US 20170202649A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2017/0202649 A1

Bernhard et al. (43) Pub. Date: Jul. 20, 2017

(54) **PROVISIONAL PROSTHETIC SYSTEMS AND METHODS OF USING SAME**

(71) Applicant: **Nobel Biocare Services AG**, Kloten (CH)

(72) Inventors: **Nicolai Bernhard**, Winterthur (CH); **Roberto Carretta**, Zug (CH); **Adrian Haus**, Zurich (CH); **Stefan Holst**, Nuremberg (DE); **Steven M. Hurson**, Yorba Linda, CA (US); **Magnus Person**, Thalwil (CH); **Jorg Weitzel**, Rielasingen-Worblingen (DE)

(21) Appl. No.: **15/328,867**

(22) PCT Filed: **Jul. 24, 2015**

(86) PCT No.: **PCT/EP2015/066970**

§ 371 (c)(1),
(2) Date: **Jan. 24, 2017**

Related U.S. Application Data

(60) Provisional application No. 62/029,289, filed on Jul. 25, 2014.

Publication Classification

(51) **Int. Cl.**

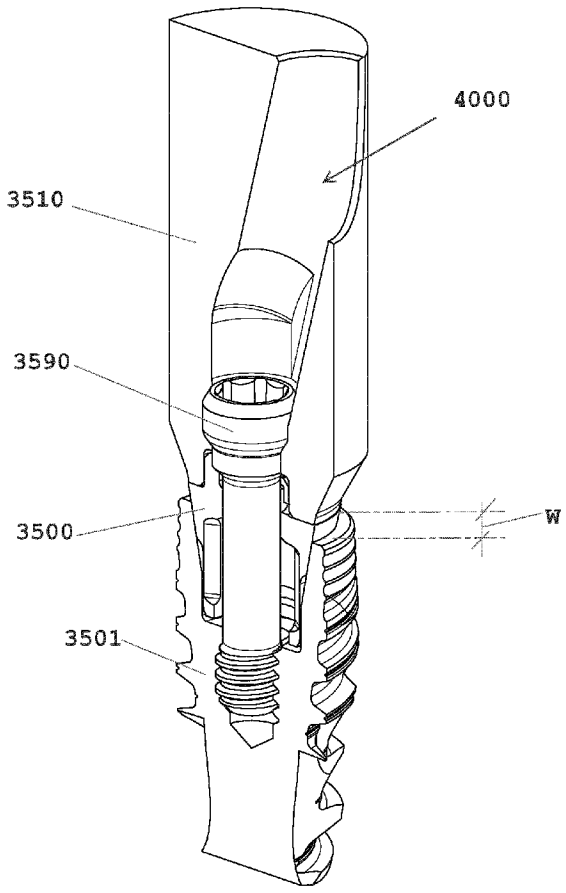
A61C 13/107	(2006.01)
A61C 8/00	(2006.01)
A61C 1/08	(2006.01)

(52) **U.S. Cl.**

CPC ***A61C 13/0001*** (2013.01); ***A61C 1/084*** (2013.01); ***A61C 8/0001*** (2013.01); ***A61C 8/0057*** (2013.01); ***A61C 8/0062*** (2013.01); ***A61C 8/0089*** (2013.01); ***A61C 8/0068*** (2013.01); ***A61C 8/0066*** (2013.01)

(57) **ABSTRACT**

Provisional prosthetic systems and methods of coupling such provisional prosthetic systems to a dental implant are disclosed. The provisional prosthetic system can include at least one dental component having a provisional connection feature and a prosthesis. A clinician can couple the prosthesis to the dental component using a bonding agent. The clinician can then drill a hole through the prosthesis. The hole can be configured to receive a fastener to securely fasten the prosthesis and dental component to the implant.



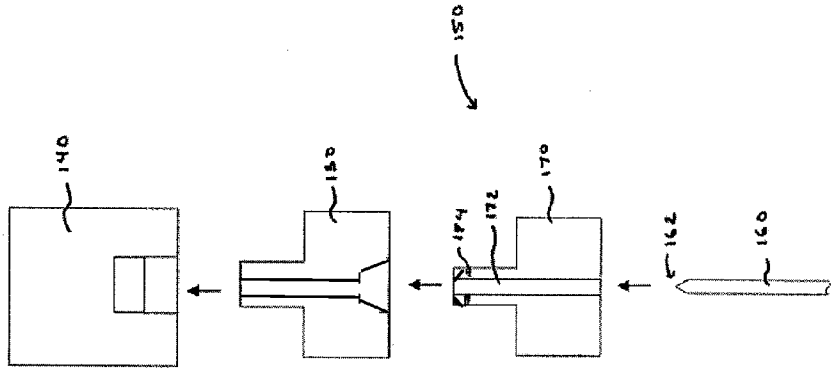


Figure 2

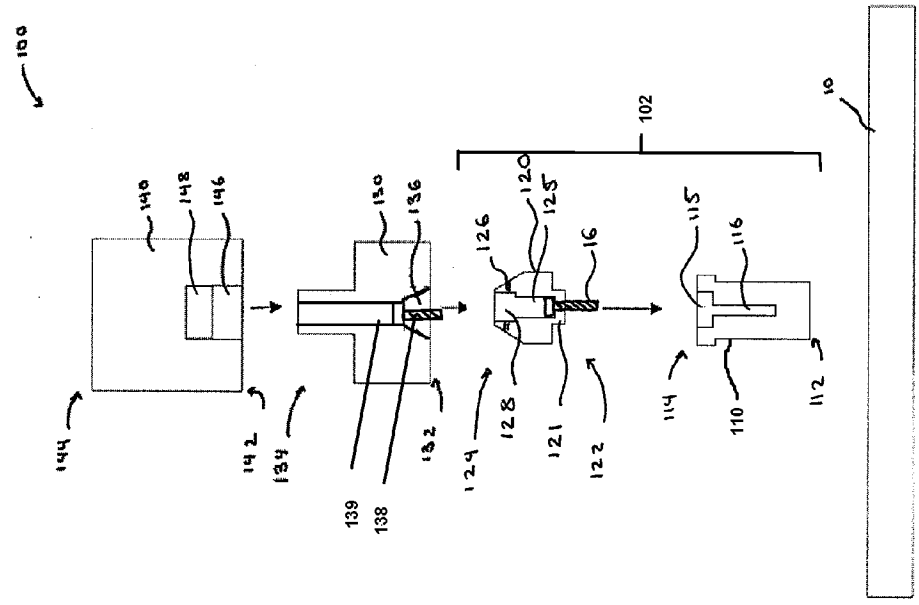


Figure 1

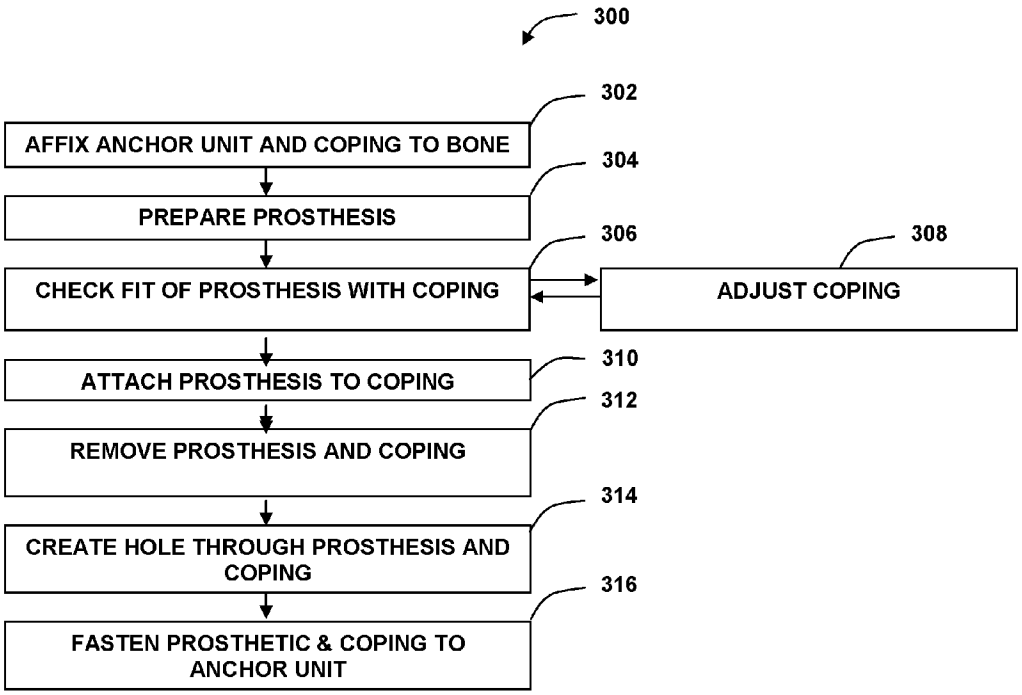

300
302
AFFIX ANCHOR UNIT AND COPING TO BONE
304
PREPARE PROSTHESIS
306
CHECK FIT OF PROSTHESIS WITH COPING
308
ADJUST COPING
310
ATTACH PROSTHESIS TO COPING
312
REMOVE PROSTHESIS AND COPING
314
CREATE HOLE THROUGH PROSTHESIS AND COPING
316
FASTEN PROSTHETIC & COPING TO ANCHOR UNIT

Figure 3

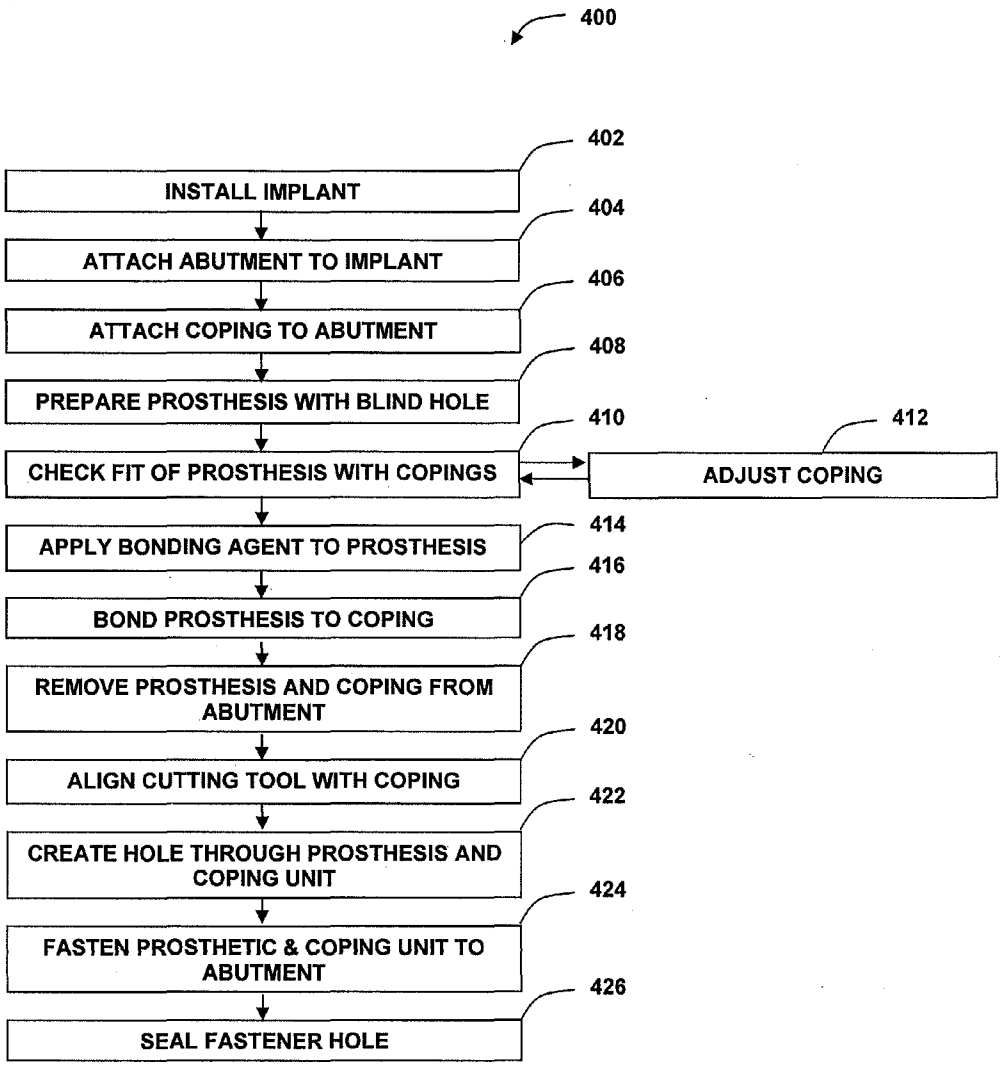

400
402
INSTALL IMPLANT
404
ATTACH ABUTMENT TO IMPLANT
406
ATTACH COPING TO ABUTMENT
408
PREPARE PROSTHESIS WITH BLIND HOLE
410
CHECK FIT OF PROSTHESIS WITH COPINGS
412
ADJUST COPING
414
APPLY BONDING AGENT TO PROSTHESIS
416
BOND PROSTHESIS TO COPING
418
REMOVE PROSTHESIS AND COPING FROM ABUTMENT
420
ALIGN CUTTING TOOL WITH COPING
422
CREATE HOLE THROUGH PROSTHESIS AND COPING UNIT
424
FASTEN PROSTHETIC & COPING UNIT TO ABUTMENT
426
SEAL FASTENER HOLE

