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- (71) Applicant (for all designated States except US): **DEPUY PRODUCTS, INC.** [US/US]; 700 Orthopaedic Drive, Warsaw, IN 46581 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **DE WILDE, Lieven** [BE/US]; P.O. Box 988, Warsaw, IN 46581-0988 (US). **LAPPIN, Kyle** [US/US]; P.O. Box 988, Warsaw, IN 46581-0988 (US).
- (74) Agents: **JOHNSON, Philip S.** et al.; Johnson & Johnson, One Johnson & Johnson Plaza, New Brunswick, NJ 08933 (US).

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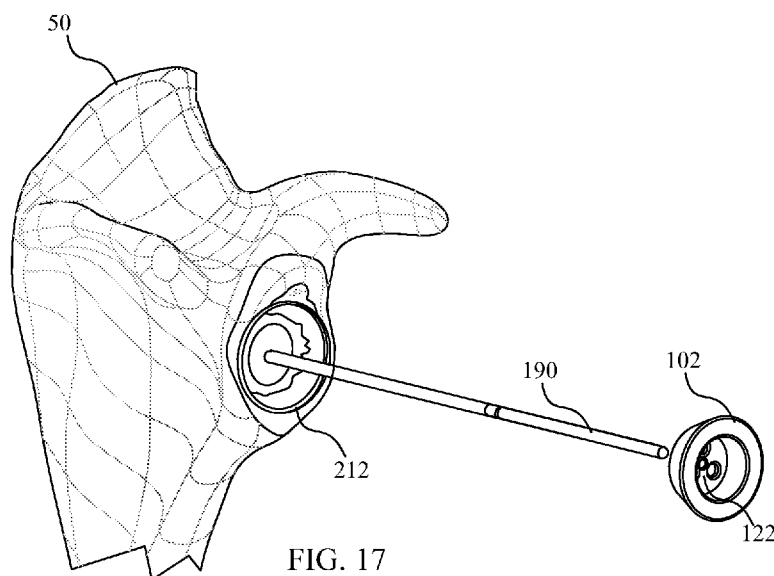
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[Continued on next page]

(54) Title: REVISION GLENOID DEVICE AND METHOD



(57) Abstract: A kit for use in revision shoulder arthroplasty has at least one revision glenoid component and a reamer for preparing a cavity in a glenoid. The revision glenoid component has a base component with a lip defining a first circular outer periphery and a bottom surface defining a second circular outer periphery. The reamer has a reamer portion shaped complementary to, and slightly larger than, the base component such that when a cavity is formed in the glenoid with the reamer, the base component fits within the cavity without being press-fit into the cavity.



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REVISION GLENOID DEVICE AND METHOD

Cross-reference to Related Applications

This application is related to U.S. Patent Application Serial No. 13/051,011,
5 entitled “Circular Glenoid Method for Shoulder Arthroscopy”, which was filed on March
18, 2011, U.S. Patent Application Serial No. 13/051,026, entitled “Combination
Reamer/Drill Bit for Shoulder Arthroscopy”, which was also filed on March 18, 2011, and
U.S. Patent Application Serial No. 13/051,041, entitled “Device and Method for
Retroversion Correction Cone for Shoulder Arthroscopy”, which was also filed on March
10 18, 2011, the contents of which are each incorporated herein by reference.

Technical Field of the Invention

[0001] The present invention relates generally to the field of orthopedics, and,
more particularly, to glenoid component apparatuses for shoulder arthroplasty and methods
15 for using them.

Background

[0002] As depicted in FIG. 1, a typical shoulder or glenohumeral joint is formed in
a human body where the humerus 10 movably contacts the scapula 12. The scapula 12
20 includes a glenoid fossa 14 that forms a socket against which the head of the humerus 10
articulates. At this socket, the scapula 12 includes cartilage 16 that facilitates such
articulation. Beneath the cartilage is subchondral bone 18 that forms a wall of a glenoid
vault 20 that defines a cavity which contains cancellous bone 22. The subchondral bone

18 that forms the glenoid vault 20 defines a glenoid rim 24 at a periphery of the glenoid vault 20 that is attached to the cartilage 16. During the lifetime of a patient, the glenoid fossa 14 may become worn, especially at its posterior and/or superior portions thereby causing severe shoulder pain and limiting the range of motion of the patient's shoulder joint. To alleviate such pain and increase the patient's range of motion, a shoulder arthroplasty may be performed. Arthroplasty is the surgical replacement of one or more bone structures of a joint with one or more prostheses.

[0003] Shoulder arthroplasty often involves replacement of the glenoid fossa of the scapula with a prosthetic glenoid component. The conventional glenoid component typically provides a generally laterally or outwardly facing generally concave bearing surface against which a prosthetic humeral head (or, alternatively, the spared natural humeral head in the case of a glenoid hemi-arthroplasty) may bear during operation of the joint. The conventional glenoid component typically also includes a generally medially or inwardly projecting stem for fixing the glenoid component in a cavity constructed by suitably resecting the glenoid fossa 14 and suitably resecting cancellous bone 22 from the glenoid vault 20.

[0004] The goal of shoulder arthroplasty is to restore normal kinematics to the shoulder. Accordingly, known systems attempt to replicate the normal kinematics by carefully controlling the geometry of the articulating surfaces in the joint as well as the positioning of the prostheses in the bones in which the prostheses are implanted. Thus, the articulating surface of a humeral component is typically spherical and positioning of the humeral component is accomplished by using the anatomical neck of the humerus as the reference plane for reconstruction of the humeral head.

[0005] In known systems, the glenoid component is positioned in the geometric center of the glenoid fossa. The geometric center is established by generating a line from the most superior point of the glenoid rim to the most inferior point of the glenoid rim (“Saller’s line”). A second line is generated between the most posterior point of the glenoid rim and the most anterior point of the glenoid rim. The intersection of the two generated lines is considered to be the geometric center of the area circumscribed by the glenoid rim. By way of example, FIG. 2 depicts a sagittal view of the scapula 12. In FIG. 2, Saller’s line 30 extends between the most superior point 32 of the glenoid rim 24 and the most inferior point 34 of the glenoid rim 24. A second line 36 extends from the most posterior point 38 of the glenoid rim 24 and the most anterior point 40 of the glenoid rim. The geometric center 42 of the glenoid fossa 14 is located at the intersection of the line 36 and Saller’s line 30. As used herein, the terms anterior, posterior, superior, and inferior, unless otherwise specifically described, are used with respect to the orientation of the scapula 12 as depicted in FIG. 2.

[0006] Over time, implanted glenoid components can become loosened. Loosened components can result in increased pain for an individual. Correction of the problem, however, may be problematic. For example, replacement of components which are loosened may be complicated by a number of different glenoid deficiencies. Glenoid deficiencies may be classified as central (a void area in the central region of the glenoid fossa), peripheral (a void area in the glenoid rim area), or combined (a void area extending from the central region of the glenoid fossa to the glenoid rim area). Replacement of components in the presence of mild or moderate deficiencies, particularly when limited to the central region, may be accomplished using known components with or without bone

grafting to fill remaining void areas. In cases involving large central deficiencies and combined deficiencies, however, other procedures such as allografting are required. Once the grafted material has been incorporated into the glenoid, a second surgery is performed to implant a replacement component into the allograft.

5 [0007] An alternative to grafting procedures is customization of components for the particular patient deficiency. Of course, customization increases the costs for a given procedure. Moreover, obtaining reproducible results is difficult when each procedure is unique.

[0008] There remains a need for a glenoid component that allows for establishing
10 normal kinematics in revision procedures. There is a further need for a technique, instrumentation, and implant that facilitates positioning of such a component even when the glenoid has a variety of deficiencies. A glenoid component that can be positioned in a manner that reduces the amount of bone that is required to be removed without overly complicating the implant procedure is also needed.

