(12) STANDARD PATENT APPLICATION (11) Application No. **AU 2026201522 A1**
(19) AUSTRALIAN PATENT OFFICE

(54) Title
Glenosphere assembly

(51) International Patent Classification(s)
A61F 2/40 (2006.01) ***A61F 2/28*** (2006.01)
A61B 17/86 (2006.01)

(21) Application No: **2026201522** (22) Date of Filing: **2026.02.27**

(43) Publication Date: **2026.03.19**
(43) Publication Journal Date: **2026.03.19**

(62) Divisional of:
2023253680

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ABSTRACT

Provided herein are various embodiments of an improved glenoid implant assembly that includes a baseplate, a polymer glenosphere, and an interfacing component. The interfacing component can be made of a material that is more rigid than the polymer glenosphere, has a bowl-shaped configuration with a convex side and a recessed side, where the convex side is configured to be secured to the circular recessed portion of the polymer glenosphere and the recessed side is configured to securely receive the baseplate. The interfacing component is interposed between the polymer glenosphere and the baseplate and provide a secure attachment between the polymer glenosphere and the baseplate.

GLENOSPHERE ASSEMBLY

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a divisional of Australian patent application no. 2023253680 the entire disclosure of which is incorporated herein by reference. This application also claims priority under 35 U.S.C. § 119(e) to United States Provisional Application No. 63/362,984, filed on April 14, 2022, the entire contents of which are incorporated herein by reference.

FIELD OF DISCLOSURE

[0002] The present disclosure generally relates to glenoid implants for shoulder prosthesis and more specifically glenoid implants configured with polymer glenosphere.

BACKGROUND

[0003] A shoulder prosthesis includes a glenoid implant intended to replace the glenoid cavity of the scapula and/or a humeral implant intended to replace the humeral head. The glenoid implant generally includes an articular body intended to articulate with the humeral head, and a fixation means to stabilize the articular body with respect to the scapula.

[0004] Currently, clinical literature shows a high rate of radiolucency around glenoid cemented, non-cemented, and hybrid components in long-term use of those glenoid implants. One issue is the potential for rocking of the implant in the superior-inferior direction. Currently, cemented implants provide good short- and mid-term fixation, but loosen over time. The current hybrid cemented press-fit implants show similar performance. Press-fit implants show high loosening at mid- to long-term time points.

[0005] One of the challenges with the conventional press-fit glenoid implants is that it is difficult to reliably secure the implants to the bone. As a result, hybrid cemented press-fit implants have increased in popularity. Adding a modular metal tray with screws is a solution that is used in many other joints, however in the shoulder, there is often insufficient space for a modular tray. In addition, the modular metal trays are often more stiff than desired.

[0006] Thus, improved glenoid implant design that offers enhanced and durable primary fixation to the bone is desired.

[0006A] Reference to any prior art in the specification is not an acknowledgement or suggestion that this prior art forms part of the common general knowledge in any jurisdiction or that this prior art could reasonably be expected to be combined with any other piece of prior art by a skilled person in the art.

SUMMARY

[0007] Provided herein are various embodiments of an improved glenoid implant assembly that includes a polymer glenosphere.

[0008] A glenoid implant according to some embodiments comprises: a glenosphere formed from a first material having a Young's modulus of less than 720 MPa, the glenosphere including:a convex articular surface extending distally from a proximal end of the glenosphere, anda distal surface provided at a distal end of the glenosphere; an interfacing component formed from a second material having a Young's modulus that is greater than the Young's modulus of the first material, the interfacing component include a convex side and an opposed recessed side, the convex side of the interfacing component disposed within a circular recessed portion defined by the distal surface of the glenosphere, wherein the recessed side of the interfacing component includes a female tapered surface sized and configured to form a friction lock engagement with a male tapered surface of a baseplate.

[0009] A glenoid implant according to some embodiments comprises: a baseplate having a first side, a second side disposed opposite from the first side, and a peripheral side extending between the first side and the second side, the second side of the baseplate configured to engage bone; a glenosphere formed from a first material having a first Young's modulus, the glenosphere including a convex articular surface and defining a recessed portion; an interfacing component formed from a second material having a second Young's modulus that is greater than the first Young's modulus, the interfacing component including: a convex side sized and configured to be received in and engage the recessed portion of the glenosphere, and a concave side including a female tapered surface configured to engage the peripheral side of the baseplate for securing the interfacing component to the baseplate.

[0010] A glenosphere assembly for a glenoid implant, the glenosphere assembly according to some embodiments including: a glenosphere formed from a first material having a first Young's modulus, the glenosphere including a convex articular surface and defining a recessed portion and an aperture, the aperture defined by the glenosphere including a first portion having a first

diameter, a second portion having a second diameter, and a third portion having a third diameter, the second diameter being larger than the first diameter, and the third diameter being larger than the second diameter; an interfacing component formed from a second material having a second Young's modulus that is greater than the first Young's modulus, the interfacing component including: a convex side sized disposed in the recessed portion of the glenosphere, and a concave side including a female tapered surface configured to engage the peripheral side of the baseplate for securing the interfacing component to the baseplate; a nut including: a first threaded portion sized and configured to engage a thread disposed within the third portion of the aperture defined by the glenosphere, and a flange extending radially outward from the first threaded portion of the nut, the flange capturing the interfacing component between the nut and the glenosphere, wherein the locking nut defines a central aperture having a first portion and a second portion, the first portion of the central aperture defined by the locking nut having a diameter that is greater than a diameter of the second portion of the central aperture defined by the nut; and a screw including: a head portion having a head diameter, and a shaft extending from the threaded head portion, wherein the head diameter is: larger than the first diameter of the first portion of the aperture defined by the glenosphere, larger than the diameter of the second portion of the central aperture defined by the locking nut, and smaller than the diameter of the first portion of the central aperture defined by the locking nut such that the head portion of the screw is trapped between the glenosphere and the nut.

[0011] A glenoid assembly according to some embodiments comprises: a baseplate that comprises a proximal end, a distal end, an outer periphery, and a frustoconical side surface extending from the proximal end to the distal end and defining a male-type tapered surface and configured to be secured to a glenoid; a polymer glenosphere having a proximal end and a distal end, including a convex articular surface extending distally from the proximal end and a distal surface provided on the distal end, and a circular recessed portion recessed from the distal surface and forming an interior contour of the circular recessed portion; and an interfacing component, made of a material that is more rigid than the polymer glenosphere, having a bowl-shaped configuration with a convex side and a recessed side, wherein the convex side is configured to secure to the circular recessed portion of the polymer glenosphere; where the recessed side of the interfacing component is configured with an annular interior surface defining a female-type tapered surface to receive and form a friction lock engagement with the male-type

tapered surface of the baseplate, and where when the polymer glenosphere, the interfacing component, and the baseplate are assembled into the glenoid implant assembly, the interfacing component is interposed between the polymer glenosphere and the baseplate and provide a secure attachment between the polymer glenosphere and the baseplate.