Figure 4

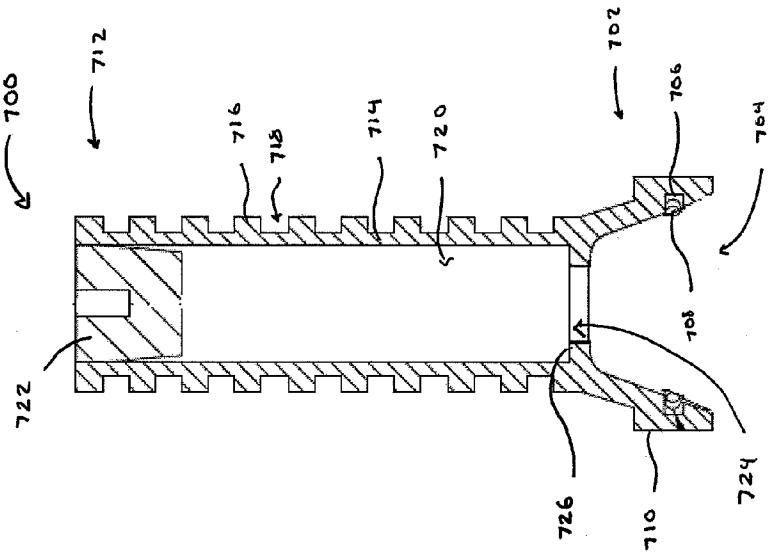


Figure 7A

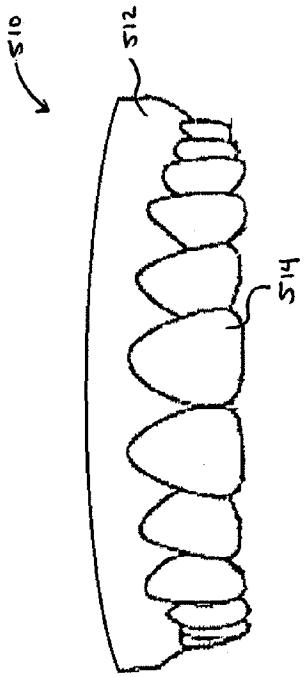


Figure 5

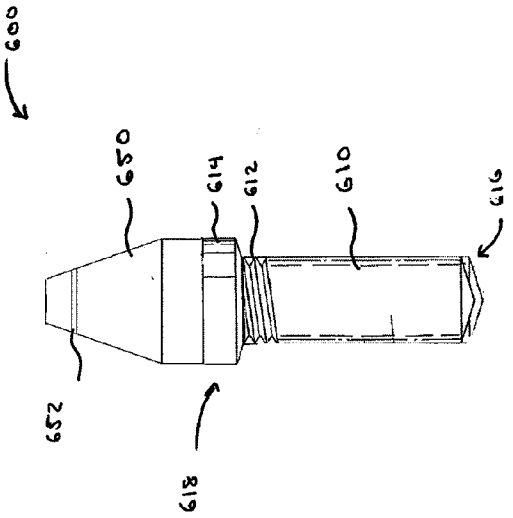


Figure 6

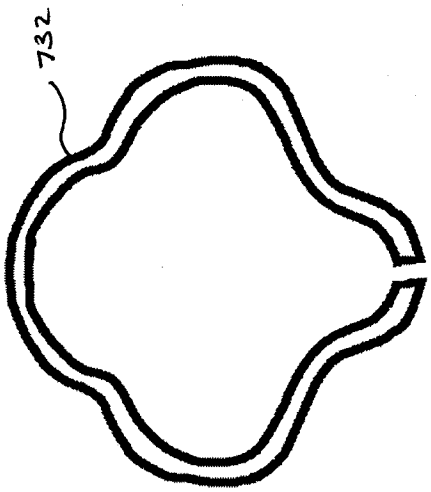


Figure 7C

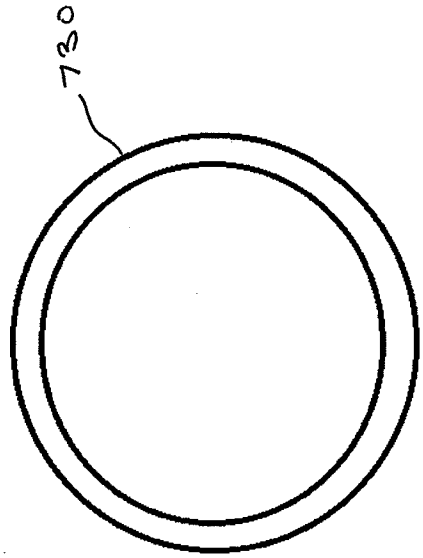


Figure 7B

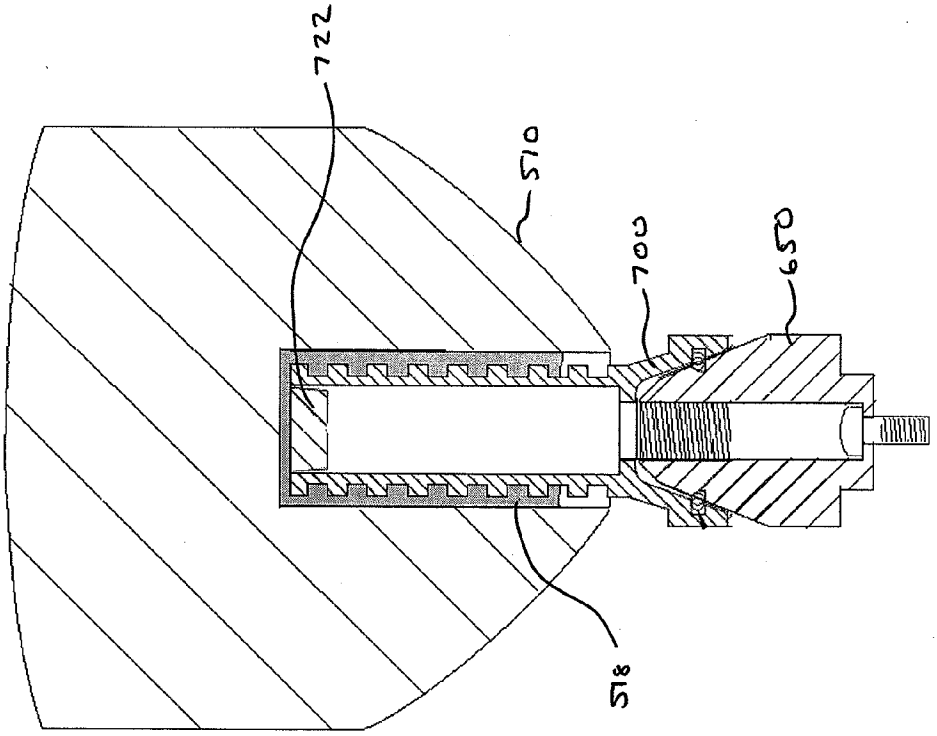


Figure 9

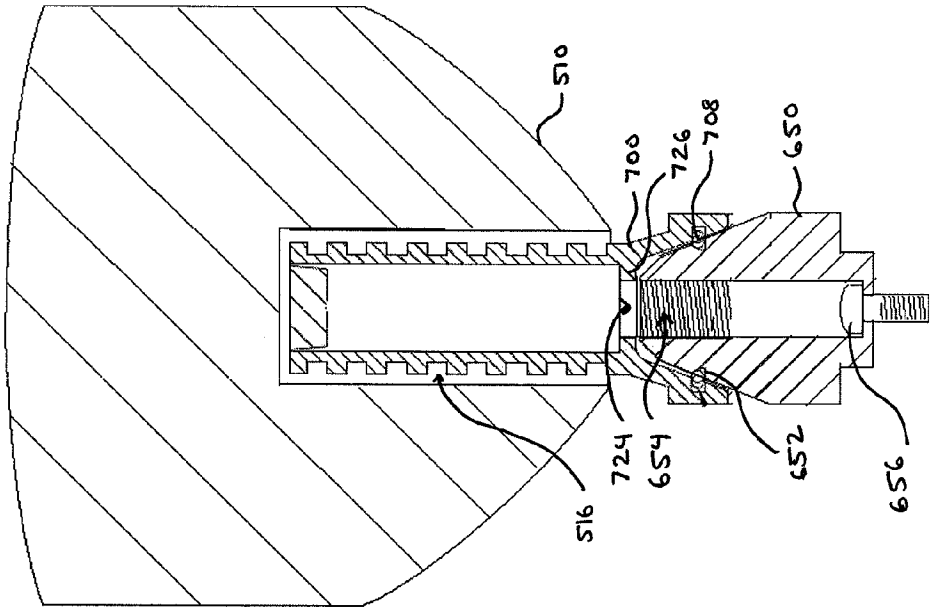


Figure 8

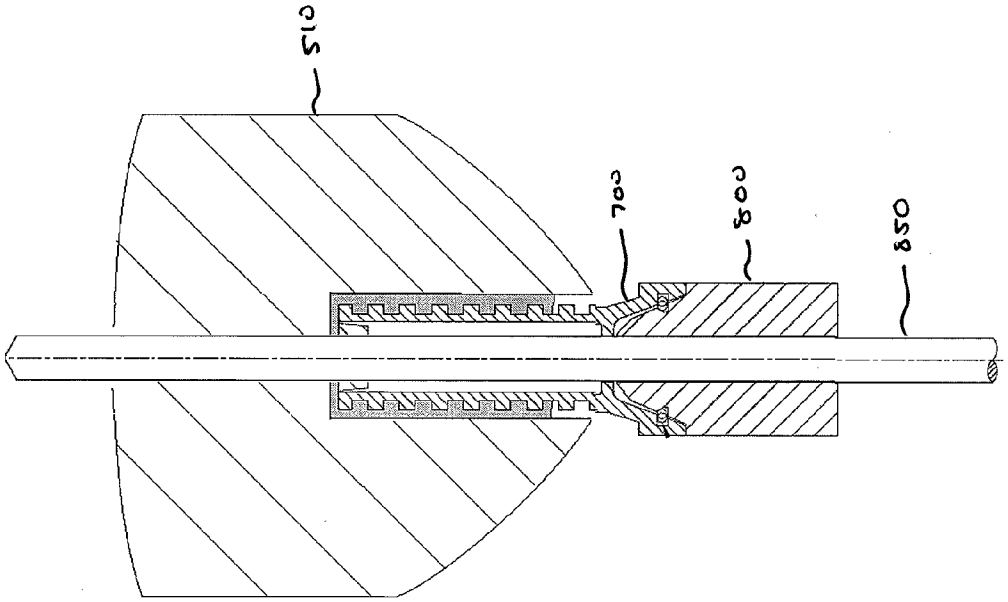


Figure 11

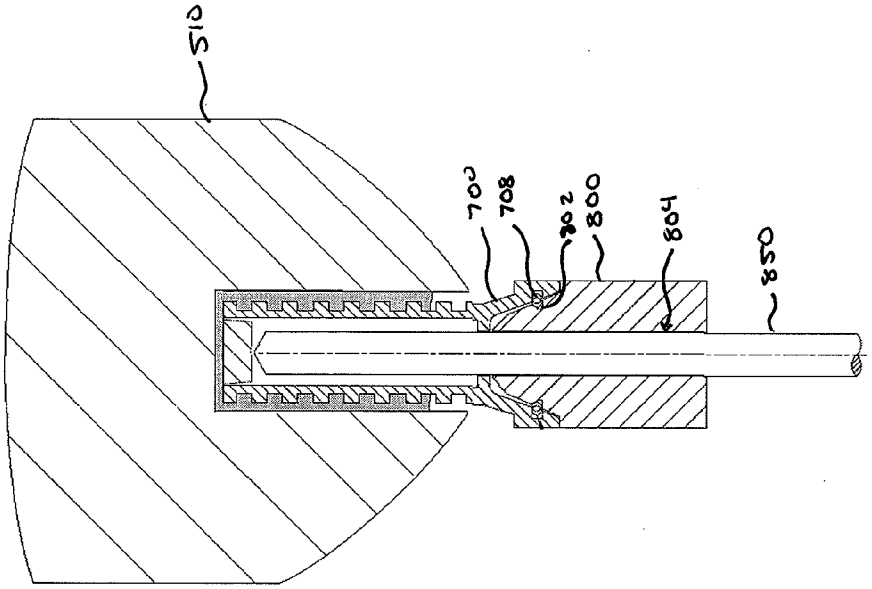


Figure 10

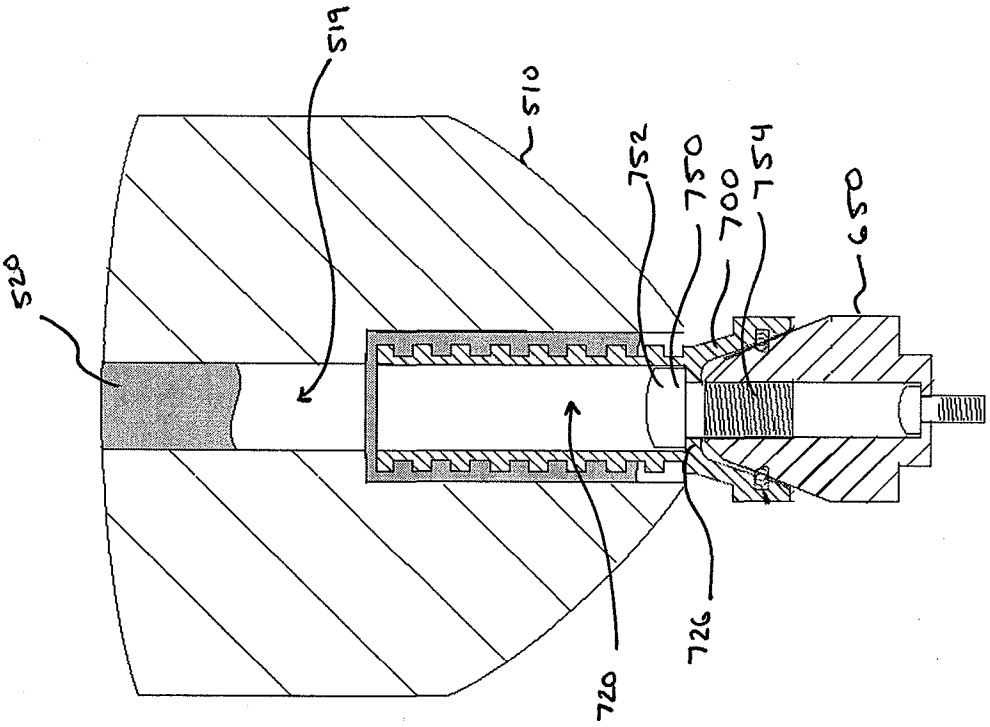


Figure 12

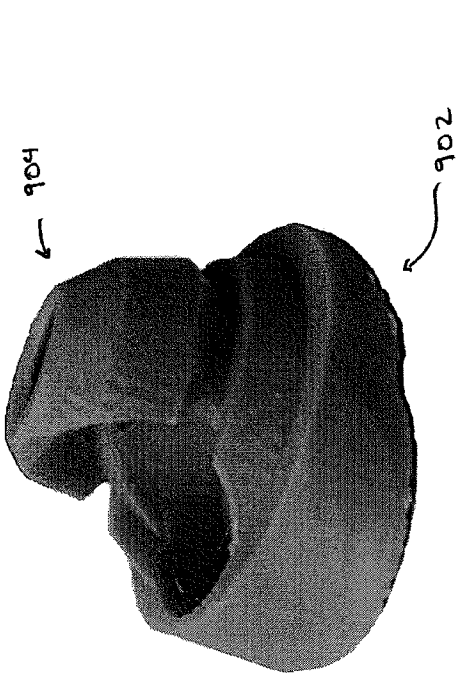


Figure 14

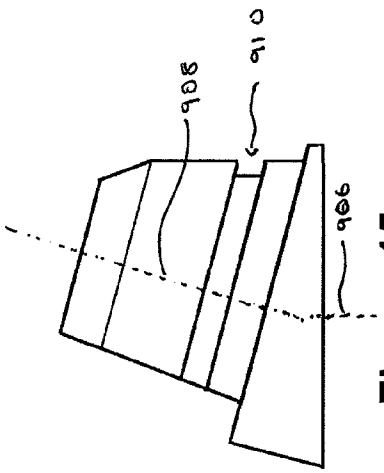


Figure 15