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Summary of the Invention

[0009] The present invention in one embodiment provides a method of implanting a revision glenoid component including accessing a previously implanted glenoid component in a scapula, removing the previously implanted glenoid component,
20 identifying an inferior glenoid circle center of the scapula, preparing a glenoid fossa of the scapula to receive a revision glenoid component, selecting a revision glenoid component,

and implanting the selected revision glenoid component based upon the identified inferior glenoid circle center in the prepared glenoid fossa.

[0010] In another embodiment, a method of implanting a revision glenoid component includes obtaining an image of a scapula, identifying an inferior glenoid circle center of the scapula based upon the image, selecting a revision glenoid component, removing a previously implanted glenoid component from the scapula, preparing a glenoid fossa of the scapula to receive a prosthesis, and implanting the selected revision glenoid component in the prepared glenoid fossa based upon the identified inferior glenoid circle center.

[0011] The above-noted features and advantages of the present invention, as well as additional features and advantages, will be readily apparent to those skilled in the art upon reference to the following detailed description and the accompanying drawings, which include a disclosure of the best mode of making and using the invention presently contemplated.

Brief Description of the Drawings

[0012] FIG. 1 depicts a coronal view of an anatomically normal shoulder joint.

[0013] FIG. 2 depicts a sagittal view of the shoulder joint of FIG. 1;

[0014] FIG. 3 depicts a front perspective view of a retroversion glenoid component

that may be implanted in a scapula in accordance with principles of the invention;

[0015] FIG. 4 depicts a front perspective view of the base of the retroversion glenoid component of FIG. 3 that may be implanted in a scapula in accordance with principles of the invention;

[0016] FIG. 5 depicts a top plan view of the base of the retroversion glenoid component of FIG. 3;

[0017] FIG. 6 depicts a side cross-sectional view of the base of the retroversion glenoid component of FIG. 3;

[0018] FIG. 7 depicts a front perspective view of the articulating component of the retroversion glenoid component of FIG. 3;

[0019] FIG. 8 depicts a side cross-sectional view of the articulation component of the retroversion glenoid component of FIG. 3;

[0020] FIG. 9 depicts a side cross-sectional view of the retroversion glenoid component of FIG. 3;

[0021] FIG. 10 depicts a medical procedure that may be used to implant the retroversion glenoid component base of FIG. 3 into a scapula using a kit that includes a guide pin and a combined reaming/planing tool;

[0022] FIG. 11 depicts a sagittal view of a scapula with an implanted glenoid component which exhibits severe central bone loss resulting in undesired movement of the implanted glenoid component and which has been accessed in accordance with the procedure of FIG. 10;

[0023] FIG. 12 depicts a sagittal view of the scapula of FIG. 11 after the previously implanted glenoid component has been removed;

[0024] FIG. 13 depicts a front perspective view of the scapula of FIG. 11 with a guide pin placement guide positioned to guide placement of the guide pin such that the guide pin is aligned with the glenoid axis of the scapula;

[0025] FIG. 14 depicts a side perspective view of the guide pin of FIG. 13 used to
5 guide a combined reaming/planning device that may be included in a kit;

[0026] FIG. 15 depicts a partial bottom perspective view of the combined reaming/planning device of FIG. 14 showing a planning portion and a reaming portion;

[0027] FIG. 16 depicts a side perspective view of the scapula of FIG. 14 after a cavity has been reamed and after the glenoid has been repaired by using bone graft and a
10 compactor to replace bone loss areas about the cavity;

[0028] FIG. 17 depicts the side perspective view of the scapula of FIG. 16 with the guide hole of a base component aligned with the guide pin such that the base component will be positioned in alignment with the glenoid axis of the scapula;

[0029] FIG. 18 depicts a sagittal plan view of the scapula of FIG. 17 with the base
15 component rotated such that fasteners inserted into two of the fastener holes of the base can access a lateral pillar and a spina pillar of the scapula;

[0030] FIG. 19 depicts a cross-sectional view of the scapula of FIG. 18 with the coupling portion of the selected articulation component aligned with the receptacle of the base component; and

[0031] FIG. 20 depicts a cross-sectional view of the scapula of FIG. 19 with the
20 articulation component coupled with the base component such that the nadir of the articulation component is positioned at the glenoid axis of the scapula.

Detailed Description

[0032] Like reference numerals refer to like parts throughout the following description and the accompanying drawings.

5 **[0033]** FIG. 3 depicts a retroversion glenoid component 100. The glenoid component 100 includes a base component 102 and an articulation component 104. With further reference to FIGs. 4-6, the base component 102 includes a wall 106 which extends between a lip 108 and a bottom surface 110. At the lip 108, the wall 106 defines a circular outer periphery that is slightly larger than the circular outer periphery of the wall 106 at the
10 bottom surface 110.

[0034] The lip 108 defines a receptacle 112 which is substantially cylindrical. The receptacle 112 extends from the lip 108 to a lower surface 114. Three fastener holes 116, 118, and 120 extend through the lower surface 114 and the bottom surface 110. A guide hole 122 also extends through the lower surface 114 and the bottom surface 110. The
15 guide hole 122 and the receptacle 112 are centrally located. Accordingly, the guide hole 122, the receptacle 112, and the outer wall 106 define a unitary axis 124.

[0035] The articulating component 104, depicted in FIG.s 6 and 7, includes a spherical articulating surface 134 and a coupling portion 136. The coupling portion 136 is substantially cylindrical in shape and sized with a diameter slightly larger than the
20 diameter of the receptacle 112. The articulating surface is positioned with a c 138 located on a central axis 140 of the articulating component 104. Accordingly, when the

articulation component 104 is coupled with the base component 102 as depicted in FIG. 8, the nadir 138 is located on the axis 124 of the base component.

[0036] The glenoid component 100 in this embodiment is modular, but in other embodiments may be integrally formed. Integrally formed units may be made from a durable biocompatible plastic or any other suitable durable biocompatible material. For example, the glenoid component 100 may be made from a polyethylene. One particular polyethylene that is well suited for glenoid component 100 is a high molecular weight polyethylene, for example ultra-high molecular weight polyethylene (“UHMWPE”). One such UHMWPE is sold as by Johnson & Johnson of New Brunswick, New Jersey as MARATHON™ UHMWPE and is more fully described in U.S. Pat. Nos. 6,228,900 and 6,281,264 to McKellop, which are incorporated herein by reference.

[0037] In the embodiment of FIG. 3 wherein the articulation component 104 and the base component 102 are separately formed, the various components may be made from different materials. Thus, the articulating surface 134 may be made from UHMWPE, while the coupling portion 136 and the base component 102 may be made from a suitable biocompatible metal such as, for example, a cobalt chromium alloy, a stainless steel alloy, a titanium alloy, or any other suitable durable material. In this embodiment, the articulating surface 134 is secured to the coupling portion 136 in any suitable manner. For example, articulating surface 134 may be bonded to coupling portion 136, or articulating surface 134 could be made from polyethylene and compression molded to coupling portion 136. Alternately, the articulating surface 134 may be glued to the coupling portion 136, for example, an adhesive. Alternatively, articulating surface 134 may be mechanically interlocked to the coupling portion 136 by taper locking or otherwise press-fitting the

articulating surface 134 into the coupling portion 136 and the coupling portion 136 may include any other suitable interlocking features, for example, rib(s), lip(s), detent(s), and/or other protrusion(s) and mating groove(s), channel(s), or indent(s) (not shown).

[0038] In alternative embodiments, one or more of the outer wall 106 and the
5 bottom surface 110 may include a porous coating to facilitate bone in-growth into the glenoid component 100. The porous coating may be any suitable porous coating and may for example be POROCOAT®, a product of Johnson & Johnson of New Brunswick, New Jersey and more fully described in U.S. Pat. No. 3,855,638 to Pilliar, which is incorporated herein by reference.

10 **[0039]** The glenoid component 100 may be included in a kit incorporating instrumentation that may be used to facilitate implantation of the glenoid component 100. Such instrumentation may include reamers and guide pins, as discussed more fully below. Additionally, the kit may include base components having different heights and widths. Typical heights may range between 10 and 30 millimeters (mm). The kit may further
15 include articulation components having different diameters. In one embodiment, a kit includes articulation components having a variety of diameters ranging from about 23 mm to about 30 mm.