[0012] Also disclosed is a glenoid implant assembly that comprises: a polymer glenosphere having a proximal end and a distal end, including a convex articular surface extending distally from the proximal end and a distal surface provided on the distal end, and a circular recessed portion recessed from the distal surface and forming an interior contour of the circular recessed portion; and an interfacing component, made of a material that is more rigid than the polymer glenosphere, having a bowl-shaped configuration with a convex side and a recessed side, wherein the convex side is configured to secure to the circular recessed portion of the polymer glenosphere; where the recessed side of the interfacing component is configured with an annular interior surface defining a female-type tapered surface to receive and form a friction lock engagement with the male-type tapered surface of the baseplate, and where when the polymer glenosphere and the interfacing component are assembled, the interfacing component provides a rigid frame for the polymer glenosphere.

[0012A] By way of clarification and for avoidance of doubt, as used herein and except where the context requires otherwise, the term "comprise" and variations of the term, such as "comprising", "comprises" and "comprised", are not intended to exclude further additions, components, integers or steps.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The various embodiments of the inventive glenoid implant of the present disclosure will be described in more detail in conjunction with the following drawing figures. The structures in the drawing figures are illustrated schematically and are not necessarily intended to show actual dimensions or relative scale.

[0014] FIG. 1 is an illustration showing a longitudinal cross-section of a glenoid implant assembly according to the present disclosure.

[0015] FIG. 2 is an illustration showing a polymer glenosphere component of the glenoid implant assembly according to the present disclosure.

[0016] FIG. 3 is an illustration showing a securing screw component of the glenoid implant assembly according to the present disclosure.

[0017] FIG. 4 is an illustration showing an interfacing component of the glenoid implant assembly according to the present disclosure.

[0018] FIG. 5A is an illustration showing a tightening nut component of the glenoid assembly according to the present disclosure.

[0019] FIG. 5B is an illustration showing a longitudinal cross-sectional view of the tightening nut component shown in FIG. 5A.

[0020] FIG. 6 is an illustration of a plan view of the polymer glenosphere component of the glenoid implant assembly viewed from its proximal end.

[0021] FIG. 7 is an illustration of a plan view of an assembly of the polymer glenosphere component, the interfacing component, and the tightening nut viewed from the distal end.

[0022] FIG. 8A is an illustration of a lateral view of an assembly of the polymer glenosphere component, the interfacing component, the tightening nut, and the securing screw.

[0023] FIG. 8B is an illustration of a longitudinal cross-sectional view of the assembly of FIG. 8A.

[0024] FIG. 8C is a detailed view of the area A identified in FIG. 8B.

[0025] FIGS. 9A-9B are illustrations showing the baseplate component of the glenoid implant assembly according to the present disclosure.

DETAILED DESCRIPTION

[0026] This description of the exemplary embodiments is intended to be read in connection with the accompanying drawings, which are to be considered part of the entire written description. The drawing figures are not necessarily to scale and certain features may be shown exaggerated in scale or in somewhat schematic form in the interest of clarity and conciseness. In the description, relative terms such as "horizontal," "vertical," "up," "down," "top" and "bottom" as well as derivatives thereof (e.g., "horizontally," "downwardly," "upwardly," etc.) should be construed to refer to the orientation as then described or as shown in the drawing figure under discussion. These relative terms are for convenience of description and normally are not intended to require a particular orientation. Terms including "inwardly" versus "outwardly," "longitudinal" versus "lateral" and the like are to be interpreted relative to one another or relative

to an axis of elongation, or an axis or center of rotation, as appropriate. Terms concerning attachments, coupling and the like, such as "connected" and "interconnected," refer to a relationship wherein structures are secured or attached to one another either directly or indirectly through intervening structures, as well as both movable or rigid attachments or relationships, unless expressly described otherwise. When only a single machine is illustrated, the term "machine" shall also be taken to include any collection of machines that individually or jointly execute a set (or multiple sets) of instructions to perform any one or more of the methodologies discussed herein. The term "operatively connected" is such an attachment, coupling or connection that allows the pertinent structures to operate as intended by virtue of that relationship. In the claims, means-plus-function clauses, if used, are intended to cover the structures described, suggested, or rendered obvious by the written description or drawings for performing the recited function, including not only structural equivalents but also equivalent structures.

[0027] Any references to “a humeral head” as used herein should be construed to include both an anatomical humeral head as well as implant humeral head.

[0028] Provided herein are various embodiments of an improved glenoid implant in reverse configuration that incorporates polymer glenosphere and a new mechanism for securing the polymer glenosphere to a baseplate.

[0029] Referring to FIGS. 1-9B, according to some embodiments, an improved glenoid implant assembly **10** comprises a polymer glenosphere **100**, an interfacing component **200**, and a baseplate **400**.

[0030] Referring to FIG. 1, the polymer glenosphere **100** is configured to be secured to a glenoid via cooperation of the interfacing component **200** and the baseplate **400**. Referring to FIGS. 2, 8A, and 8B, the polymer glenosphere **100** comprises a proximal end **101** and a distal end **102**, including an outer surface of the glenosphere **100** convexly contoured to form a convex articular surface **111**, a distal surface **112**, and a circular recessed portion **120**. The convex articular surface **111** extends radially outward, with respect to the longitudinal axis **15A**, from the proximal end **101** toward the distal end **102**. The convex articular surface **111** can be contoured as a spherical surface or a non-spherical surface. The convex articular surface **111** forms substantially a half of a sphere or a portion of a sphere. This can be better seen in the side view shown in FIG. 8A.

[0031] The distal surface **112** is at the distal end **102** of the glenosphere **100**. As can be seen in FIG. 2, the circular recessed portion **120** is recessed from the distal surface **112** toward the proximal end **101**. The recessed portion **120** can have an interior contour that includes an annular sidewall **125**.

[0032] In some embodiments of the glenoid implant, the polymer glenosphere **100** can be made of polymers such as polyether ether ketone (PEEK), high-modulus polyethylene (HMPE), and ultra-high-molecular-weight polyethylene (UHMWPE), etc. that are selected to provide the desired performance for the glenosphere. All references to UHMWPE herein include all variants of UHMWPE in orthopedic application such as vitamin E diffused
UHMWPE.

[0033] Referring to FIGS. 1, 9A, and 9B, the baseplate **400** comprises a proximal end **401**, a distal end **402**, a generally disc-shaped body **410**, and a central stem **420** extending from the body **410** toward the distal end **402**. The body **410** comprises a proximal surface **411**, a distal surface **412**, and a frustoconical side surface **413** extending between the proximal surface **411** and the distal surface **412**. The distal surface **412** is the bone-facing surface that would contact the glenoid when the baseplate **400** is implanted in a patient's shoulder. The distal surface **412** can be provided with a plurality of dimpled features **412A** that can promote boney tissue ingrowth after the baseplate **400** is implanted onto a glenoid. The central stem **420** extends from the distal surface **412** along the baseplate's longitudinal axis **450**.

[0034] The frustoconical side surface **413** defines a male-type tapered surface (e.g. Morse taper) that is configured to secure to the interfacing component **200** by establishing a friction lock. The frustoconical side surface **413** is oriented so that the proximal surface **411** has a smaller diameter than the distal surface **412**. As will be discussed more in detail below, the interfacing component **200**, in turn, is correspondingly configured to receive the generally disc-shaped body **410** and establish a friction lock with the frustoconical side surface **413**. The interfacing component **200** is also configured to securely engage the polymer glenosphere **100** by a combination of a longitudinally-hollow tightening screw **250** and a press-fitting engagement. This arrangement will be described in more detail below.