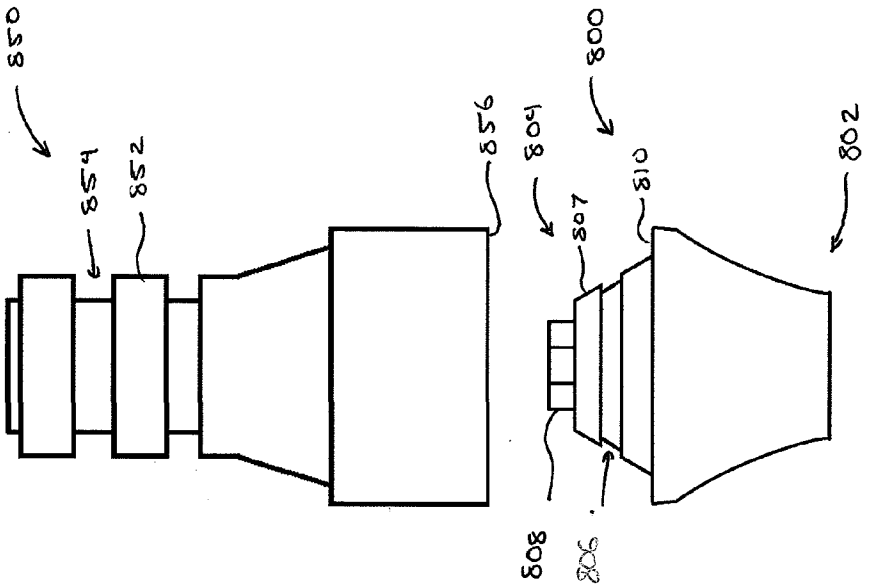


Figure 13

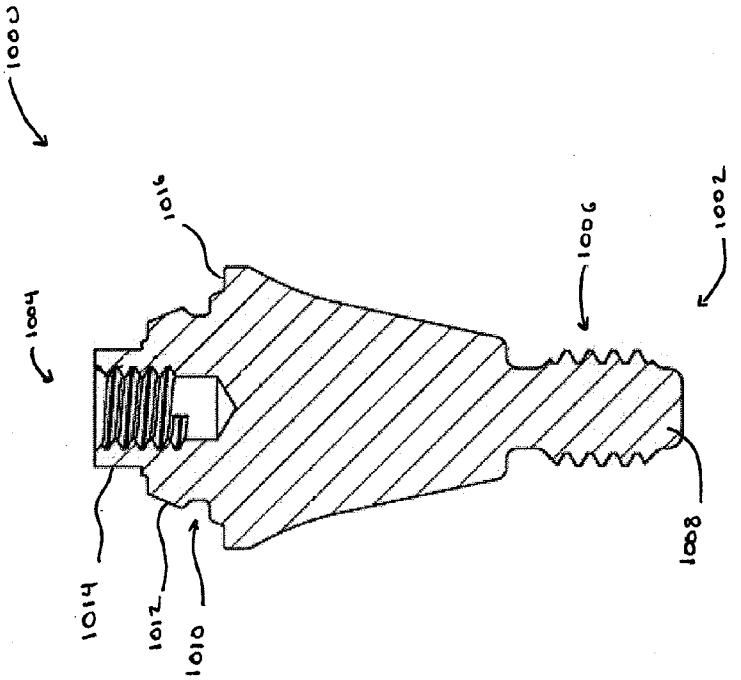


Figure 17

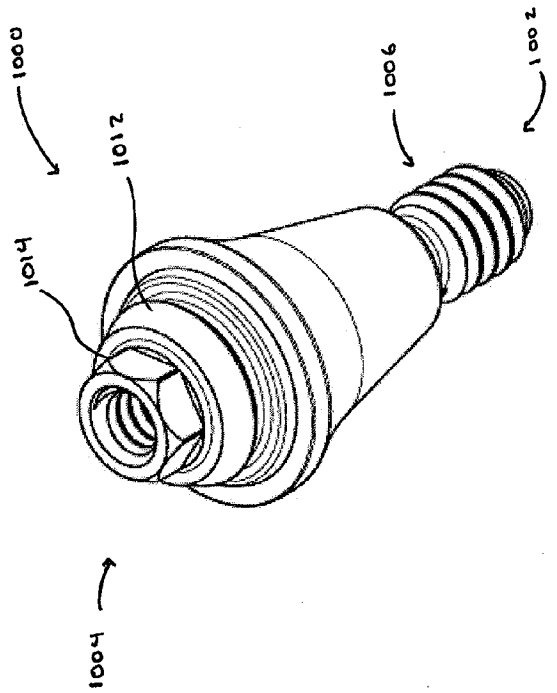


Figure 16

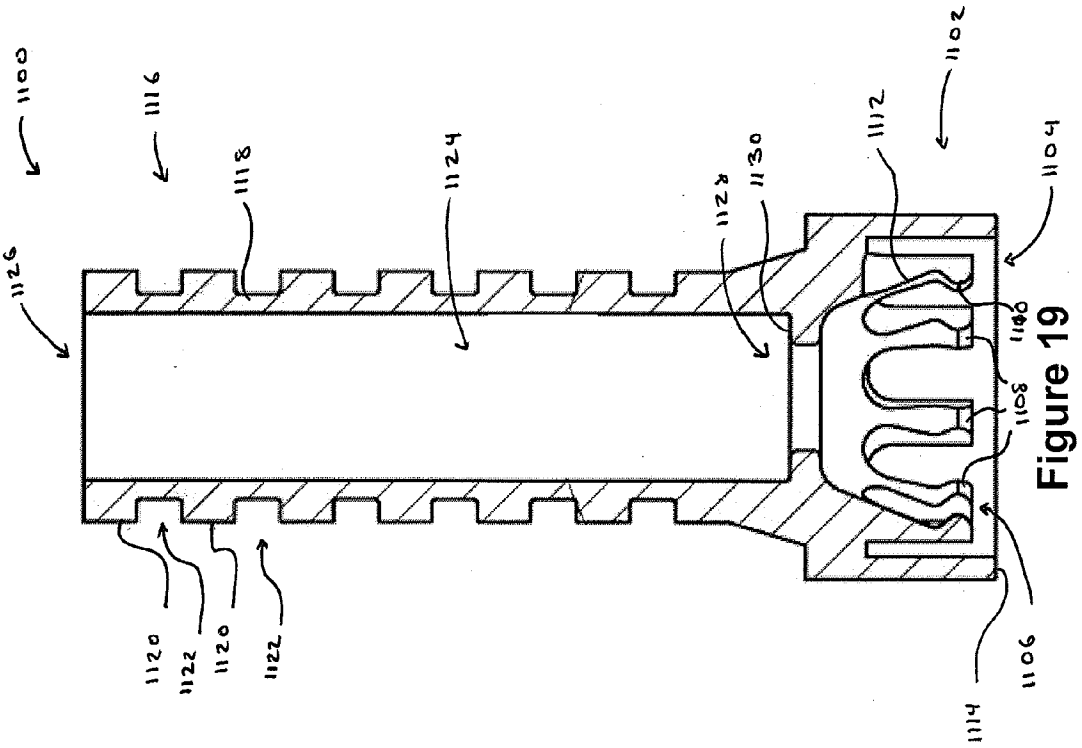


Figure 19

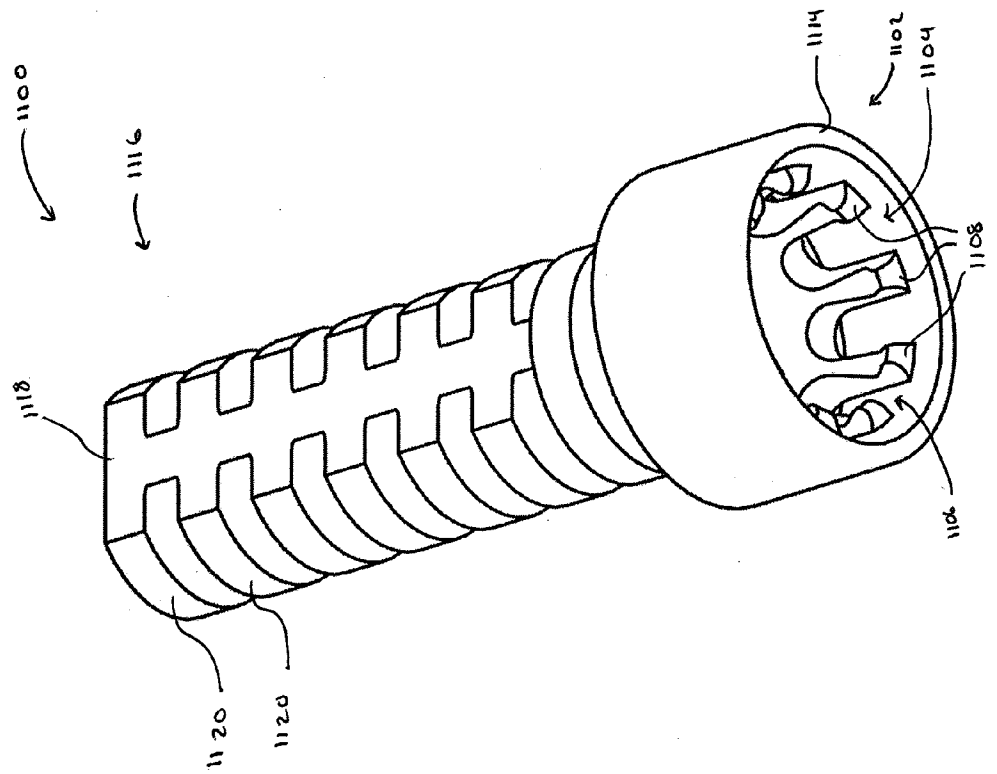


Figure 18

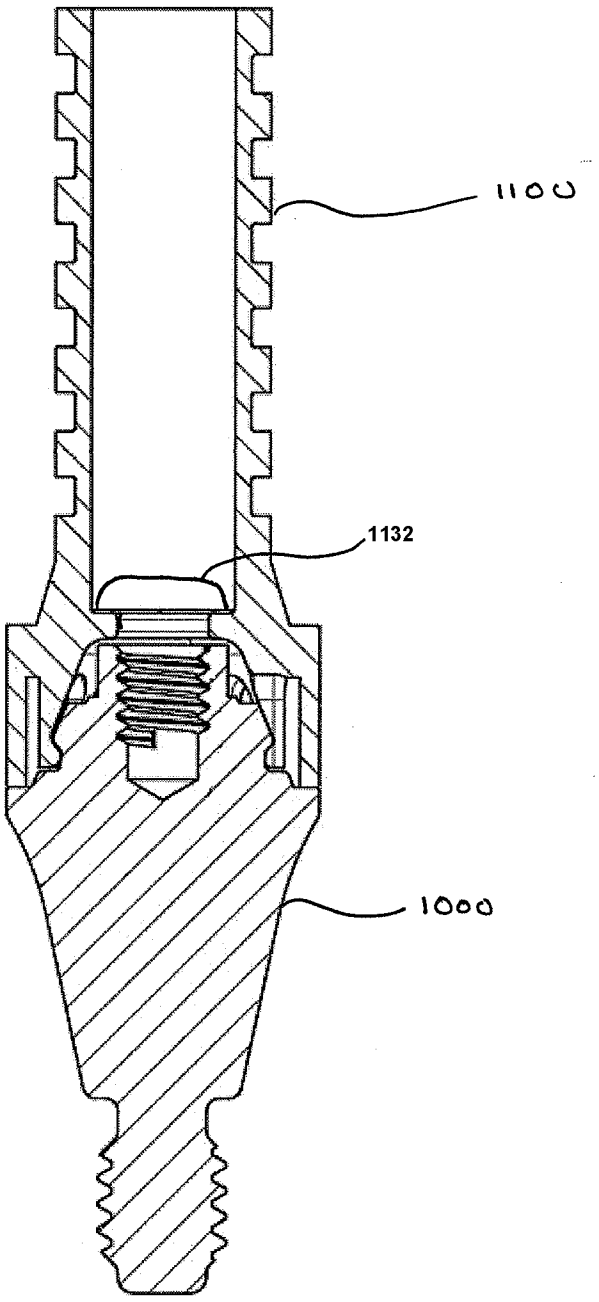


Figure 20

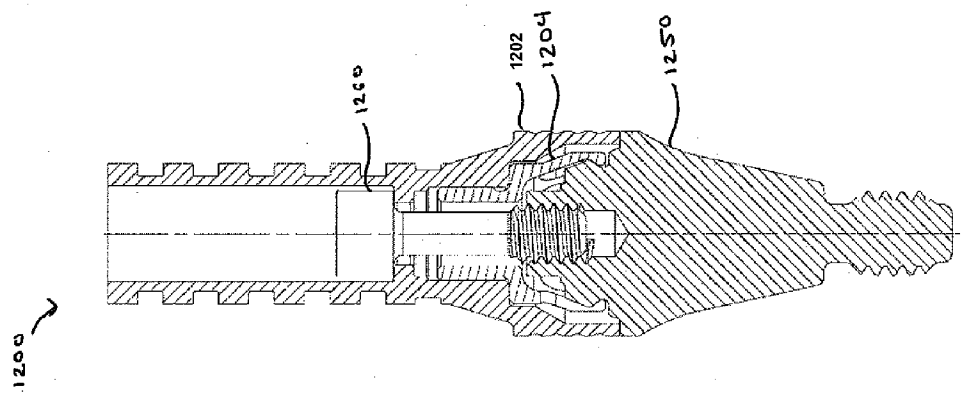


Figure 23

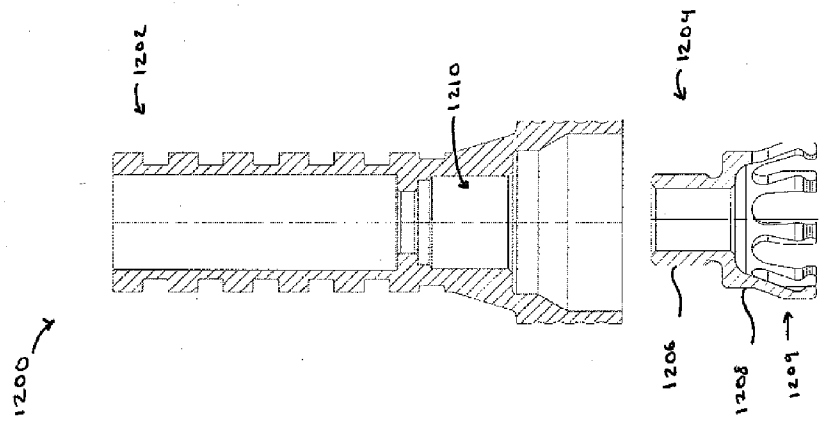


Figure 22

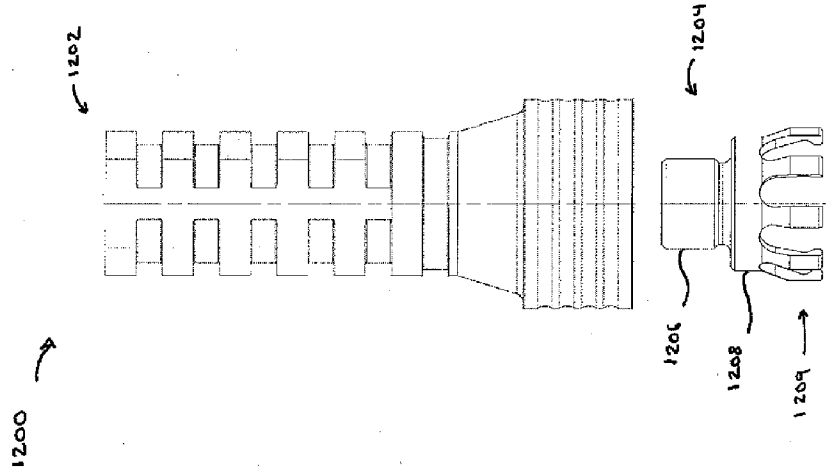


Figure 21

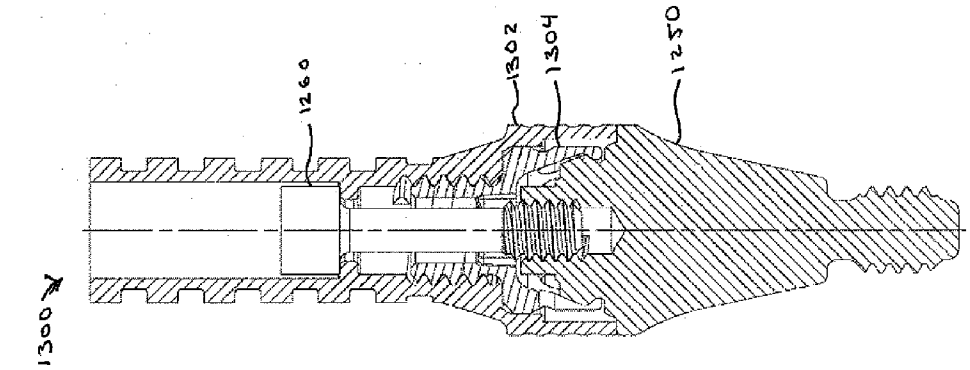


Figure 26

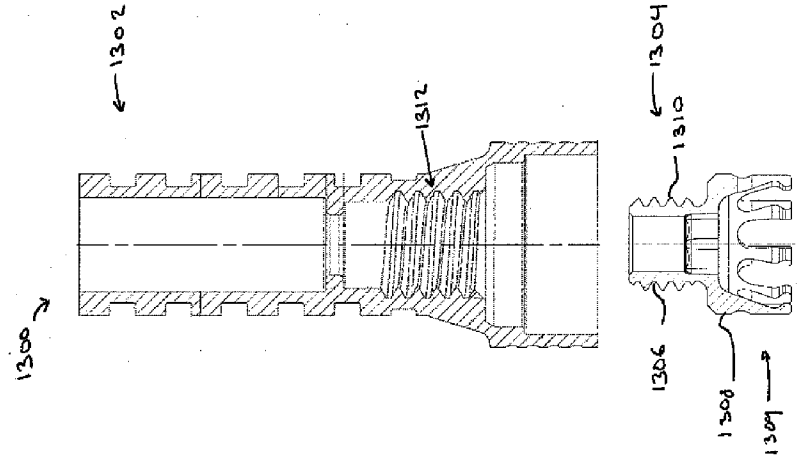


Figure 25

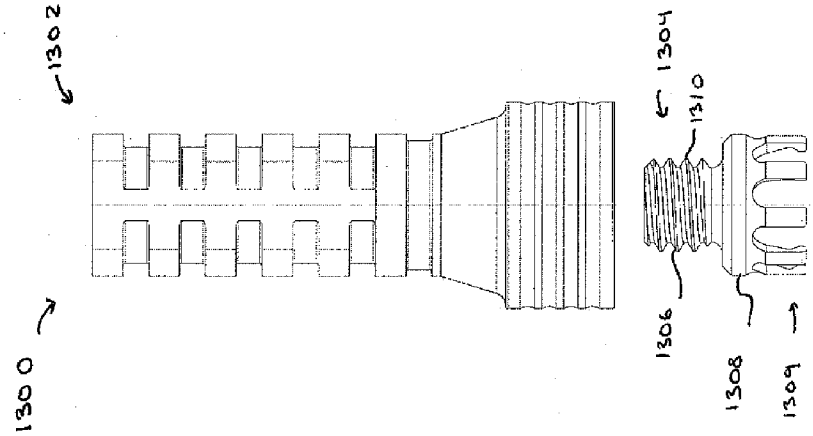
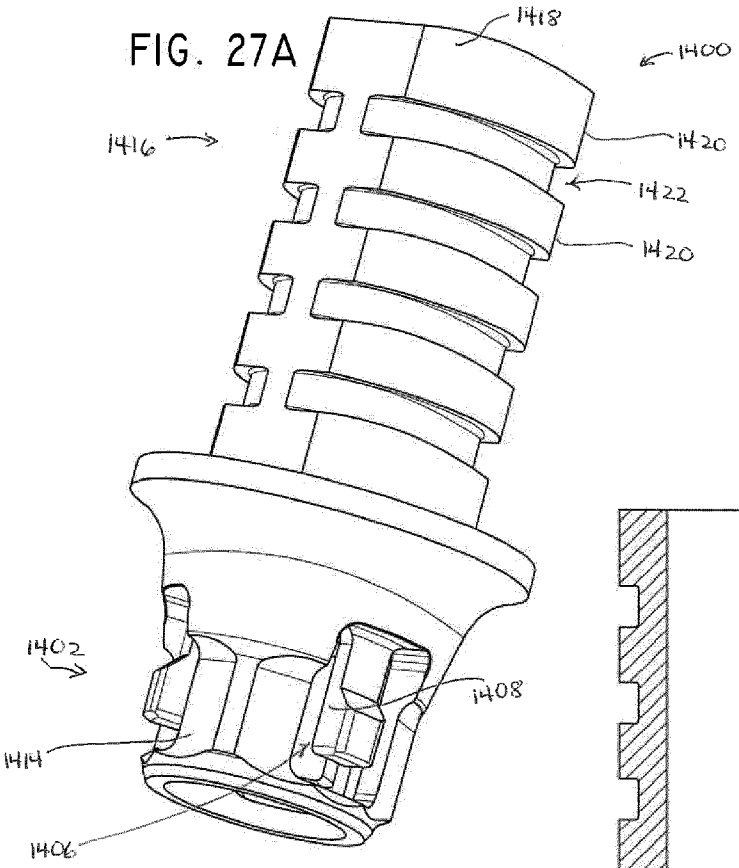