[0040] Preferably, each of the base components in a kit has a receptacle 112 that is shaped and dimensioned the same as the receptacle 112 of each of the other base
20 components 102 while each of the articulation components 104 has a coupling portion 136 that is shaped and dimensioned the same as the coupling portion 136 of each of the other articulation components 104. Accordingly, any of the articulation components 104 may be coupled with any of the base components 102 in the kit.

[0041] A kit including the glenoid component 100 may be used to implant the glenoid component 100 into a scapula that has previously received a glenoid component in accordance with a procedure 150 depicted in FIG. 10. In accordance with the procedure 150, a scapula is accessed at block 152 in accordance with a desired surgical approach.

5 The previously implanted glenoid component is then removed at block 154. At block 156, the center of an inferior glenoid circle, further described in co-pending U.S. Patent Application No. [Atty Docket No. 1671-0479], is identified for the scapula. While visual identification of the inferior glenoid circle and hence the center of the inferior glenoid circle is possible once the scapula is accessed at block 152, the center of the inferior
10 glenoid circle may alternatively be identified prior to or after incising a patient with the aid of imaging or other techniques.

[0042] Once the center of the inferior glenoid circle is identified at block 156, a glenoid axis which extends through the center of the inferior glenoid circle and is perpendicular to the articulating surface of the glenoid is identified (block 158). In
15 alternative approaches, the glenoid axis may extend through the scapula at locations other than the center of the inferior glenoid circle. The glenoid axis may be identified prior to or after incising a patient with the aid of imaging or other techniques.

[0043] Next, a guide pin is positioned in the scapula such that the longitudinal axis of the guide pin is coextensive with the glenoid axis (block 160). A circular cavity is then
20 reamed in the glenoid (block 162) and the glenoid surface is planed (block 164). The circular cavity is preferably slightly larger than the diameter of the revision glenoid base component 102. This allows for positioning of the base component 102 without placing stress on the glenoid which may be significantly compromised as discussed more fully

below. At block 166, a bone graft compactor is used over the guide pin, if needed, to fill in void areas of the glenoid which are not needed for receiving the revision glenoid component. The guide hole 122 of the base component 102 is then aligned with and inserted onto the guide pin (block 168).

5 [0044] Using the guide pin as a guide, the base component 102 is then implanted in the prepared glenoid (block 170). Because the guide pin is positioned on the glenoid axis and because the guide pin is positioned within the guide hole 122, using the guide pin ensures that the central axis 124 of the base component (see FIG. 6) is aligned with the glenoid axis. At block 172, the base component 122 may further be rotated about the
10 guide pin to align one or more of the fastener holes 116, 118, and 120 with a respective one of the pillars of the scapula as described by *A. Karellse, et al.*, "Pillars of the Scapula", Clinical Anatomy, vol. 20, pp. 392-399 (2007). Typically, at least two of the fastener holes 116, 118, and 120 may be positioned so as to access the lateral and spina pillars. Rotation of the base component 102 is facilitated since the cavity in the glenoid is slightly
15 larger than the base component 102 as discussed above.

[0045] The guide pin may then be removed (block 174) and one or more fasteners may be inserted through fastener holes 116, 118, and 120 to affix the base component 102 to the scapula (block 176). To ensure firm fixation of the base component 102, it is preferred that one or even two fasteners extend into solid bone material within one or more
20 of the pillars of the scapula. The fastener holes 116, 118, and 120 may be configured to allow for variable angle fastener placement to assist in achieving a firm fixation. A desired articulation component is then obtained (block 178) and the coupling portion 136 is aligned with the receptacle 112 (block 180). The coupling portion 136 is then moved into

the receptacle 112 and the articulation component 104 is coupled to the base component 102 (block 182). Coupling may be facilitated by forming the coupling portion 136 and he receptacle 112 to form a friction fit, Morse taper, etc. Once the articulation component 104 is coupled to the base component 102, the nadir 138 will be aligned with the glenoid axis
5 since the articulation component 104 is configured to couple with the base component 102 such that the nadir 138 is on the axis 140 as discussed above.

[0046] FIGs. 11-20 depict a scapula 50 at various points of the procedure 220. In FIG. 11, the scapula 12 is depicted after block 152 with a previously implanted glenoid component 52. FIG. 12 depicts the scapula 50 after the component 52 has been removed.

10 The scapula 50 in FIG. 12 exhibits severe central bone loss which has resulted in instability of the glenoid component 52. The methods and devices disclosed herein may be used in performing a retroversion glenoid implantation in the presence of a variety of glenoid deficiencies including central, peripheral, and combined deficiencies ranging from mild to severe. Because the base component 102 is not press fit in to the scapula as
15 discussed above, the potential of fracturing a portion of the scapula even in the presence of severe deficiencies is reduced.

[0047] FIG. 13 depicts a guide pin 190 and a guide pin placement guide 192 that may be included in a kit used to perform a revision glenoid component implantation procedure. The guide pin placement guide 192 is positioned on the scapula 50
20 substantially centered upon the inferior glenoid circle. The guide pin 190 is thus positioned in the scapula 50 with the longitudinal axis of the guide pin 190 aligned with the glenoid axis.

[0048] FIG. 14 depicts the scapula 50 with the guide pin 190 used to guide a combination reaming device 194 that may also be included in a kit in accordance with the present disclosure. The combination reaming device 194 includes a shaft 196 and a working portion 198. The shaft 196 and the working portion 198 are cannulated to allow the guide pin 190 to be used to precisely position the combination device 194. The working portion 198 includes an outer planing portion 202 and a central reaming portion 204. The planing portion 202 and the central reaming portion 204 allow for simultaneous reaming and planing of the glenoid surface. Alternatively, two separate devices may be used sequentially.

[0049] Once the scapula 50 has been reamed and planed, some areas of deficiency may be present. Accordingly, bone grafting material may be used to fill the void areas. In one embodiment, a kit includes a cannulated compactor which is shaped like the reaming portion 204. The cannulated compactor may be guided by the guide pin 190 to compact bone graft material 210 (see FIG. 16) while maintaining or finally forming a cavity 212 that is shaped slightly larger than the outer wall 106 of the base component 102.

[0050] The guide hole 202 is then aligned with the guide pin 190 as depicted in FIG. 17 and the base component 102 is guided by the pin 190 into the cavity 212. The base component 102 is then rotated within the cavity 212 as desired to position the fastener holes 116, 118, or 120 to allow a fastener passed therethrough to be fixed into solid bone.

By way of example, FIG. 18 depicts the base component 102 positioned such that a fastener passing through the fastener hole 116 may be fixed in the lateral pillar while a fastener passing through the fastener hole 118 may be fixed in the spina pillar. Thus, even though some or all of the base component 102 may be positioned on bone graft 210 (see,

e.g., FIG. 19), the base component may be solidly fixed to the scapula 50. Thus, even when bone graft material 210 is used to fill in deficient areas of the scapula 50, a second surgery is not required.

[0051] Once the base 102 is fixed to the scapula 50 and the guide pin 190 is removed, in any desired sequence, the coupling portion 136 of the selected articulation component 104 is aligned with the receptacle 112 of the base component 102 as depicted in FIG. 19. The coupling portion 136 is then moved into the receptacle 112 and the articulation component 104 is coupled to the base component 102 in any desired manner, such as by a Morse taper fit between the coupling portion 136 and the receptacle 112, resulting in the configuration of FIG. 20. In FIG. 20, the nadir 138 is located on the glenoid axis since the base component 102 was fixed with the axis 124 of the guide hole 122 aligned with the glenoid axis as discussed above.