[0035] Referring to FIGS. 1, 4, and 8B, the interfacing component **200** is a generally bowl-shaped structure having a convex side **201** and a concave side **202**. The convex side **201** can be configured to be received in the circular recessed portion **120** of the polymer glenosphere **100**

and securely engage the glenosphere **100** by press-fitting into the recessed portion **120** of the polymer glenosphere **100**. The convex side **201** comprises a side surface **220** that is configured to engage the circular recessed portion **120** of the polymer glenosphere **100** to establish the press-fit engagement.

[0036] The concave side **202** of the interfacing component **200** can be configured with an annular female-type tapered surface **202A** to receive the disc-shaped body **410** of the baseplate **400** and form a secure attachment by cooperation of the annular female-type tapered surface **202A** with the tapered side surface **413** of the baseplate **400** to form a friction lock engagement. The taper on the annular tapered surface **202A** and the tapered side surface **413** can be Morse tapers.

[0037] The interfacing component **200** can be made of a material that is more rigid than the polymer glenosphere **100** to provide a desired structural rigidity when the interfacing component **200** is assembled with the polymer glenosphere **100**. More rigid here means that the interfacing component **200** can be made of a material having Young's modulus of at least 720 Mpa. The convex side **201** of the interfacing component **200** can have a contour that generally follows the interior contour of the circular recessed portion **120** of the polymer glenosphere **100** and form an interface between the interfacing component **200** and the polymer glenosphere **100**.

[0038] Preferably, the convex side **201** of the interfacing component **200** and the interior of the circular recessed portion **120** can form intimate contact along some portions of the interface to establish the press-fit engagement. For example, the convex side **201** can be configured so that its side surface **220** along its periphery is a male-type tapered surface that forms an intimate contact with the annular interior surface **125** of the recessed portion **120** of the polymer glenosphere **100** and form press-fit between the interfacing component **200** and the polymer glenosphere **100**. To accomplish this, the annular interior surface **125** can be configured as a corresponding female-type tapered surface.

[0039] FIG. 8A is a lateral view of a partial assembly **10A** in which the polymer glenosphere **100** has been assembled with the interfacing component **200**, the tightening nut **250,** and the securing screw **300**. Referring to FIG. 8B, which is a longitudinal sectional view of the partial assembly **10A** of FIG. 8A taken through the line **B-B** shown in FIG. 8A, the assembly **10A** is radially symmetric about the assembly's longitudinal axis **15A**. When the polymer glenosphere

100 and the interfacing component **200** are assembled, the interfacing component **200** provides a rigid frame for the polymer glenosphere.

[0040] Referring to FIG. 1, when the polymer glenosphere **100**, the interfacing component **200**, the tightening nut **250**, the securing screw **300**, and the baseplate **400** are assembled, the resulting glenoid implant assembly **10** is radially symmetric about the glenoid implant assembly's longitudinal axis **15**. The longitudinal axis **15A** of the partial assembly **10A** coincides with the glenoid implant assembly's longitudinal axis **15**. In the glenoid implant assembly **10**, the interfacing component **200** is interposed between the polymer glenosphere **100** and the baseplate **400** and provide a secure attachment between the polymer glenosphere **100** and the baseplate **400**.

[0041] Referring to FIGS. 2 and 4, the circular recessed portion **120** of the polymer glenosphere **100** comprises an annular interior surface **125** along its periphery that is configured to engage the side surface **220** of the convex side **201** of the interfacing component **200** to establish the press-fit engagement mentioned above. The outer diameter of the convex side **201** of the interfacing component **200** and the inner diameter of the annular interior surface **125** of the polymer glenosphere **100** are sized to effectively form the press-fit. In other words, the outer diameter of the convex side **201** can be incrementally larger than the inner diameter of the annular interior surface **125** resulting in an interference that enables the press-fitting. The degree of this interference can be optimized to form the desired level of press-fitting depending on the overall dimensions of the components and the particular materials selected for the components.

[0042] Referring to FIG. 4, in some embodiments, the side surface **220** of the interfacing component **200** can comprise a plurality of anti-rotation blades **230** configured to engage and interfere with the annular interior surface **125** to prevent rotational movement between the polymer glenosphere **100** and the interfacing component **200**. The anti-rotation blades **230** radially extend outward beyond the side surface **220** which allows the anti-rotation blades **230** to press into the annular interior surface **125** of the polymer glenosphere **100** when the press-fit engagement is made.

[0043] Referring to FIGS. 2, 4, 5A, 5B, and 8B, in some embodiments, the polymer glenosphere **100** and the interfacing component **200** each comprises an aperture **131**, **221**, respectively, extending through the polymer glenosphere **100** and the interfacing component **200**, respectively, along the glenoid implant assembly's longitudinal axis **15**. The glenoid implant

assembly **10** further includes a longitudinally-hollow tightening screw **250** that is inserted through the aperture **221** in the interfacing component from the concave side **202** and threading into the aperture **131** in the polymer glenosphere to establish a second attachment mechanism, in addition to the press-fitting engagement described above. The tightening nut **250** is configured to capture the interfacing component **200** between the tightening nut **250** and the polymer glenosphere **100**.

[0044] Referring to FIG. 2, the aperture **131** in the polymer glenosphere **100** expands stepwise into two portions **132** and **133** having successively larger diameters starting from the initial aperture **131**. The initial aperture **131** will be referred to as the first portion. The larger diameter portion **132** will be referred to as the second portion. The largest diameter portion **133** will be referred to as the third portion. The third portion **133** is threaded to receive the tightening nut **250**, and the second portion **132** is threaded to receive the threaded head **310** of the securing screw **300**.

[0045] Referring to FIGS. 5A-5B, in some embodiments, the tightening nut **250** can be configured with a radially extending flange **253** that captures the interfacing component **200** between the tightening nut and the polymer glenosphere in the glenoid implant assembly **10**. The tightening nut **250** comprises an externally threaded portion **251** that has the appropriate outer diameter to thread into the third portion **133** of the aperture **131** in the polymer glenosphere **100**. The tightening nut **250** can be configured to accommodate the use of an instrument to assist in threading and tightening the tightening nut **250** into the third portion **133**. For example, instrument receiving features such as the two or more recesses **257** shown can be provided on the distal surface of the tightening nut **250**. An appropriate instrument provided with matching number of prongs can be used to engage the two or more recesses **257** to turn the tightening nut **250**.

[0046] Referring to FIGS. 1, 5A-5B, and 8B, the tightening nut **250** also comprises a central aperture **255** that extends longitudinally through the whole length of the tightening nut **250**. The central aperture **255** coaxially aligns with the apertures **131**, **221** in the polymer glenosphere and the interfacing component, respectively, along the longitudinal axis **15** of the glenoid implant assembly **10** to allow a securing screw **300** (discussed in more detail below) to extend through the aperture **255** in the tightening nut **250**. The central aperture **255** includes two portions: a smaller diameter first portion **255B** and a larger diameter second portion **255A** that is proximally

positioned with respect to the first portion **255B**. The diameter of the first portion **255B** is sized to allow the threaded portion **322** of the securing screw **300** to slide through. The proximal direction referred to herein coincides with the proximal and distal directions identified for the glenoid implant assembly **10**.