Figure 24

FIG. 27A



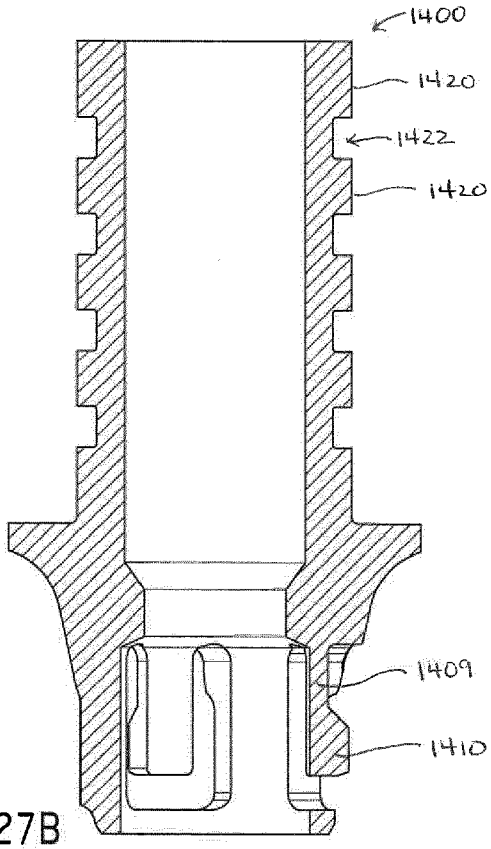


FIG. 27B

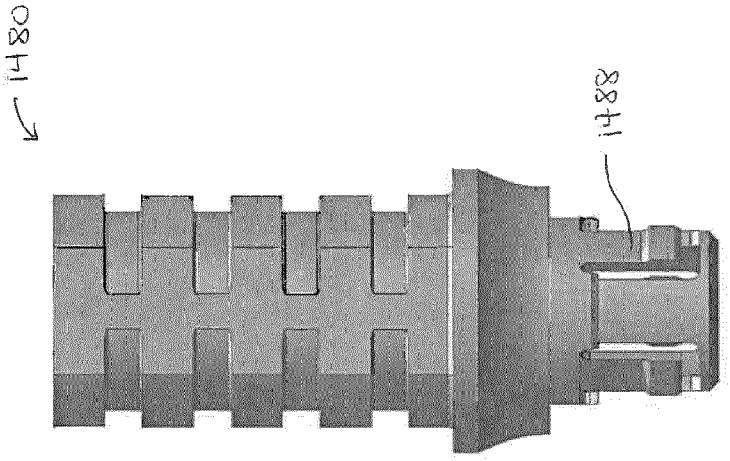


Figure 27E

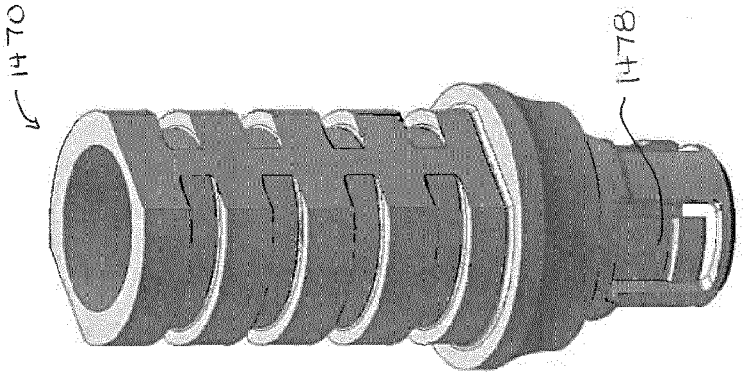


Figure 27D

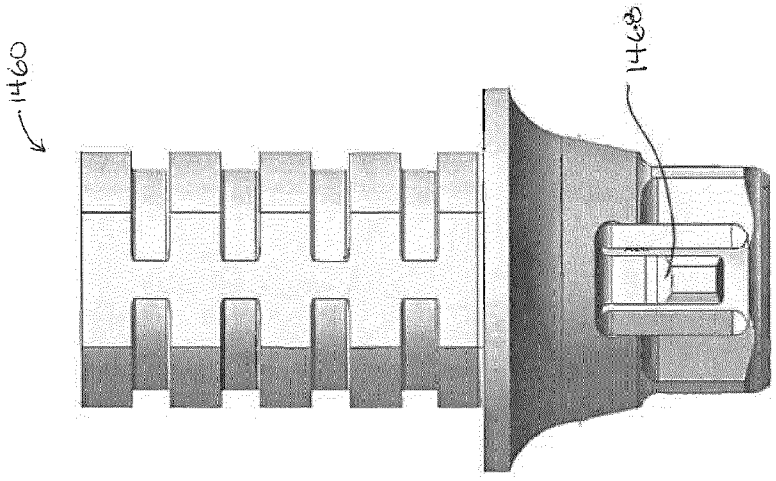


Figure 27C

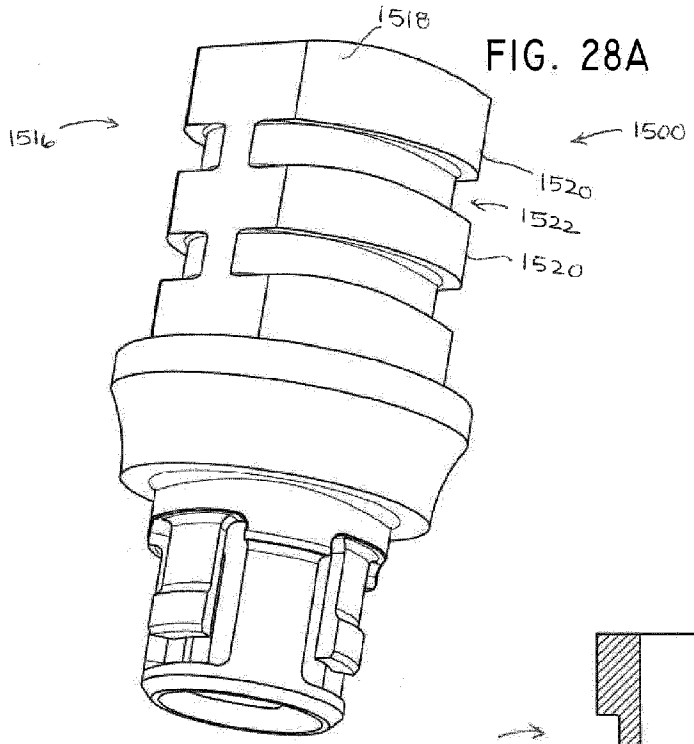


FIG. 28A

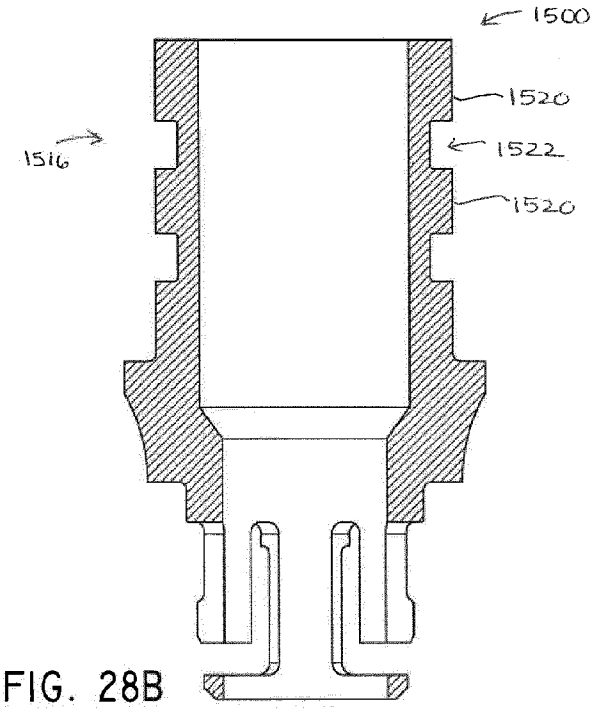
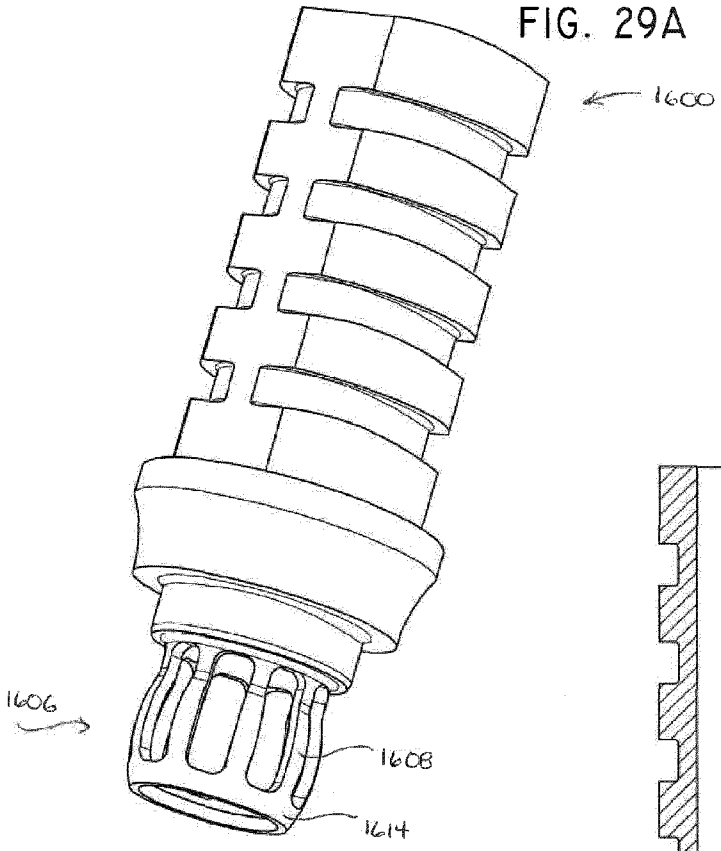


FIG. 28B

FIG. 29A



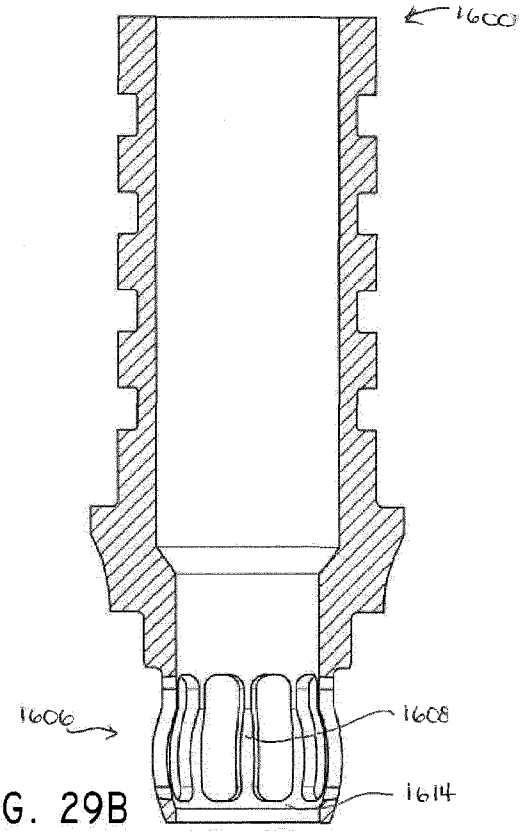
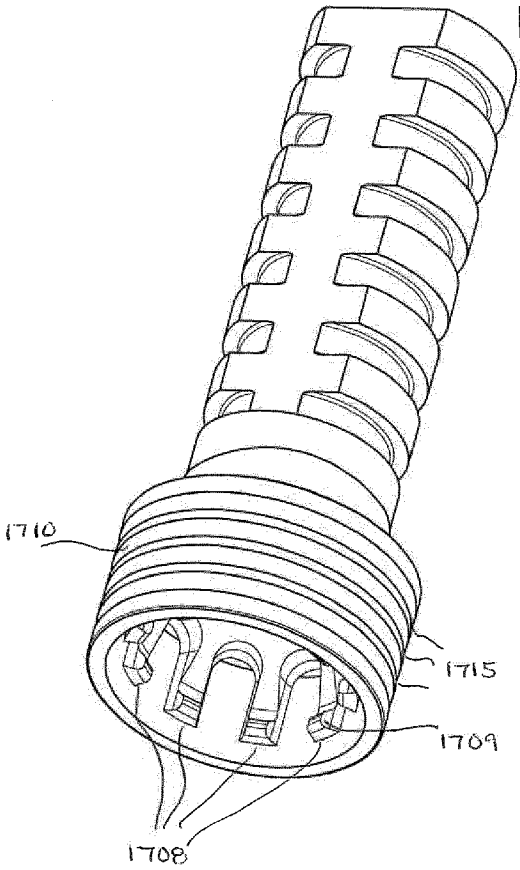