[0052] While the foregoing examples detailed only a single glenoid component 100, a kit may incorporate a number of different glenoid components. Each glenoid component in the kit may be of a different diameter. Additionally, the procedure 150 may be modified in a number of ways in addition to those discussed above. By way of example, while in the above example the glenoid component 100 was implanted with the nadir 138 aligned with the inferior glenoid circle center at block 182, the nadir 138 may alternatively be offset from the inferior glenoid circle center. For example, the nadir 138 may be offset from the inferior glenoid circle center by about 1.1 mm in a direction superiorly and posteriorly from the inferior glenoid circle center by positioning the guide pin 190 at the offset location at block 160. Imaging and computer based systems may be used to assist in the positioning of the glenoid component at this location.

[0053] Moreover, while a specific sequence was described in the procedure 150, many of the steps may be performed in a different order and/or simultaneously with other of the steps.

[0054] In accordance with the methods described above, a glenoid component with
5 a spherical articulating surface is implanted at or very near to the spinning point of a shoulder in a revision procedure. Because of the location of the glenoid component, a humeral component with a radius of curvature matched to the radius of curvature of the articulating surface may be used to provide a constrained fit. As used herein, the term “matched” means a difference in the radii of curvature of the articulating surfaces of less
10 than 2 mm.

[0055] The foregoing description of the invention is illustrative only, and is not intended to limit the scope of the invention to the precise terms set forth. Further, although the invention has been described in detail with reference to certain illustrative embodiments, variations and modifications exist within the scope and spirit of the
15 invention as described and defined in the following claims.

What is claimed is:

Claim 1. A kit for use in revision shoulder arthroplasty comprising:

at least one revision glenoid component including a base component including a lip
defining a first circular outer periphery and a bottom surface defining a second circular
5 outer periphery; and

a reamer for preparing a cavity in a glenoid, the reamer including reamer portion
shaped complementary to, and slightly larger than, the base component such that when a
cavity is formed in the glenoid with the reamer, the base component fits within the cavity
without being press-fit into the cavity.

10

Claim 2. The kit of claim 1, wherein:

the lip defines a receptacle;

the kit includes a plurality of articulation components, each of the plurality of
articulation components including a coupling portion configured to couple with the

15 receptacle; and

the at least one revision component comprises the base component and a selected
one of the plurality of articulation components.

Claim 3. The kit of claim 2, wherein the plurality of articulation components comprises:

20 a first articulation component including a spherical articulating surface having a
first diameter; and

a second articulation component including a spherical articulating surface having a
second diameter, the second diameter greater than the first diameter.

Claim 4. The kit of claim 2, wherein:

the receptacle defines a central axis; and

the plurality of articulation components comprises a first articulation component

5 with a spherical articulation surface which defines a nadir, the base component and the first articulation component configured such that when the first articulation component is coupled with the base component, the nadir is aligned with the central axis.

Claim 5. The kit of claim 2, wherein:

10 the receptacle defines a central axis; and

the plurality of articulation components comprises a first articulation component

with a spherical articulation surface which defines a nadir, the base component and the first articulation component configured such that when the first articulation component is coupled with the base component, the nadir is offset from the central axis.

15

Claim 6. The kit of claim 5, wherein the base component and the first articulation component are configured such that when the first articulation component is coupled with the base component, the nadir is offset from the central axis by about 1.1 millimeter.

20 Claim 7. The kit of claim 2, wherein:

the receptacle defines a central axis; and

a base component guide bore extends from the receptacle to the bottom surface and is aligned with the central axis.

Claim 8. The kit of claim 7, the base component further comprising:

a plurality of fastener holes, each of the plurality of fastener holes extending from the receptacle to the bottom surface and offset from the central axis.

5

Claim 9. The kit of claim 7, wherein the reamer comprises:

a reamer guide bore extending through the reamer portion; and

a planing portion located outwardly of the reamer portion.

10 Claim 10. The kit of claim 9, further comprising:

a cannulated compactor, the cannulated compactor configured to form a cavity shaped complementary to, and slightly larger than, the base component such that when a cavity is formed in the glenoid using the compactor, the base component fits within the cavity formed using the cannulated compactor without being press-fit into the cavity.