[0047] Referring to FIGS. 1 and 3, in some embodiments, the glenoid implant assembly further comprises a securing screw **300** comprising a threaded screw head **310** and a shaft **320**. The shaft **320** comprises a threaded portion **322** that is adjacent to the threaded head **310** and a non-threaded portion **323** extending distally and away from the threaded head **310**. The threaded screw head **310** has threaded surface **312** that threads into the second portion **132** of the aperture **131** in the polymer glenosphere **100** from the recessed portion **120** of the polymer glenosphere with the shaft **320** extending distally. The screw head **310** can be provided with a tool-receiving recess **315** so that an appropriate screw driver tool can be used to turn the screw **300** as necessary.

[0048] Referring to FIGS. 9A-9B, in some embodiments, the baseplate **400** comprises a centrally located aperture **425** extending from the proximal surface **411** through the length of the central stem **420**. The aperture **425** is configured to receive the non-threaded portion **323** of the shaft **320** of the securing screw **300**. The interior surface of the aperture **425** and the surface of the non-threaded portion **323** can be finished with an appropriate surface finish so that they interact with each other smoothly with minimum friction.

[0049] When the partial assembly **10A** shown in FIGS. 8A-8B is being secured to the baseplate **400**, the shaft **320** of the securing screw **300** extending distally beyond the distal surface **112** of the glenosphere **100** is inserted into the aperture **425** and acts as a stabilizing guide and assist in aligning the circular recessed portion **120** of the polymer glenosphere **100** with the baseplate **400** so that the complementary tapered surfaces **125** (on the glenosphere) and **413** (on the baseplate) are properly engaged.

[0050] Referring again to FIGS. 9A-9B, in some embodiments, the baseplate **400** comprises one or more apertures **427** extending through the baseplate **400** adjacent to the outer periphery for accommodating anchoring members such as bone screws **500**. The bone screws **500** are used to secure the baseplate **400** to the glenoid. Referring to FIG. 9A, for each of the one or more apertures **427**, the opening on the proximal surface **411** of the baseplate is configured with a

shoulder or a countersink **427C** to accommodate the head of the bone screw **500**. The countersink **427A** has a curved surface and otherwise configured to accommodate the head of the bone screw **500** in a variety of screw angles. Referring to FIG. 9B, for the same reason, each of the openings for the apertures **427** on the distal surface **412** of the baseplate is configured with a shoulder **427B** having a frustoconical surface to accommodate the shaft of the bone screw **500** in a variety of screw angles.

[0051] In some embodiments, one or more of the apertures **427** for the bone screws **500** can be provided with an internal member **440** that is disposed within the aperture **427**. When an internal member **440** is provided, the internal member **440** can be semi-spherical and the aperture holding the internal member **440** is also semi-spherical to permit movement of the internal member **440** with respect to the baseplate **400**. The movement of the internal member **440** can rotation and/or tilting. Each internal member **440** has a threaded hole as shown for receiving a bone screw **500**. The movable feature of the internal member 440 allows a bone screw received therein to be aimed along a desired vector.

[0052] Preparing the Glenoid and Securing the Baseplate:

[0053] The surgical procedure for implanting the glenoid implant assembly **10** of the present disclosure would include at least the following steps. First, the glenoid surface is prepared to receive the baseplate **400** by reaming the glenoid surface as necessary to receive and meet the distal surface **412** of the baseplate **400**. Then, an appropriately sized hole is drilled into the glenoid surface for receiving the central stem **420** of the baseplate **400**. The baseplate **400** is then seated onto the prepared glenoid surface. Next, one or more holes are drilled into the glenoid using the one or more apertures **427** in the baseplate **400** as guides. Then, bone screws **500** are used to secure the baseplate **400** to the glenoid.

[0054] Assembling the Glenosphere, Interface Component, and the Securing screw:

[0055] Either before or after the glenoid is prepared, the partial assembly **10A** shown in FIGS. 8A-8B can be assembled. First, the securing screw **300** is secured to the polymer glenosphere **100** from the circular recessed portion **120** side of the glenosphere **100**. The threaded portion **312** of the threaded head **310** of the securing screw is threaded into the second portion **132** of the aperture **131** of the glenosphere **100** with the securing screw oriented so that the shaft **320** is pointing in the distal direction and extending out of the circular recessed portion **120** as shown.

[0056] Next, the interfacing component **200** and the polymer glenosphere **100** is assembled by inserting the convex side **201** of the interfacing component **200** into the circular recessed portion **120** of the glenosphere **100**. Because the circular recessed portion **120** and the convex side **201** are dimensioned for press-fitting, the interfacing component **200** may need to be pushed into the circular recessed portion **120** with some force.

[0057] Once the interfacing component **200** is seated inside the circular recessed portion **120** of the polymer glenosphere **100**, the securing screw's shaft **320** is extending through the aperture **221** of the interfacing component **200** and positioned in the center of the aperture **221**.

[0058] Next, the tightening nut **250** is used to further secure the interfacing component **200** and the glenosphere **100**. With the tightening nut **250** oriented with the end having the flange **253** distally of the polymer glenosphere **100**, the tightening nut **250** is slipped over the shaft **320** of the securing screw **300** and advanced proximally through the aperture **221** in the interfacing component **200** until the externally threaded portion **251** engages the threaded third portion **133** of the polymer glenosphere **100**. Then, the tightening nut **250** is turned and screwed into the polymer glenosphere **100** until the flange **253** captures the annular edge of the aperture **221** of the interfacing component **200** between the flange **252** and the polymer glenosphere **100**. The tightening nut **250** is screwed into the glenosphere **100** until desired torque is reached.

[0059] FIG. 8B shows the configuration of the partial assembly **10A** once the tightening nut **250** is screwed in and tightened to the desired level.

[0060] <u>Assembling the Partial Assembly **10A** to the Baseplate:</u>

[0061] The completed partial assembly **10A** is then secured to the baseplate **400** that has been installed onto a glenoid by inserting the shaft **320** of the securing screw **300** into the aperture **425** of the baseplate **400** until the configuration shown in FIG. 1 is achieved. During this insertion, the female-type tapered surface **202A** of the interfacing component **200** and the male-type tapered surface **413** of the baseplate **400** engage and form a friction-lock engagement.

[0062] After the configuration shown in FIG. 1 is reached, the securing screw **300** is dissociated from the polymer glenosphere **100** by unscrewing the securing screw **300** from the polymer glenosphere **100**. This can be achieved by accessing the screw head **310** through the aperture **131** in the glenosphere. An appropriate screw driver tool can be used to engage the tool-receiving recess **315** in the screw head. By unscrewing the screw **300** from the polymer glenosphere **100**, the securing screw **300** is dissociated from the polymer glenosphere **100** and

advance distally further into the aperture **425** of the baseplate **400** until the threaded portion **322** engages the internal thread of the aperture **425**. Then, the securing screw **300** is screwed further into the aperture **425** until the screw head **310** advances distally enough to be within the space **S** (see FIG. 8C) inside the tightening nut **250** and contact the peripheral edge **255E** of the aperture **255** of the tightening nut **250**. At this point, screwing the securing screw **300** further into the aperture **425** of the baseplate **400** will cause the screw head **310** to urge the tightening nut **250** and in turn the whole partial assembly **10A** (assembly of the glenosphere **100**, the interfacing component **200**, and the tightening nut **250**) toward the baseplate **400** and establish secure engagement between the partial assembly **10A** and the baseplate **400**.