FIG. 29B

FIG. 30A



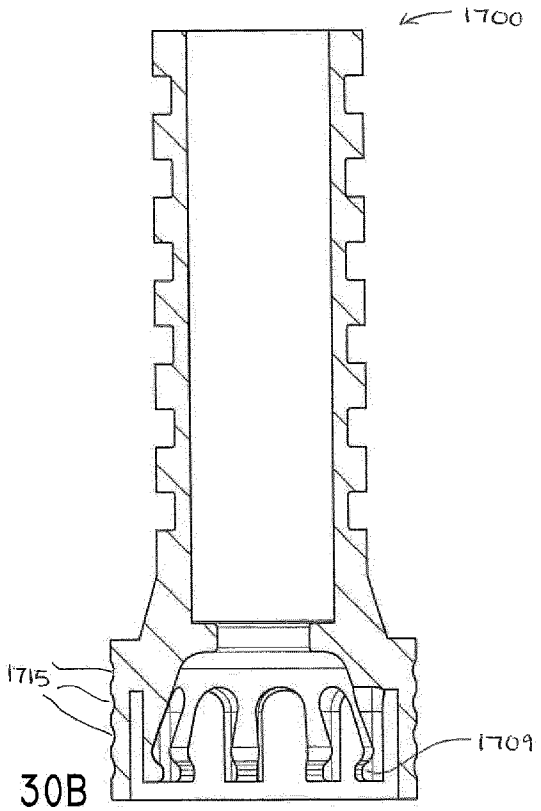


FIG. 30B

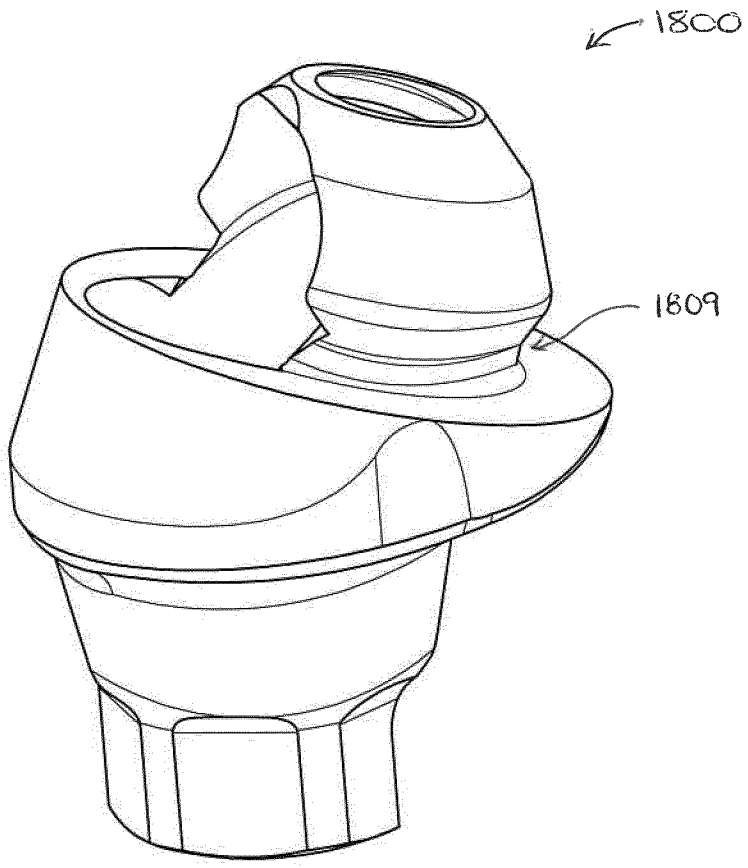


FIG. 31

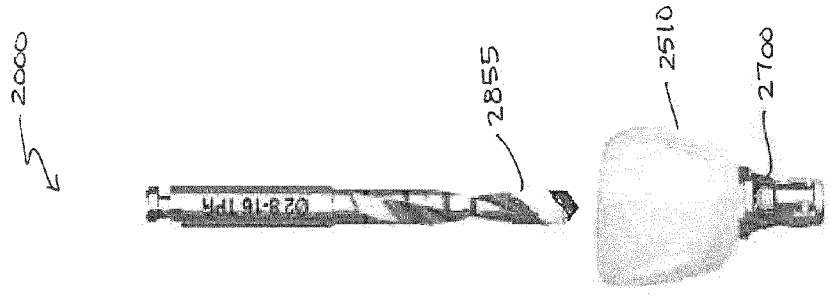


Figure 32C

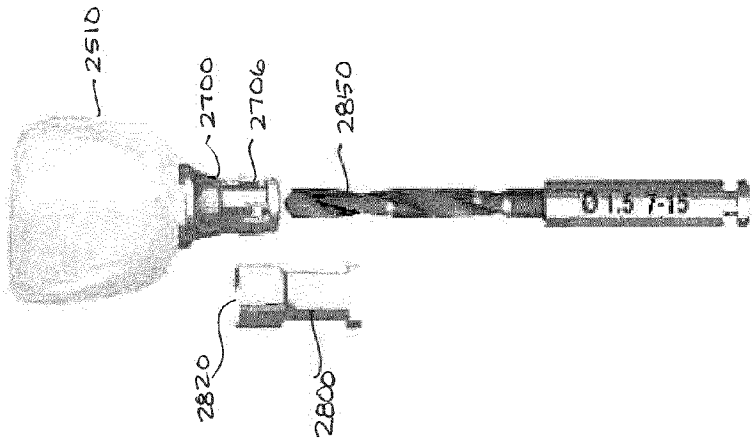


Figure 32B

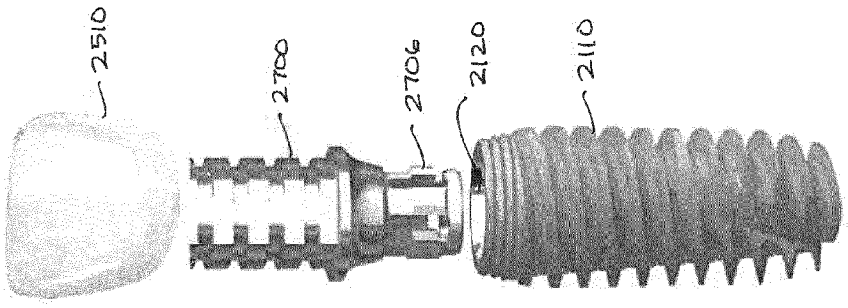


Figure 32A

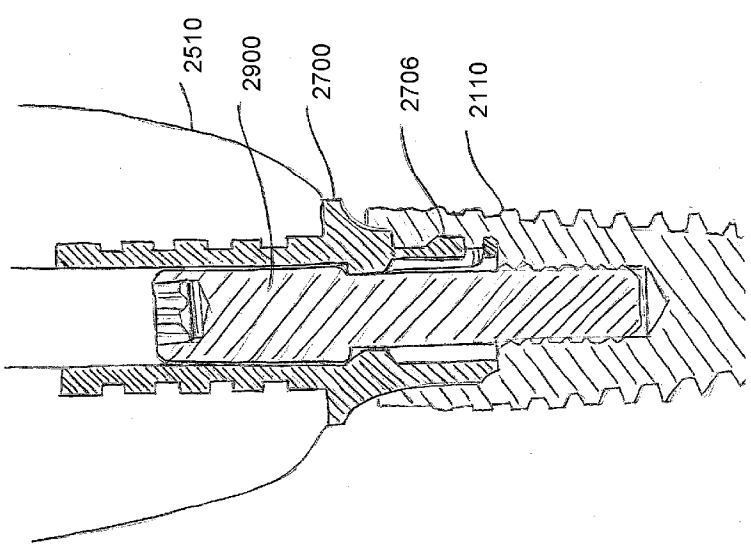


Figure 32D

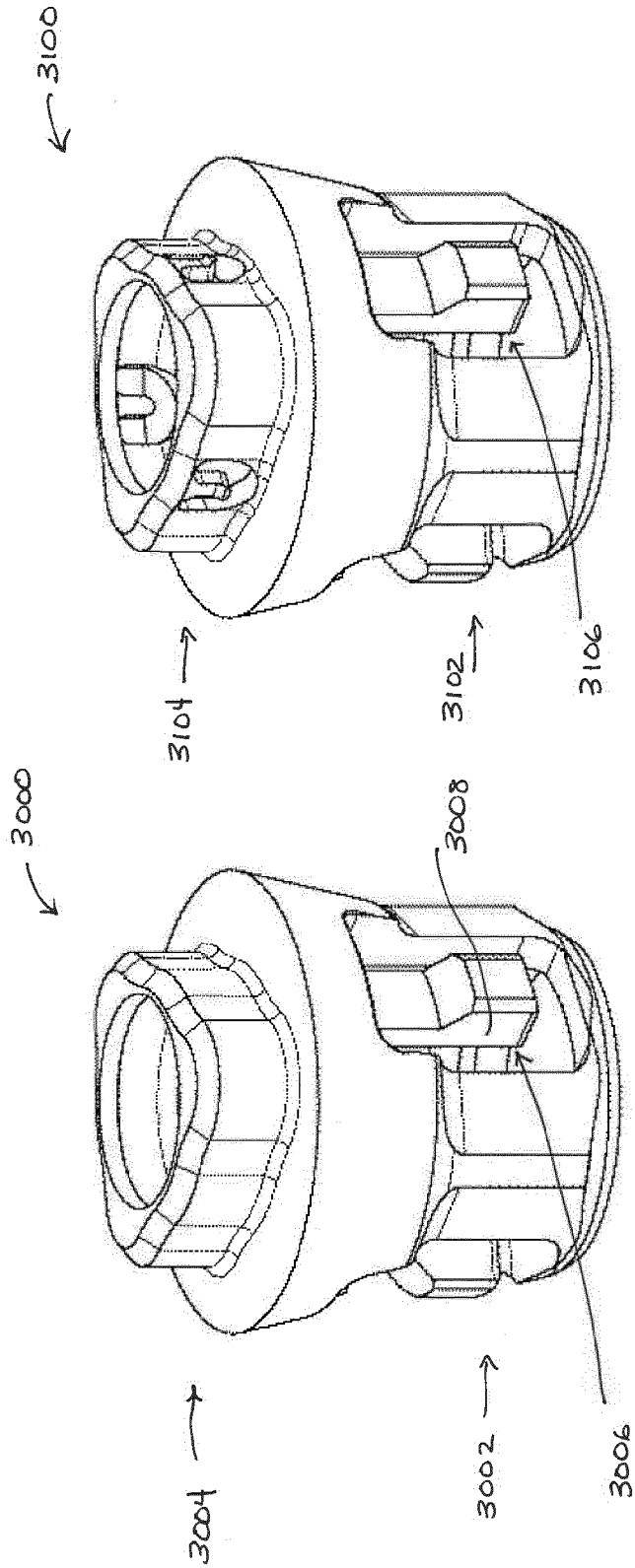


Figure 33B

Figure 33A

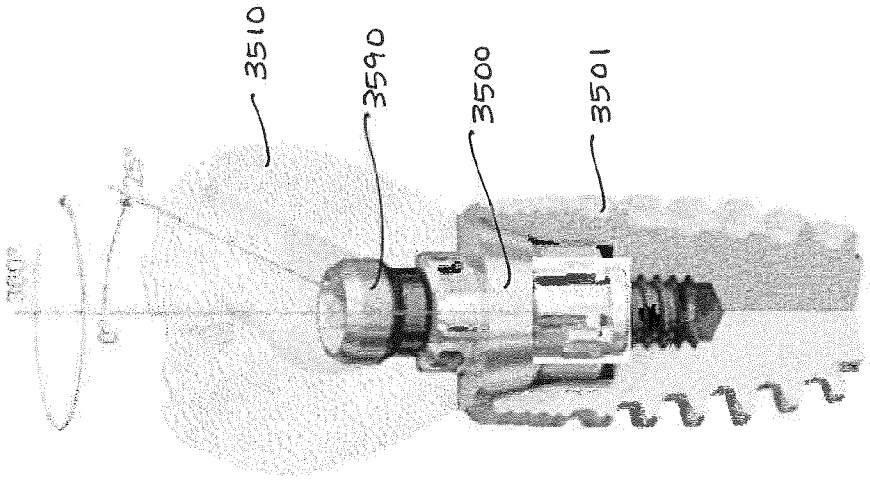


Figure 35

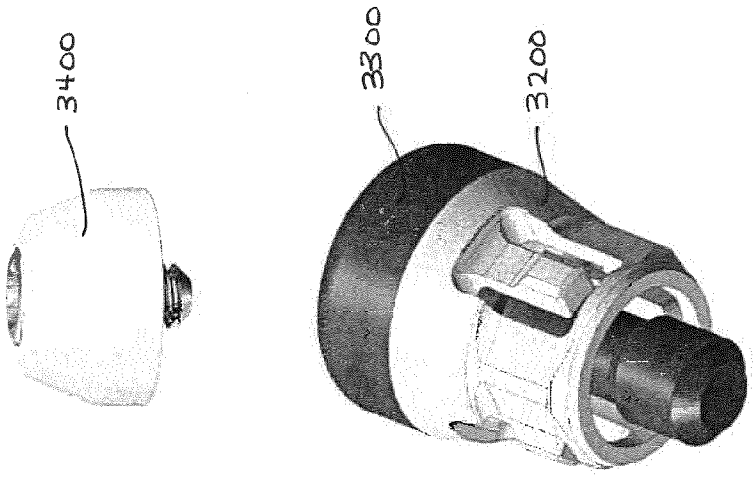


Figure 34

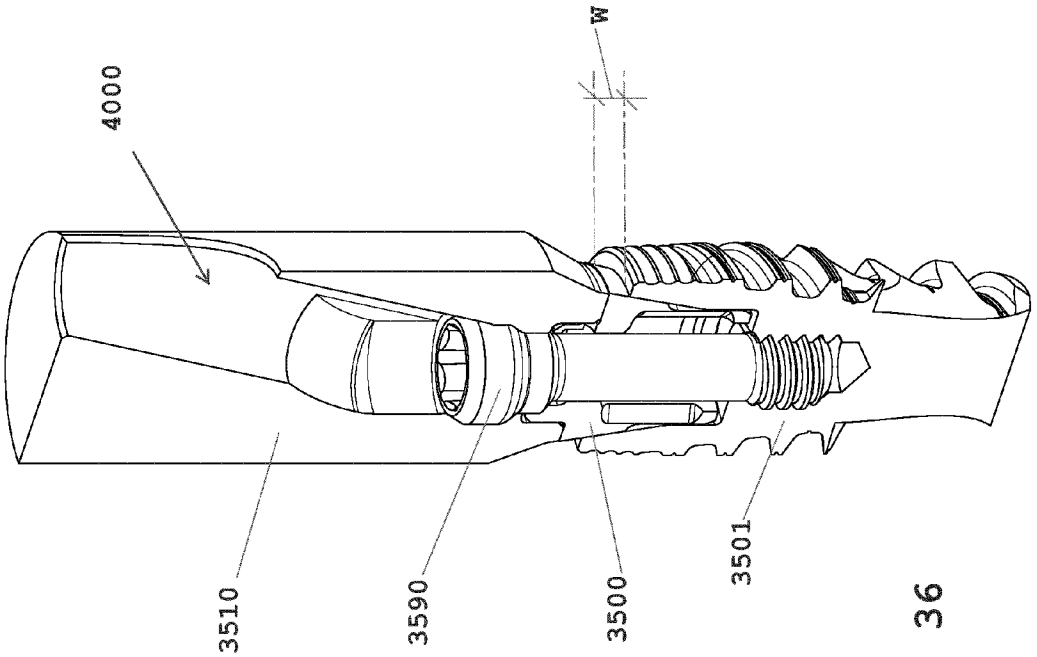


Figure 36

PROVISIONAL PROSTHETIC SYSTEMS AND METHODS OF USING SAME

INCORPORATION BY REFERENCE TO ANY PRIORITY APPLICATIONS

[0001] This application claims the benefit of priority of U.S. Provisional Application No. 62/029,289 filed on Jul. 25, 2014, the entire disclosure of which is incorporated herein by reference.

BACKGROUND

[0002] Field

[0003] The present invention relates to prosthetic systems and methods, and more specifically, to dental prosthetic systems and methods.

[0004] Description of the Related Art

[0005] Dental prosthetic systems can be used to reconstruct defects in a patient's jaw such as missing or misaligned teeth. Dental prosthetic systems can include components such as a dental implant, an intermediary structure such as an abutment, and a prosthesis such as a crown, bridge or a denture.

[0006] In one method, a provisional dental prosthetic system can be attached to the patient's jaw prior to fabrication and installation of a more permanent dental prosthetic system. This can provide the patient with an interim prosthetic solution which is directly attached to the patient's jaw. However, such provisional dental prosthetic systems and methods often require use of devices, such as long processing screws, which interfere with the clinician's ability to determine and obtain a proper fit for the prosthesis with respect to opposing dentition. Accordingly, there is a need for further improvement of provisional dental prosthetic systems and methods of attaching provisional prosthetic systems to enhance the clinician's ability to obtain a proper fit for the prosthesis.

SUMMARY

[0007] One aspect of the dental prosthetic systems and methods described herein is the recognition of a need for enhancing the fit of a dental prosthesis with respect to opposing dentition. Provisional dental prosthetic systems are often limited due to the use of other devices, such as long processing screws, which interfere with the ability for a clinician to obtain a proper fit.

[0008] In some embodiments, a method of coupling a dental prosthesis to an implant or an abutment can include the step of coupling a coping to the abutment using a snap-fit connection. The method can also include the step of bonding the prosthesis to the coping. The method can also include the step of decoupling the prosthesis and coping from the abutment via the snap-fit connection. The method can also include the step of forming a through-hole in both the coping and the prosthesis. The method can also include the step of coupling the coping and prosthesis to the abutment using a fastener inserted into the through-hole.

[0009] In some embodiments, the following features can be combined separately, or together with, the embodiment above. In some embodiments, the step of coupling the prosthesis to the coping can include the step of applying a bonding agent to the coping and to the prosthesis and/or backfilling holes formed in the prosthesis with an acrylic, such as a self-curing acrylic or a light cured composite. This acrylic can be the same material used in forming the prosthesis. In some embodiments, the prosthesis can include one or more blind holes and the step of applying the bonding agent to the prosthesis can include the step of introducing the bonding against into the one or more blind holes and/or backfilling holes formed in the prosthesis with an acrylic, such as a self-curing acrylic or a light cured composite. The method can also include the step of temporarily coupling a coping to the abutment via a provisional connection feature. In some embodiments, the step of temporarily coupling the coping to the abutment via a provisional connection feature can include the step of engaging a snap fit connection feature on the coping with a corresponding snap fit connection feature on the abutment. The method can also include the step of modifying the alignment between the prosthesis and coping and coupling the prosthesis to the coping. In some embodiments, the step of modifying the alignment between the prosthesis and coping can include the step of orienting occlusal surfaces and establishing vertical dimension of the prosthesis with occlusal surfaces of opposing dentition. The method can also include the step of removing the prosthesis and coping from the abutment such that the prosthesis and coping remain in the modified alignment. The method can also include the step of forming a hole through at least the prosthesis using a cutting tool. In some embodiments, the step of forming a hole through at least the prosthesis can include the step of attaching an alignment tool to the coping and using the alignment tool to align the cutting tool with respect to the prosthesis. The method can also include the step of coupling the coping to the abutment via a second connection feature, the second connection feature being different from the provisional connection feature. In some embodiments, the step of coupling the coping to the abutment via a second connection feature can include the step of fastening the coping to the abutment using a threaded fastener. The method can also include the step of determining a preliminary fit of the prosthesis with respect to the coping prior to the step of attaching the prosthesis to the coping. The method can also include the step of modifying the coping to alter the fit of the prosthesis with respect to the coping.

[0010] In some embodiments, a method of attaching and aligning a dental prosthesis to an abutment and coping in a patient's jaw can include the step of coupling the coping to the abutment via a provisional connection feature. The method can also include the step of bonding the prosthesis to the coping. The method can also include the step of modifying the alignment between the prosthesis and the coping while the prosthesis is being bonded to the coping. The method can also include the step of removing the prosthesis and coping from the abutment.

[0011] In some embodiments, the following features can be combined separately, or together with, the embodiment above. The method can also include the step of forming one or more blind holes in the prosthesis. In some embodiments, the step of bonding the prosthesis to the coping can include the step of bonding the coping within one or more blind holes in the prosthesis. The method can also include forming a hole through the prosthesis using a cutting tool. In some embodiments, the step of forming a hole through the prosthesis can include the step of attaching an alignment tool to the coping and using the alignment tool to align the cutting tool with respect to the prosthesis. The method can also include the step of coupling the coping to the abutment using

a threaded fastener. In some embodiments, the step of modifying the alignment between the prosthesis and coping includes the step of placing occlusal surfaces of the prosthesis in contact with occlusal surfaces of opposing dentition.

[0012] In certain embodiments, a system for coupling one or more dental components to a dental implant is provided. The system can include at least one dental component comprising a provisional connection feature. In some embodiments, the dental component can comprise an abutment configured to couple with the dental implant via the provisional connection feature. In some such embodiments, the abutment can comprise an abutment integrated with a coping. The provisional connection feature of the abutment can include one or more fingers and/or can include a spring. In some embodiments, the abutment and the implant can be configured to be coupled via a snap-fit and/or via a friction fit.

[0013] In various embodiments where the dental components include a coping and an abutment, the coping can be configured to couple with the abutment via the provisional connection feature, or the abutment can be configured to couple with the coping via the provisional connection feature. In some embodiments, the abutment can include a second connection feature. In some such embodiments, the abutment can be configured to be coupled to the implant via the second connection feature. In various embodiments, the provisional connection feature can comprise one or more fingers and/or can comprise a spring. In some embodiments, the coping and the abutment can be configured to be coupled via a snap-fit and/or via a friction fit. The coping can include an elongate member. In some such embodiments, the elongate member can include a plurality of protrusions and slots. The coping can also include a flange. In some such embodiments, the flange can include a plurality of grooves. In some embodiments, the system can further include a cutting tool.

[0014] In various embodiments the dental component can include an adapter configured to couple with the dental implant via the provisional connection feature. In various embodiments, the provisional connection feature can comprise one or more fingers and/or can comprise a spring. In some embodiments, the adapter and the implant can be configured to be coupled via a snap-fit and/or via a friction fit. On a side opposite the dental implant, the adapter can be configured to be coupled to one or more other dental components. For example, the one or more other dental components can include at least one of a prosthesis, an abutment, an impression post, or a healing cap. In some embodiments, the one or more dental component can include an angulated screw channel.

[0015] In certain embodiments, a method of creating a dental prosthesis configured to be coupled to a dental implant is provided. The method can include coupling one or more dental components to the implant. At least one dental component can have a provisional connection feature. The method can also include bonding the prosthesis to one or more dental components, decoupling the prosthesis and at least one dental component from the implant via the provisional connection feature, and forming a through-hole in both the at least one dental component and the prosthesis. The through-hole can be configured to receive a fastener configured to couple with the prosthesis and the at least one dental component to the dental implant. In various embodiments, forming the through-hole can include forming the through-hole using a cutting tool from a distal side of the at least one dental component. Forming the through-hole can further include forming the through-hole using the cutting tool or another cutting tool from an occlusal side of the prosthesis. In some embodiments, the method can further include coupling the at least one dental component and the prosthesis to the implant using the fastener inserted into the through-hole.

[0016] In various embodiments, the provisional connection feature can comprise a snap-fit connection feature and/or a friction fit connection feature. In some embodiments, the at least one dental component can comprise an abutment configured to couple with the implant via the provisional connection feature. In some such embodiments, the abutment can include an abutment integrated with a coping. In some embodiments where the dental components include a coping and an abutment, the coping can be configured to couple with the abutment via the provisional connection feature, or the abutment can be configured to couple with the coping via the provisional connection feature. In some embodiments, the abutment can include a second connection feature. In some such embodiments, the abutment can be configured to be coupled to the implant via the second connection feature.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The foregoing and other features of the present disclosure will become more fully apparent from the following description and appended claims, taken in conjunction with the accompanying drawings. Understanding that these drawings depict only several embodiments in accordance with the disclosure and are not to be considered limiting of its scope, the disclosure will be described with additional specificity and detail through the use of the accompanying drawings.

[0018] FIG. **1** illustrates a schematic view of embodiments of an anchoring unit, a coping, and a prosthesis of a prosthetic system.

[0019] FIG. **2** illustrates a schematic view of embodiments of a cutting tool, alignment tool, coping, and prosthesis of the system of FIG. **1**.

[0020] FIG. **3** illustrates a flow diagram of a first method of attaching a provisional prosthetic system.

[0021] FIG. **4** illustrates a flow diagram of a second method of attaching a provisional prosthetic system.

[0022] FIG. **5** illustrates a front elevation view of another embodiment of a prosthesis of a prosthetic system.

[0023] FIG. **6** illustrates a side elevation view of an embodiment of an implant and abutment of a prosthetic system.

[0024] FIG. **7**A illustrates a cross-sectional view of an embodiment of a coping of a prosthetic system.

[0025] FIG. **7**B illustrates a top view of an embodiment of a spring element.

[0026] FIG. **7**C illustrates a top view of another embodiment of a spring element.

[0027] FIG. **8** illustrates a cross-sectional view of the prosthesis of FIG. **5**, the abutment of FIG. **6**, and the coping of FIG. **7**.

[0028] FIG. **9** illustrates a cross-sectional view of the apparatus of FIG. **8** with a bonding agent.

[0029] FIG. **10** illustrates a cross-sectional view of embodiments of an alignment tool and a cutting tool attached to the prosthesis of FIG. **5** and the coping of FIG. **7**.

[0030] FIG. **11** illustrates a cross-sectional view of the apparatus of FIG. **10** in a second configuration.

[0031] FIG. **12** illustrates a cross-sectional view of the apparatus of FIG. **9** attached with a fastener.

[0032] FIG. **13** illustrates a side elevation view of another embodiment of an abutment and of a coping.

[0033] FIG. **14** illustrates a perspective view of another embodiment of an abutment.

[0034] FIG. **15** illustrates a side elevation view of the abutment of FIG. **14**.

[0035] FIG. **16** illustrates a perspective view of another embodiment of an abutment.

[0036] FIG. **17** illustrates a cross-sectional view of the abutment of FIG. **16**.

[0037] FIG. **18** illustrates a perspective view of another embodiment of a coping.

[0038] FIG. **19** illustrates a cross-sectional view of the abutment of FIG. **18**.

[0039] FIG. **20** illustrates a cross-sectional view of the abutment of FIG. **16** and the coping of FIG. **18** attached together.

[0040] FIG. **21** illustrates a side elevation view of an embodiment of a two-piece coping.

[0041] FIG. **22** illustrates a cross-sectional view of the two-piece coping of FIG. **21**.

[0042] FIG. **23** illustrates a cross-sectional view of the two-piece coping of FIG. **21** attached to an embodiment of an abutment and connecting screw.

[0043] FIG. **24** illustrates a side elevation view of another embodiment of a two-piece coping.

[0044] FIG. **25** illustrates a cross-sectional view of the two-piece coping of FIG. **24**.

[0045] FIG. **26** illustrates a cross-sectional view of the two-piece coping of FIG. **24** attached to an embodiment of an abutment and connecting screw

[0046] FIG. **27**A illustrates a perspective view of another embodiment of an abutment.

[0047] FIG. **27**B illustrates a cross-sectional view of the abutment of FIG. **27**A.

[0048] FIGS. **27**C-**27**E illustrate perspective views of other embodiments of an abutment.

[0049] FIG. **28**A illustrates a perspective view of another embodiment of an abutment.

[0050] FIG. **28**B illustrates a cross-sectional view of the abutment of FIG. **28**A.

[0051] FIG. **29**A illustrates a perspective view of another embodiment of an abutment.

[0052] FIG. **29**B illustrates a cross-sectional view of the abutment of FIG. **29**A.