15

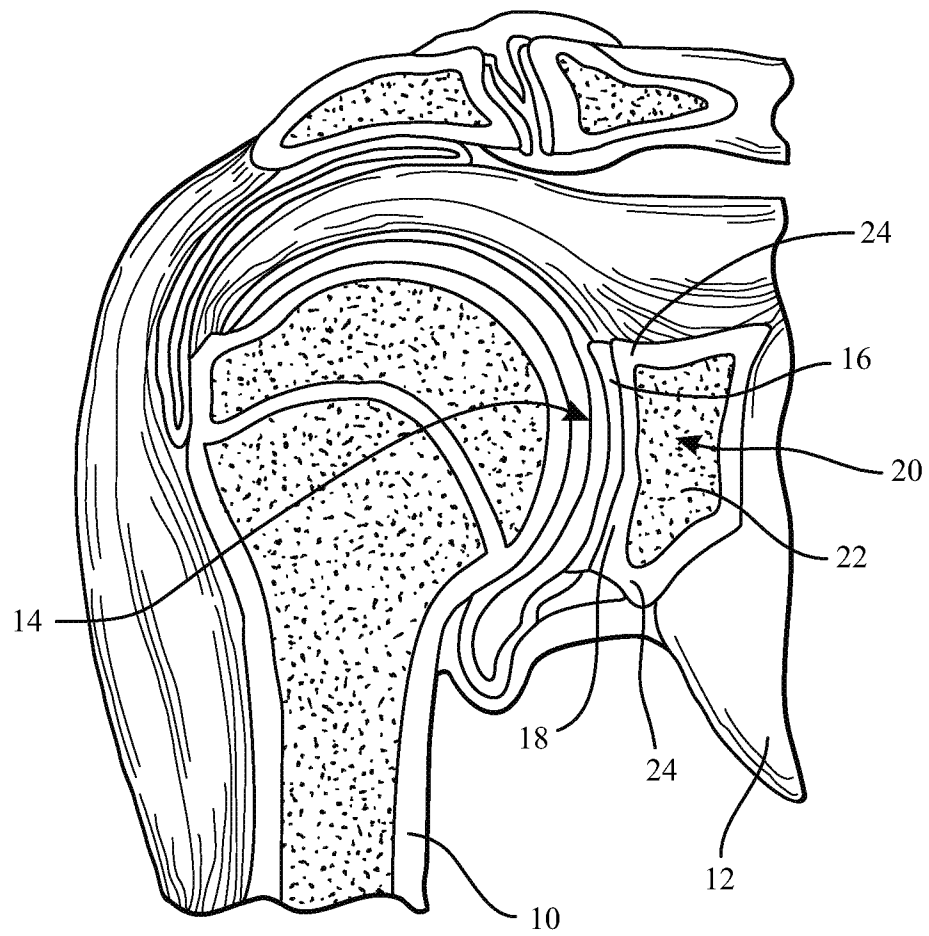


FIG. 1

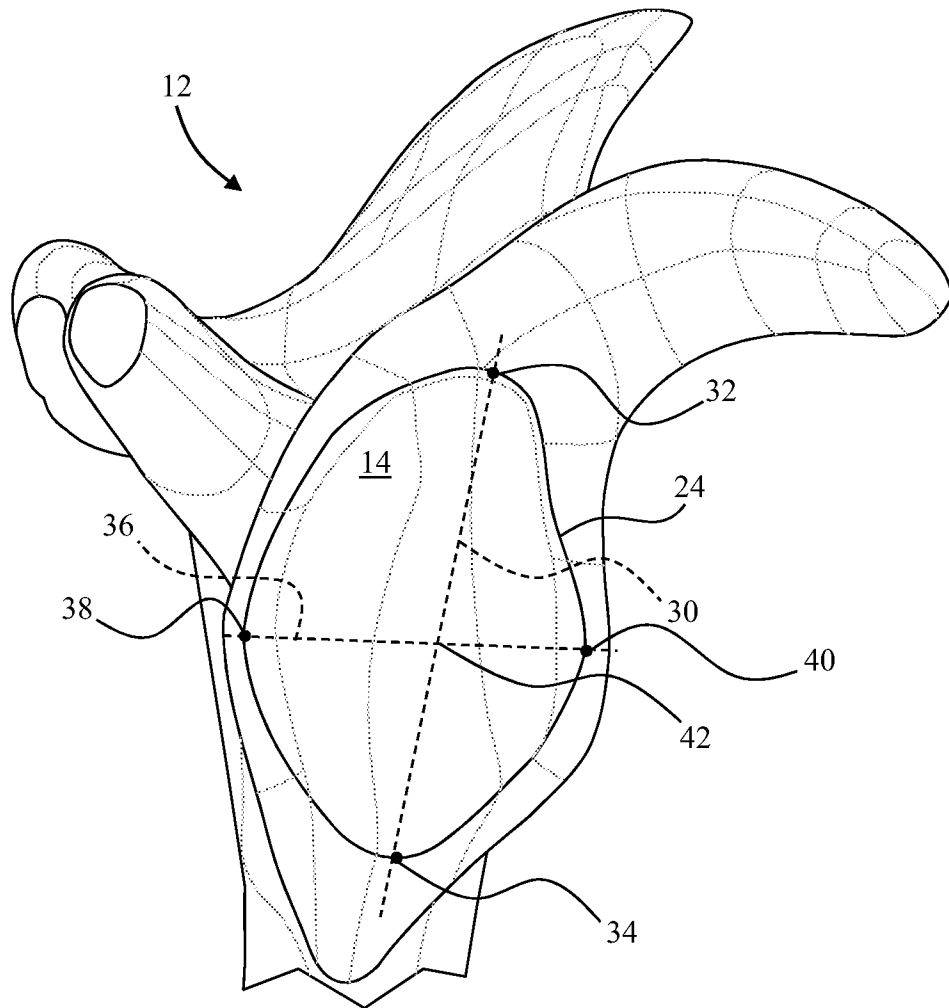


FIG. 2

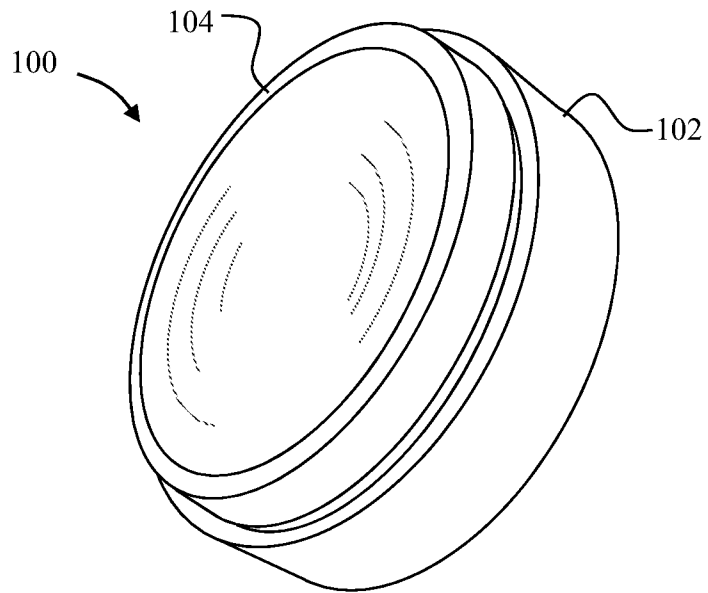


FIG. 3

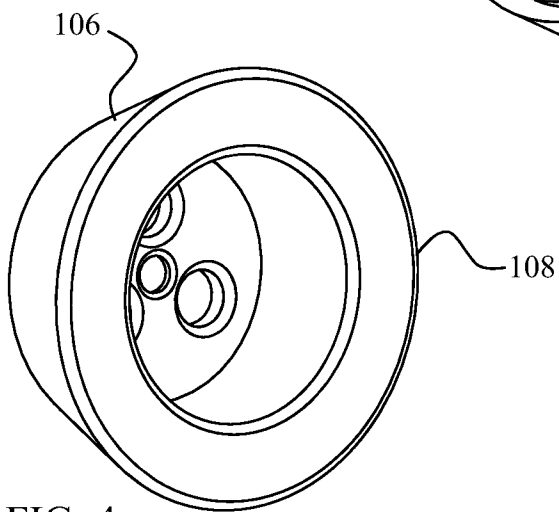


FIG. 4

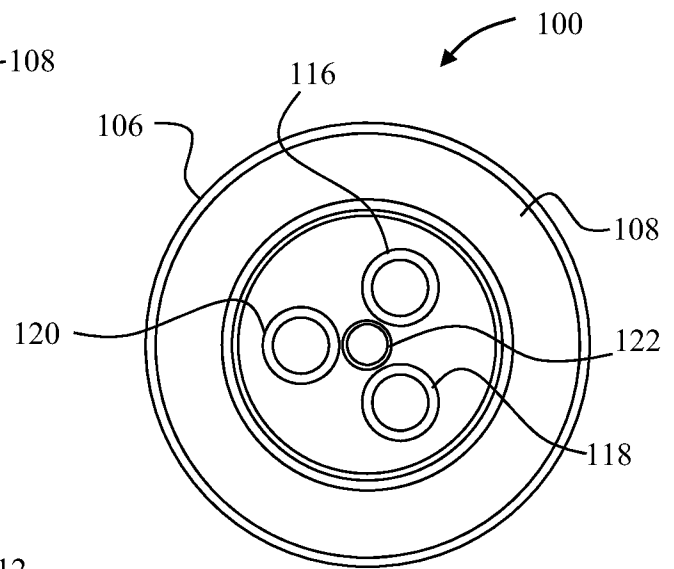


FIG. 5

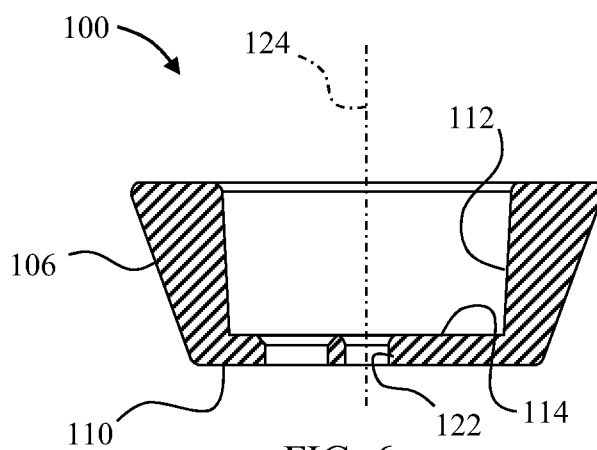


FIG. 6

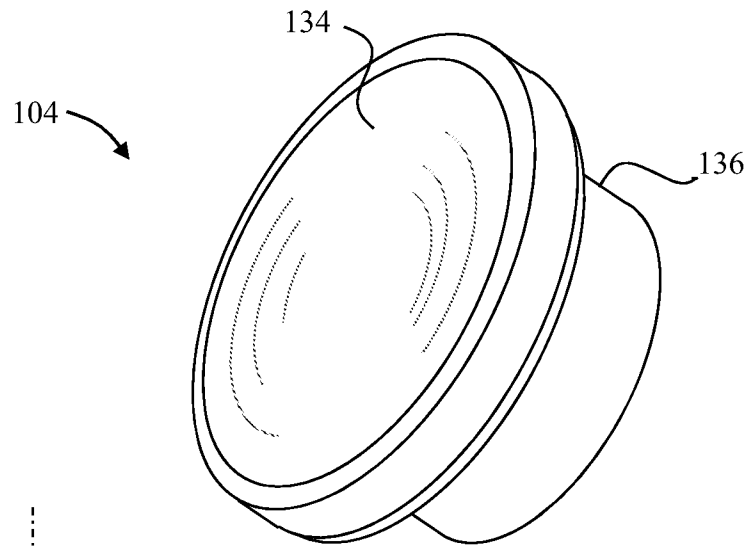


FIG. 7

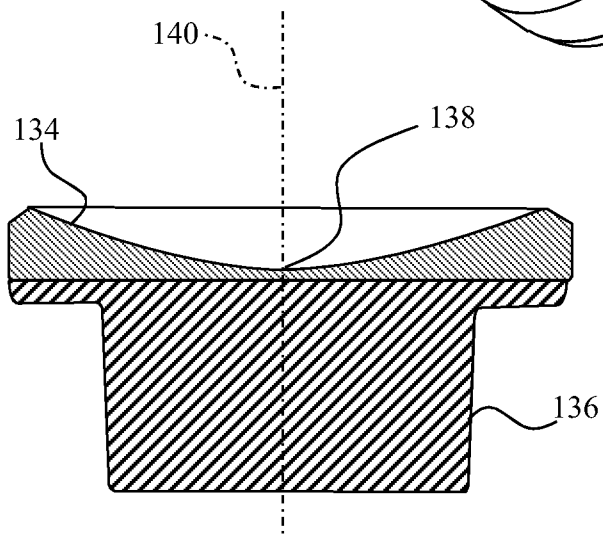


FIG. 8

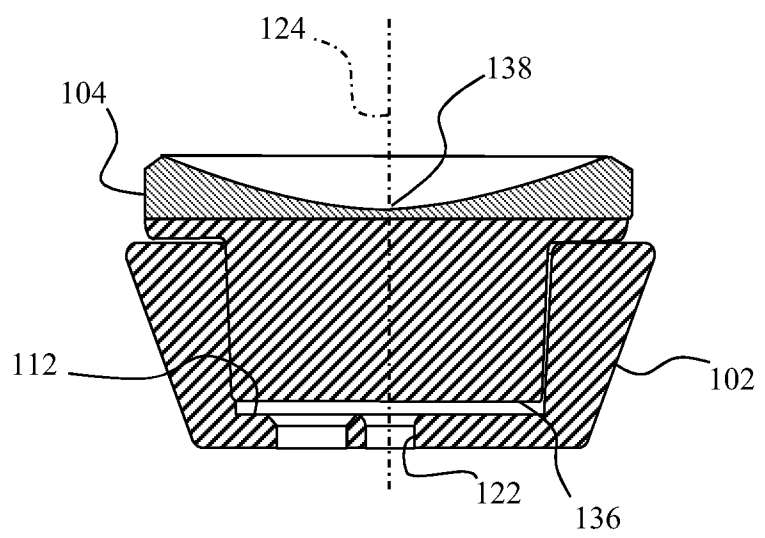


FIG. 9

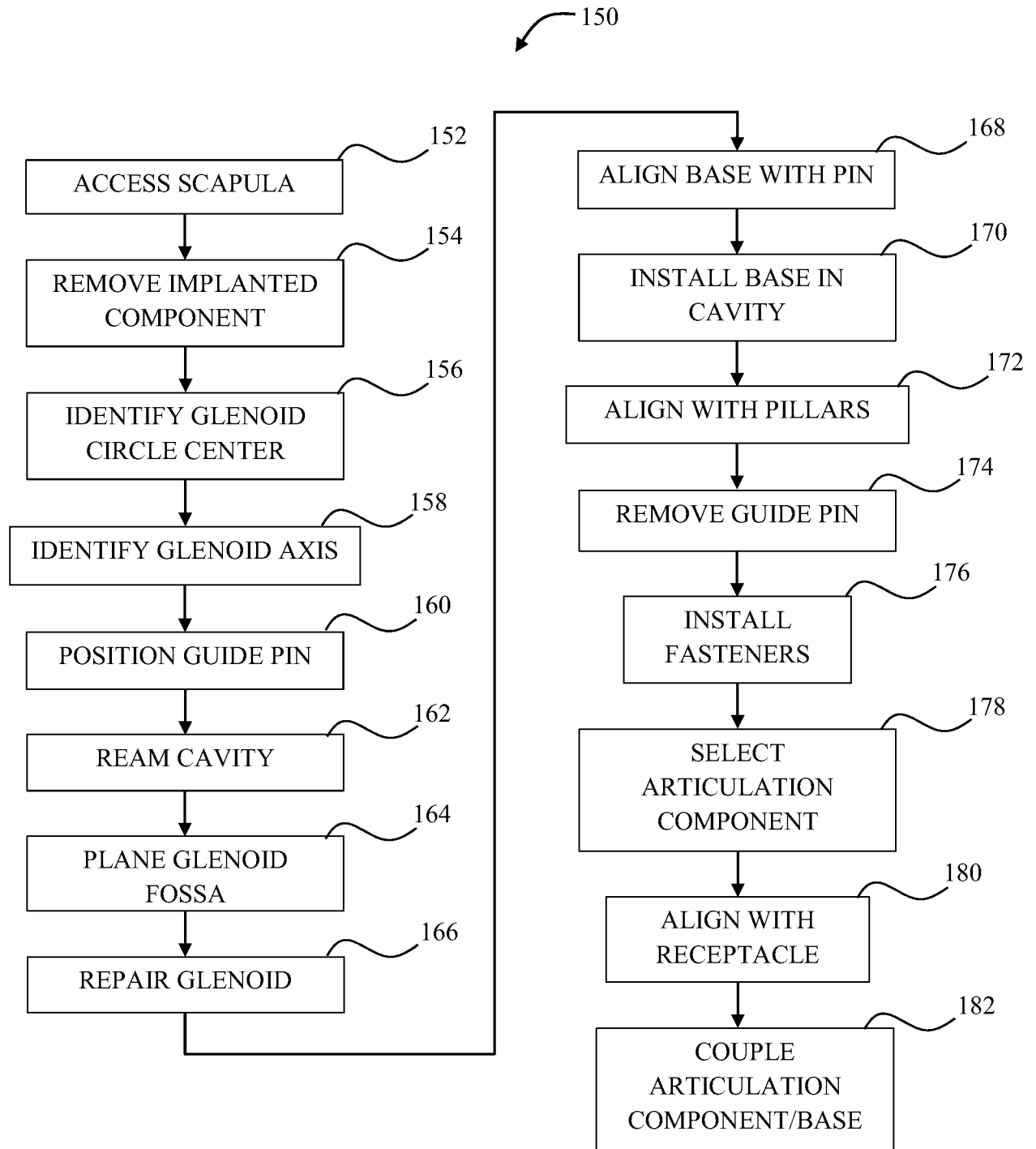


FIG. 10

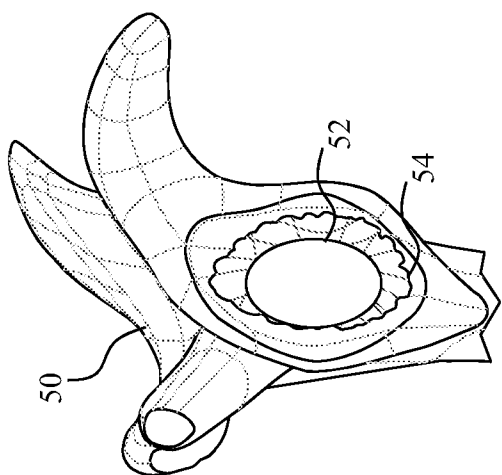


FIG. 11

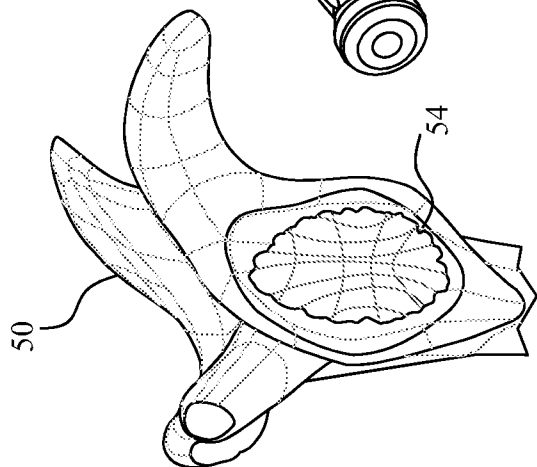


FIG. 12

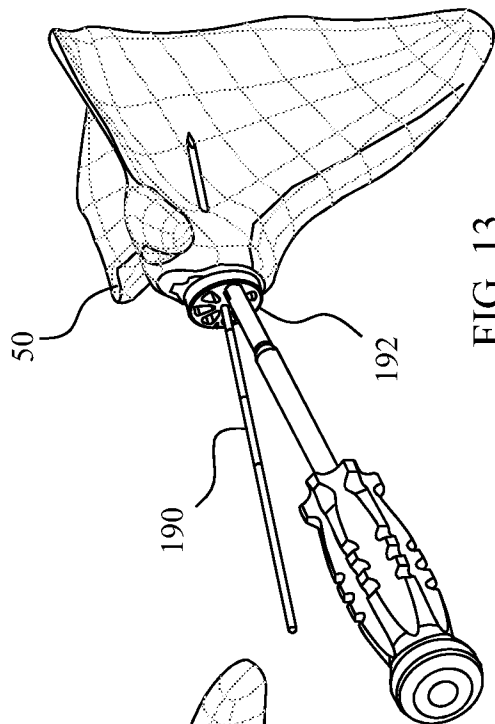


FIG. 13

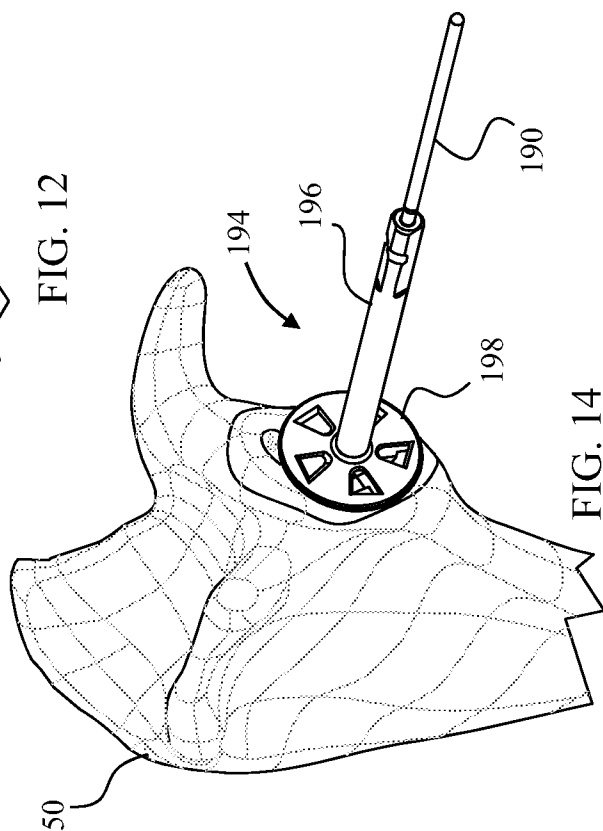


FIG. 14

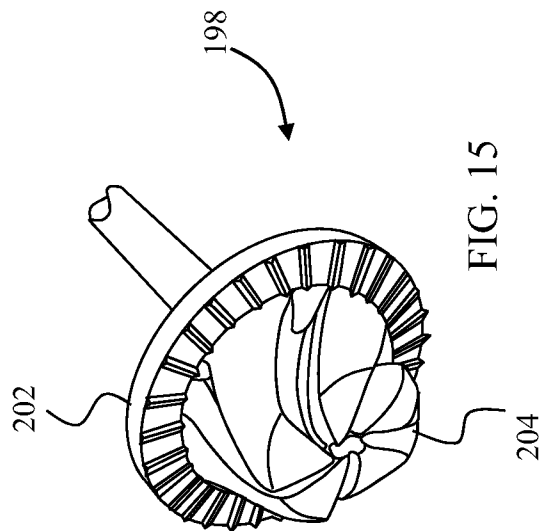


FIG. 15

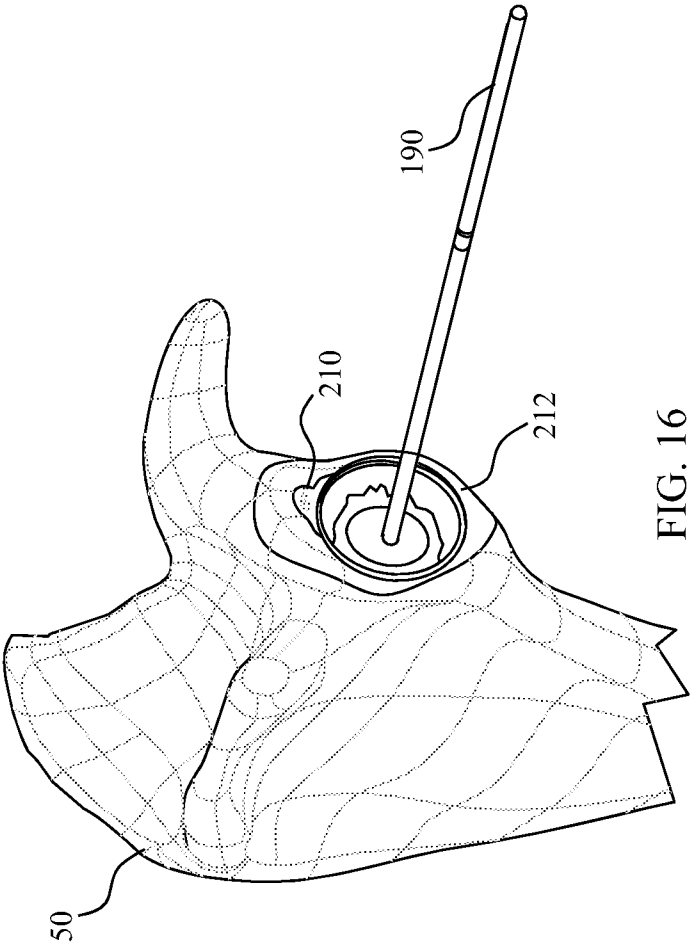


FIG. 16