[0063] Although the devices, kits, systems, and methods have been described in terms of exemplary embodiments, they are not limited thereto. Rather, the appended claims should be construed broadly, to include other variants and embodiments of the devices, kits, systems, and methods, which may be made by those skilled in the art without departing from the scope and range of equivalents of the devices, kits, systems, and methods.

CLAIMS

1. A glenoid implant, comprising:

a glenosphere formed from a first material having a Young's modulus of less than 720 MPa, the glenosphere including:

a convex articular surface extending distally from a proximal end of the glenosphere, and

a distal surface provided at a distal end of the glenosphere;

an interfacing component formed from a second material having a Young's modulus that is greater than the Young's modulus of the first material, the interfacing component include a convex side and an opposed recessed side, the convex side of the interfacing component disposed within a circular recessed portion defined by the distal surface of the glenosphere,

wherein the recessed side of the interfacing component includes a female tapered surface sized and configured to form a friction lock engagement with a male tapered surface of a baseplate.

2. The glenoid implant of claim 1, wherein the convex side of the interfacing component includes at least one anti-rotation feature configured to engage a surface of the glenosphere defining the circular recessed portion.

3. The glenoid implant of claim 1 or claim 2, wherein each of the glenosphere and the interfacing component defines an aperture that extends along a longitudinal axis of the glenoid implant, each of the apertures defined by the glenosphere and the interfacing component sized and configured to receive a screw therein.

4. The glenoid implant of claim 1, further comprising:

the baseplate, the baseplate defining an aperture;

a nut sized and configured to be received within apertures defined by the glenosphere and the interfacing component, the nut defining a central aperture and including an outwardly extending flange at one end; and

a screw sized and configured to be received within the apertures defined by the interfacing component and the glenosphere, the central aperture defined by the nut, and within the aperture defined by the baseplate for locking the glenosphere and interfacing component to the baseplate.

5. The glenoid implant of claim 4, wherein the screw includes:

a head;

a non-threaded portion; and

a threaded portion disposed between the head and the non-threaded portion, the threaded portion having an outer diameter that is smaller than an outer diameter of the head.

6. The glenoid implant of claim 4 or claim 5, wherein the central aperture defined by the nut includes a first portion having a first diameter and a second portion having a second diameter that is different from the first diameter.

7. The glenoid implant of any one of claims 4 to 6, wherein the nut includes an externally threaded portion sized and configured to engage a threaded portion of the glenosphere.

8. The glenoid implant of any one of the preceding claims, wherein the baseplate includes:

a circular body having a first side, an opposed second side, and a peripheral side extending between the first side and the opposed second side, the peripheral side defining the male tapered surface; and

a stem extending from the second side of the baseplate.

9. The glenoid implant of claim 8, wherein the baseplate defines a plurality of bone screw apertures each sized and configured to receive a respective bone screw for securing the baseplate to a bone.

10. The glenoid implant of claim 8 or claim 9, wherein the second side of the baseplate includes a plurality of features configured to promote bone ingrowth.

11. A glenoid implant, comprising:

a baseplate having a first side, a second side disposed opposite from the first side, and a peripheral side extending between the first side and the second side, the second side of the baseplate configured to engage bone;

a glenosphere formed from a first material having a first Young's modulus, the glenosphere including a convex articular surface and defining a recessed portion;

an interfacing component formed from a second material having a second Young's modulus that is greater than the first Young's modulus, the interfacing component including:

a convex side sized and configured to be received in and engage the recessed portion of the glenosphere, and

a concave side including a female tapered surface configured to engage the peripheral side of the baseplate for securing the interfacing component to the baseplate.

12. The glenoid implant of claim 11, wherein the glenosphere defines an aperture having a first portion with a first diameter, a second portion with a second diameter that is different from the first diameter, and a third portion with a third diameter that is different from the first diameter and from the second diameter.

13. The glenoid implant of claim 12, further comprising:

a nut including:

a first threaded portion sized and configured to engage a thread disposed within the third portion of the aperture defined by the glenosphere, and

a flange extending radially outward from the first threaded portion of the nut, the flange configured to capture the interfacing component between the nut and the glenosphere.

14. The glenoid implant of claim 13, further comprising:

a screw including:

a threaded head portion sized and configured to engage a thread disposed within the second portion of the aperture defined by the glenosphere, and

a shaft extending from the threaded head portion.

15. The glenoid implant of claim 14, wherein the shaft of the screw includes:

an unthreaded portion; and

a threaded portion disposed between the threaded head portion of the screw and the unthreaded portion of the screw, the threaded portion of the screw sized and configured to engage a thread disposed within an aperture defined by the baseplate.

16. The glenoid implant of claim 14 or claim 15, wherein a diameter of the threaded head portion of the screw is greater than the first portion of the aperture defined by the glenosphere.

17. The glenoid implant of any one of claims 11 to 16, wherein a stem extends from the baseplate.

18. The glenoid implant of any one of claims 11 to 17, wherein a side surface of the interfacing component includes at least one anti-rotation feature configured to resist rotational movement between the interfacing component and the glenoid component.

19. A glenosphere assembly for a glenoid implant, the glenosphere assembly including:

a glenosphere formed from a first material having a first Young's modulus, the glenosphere including a convex articular surface and defining a recessed portion and an aperture, the aperture defined by the glenosphere including a first portion having a first diameter, a second portion having a second diameter, and a third portion having a third diameter, the second diameter being larger than the first diameter, and the third diameter being larger than the second diameter;

an interfacing component formed from a second material having a second Young's modulus that is greater than the first Young's modulus, the interfacing component including:

a convex side sized disposed in the recessed portion of the glenosphere, and

a concave side including a female tapered surface configured to engage the peripheral side of the baseplate for securing the interfacing component to the baseplate;

a nut including:

a first threaded portion sized and configured to engage a thread disposed within the third portion of the aperture defined by the glenosphere, and

a flange extending radially outward from the first threaded portion of the nut, the flange capturing the interfacing component between the nut and the glenosphere,

wherein the locking nut defines a central aperture having a first portion and a second portion, the first portion of the central aperture defined by the locking nut having a diameter that is greater than a diameter of the second portion of the central aperture defined by the nut; and

a screw including:

a head portion having a head diameter, and

a shaft extending from the threaded head portion,

wherein the head diameter is:

larger than the first diameter of the first portion of the aperture defined by the glenosphere,

larger than the diameter of the second portion of the central aperture defined by the locking nut, and

smaller than the diameter of the first portion of the central aperture defined by the locking nut such that the head portion of the screw is trapped between the glenosphere and the nut.