[0053] FIG. **30**A illustrates a perspective view of another embodiment of a coping.

[0054] FIG. **30**B illustrates a cross-sectional view of the coping of FIG. **30**A.

[0055] FIG. **31** illustrates a perspective view of an example abutment configured to mate with the coping of FIGS. **30**A and **30**B.

[0056] FIG. **32**A-**32**D illustrate an example embodiment of a method of coupling a provisional prosthetic system.

[0057] FIG. **33**A illustrates a perspective view of an embodiment of an adapter.

[0058] FIG. **33**B illustrates a perspective view of another embodiment of an adapter.

[0059] FIGS. **34-36** illustrate example components that can be coupled to an adapter.

DETAILED DESCRIPTION

[0060] Embodiments of a prosthetic system and method will now be described with reference to the accompanying figures, wherein like numerals refer to like or similar elements throughout. Although several embodiments, examples and illustrations are disclosed below, it will be understood by those of ordinary skill in the art that the inventions described herein extends beyond the specifically disclosed embodiments, examples and illustrations, and can include other uses of the inventions and obvious modifications and equivalents thereof. The terminology used in the description presented herein is not intended to be interpreted in any limited or restrictive manner simply because it is being used in conjunction with a detailed description of certain specific embodiments of the inventions. In addition, embodiments of the inventions can comprise several novel features and no single feature is solely responsible for its desirable attributes or is essential to practicing the inventions herein described.

[0061] Certain terminology may be used in the following description for the purpose of reference only, and thus are not intended to be limiting. For example, terms such as "above" and "below" refer to directions in the drawings to which reference is made. Terms such as "proximal," "distal," "front," "back," "rear," and "side" describe the orientation and/or location of portions of the components or elements within a consistent but arbitrary frame of reference which is made clear by reference to the text and the associated drawings describing the components or elements under discussion. Such terminology may include the words specifically mentioned above, derivatives thereof, and words of similar import.

[0062] As used herein, the term "proximal" refers to the parts of the device and system which are located closer to the operator of the device and system (e.g., clinician) and generally would refer to parts of the device and system located further from the implantation location of the device and system. The term "distal" refers to the parts of the device and system which are located further from the operator of the device and system (e.g., clinician) and generally would refer to parts of the device and system located closer to the implantation location of the device and system.

[0063] As will be described, certain embodiments relate to a maxillofacial prosthesis system and methods of using the system. More specifically, one embodiment is directed to a provisional dental prosthetic system and methods of attaching a provisional dental prosthetic system to a patient. The present systems and methods can be used, for example, within days after dental implants have been affixed into a patient's jaw and before a permanent prosthetic solution has been fabricated and installed. In some instances, the present systems and methods can be used immediately after dental implants have been affixed to the patient's jaw. Accordingly, the patient can be provided with an attachable prosthesis during the healing period and prior to full osseointegration of the implant.

[0064] However, it should be appreciated that while, in some instances, the figures and description herein refer to a provisional dental prosthesis in the form of a full bridge for placement along the maxillary and/or mandibular arches, in

modified embodiments, the prosthesis can be any type of prosthesis including, but not limited to, partial bridges and crowns. It should also be appreciated that while, in some instances, the figures and description herein refer to a provisional dental prosthesis in the form of a single tooth crown, in modified embodiments, the prosthesis can be any type of prosthesis including, but not limited to, partial and full bridges. In other words, various features described herein can be used for either single tooth or multi-tooth restorations. In addition, while in some examples, various features are described and shown associated with an illustrated dental component (e.g., a coping), in modified embodiments, those features can be associated with any type of dental component (e.g., an abutment, an implant, etc.). Furthermore, it should be appreciated that the systems and methods described herein are at times described as being provisional in nature, such systems and methods can also be applied to the fabrication and attachment of permanent prosthetic solutions.

Provisional Dental Prosthesis and Attachment System

[0065] With reference now to FIG. **1**, an embodiment of a dental prosthesis and attachment system **100** is schematically illustrated. The system **100** can include an anchoring unit **102** for coupling to a patient's bone **10**, as well as a coping **130**, and a prosthesis **140**. As will be explained below, the coping **130** can be coupled to the anchoring unit **102** and the prosthesis **140** can be coupled to the coping **130**. In some embodiments, the anchoring unit **102** can include a bone implant **110**, such as a dental implant, and an abutment **120**, such as a multi-unit abutment. In the illustrated arrangement, the abutment **120** can be removably coupled to the bone implant **110** via a coupling screw **16**. In some embodiments, the implant **110** and the abutment **120** can form an integral unit. Furthermore, it should be understood that certain components of the anchoring unit **102** can be omitted. For example, in some embodiments, the abutment **120** can be omitted from the anchoring unit **102** such that the coping **130** is instead directly attached to the implant **110**. As another example, in some embodiments, the coping **130** and abutment **120** can form an integral unit such that the combined coping **130**/abutment **120** is directly attached to the implant **110**. In some such instances, the combined coping **130**/abutment **120** can sometimes be referred to simply as the coping **130** or simply as the abutment **120**. In other arrangements, the coupling screw **16** can be omitted and the abutment **120** can include a threaded end that is inserted into the implant **110**

[0066] As will be described in further detail below, certain of the connection features used to attach the various components together can be designed to facilitate removal of the components from each other. In some embodiments, the connection features form "snap-fit" connections which include, but is not limited to springs, clips, resilient dimples or bosses, can be used to facilitate coupling and then removal of components from each other. For example, the coping **130** can be coupled to the abutment **120** using a "snap-fit" connection. Accordingly, in some embodiments, the coping **130** can be initially coupled to the abutment **120** by a "snap-fit" and then removed from the abutment **120** by applying a separation force in a direction away from the abutment **120** that exceeds the snap-fit. As another example, the coping **130**, the abutment **120**, or the combined coping **130**/abutment **120** can be coupled directly to the implant **110** using a "snap-fit" connection. Accordingly, in some embodiments, the coping **130**, the abutment **120**, or the combined coping **130**/abutment **120** can be initially coupled to the implant **110** by a "snap-fit" and then removed from the implant **110** by applying a separation force in a direction away from the implant that exceeds the "snap-fit."

[0067] However, in other embodiments, other types of provisional connection features can also be used, for example, including a retention collar or other feature which can be tightened to create a friction fit between the components, adhesives between the two components, and the like. In some embodiments, a portion of a dental component can press against a surface of another dental component creating a friction fit or interference fit. In some such embodiments, a distal portion of a first dental component can create a friction fit with a proximal portion of a second dental component. The first dental component can include a coping **130** and the second dental component can include an abutment **120**. As another example, the first and second dental components can include two portions of a multi-unit abutment. As yet another example, the first dental component can include a coping **130**, an abutment **120**, or a combined coping **130**/abutment **120** and the second dental component can include an implant **110**. In some instances, the distal portion of the first dental component can include a portion of an exterior surface, and the proximal portion of the second dental component can include an interior surface (e.g., an inner wall of a recess, bore, or cavity). In some other instances, the distal portion of the first dental component can include a portion of an interior surface (e.g., an inner wall of recess, bore, or cavity), and the proximal portion of the second dental component can include an exterior surface. In some embodiments, a friction fit or an adhesive can provide a sufficient initial holding force such that the two components retain their positioning and orientation upon application of a force below a threshold value but are removable once a threshold, separating force has been applied to the two components. Generally, the threshold force required to overcome the provisional connection feature and detach the components should be chosen such that injury to the patient's bone is avoided. This is particularly important in cases of provisional prosthetic systems in which the prosthetic system is being attached immediately or shortly after surgical implantation of the implants **110**.

[0068] With continued reference to FIG. **1**, as noted above, the system **100** can include one or more implants **110** (e.g., a dental implant) for affixing into a patient's bone **10**. In some embodiments, the implant **110** can have a monolithic structure with a distal end **112** designed to be placed within and osseointegrated with a patient's jaw and a proximal end **114** designed to allow attachment of another dental component such as the abutment **120** (or the coping **130** or the combined coping **130**/abutment **120**). In some embodiments, the one or more implants **110** can be placed at multiple implantation locations within the patient's jaw based on factors such as the nature of the permanent prosthesis to be fitted to the patient upon complete osseointegration of the implants **110** as well as the patient's bone structure. In some embodiments, a single implant **110** can be used when the patient is being fitted with a crown (i.e., a prosthesis having a single tooth). In other embodiments, two or more implants **110** can be used when the patient is being fitted with a partial or full bridge (i.e., a prosthesis having multiple teeth). For example, in some surgical procedures,

four implants **110** can be used for attaching a full bridge dental prosthesis. Such a technique can be used, for example, as part of Nobel Biocare's All-On-4® surgical procedure. Of course, it should be understood that in some surgical procedures, it may be deemed by the clinician that no anchoring units **102** are needed and thus the implants **110** can be omitted entirely from the system **100**. Such may be the case, for example, when the patient's existing teeth are deemed sufficient to retain the prosthesis.

[0069] For affixing the implant **110** to bone **10**, the implant **110** can include threading or similar features along at least a portion of the exterior surface. In some embodiments, the implant **110** can include threading at least partially along the exterior surface adjacent the bone **10** when the implant **110** is placed within the implantation location. For example, threading can be included at least partially along exterior surfaces proximate the distal end **112** of the implant **110**. Of course, it should be understood that threading or similar features can extend towards the proximal end **114** of the implant **110** or be located primarily at the proximal end **114**.

[0070] For attachment to other dental components, such as abutment **120** (or coping **130** or combined coping **130**/abutment **120**), the implant **110** can include one or more connection features designed to interact with a corresponding connection feature on the other dental component. In some embodiments, the implant **110** can include one or more internal connection elements such as bores or cavities sized and shaped to at least partially receive a portion of the abutment **120** and/or fasteners. For example, as shown in the illustrated embodiment, the implant **110** can include a threaded bore **116** into which a threaded screw, such as coupling screw **16**, can be attached. In addition, the implant **110** can include an alignment feature **115** which can comprise internal lobes or an internal hex which correspond to external lobes or an external hex on an abutment **120**. The bore **116** of the implant **110** can also include additional elements e.g., a tapered connection portion or less elements. In other embodiments, the implant **110** can include external features (e.g., such as external lobes or an external hex) that can be received within a corresponding recess within the abutment **120**. In some embodiments, the alignment feature **115** can be located at or proximate the proximal end **114** of the implant **110**. The alignment feature **115** can have an aperture located along a proximal surface of the implant **110** for allowing entry of the dental component into the alignment feature **115** and the threaded bore **116**.

[0071] In some embodiments, the implant **110** can include additional features for facilitating and enhancing the connection between the implant **110** and the dental component. For example, the implant **110** can include grooves, dimples, roughening, or the like to enhance the connection with the dental component. As another example, the implant **110** can include other keyed features for ensuring that the dental component cannot rotate with respect to the implant **110**. Such keyed components can include providing the bore with a specific cross-sectional shape or by adding slots, channels, protrusions or other structure which allow insertion of a dental component in a select number of orientations. Furthermore, the implant **110** can include other connection features to positively engage the dental component and reduce the likelihood that the component becomes inadvertently detached from the implant **110**. For example, the implant **110** can include a "snap-fit" connector for positively engaging a corresponding "snap-fit" connector of the dental component. Such features can be located, for example, on the interior surfaces, exterior surfaces, or both of the implant **110**.

[0072] With continued reference to FIG. **1**, as noted above, the system **100** can include one or more abutments **120** for attachment to one or more other dental components. For example, the abutment **120** can be a multi-unit abutment that is coupled to the implant **110** with a coupling screw **16** that passes through an internal bore **125** and engages threading on the threaded bore **116** of the implant **110**. In some embodiments, the abutment **120** can have a monolithic structure with a distal end **122** designed to be inserted into the implant **110** and a proximal end **124** designed to allow attachment to another dental component, such as the coping **130**. Of course, it should be appreciated that the abutment **120** can also be formed from two or more sub-components. For example, the abutment **120** can have a distal sub-component forming the distal end **122** for attachment to the implant **110** and a proximal sub-component forming the proximal end **124** for attachment to another dental component. The proximal and distal sub-components can be attached together to form the abutment **120**.

[0073] For attachment to a dental component, such as implant **110**, the abutment **120** can include one or more corresponding connection features to attach to the implant **110** and reduce the likelihood of inadvertent removal. As described above, in some embodiments, the abutment **120** can be attached to the implant **110** using a coupling screw **16**. In some embodiments, the abutment **120** can include threading at least partially along an exterior surface of the distal end **122** such that the abutment **120** can engage corresponding threading of the implant **110**. In some embodiments, the abutment **120** can include resiliently deformable members which are received into a corresponding connection feature in the implant **110** which can advantageously provide a "snap-fit" and/or friction fit connection. Other types of connection features, such as a bayonet mounting structure, can also be used. It should be understood that such connection features can also be included along interior surfaces of the abutment **120** if the abutment **120** has a bore or cavity.

[0074] To facilitate alignment of the abutment **120** with respect to the implant **110**, the abutment **120** can include keyed features which correspond to keyed features of the implant **110**. For example, at least a portion of the abutment **120** can have a non-circular cross-section which corresponds to a non-circular cross-section of the bore of the implant **110**. For example, the abutment **120** can include an alignment feature **121** which corresponds with the alignment feature **115** of the implant **110**. For example, the alignment feature **115** can have a plurality of external lobes or an external hex-shape. In some embodiments, the abutment **120** can include slots, grooves, or other protrusions which align with corresponding slots, grooves, or protrusions on the implant **110** to ensure proper alignment prior to fastening.

[0075] For attachment to other dental components, such as coping **130** and/or to a dental component such as, for example, a dental restoration or dental restoration component such as, for example, a multi-unit bridge and/or restoration, in some embodiments the abutment **120** can include one or more provisional connection features **126** designed to interact with a corresponding provisional connection feature on the other dental component. For example, in some embodiments, the abutment **120** can include a slot or pro-

trusion positioned along an exterior surface configured to engage a corresponding protrusion or slot on the other dental component. Accordingly, the provisional connection feature **126** can be positioned at or proximate the proximal end **124** of the abutment **120**. As discussed above, in one embodiment, the provisional connection feature **126** can be designed to allow for a "snap-fit" and or a friction fit connection between the abutment **120** and the other dental component such as the coping **130** thereby advantageously allowing the abutment **120** and the other dental component (e.g., coping **130**) to be easily removed via application of a separation force. As will be made apparent through the course of this disclosure, the ability to easily remove the dental component from the abutment **120** can facilitate preparation of the provisional prosthesis system **100** for final installation to the patient's jaw.

[0076] It should be appreciated that, in some embodiments, the provisional connection feature **126** can be included on an interior surface of the abutment **120**. For example, the provisional connection feature **126** can be located either entirely or partially along an interior surface of a bore, such as bore **125**, of the abutment **120**. Moreover, in some embodiments, the provisional connection feature **126** can be an adhesive component disposed on the component **120**. Such adhesive can be chosen to sever upon application of a threshold separation force.

[0077] In some embodiments, the abutment **120** can include connection features designed to interact with a corresponding connection feature on the other dental component, such as coping **130**. As shown in the illustrated embodiment, the connection feature can be an internally threaded bore **128**. The internally threaded bore **128** can engage a prosthesis screw used to couple the coping **130** to the abutment **120**. In some embodiments, the internally threaded bore **128** can be located at or proximate the proximal end **124** of the abutment **120**. The bore can have an aperture located along a proximal surface of the first abutment **120** for allowing entry of the dental component, a separate fastener, or both into the bore **128**. Although the bore **128** is illustrated as having a greater diameter than that bore **125**, it should be understood that the bore **128** can have the same diameter as bore **125**. Moreover, while the bore **128** is illustrated as being coaxial with bore **125**, it should be understood that the two bores **125**, **128** can be non-coaxial. In some embodiments, the connection feature can be located along an exterior surface of the abutment **120**. However, it should be understood that connection feature can be omitted. For example, in some embodiments, a prosthetic screw used to couple the coping **130** to the abutment **120** can engage internal threading on the coupling screw **16** itself if such internal threading is provided.

[0078] With continued reference to FIG. **1**, the system **100** can include one or more copings **130** for attachment to one or more dental components. In some embodiments, the coping **130** can have a monolithic structure with a distal end **132** designed to be attached to a dental component, such as abutment **120** or implant **110**, and a proximal end **134** designed to allow attachment of another dental component such as the provisional prosthesis **140**.

[0079] For attachment to a dental component, such as abutment **120**, the coping **130** can include one or more connection features designed to interact with a corresponding connection feature, such as provisional connection feature **126**, on the abutment **120**. In some embodiments, the coping **130** can include a cavity **136** or bore sized and shaped to at least partially receive a portion of the abutment **120** which includes a connection feature along an interior surface to engage provisional connection feature **126**. In some embodiments, the cavity **136** can be located at or proximate the distal end **132** of the coping **130** and can have an aperture located along a distal surface of the coping **130** for allowing entry of the dental component into the cavity **136**.

[0080] The connection feature can include an annular protrusion or annular slot positioned along interior surfaces, such as an interior surface of cavity **136**, configured to engage a corresponding feature, such as provisional connection feature **126**, on the abutment **120**. Accordingly, in some embodiments, both the coping **130** and the abutment **120** can be retained using a "snap-fit" and/or friction fit connection. This can advantageously allow the coping **130** and the abutment **120** to be easily removed. Other types of connection features, such as a bayonet mounting structure, can also be used. Moreover, in some embodiments, the connection feature can be an adhesive component disposed on the coping **130**. Such adhesive can be chosen to sever upon application of a threshold separation force. It should be appreciated that connection features can also be included along exterior surfaces of the coping **130**.

[0081] In some embodiments, the coping **130** can include features for facilitating and enhancing the connection between the coping **130** and the abutment **120**. For example, to facilitate alignment of the coping **130** with respect to the abutment **120**, the coping **130** can include keyed features which correspond to keyed features of the abutment **120**. For example, at least a portion of the cavity **136** of the coping **130** can have a non-circular cross-section which corresponds to a non-circular cross-section of the abutment **120**. In some embodiments, the coping **130** can include slots, grooves, or other protrusions which align with corresponding slots, grooves, or protrusions on the abutment **120**. Such features can be located, for example, on the interior surfaces, exterior surfaces, or both of the coping **130**. For example, such features can be located along an inner surface of the cavity **136**.