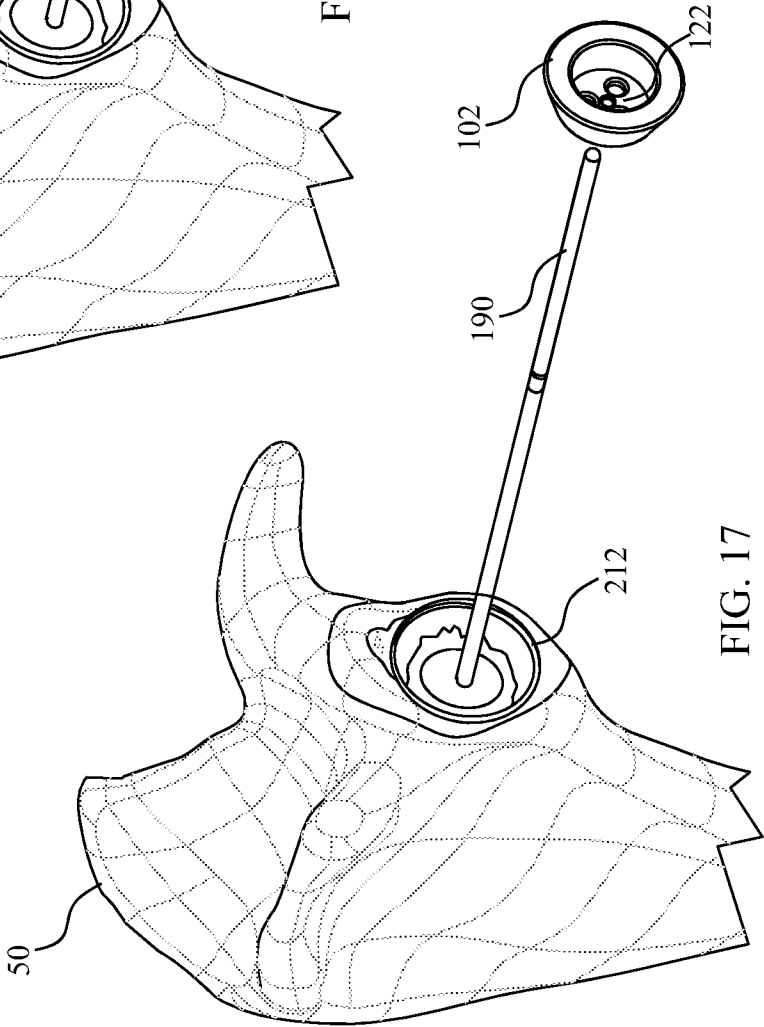


FIG. 17

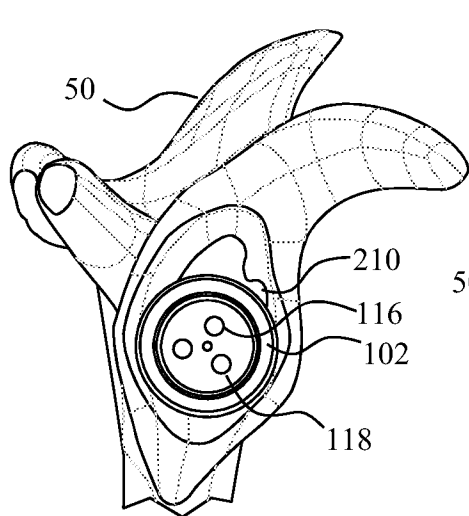


FIG. 18

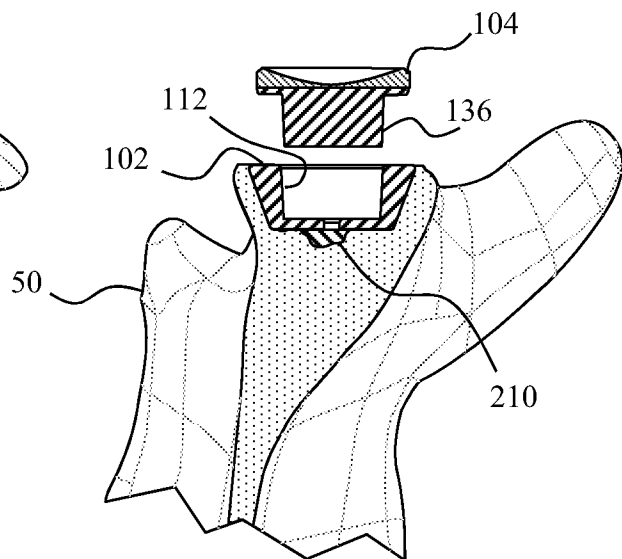


FIG. 19

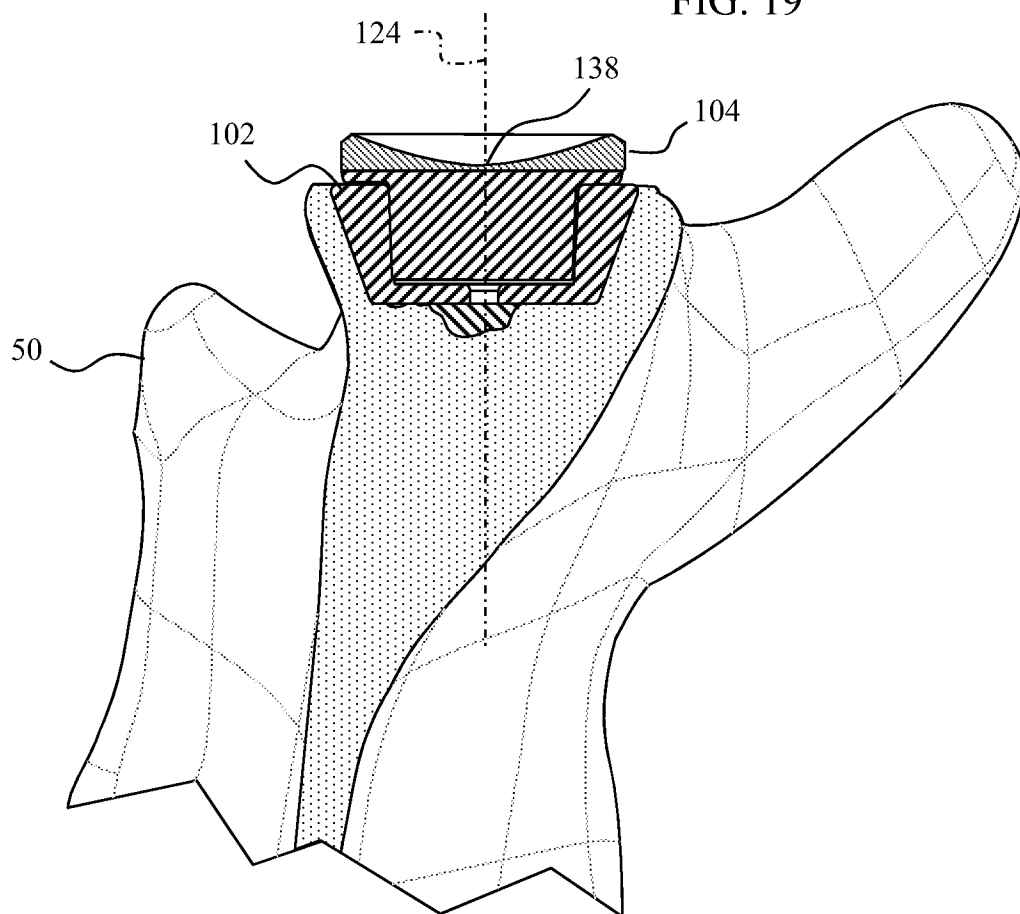


FIG. 20

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 12/29034

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - A61F 2/40 (2012.01)

USPC - 623/19.13

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC(8) - A61F 2/40 (2012.01)

USPC - 623/19.13

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

IPC(8) - A61F 2/40 (2012.01)

USPC - 623/19.11, 19.12, 19.13, 19.14, 11.11, 16.11, 18.11

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PubWEST (); Google (Patents, Scholar, Web)