20. The glenosphere assembly of claim 19, wherein the glenosphere is formed from a polymer.

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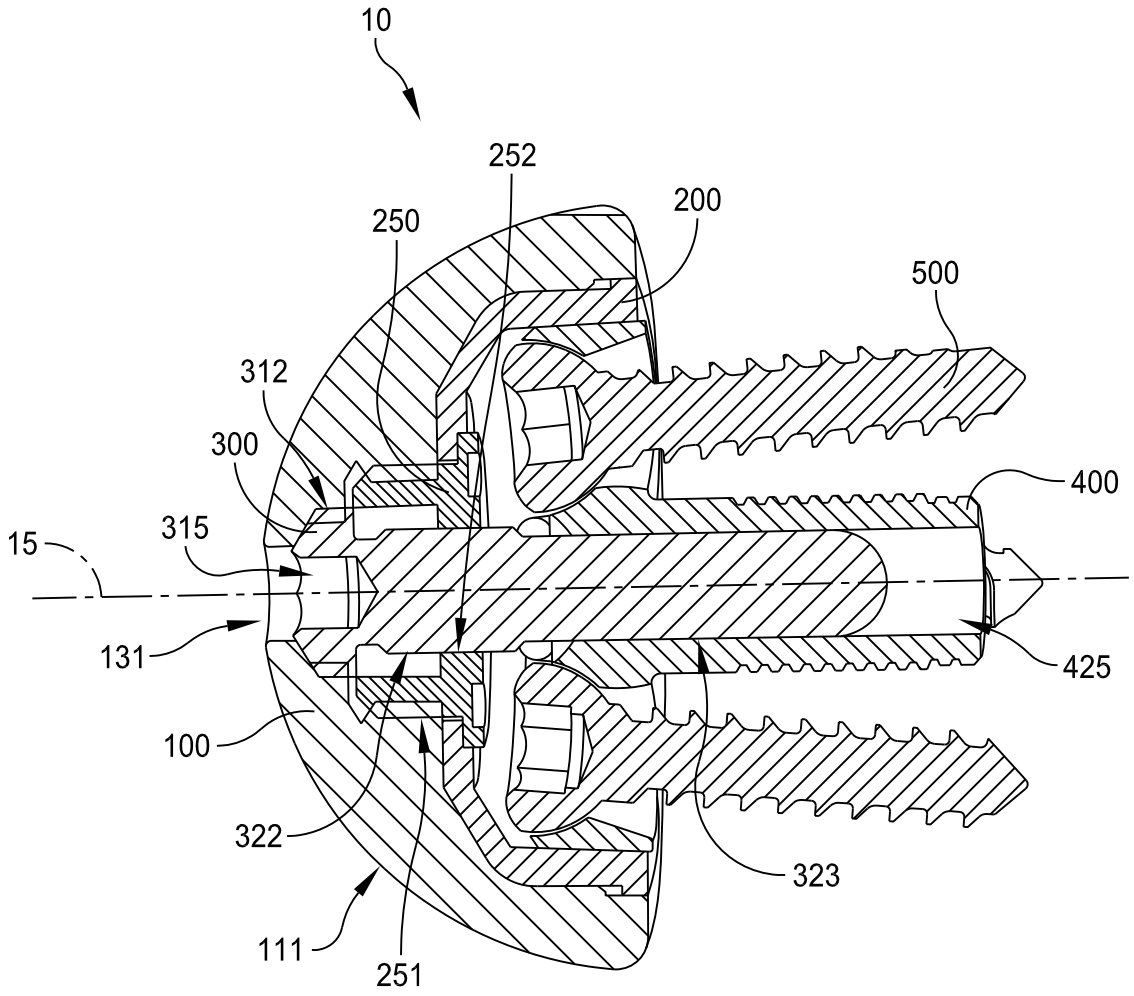

FIG. 1

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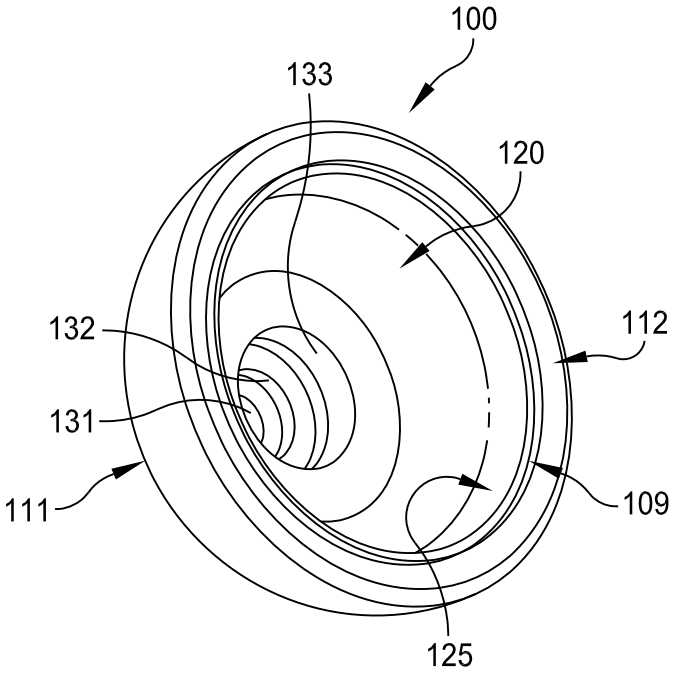

FIG. 2

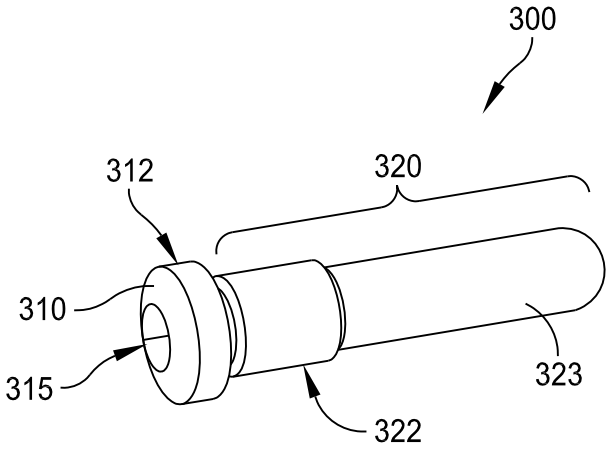

FIG. 3

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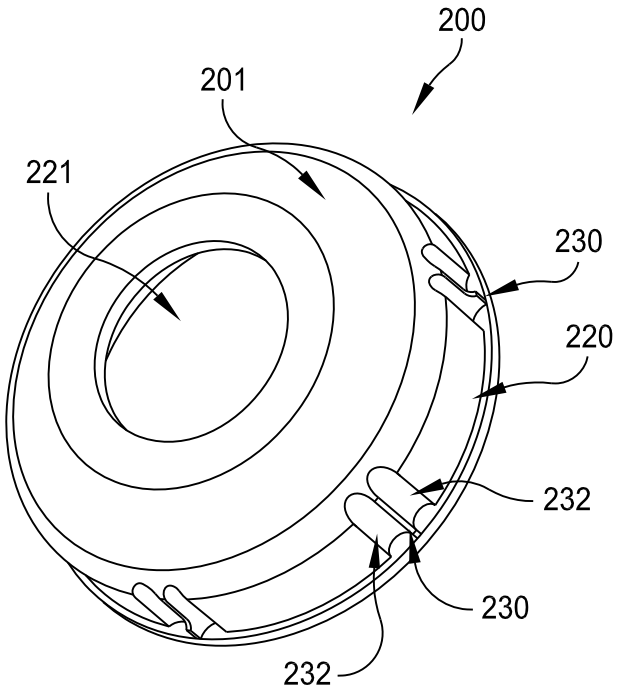