[0082] In some embodiments, the coping **130** can include additional connection features to reduce the likelihood of inadvertent detachment of the coping **130** from the abutment **120**. For example, in some embodiments, the coping **130** and the abutment **120** can be attached using a separate fastener such as a prosthetic screw **138**. The prosthetic screw **138** can pass through a bore **139** of the coping **130** and positively engage a connection feature of the abutment **120**, such as threaded bore **128**, or of the coupling screw **16** thereby securely attaching the coping **130** to the abutment **120**. This can advantageously further reduce the likelihood of inadvertent detachment of the coping **130** from the abutment. It should be noted that, in some embodiments, the bore **139** is not preliminarily included on the coping **130** but can be formed at a later time.

[0083] For attachment to other dental components, the coping **130** can include corresponding connection features to attach to other dental components and reduce the likelihood of inadvertent removal. In some embodiments, the coping **130** can include ridges, protrusions or other features for positively engaging corresponding features on the other dental component.

[0084] With continued reference to FIG. **1**, the system **100** can include one or more provisional prostheses **140** for attachment to a dental component. In some embodiments, the provisional prosthesis **140** can have a monolithic structure with a distal end **142** designed to be attached to a dental component, such as the coping **130** (or a combined coping **130**/abutment **120** or abutment **120**), and a proximal end **134** designed to contact opposing dentition.

[0085] For attachment to the coping **130**, the provisional prosthesis **140** can include one or more connection features designed to interact with a corresponding connection feature on the coping **130**. In some embodiments, the provisional prosthesis **140** can include a cavity **146** or bore sized and shaped to at least partially receive a portion of the coping **130**. In some embodiments, the cavity **146** can be located at or proximate the distal end **142** of the provisional prosthesis **140**. The cavity **146** can have an aperture located along a distal surface of the provisional prosthesis **140** for allowing entry of the coping **130** into the bore. In some embodiments, the cavity **146** can include a connection feature for facilitating and enhancing the connection between the provisional prosthesis **140** and the coping **130**. For example, the bore can include a bonding agent **148** which can be used to bond the provisional prosthesis **140** to the coping **130**. Such bonding agents **148** can include self-curing, light-curing or other bonding agents which can convert from a relatively low viscosity fluid to a high viscosity fluid or solid. In some embodiments, the bore can be backfilled with an acrylic, such as a self-curing acrylic or a light cured composite. This acrylic can be the same material used in forming the prosthesis. Other types of connection features can also be used including separate fasteners, such as threaded screws or bolts, resiliently deformable members for creating a "snap-fit" or friction fit between the two components, and threading, such as threading along the internal surfaces, of the provisional prosthesis **140**.

[0086] With reference now to FIG. **2**, a cutting system **150** is illustrated which can include a cutting tool **160** and an alignment tool **170**. The cutting system **150** can form part of the provisional prosthetic system **100**. As shown in the illustrated embodiment, the alignment tool **170** can be attached to the coping **130**. However, in some embodiments, the alignment tool **170** might not be used.

[0087] The cutting tool **160** can be an elongate member having cutting surfaces located along the outer surfaces of the tool **160**. In some embodiments, the cutting tool **160** can have a pointed tip **162** to facilitate cutting in a longitudinal direction when the cutting tool **160** is moved along a longitudinal axis of the tool **160**. Accordingly, in some embodiments, the cutting tool **160** can be a drill bit having a circular cross-section. The cutting tool **160** can advantageously be used to create a bore through dental components of the provisional prosthetic system **100** such as the coping **130** and the provisional prosthesis **140**.

[0088] In some embodiments, an alignment tool **170** can be provided for facilitating the creation of a bore through the dental components. Accordingly, the alignment tool **170** can include an alignment feature **172**, such as an alignment bore, through which the cutting tool **160** can pass. In some embodiments, the alignment bore can have a cross-sectional area that is slightly greater than that of the cutting tool **160**. This can advantageously allow the cutting tool **160** to pass through the bore without contacting the sides of the bore. Of course, the bore can have a cross-sectional area that is about equal to the cross-sectional area of the cutting tool **160**. This can advantageously reduce the amount of play between the cutting tool **160** and the alignment tool **170** thereby enhancing the alignment function of the cutting tool **160**. It should be understood that the bore need not have a constant cross-sectional area. In some embodiments, only portions of the bore can be used for alignment of the cutting tool **160**. Furthermore, the bore can include additional features for facilitating use of the alignment tool **170** such as tapering along the entry of the alignment bore to facilitate insertion of the cutting tool **160** into the alignment bore.

[0089] Furthermore, it should be understood that the bore can be oriented and positioned at various locations within the alignment tool **170** depending on the specific alignment required. For example, in some embodiments, the alignment tool can be used for creating a bore (not shown) through the coping **130** and the provisional prosthesis **140** which is aligned, or at least provides access to, a connection feature, such as threaded bore **128**, of the component **120**. In some embodiments, after the bore through the prosthesis **140** is created from the coping **130** side (e.g., from the distal side of the coping **130**), the cutting tool **160** or another cutting tool (e.g., a cutting tool with a larger diameter than the diameter of cutting tool **160**) can also reinforce and/or enlargen the bore by entering from the prosthesis **140** side (e.g., from the proximal or occlusal side of the prosthesis **140**). The bore through the coping **130** and prosthesis **140** can subsequently be used to allow a fastener, such as a threaded screw or bolt, to pass therethrough and engage a connection feature of the abutment **120** or implant **110**.

[0090] In some embodiments, the alignment tool **170** can be designed to be attached to the coping **130** and the provisional prosthesis **140**. Accordingly, the alignment tool **170** can include a connection feature **174** designed to interact with a corresponding connection feature on the other dental component. For example, in some embodiments, the alignment tool **170** can include an annular slot or annular protrusion positioned along an exterior surface configured to engage a corresponding feature on the other dental component. In some embodiments, the connection feature **176** can be similar to provisional connection feature **126** of the abutment **120**. The connection feature **176** can be designed to allow for a "snap-fit" and/or friction fit connection between the alignment tool **170** and the coping **130**. This can advantageously allow the alignment tool **170** and the other dental component to be easily removed after the cutting operation has been completed. It should be appreciated that connection feature **176** can be any type of connection feature as herein described and can be included on exterior surfaces, interior surfaces, or both of the alignment tool **170**.

[0091] The components of the system **100** can be manufactured from a variety of different materials such as, but not limited to, metals including titanium, cobalt chromium alloy, shape-memory alloys, polymers including acrylics, ceramics including zirconia, composite materials, and/or any other material as desired. For example, in some embodiments, the system **100** can include a cage constructed of a material which can have different characteristics when subject to heat. For example, the material can have a relatively rigid structure at ambient temperatures whereas the material can have a flexible or relaxed structure when subject to slightly elevated temperatures. While at ambient temperature, the cage can be used to couple two separate components together. For example, the cage can be placed inside the

coping **130** to couple with the provisional connection feature **126** of the abutment **120**. To remove the coping from the abutment, the cage can be heated such that the cage has a relatively relaxed structure thereby facilitating decoupling of the coping from the abutment.

Methods of Attaching a Provisional Dental Prosthesis System

[0092] FIG. **3** illustrates a flowchart describing steps of a method **300** for attaching a provisional dental prosthetic system such as the provisional dental prosthetic system **100**. For purposes of clarity, the steps are described as being performed by a clinician; however, it should be understood that some or all of the steps of this procedure can be performed by others such as, but not limited to, the clinician's assistants and other third-parties. Moreover, some or all of the steps described herein can be performed either in situ (i.e., in the patient's mouth) or ex situ. For example, some or all of the steps described herein can be performed on a molding of the patient's teeth.

[0093] As shown in step **302**, a clinician can affix attachment mechanisms to the patient's jaw for allowing the installation of additional dental components. Accordingly, during this step, the clinician can affix one or more anchoring units, such as anchoring unit **102**, to the patient's jaw. The clinician can also affix any additional dental components including a coping, such as the coping **130**, during this step. Depending on the nature of the procedure such as the patient's condition, the remainder of the method **300** can either be performed immediately after or shortly after this step.

[0094] As shown in step **304**, the clinician can then prepare a prosthesis, such as provisional prosthesis **140**, for attachment to the anchoring unit and the coping. In some procedures, the prosthesis can be prepared chairside. That is, the clinician and/or the clinician's assistants can prepare the prosthesis during the course of the operation. For example, the clinician and/or the clinician's assistants can take the patient's existing prosthesis, such as a removable partial or full denture, and create one or more blind holes opposite the occlusal surfaces of the prosthesis. These blind holes can be aligned such that the prosthesis would generally be properly oriented within the patient's mouth upon completion of the method **300**. Furthermore, the blind holes can be formed with a cross-sectional area slightly greater than the cross-sectional area of the coping and/or anchoring unit to permit some degree of play between the blind hole and the coping and/or anchoring unit. Use of an existing prosthesis can advantageously reduce overall complexity and costs of the procedure as modification of an existing prosthesis can be performed within a short span of time. In some instances, this procedure can be performed during a single sitting.

[0095] Of course, in some procedures, a new prosthesis can be fabricated in lieu of using the existing prosthesis. In some procedures, the new prosthesis can be prepared with the one or more blind holes already incorporated into the prosthesis. This method can be employed advantageously in situations where the clinician already knows the general placement and orientation of the implants. For example, the new prosthesis can be fabricated in advance of the operation based upon the clinician's planned placement of the implants. Accordingly, the prosthesis can be fabricated prior to the operation thereby allowing the prosthesis to be advantageously attached during a single sitting. In some embodiments, the new prosthesis can be fabricated after the implants have already been affixed to the patient's jaw such that the clinician can better judge the placement of the implants. In other procedures, the new prosthesis can be prepared without blind holes so that the clinician can create such holes as the clinician deems necessary. It should be understood that, while reference is made to the creation of blind holes in the prosthesis, other types of holes such as through-holes can also be included on the prosthesis.

[0096] As shown in step **306**, the clinician can test the prosthesis for preliminary fit by seating the prosthesis on the anchoring unit, the coping, or a combination of both. During this step, the clinician can place the prosthesis over the anchoring units and copings such that at least the copings are received within one or more blind holes of the prosthesis. Upon placement of the prosthesis over the anchoring units and copings, the clinician can check to see whether the prosthesis is generally aligned with respect to the patient's jaw and opposing dentition. For example, the clinician can determine whether the occlusal surfaces are generally aligned and whether the patient's nose, lips and chin are generally aligned.

[0097] The clinician can also determine whether the vertical dimension of occlusion (VDO) and/or vertical dimension at rest (VDR) is properly chosen. The VDO indicates the superior-inferior relationship between the maxilla and mandible when the teeth are in maximum intercuspation. Accordingly, particularly for patients who are fully and/or partially edentulous and thus lack the teeth to position in maximum intercuspation, the clinician can perform one or more tests to determine a proper VDO and/or VDR. For example, the clinician can view the overall appearance of the patient when the prosthesis is seated on the coping to determine whether the patient's nose, lips and chin appear to be in an ordinary configuration of the average person. The clinician can also determine a proper VDO and/or VDR by listening to the patient's pronunciation of certain words. The clinician can take any number of steps to ensure that a proper VDO and/or VDR will be established upon the prosthesis being seated on the copings. For example, to increase the distance between the prosthesis and the coping, the clinician can add pads to either the coping and/or the prosthesis. To decrease the distance between the prosthesis and the coping, the clinician can trim down the top most portion of the coping and/or drill a longer blind hole through the prosthesis.

[0098] The clinician can check to see whether only minor adjustments would be needed to place the prosthesis in proper alignment and achieve a proper VDO and/or VDR. Preferably, the adjustments should be sufficiently aligned such that any remaining adjustments made during the attachment step **310** can take place by placing the patient's teeth in a centric occlusion to mate the occlusal surfaces of the prosthesis to the opposing dentition.

[0099] Should the clinician determine that the prosthesis is not generally aligned, due to the location and/or orientation of the anchoring units, the clinician can remove the prosthesis and modify the anchoring units accordingly as illustrated in step **308**. For example, if the anchoring unit is positioned too high with respect to the jaw, the clinician can reduce the overall height of the anchoring unit by removing portions of the anchoring unit (e.g., by reducing the height of the coping **130**), such as the proximal end. If the inverse is true and the anchoring unit is positioned too low with

respect to the jaw, the clinician can also increase the overall height of the anchoring unit by adding portions to the anchoring unit or by modifying other portions of the anchoring unit. If the anchoring unit is positioned at an incorrect angle, the clinician can modify the angling of the anchoring unit. It should be understood that any modifications can be made to the anchoring unit in order to achieve a satisfactory fit between the prosthesis and the anchoring unit. Furthermore, it should also be understood that, as an alternative procedure, the clinician can also modify the size, position and/or angle of the blind holes in the prosthesis to achieve a generally aligned fit. Upon making appropriate modifications to the anchoring units and/or prosthesis, the clinician can proceed back to step **306** to test the fit of the prosthesis with the modified anchoring units. The clinician can repeat steps **306** and **308** until a generally aligned fit is achieved.

[0100] As shown in step **310**, after the clinician has determined that a satisfactory preliminary fit has been achieved, the clinician can attach the prosthesis to the coping using any of the connection features as herein discussed. Preferably, the clinician attaches the prosthesis to the coping such that the prosthesis and coping are aligned and oriented properly with respect to the opposing dentition.

[0101] For example, in some procedures, the clinician can apply a bonding agent, such as self-curing, light-curing, or other polymeric material, to the prosthesis. In some procedures, the clinician can backfill holes formed in the prosthesis with an acrylic, such as a self-curing acrylic or a light cured composite. In some procedures, the clinician can remove the prosthesis from the anchoring units and introduce the bonding agent to the blind holes and/or backfill the blind holes with an acrylic and reseat the prosthesis on the copings after the bonding agent and/or acrylic has been applied. During the bonding process, the patient's teeth can be placed in a centric occlusion to mate the occlusal surfaces of the prosthesis to the opposing dentition. Since the bonding agent and/or acrylic can have a low viscosity prior to curing and because the copings can have some degree of play within the blind holes, the orientation of the prosthesis with respect to the coping can be further modified or altered during this step. The prosthesis and coping can then be fully cured, either via passage of time or introduction of a catalyst, such as light, to the bonding agent and/or acrylic such that the prosthesis and coping are attached in the modified or altered orientation.

[0102] Accordingly, upon curing of the bonding agent and/or acrylic, the prosthesis and coping can be placed such that the provisional prosthesis is in a more proper relationship with the opposing dentition as compared with the preliminary fit. This can significantly enhance comfort and fit of the provisional prosthesis. Moreover, this considerably reduces the amount of guesswork being performed by the clinician who would normally be tasked with estimating the proper orientation and alignment of the prosthesis. In edentulous cases, this can be particularly advantageous as it further allows the clinician to establish the proper jaw relationship with the opposing dentition. It should be understood that other relationships between the prosthesis and opposing dentition can be chosen. For example, the patient can instead close into maximum intercuspation so that the provisional prosthesis is properly aligned in this orientation.

[0103] In some procedures, other connection features can be used to attach the prosthesis to the coping. For example, the provisional prosthesis can be attached to the coping via a fastener, a "snap-fit," a friction fit, a collar, or other connection features.

[0104] As shown in step **312**, the clinician can remove the prosthesis from the patient's jaw after the bonding agent and/or acrylic has sufficiently cured such that the prosthesis is attached to at least the coping. Since the coping is attached to the prosthesis via the cured bonding agent and/or acrylic and because the coping can be attached to the anchoring unit using a "snap-fit," a friction fit, or other similar provisional connection feature, removal of the prosthesis can result in the copings being detached from the anchoring unit. During this process, the anchoring units can remain attached to the prosthesis in an aligned configuration. Accordingly, it should be appreciated that the threshold separation force to overcome the "snap-fit," friction fit, or other provisional connection feature can be chosen such that little to no misalignment between the prosthesis and coping is caused when removing the prosthesis and coping from the anchoring unit.

[0105] As shown in step **314**, the clinician can then use a cutting tool to create a through hole into the prosthesis and coping. In some procedures, the clinician can align the through hole such that the through hole provides access to a connection feature on the abutment. As shown in step **316**, in order to more securely fasten the prosthesis to the anchoring unit, a clinician can use a fastener (e.g., prosthetic screw) to fasten the prosthesis and coping to the anchoring unit. During this step, the clinician can insert a separate fastener, such as a screw or bolt, into the recently created through-hole. The separate fastener can positively engage a connection feature of the anchoring unit, such as internal threading on the abutment, such that the prosthesis is attached to the anchoring unit via the separate fastener. Accordingly, the entire provisional prosthetic system can be attached using threads thereby further reducing the likelihood that the components of the system will become inadvertently detached from each other.

[0106] FIG. **4** illustrates a flowchart describing steps of a method **400** for attaching a provisional dental prosthetic system such as the provisional dental prosthetic system **100**. Certain of the steps of method **400** are similar to those of method **300**. For purposes of clarity, the steps are described as being performed by a clinician; however, it should be understood that some or all of the steps of this procedure can be performed by others such as, but not limited to, the clinician's assistants and other third-parties. Moreover, the some or all of the steps described herein can be performed either in situ (i.e., in the patient's mouth) or ex situ. For example, some or all of the steps described herein can be performed on a molding of the patient's teeth.

[0107] As shown in step **402**, a clinician can affix attachment mechanisms to the patient's jaw for allowing installation of additional dental components. Accordingly, during this step, the clinician can affix one or more implants to the patient's jaw. As with method **300**, the remainder of the method **400** can either be performed immediately after this step or shortly thereafter.

[0108] As shown in step **404**, the clinician can attach an abutment to the implant using any of the connection features and techniques as herein described. For example, in some embodiments, the abutment can be attached to the implant using a threaded coupling screw. However, it should be understood that other connection features and techniques can also be used for attaching the abutment to the implant.

For example, in some embodiments, the abutment can be attached to the implant using a "snap fit" connection, friction fit connection, and/or other such connection features.

[0109] As shown in step **406**, the clinician can attach a coping to the abutment using any of the connection features and techniques as herein described. For example, in some embodiments, the coping can be attached to the abutment using a "snap-fit" connection feature on the abutment and the coping. Accordingly, the clinician can simply exert a sufficient force upon the coping in a direction towards the abutment until the "snap-fit" connection feature has been properly engaged. In some embodiments, the "snap-fit" connection feature can provide some form of feedback to the clinician to indicate that the "snap-fit" connection feature has been properly engaged. For example, the "snap-fit" connection feature can provide audible feedback, tactile feedback, or a combination of both to the clinician to alert the clinician of proper engagement of the coping with the abutment.

