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 1 986 687 A (ALFRED TENISON SAMUEL) 1 January 1935 (1935-01-01) * page 1, line 47 - page 3, line 61; figures *	5-10	INV. A63B65/00 A63B43/00 A63B65/06
A	US 6 387 022 B1 (SMITH ROBERT S [US]) 14 May 2002 (2002-05-14) * column 2, line 5 - line 56; figures *	5-10	
A	CN 203 989 762 U (JIANGSU MARITIME INST) 10 December 2014 (2014-12-10) * the whole document *	5-10	
A	US 2016/256730 A1 (BARTOS MIKE [US]) 8 September 2016 (2016-09-08) * paragraph [0017] - paragraph [0034]; figures *	5-10	
			TECHNICAL FIELDS SEARCHED (IPC)
			A63B
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
Munich		14 August 2020	Lucas, Peter
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	

EPO FORM 1503 03.82 (P04E07)



**INCOMPLETE SEARCH
SHEET C**

Application Number
EP 20 15 8666

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Claim(s) completely searchable:
5-10

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Claim(s) not searched:
1-4, 11-15

Reason for the limitation of the search:

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The search has been restricted to the subject-matter (claims 5-10) indicated by the applicant in his letter of 04.08.20 filed in reply to the invitation pursuant to Rule 62a(1) EPC.

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 20 15 8666

5 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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14-08-2020

10	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
	US 1986687	A	01-01-1935	NONE

	US 6387022	B1	14-05-2002	NONE
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82