FIG. 4

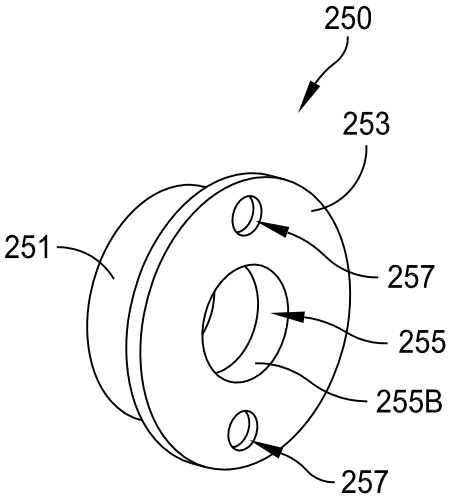

FIG. 5A

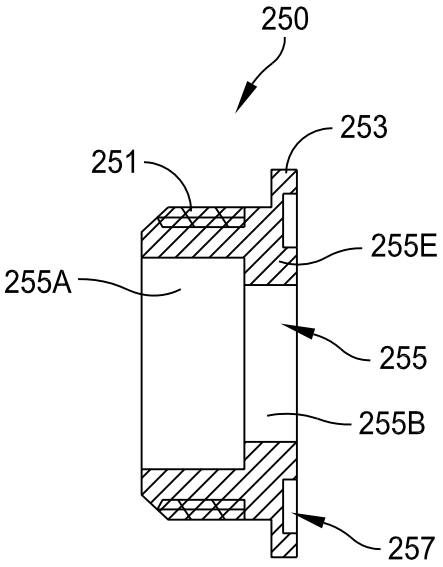

FIG. 5B

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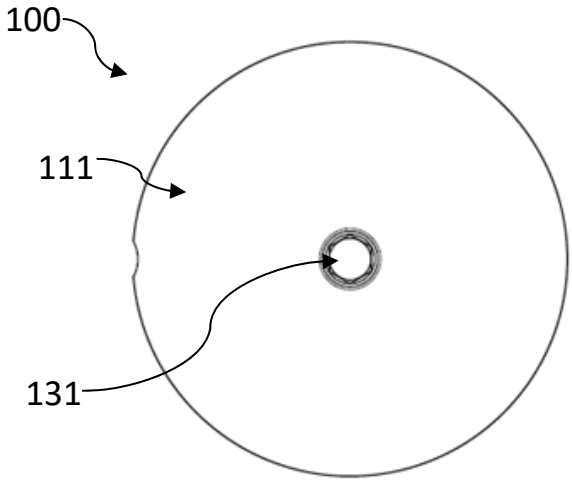

FIG. 6

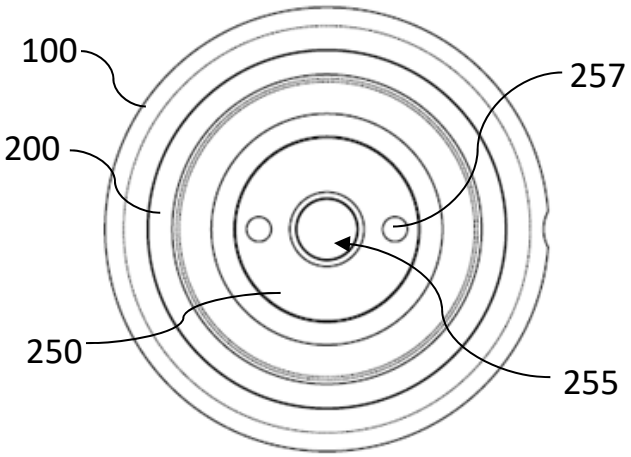

FIG. 7

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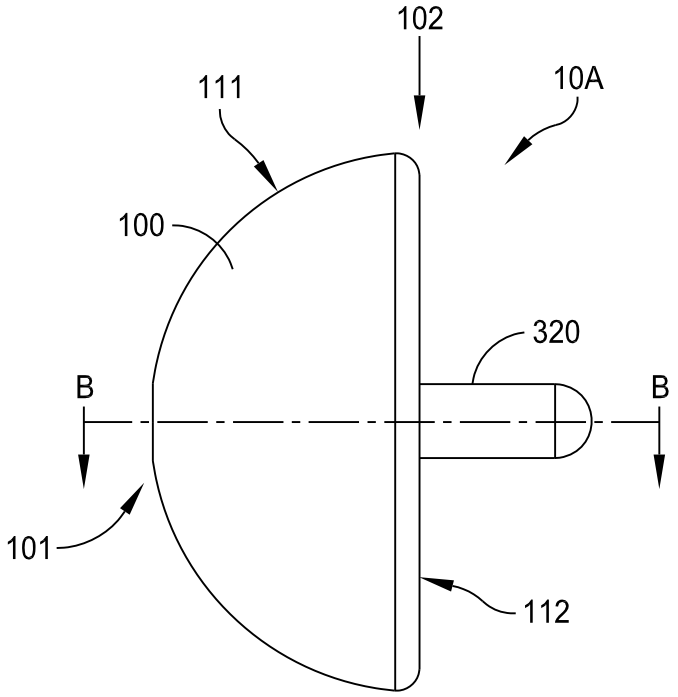