Search Terms: Shoulder, glenoid, scapula, revision, alter, adjust, change, modify, base, component, element, piece, part, lip, ridge, cup, receive, receptacle, mate, mating, articulate, ball, joint, axis, guide, bore, diameter, radius, periphery, different, larger, smaller, reduce,

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2010/0070044 A1 (MARONEY et al.) 18 March 2010 (18.03.2010) Fig. 13-14, 16-17; Para [0027], [0073], [0076]-[0082], [0084]-[0087], [0096]-[0100], [0132]	1-10
Y	US 5,800,551 A (WILLIAMSON et al.) 01 September 1998 (01.09.1998) Fig. 4B-4D; col 5, ln 49 to col 6, ln 32, col 6, ln 44 to col 7, ln 4	1-10
Y	US 5,080,673 A (BURKHEAD et al.) 14 January 1992 (14.01.1992) Fig. 4, 6-7; col 4, ln 64 to col 5, ln 22	6
Y	US 6,679,916 B1 (FRANKLE et al.) 20 January 2004 (20.01.2004) Fig. 3, 5; col 4, ln 7-22	8
A	US 2010/0161065 A1 (WILLIAMS et al.) 24 June 2010 (24.06.2010) Fig. 2-9, 13-14; Para [0030]-[0040], [0052]-[0058]	1-10
A	US 2010/0274359 A1 (BRUNNARIUS et al.) 28 October 2010 (28.10.2010) Fig. 1-5; Para [0022]-[0038]	1-10
A	US 2007/0016304 A1 (CHUDIK) 18 January 2007 (18.01.2007) Fig. 21-26B; Para [0126], [0128], [0143]-[0144]	1-10

☐ Further documents are listed in the continuation of Box C.

* Special categories of cited documents:

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"&" document member of the same patent family

Date of the actual completion of the international search

27 June 2012 (27.06.2012)

Date of mailing of the international search report

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Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450

Facsimile No. 571-273-3201

Authorized officer:

Lee W. Young

PCT Helpdesk: 571-272-4300

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