FIG. 8A

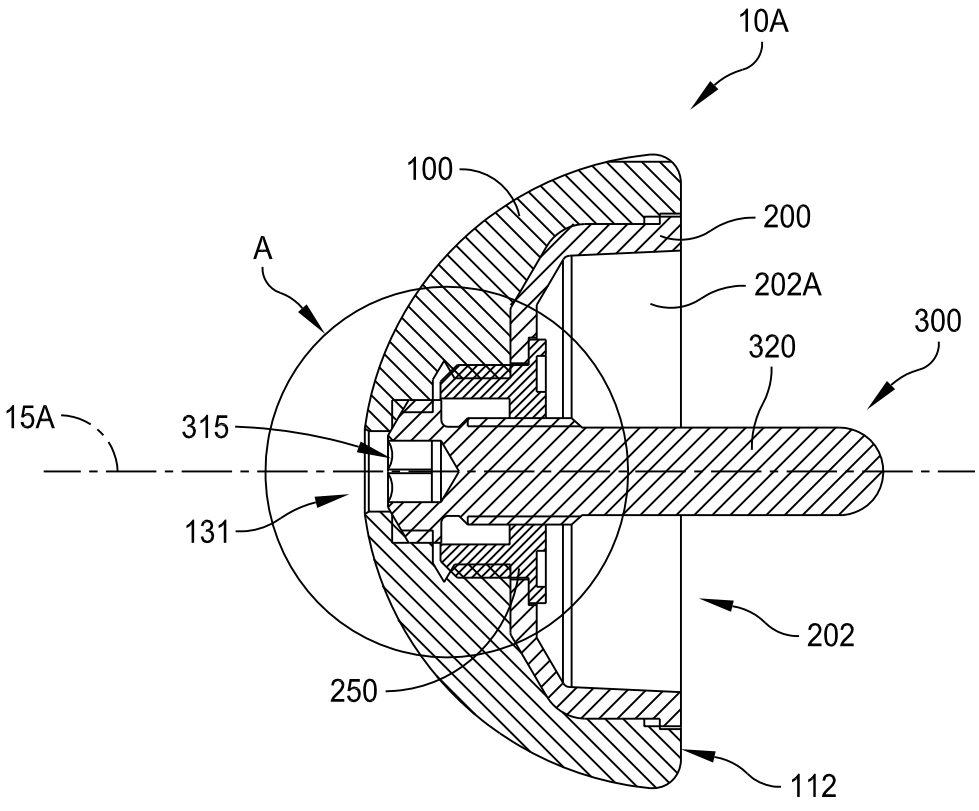

FIG. 8B

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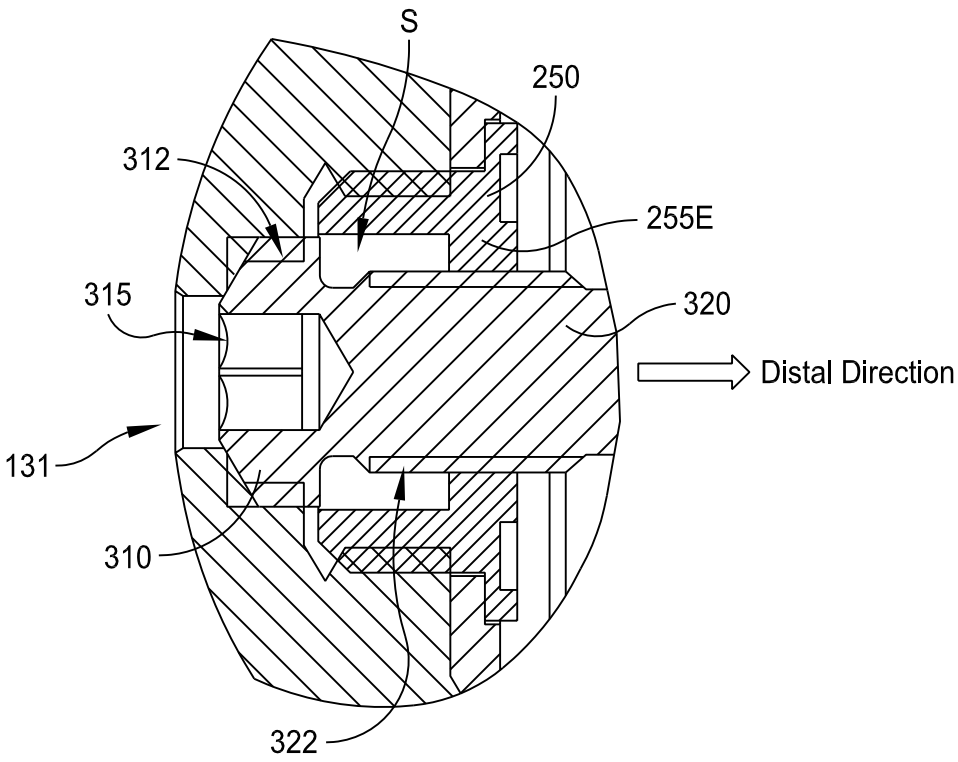

FIG. 8C

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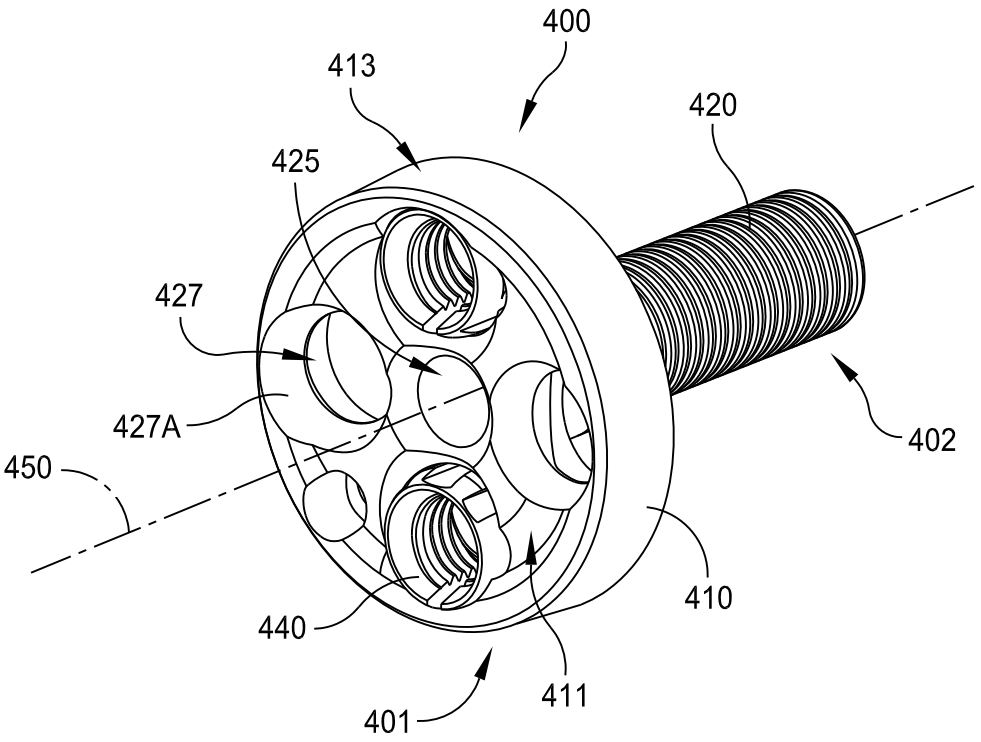

FIG. 9A

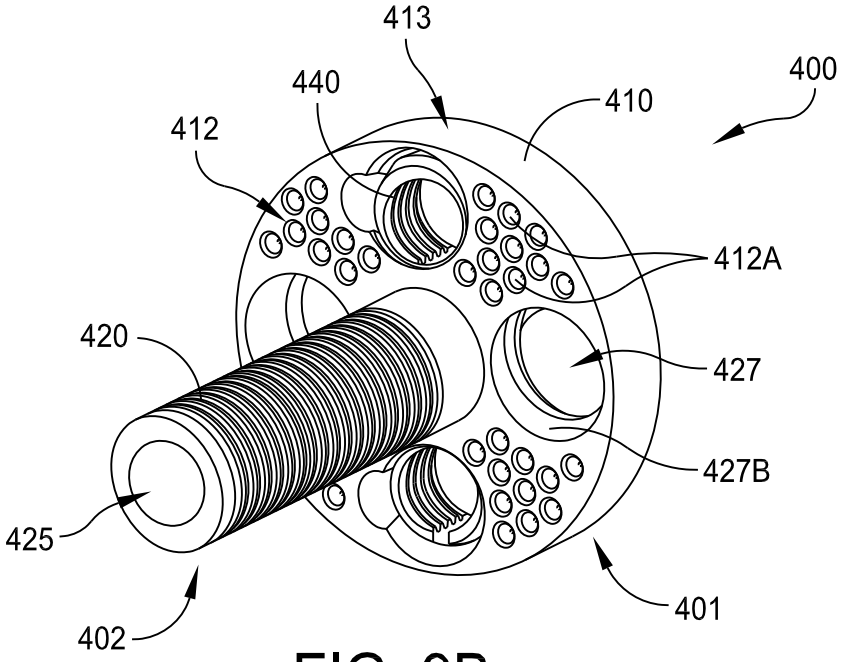

FIG. 9B