[0110] As shown in step **408**, the clinician can then prepare the prosthesis for attachment to the coping. As described above with respect to method **300**, the prosthesis can be prepared chairside using either the patient's existing prosthesis or a newly fabricated prosthesis. The prosthesis can be provided with blind holes or the clinician can create such blind holes during the procedure. These blind holes can be aligned such that the prosthesis would be properly oriented within the patient's mouth upon completion of the method **400**. Furthermore, the blind holes can be designed to allow some degree of play between the blind holes and the coping.

[0111] As shown in step **410**, the clinician can test the prosthesis for preliminary fit by seating the prosthesis on the copings. During this step, the clinician can place the prosthesis over the copings such that the copings are received within one or more blind holes of the prosthesis. Upon placement of the prosthesis over the copings, the clinician can check to see whether the prosthesis is generally aligned with respect to the patient's jaw and opposing dentition. For example, the clinician can determine whether the occlusal surfaces are generally aligned and whether the patient's nose, lips and chin are generally aligned.

[0112] The clinician can also determine whether the vertical dimension of occlusion (VDO) and/or vertical dimension at rest (VDR) is properly chosen. The VDO indicates the superior-inferior relationship between the maxilla and mandible when the teeth are in maximum intercuspation. Accordingly, particularly for patients who are fully and/or partially edentulous and thus lack the teeth to position in maximum intercuspation, the clinician can perform one or more tests determine a proper VDO and/or VDR. For example, the clinician can view the overall appearance of the patient when the prosthesis is seated on the coping to determine whether the patient's nose, lips and chin appear to be in an ordinary configuration of the average person. The clinician can also determine a proper VDO and/or VDR by listening to the patient's pronunciation of certain words. The clinician can take any number of steps to ensure that a proper VDO and/or VDR will be established upon the prosthesis being seated on the copings. For example, to increase the distance between the prosthesis and the coping, the clinician can add pads to either the coping and/or the prosthesis. To decrease the distance between the prosthesis and the coping, the clinician can trim down the top most portion of the coping and/or drill a longer blind hole through the prosthesis.

[0113] The clinician can check to see whether only minor adjustments would be needed to place the prosthesis in proper alignment and achieve a proper VDO and/or VDR. Preferably, the adjustments should be sufficiently aligned such that any remaining adjustments made during the bonding step **416** can take place by placing the patient's teeth in a centric occlusion to mate the occlusal surfaces of the prosthesis to the opposing dentition.

[0114] Should the clinician determine that the prosthesis is not properly aligned, due to the location and/or orientation of the copings, the clinician can remove the prosthesis and modify the copings accordingly as illustrated in step **412**. Steps to modify the copings are described in connection with step **308** above. Furthermore, it should also be understood that, as an alternative procedure, the clinician can also modify the size, position and/or angle of the blind holes in the prosthesis to achieve a generally aligned fit. Upon making appropriate modifications to the coping and/or prosthesis, the clinician can proceed back to step **410** to test the fit of the prosthesis with the modified copings. The clinician can repeat steps **410** and **412** until a generally aligned fit is achieved.

[0115] As shown in step **414**, after the clinician has determined that a satisfactory fit has been achieved, the clinician can apply a bonding agent, such as self-curing or light-curing polymeric material, to the prosthesis. In some procedures, the clinician can backfill holes formed in the prosthesis with an acrylic, such as a self-curing acrylic or a light cured composite. In some procedures, the clinician can remove the prosthesis from the copings and introduce the bonding agent and/or acrylic to the blind holes. The amount of bonding agent and/or acrylic chosen should be sufficient to adequately cover the copings upon placement of the prosthesis on the copings as this can enhance the connection between the coping and the prosthesis. However, care should be taken such that the blind holes are not overfilled thus causing the bonding agent and/or acrylic to leak onto other components or onto soft tissue thereby potentially causing complications and increasing the overall procedural time. Of course, a greater or lesser amount of bonding material and/or acrylic can be used based on the bonding strength desired.

[0116] As shown in **416**, after the clinician has applied the bonding agent to the prosthesis and/or backfilled the blind holes with an acrylic, the clinician can then bond the prosthesis to the copings. In procedures where the bonding agent and/or acrylic was applied to the blind holes, this can be achieved by simply seating the prosthesis in the same manner as was performed during step **410**. During the bonding process, the patient's teeth can be placed into a centric occlusion to mate the occlusal surfaces of the prosthesis to the opposing dentition. Accordingly, the prosthesis can advantageously be placed in a more proper relationship with the opposing dentition. It should be understood that other relationships between the prosthesis and opposing dentition can be chosen. For example, the patient can instead close into maximum intercuspation so that the prosthesis is properly aligned in this orientation.

[0117] As shown in step **418**, after the bonding agent and/or acrylic has sufficiently cured such that the prosthesis is attached to the coping, the clinician can remove the prosthesis from the abutments. Since the copings are

attached to the prosthesis via the cured bonding agent and/or acrylic and because the copings are attached to the abutments using only a "snap-fit," friction fit, or other similar provisional connection, removal of the prostheses can result in the copings being removed along with the prosthesis. Moreover, since the copings remain attached via the cured bonding agent and/or acrylic, the copings can remain attached to the prosthesis in an aligned configuration. Accordingly, it should be appreciated that the threshold separation force to overcome the "snap-fit," friction fit, or other provisional connection feature can be chosen such that little to no misalignment between the prosthesis and coping is caused when removing the prosthesis and coping from the abutment.

[0118] As shown in steps **420** and **422**, a through-hole can be created in the prosthesis and the coping to allow for a fastener, such as a screw or bolt, to pass through the prosthesis and coping. During these steps, the clinician can use a cutting tool such as cutting tool **160** to prepare the through-hole.

[0119] As shown in step **420**, in order to assist with proper placement and alignment of the through-hole, the clinician can first attach an alignment tool, similar to alignment tool **170**, to the coping. In some procedures, the alignment tool can be attached to the coping using a "snap-fit," friction fit, or other provisional connection feature. In some procedures, the alignment tool can be keyed to ensure that the alignment tool is properly oriented with respect to the coping. Upon attaching the alignment tool to the coping, the clinician can then insert the cutting tool through an alignment feature, such as alignment bore **172**, and create a through hole into the coping and prosthesis as is shown in step **422**. In some embodiments, an alignment tool **170** might not be used. In some embodiments, step **422** can include an additional step of creating an additional hole through the prosthesis from the occlusal surface towards the coping. This additional hole can have a greater diameter than the original through-hole and be generally coaxial with the original through-hole. This step can be performed when a fastener being used is larger than the original through-hole.

[0120] As shown in step **424**, in order to more securely fasten the prosthesis to the abutments, a clinician can use a fastener to fasten the prosthesis to the abutment. During this step, the clinician can insert a separate fastener, such as a screw or bolt, into the recently created through-hole. The separate fastener can positively engage a connection feature on the abutment, such as internal threading, such that the prosthesis and coping is attached to the abutment via the separate fastener. Accordingly, the entire provisional prosthetic system can be attached using threads thereby reducing the likelihood that the components of the system will become inadvertently detached.

[0121] As shown step **426**, the clinician can then seal the through-hole with a sealing agent to enhance the appearance of the prosthesis and prevent or at least reduce the likelihood of foreign matter collecting within the through hole. Upon removal of the prosthesis, such as may be the case prior to attachment of a permanent prosthetic system, the clinician can remove the sealing agent to regain access to the separate fastener and remove the prosthesis and coping from the abutment.

Provisional Dental Prosthesis and Attachment System

[0122] With reference to FIG. **5**, an embodiment provisional prosthesis **510** is illustrated which can be used in a provisional dental prosthesis system described herein. The provisional prosthesis **510** can include a base **512** upon which one or more prosthetic teeth **514** are attached. The base **512** can include a first side on which the teeth **514** are attached and a second side opposite the first side configured to be placed in contact with soft tissue adjacent the patient's jawbone. As shown in the illustrated embodiment, the provisional prosthesis **510** can be a full bridge such that the provisional prosthesis **510** replaces the entire set of teeth along either the maxillary and/or mandibular arches. As noted above, the provisional prosthesis **510** can also be a partial bridge that replaces fewer than the entire set of teeth along the maxillary and/or mandibular arches. Furthermore, as noted above, the provisional prosthesis **510** can also be a crown to replace a single tooth. In some embodiments, the provisional prosthesis **510** can be a patient's existing prosthesis such as a full or partial denture.

[0123] FIG. **6** illustrate components of an anchoring unit **600** which can include a dental implant **610** and an abutment **650**. In the illustrated embodiment, the implant **610** can include threading **612** about an external surface of the implant **610** and a flange **614**. The threading **612** can be used to fasten the implant **610** to bone in the patient's jaw and the flange **614** can be designed to sit atop the bone such that the implant **610** remains above soft tissue surrounding the bone. As shown in the illustrated embodiment, the threading **612** can extend partially from the flange **614** towards a distal end **616** of the implant **610**. Such threading **612** can extend further towards the flange **614** to increase the threaded contact surface of the implant **610**. Furthermore, the threading **612** can begin at a position below the flange **614**. At a proximal end **618** of the implant **610**, an abutment **650** can be attached using any of the connection features and techniques as herein described. For example, the implant **610** can include an internally threaded bore (not shown) configured to engage a threaded shaft of the abutment **650**. It should be appreciated that, in some embodiments, the flange **614** can be omitted and the threading **612** can extend towards the proximal edge of the implant.

[0124] The abutment **650** can include an annular slot **652** circumscribing a proximal portion **654** of the abutment **650**. This annular slot **652** can serve as a provisional connection feature between the abutment **650** and the coping **700**. Other shapes and designs can also be used. For example, in some embodiments, the slot **652** can circumscribe only portions of the abutment **650**. Moreover, the abutment **650** can include annular protrusions or ribs, dimples circumscribing the abutment **650**, or a combination of any of the above. In some embodiments, the abutment **650** can include vertically oriented slots or protrusions which can both facilitate alignment of the abutment **650** with another component, such as a coping **700** (shown in FIG. **7**A). The abutment **650** can include pins or dowels, or holes configured to receive pins or dowels on an attached component, as connection features. In some embodiments, the abutment **650** can omit slot **652**.

[0125] As shown in the illustrated embodiment, the proximal portion of the abutment **650** can have a frustoconical shape which tapers towards the proximal end. However, it should be understood that the proximal portion of the abutment **650** can have any other type of shape and need not exhibit rotational symmetry. As described above, the proxi-

mal portion and/or the distal portion (not shown) of the abutment **650** can be keyed such that components attached thereto can be in only certain orientations.

[0126] With reference now to FIG. **7**A, the coping **700** can include a distal portion **702** having a cavity **704** sized and shaped to receive at least some portion of the proximal portion of the abutment **650**. The cavity **704** can have a frustoconical shape, or any other shape, similar to that of the abutment **650**. Preferably, the cavity **704** is shaped to closely fit the shape of the abutment **650**. In some embodiments, the cavity **704** can be sized and shaped to receive a keyed feature on the abutment **650** to further ensure that the abutment **650** and the coping **700** are properly aligned and oriented prior to attachment. The cavity can also include an annular recess **706** located along an interior surface of the cavity **704**. The recess **706** can be sized and to receive a resilient spring element **708** thereby forming a provisional connection feature designed to positively engage the annular slot **652** of the abutment **650**. The resilient spring element **708** can be designed to provide the clinician with audible and/or tactile feedback when the spring element **708** engages the slot **652**. It should be appreciated that use of a separate resilient spring element **708** can advantageously allow the coping **700** to be manufactured from a less resilient, and potentially more durable, material that can be more resistant to deformation. This increased durability can reduce the likelihood that the coping **700** deforms upon removal of the coping **700** from the abutment **650** as described in connection with FIG. **4**. In some embodiments, the spring element **708** can be an annular ring spring **730** (FIG. **7**B) which projects radially inward and beyond the recess **706** such that it can positively engage annular slot **652** of the abutment **650**. In some embodiments, the annular ring spring **730** can include resiliently deformable fingers (not shown) which project radially inward and beyond the recess **706**. In some embodiments, a wave spring **732** (FIG. **7**C) which has portions which project radially inward beyond the recess **706** can be used. The wave spring **732** can be a flat wire wave spring, a single turn wave spring, a Marcel Expander or other type of wave spring as desired. The spring element **708** can have flat or non-flat cross-section including a circular cross-section. Other types of designs can be used such as Belleville washers, curved disc springs, wave washers, split washers, internal and/or external tooth lock washers, internal and/or internal serrated washers. The characteristics of the spring element **708** can be chosen such that the spring element **708** can maintain the positioning and orientation of the abutment **650** and the coping **700** during the procedure described above yet still be removable without significant force. In the illustrated embodiment, the wave spring **732** includes four (4) radially inward projections. In modified embodiments, the wave spring can include more or less projections, such as, for example, 1, 2, 3, 5, or 6 projections. One advantage of the illustrated wave spring arrangement is that the arrangement can still provide an inward force even if a portion of the radially inward projections encounters an opening in the annular slot **652** (see e.g., FIG. **14** and slot **910**).

[0127] In some embodiments, other structures can be used to create a provisional connection feature. For example, the coping **700** can include an annular rib, protrusion, dimples or similar resilient features to interact with the annular slot **652**. Furthermore, the vertically oriented slots or protrusions can also be included along the interior surface of the cavity **704**. Along the outer surface of the distal portion **702**, the coping **700** can include a flange **710**.

[0128] The proximal portion **712** of the coping **700** can include an elongate member **714** extending in a longitudinal direction. The elongate member **714** can include multiple annular projections **716** or ribs which project outwardly from the elongate member **714** in a radial direction. The annular projections **716** can be spaced apart to form annular slots **718**. As will be described in further detail below, inclusion of the projections **716** and slots **718** along the elongate member **714** can advantageously enhance the connection between the coping **700** and the prosthesis **510** when a bonding agent and/or acrylic is used. In some embodiments, protrusions **716** can extend only partially around the elongate member **714** and can extend only partially along the length of the elongate member **716**. Other structures can be also used for providing a similar benefit. For example, dimples or bosses can also be used with or without the protrusions **716** and slots **718**. Furthermore, the surfaces of the coping **700** can be roughened. In some embodiments, these protrusions **716**, slots **718**, dimples, and/or bosses can also be included on interior surfaces of the elongate member **714** and therefore be located within a bore **720**. Similar structures, e.g., grooves, can also be used on the exterior surface of the flange **710** of the coping.

[0129] As shown in the illustrated embodiment, the elongate member **714** can include a longitudinal bore **720** through at least a portion of the elongate member **714**. As will be described in further detail below, this bore **720** can be sized and shaped to allow a fastener to pass therethrough. At a proximal end of the bore **720**, a plug **722** can be provided which can reduce the likelihood of foreign materials entering into the bore **720**. The plug **722** can be manufactured from the same material as the coping **700** or be manufactured from a different material. In some embodiments, it can be preferable to manufacture the plug **722** from a softer material to facilitate cutting or drilling the plug **722**. At an opposite end of the bore **720**, the coping **700** can include an aperture **724** and a rim **726**.

[0130] With reference now to FIG. **8**, an abutment **650** is shown inserted into the cavity **704** of the coping **700** and the elongate member **714** of the coping **700** is shown inserted into a bore **516** of the prosthesis **510** with prosthesis **510** seated on the elongate member **714**. As shown in the illustrated embodiment, coping **700** has been partially modified to reduce the overall height of the elongate member **714**. As described above in connection with FIGS. **3** and **4**, this can be performed by the clinician to achieve a more satisfactory fit between the prosthesis **510** and the coping **700**. Furthermore, as shown in the illustrated embodiment, the abutment **650** and the coping **700** can be attached via the retention spring **708**. In some embodiments, the aperture **724** can be aligned with a bore **654** of the abutment **650** with the rim **726** adjacent to and contacting at least a portion of the proximal end of the abutment **650**. As shown in the illustrated embodiment, the bore **654** can be partially or entirely internally threaded or include a connection feature. Moreover, a coupling screw **656** can pass through the bore **654** for coupling the abutment to the implant **600**.

[0131] With reference now to FIG. **9**, a bonding agent **518** such as a self-curing or light curing polymeric material, and/or an acrylic, can be introduced into the bore **516** of the prosthesis **510**. Upon curing of the bonding agent **518** and/or acrylic, the prosthesis **510** and the coping **700** can be

securely attached. This attachment can be enhanced via use of surface features such as protrusions **716** and slots **718**. Furthermore, this attachment can be further enhanced by increasing the surface roughness of the interior surfaces of bore **516**. It should be appreciated that due to the existence of plug **722**, the bonding agent **518** and/or acrylic is not introduced into the bore **720**. During a cutting or drilling operation, this can advantageously reduce the likelihood of difficulties associated with cutting or drilling through the cured bonding agent **518** and/or acrylic which could potentially gum up the cutting surfaces of the cutting tool. In some embodiments, the plug can be removed to allow the bonding agent **518** and/or acrylic to be received within the bore **720**. Such an embodiment may be advantageous when a more secure bond between the prosthesis **510** and the coping **700** is desired.

[0132] The metal surfaces of components can be surface treated to further enhance bonding. In some embodiments, a primer can be applied to surfaces of components of the provisional dental prosthesis system such as the coping **700**. For example, a metal primer can be applied to metal surfaces of components to enhance the bond between the metal surfaces and the bonding agent **518** and/or acrylic. In some embodiments, the primer can advantageously enhance the bond between the metal surface of the component and bonding agent **518** and/or acrylic. The primer can be pre-applied to such surfaces such that the clinician need not apply the primer during the procedure. In some embodiments, the surfaces of components can include other surface treatments for further enhance the bond between the surface and the bonding agent **518** and/or acrylic. For example, the surfaces of components, such as metal components, can be roughed to further enhance the bond between the component and the bonding agent **518** and/or acrylic. This can be achieved by sandblasting or other means of roughening a surface.

[0133] With reference now to FIGS. **10** and **11**, an alignment tool **800** is shown inserted into the cavity **704** of the coping **700** and the elongate member **714** of the coping **700** is shown inserted into a bore **516** of the prosthesis **510** with prosthesis **510** seated on the elongate member **714**. Furthermore, a drill bit **850** is shown inserted into the alignment tool **800** and the bore **720** of the coping **700**. As shown in the illustrated embodiment, the alignment tool **800** can have a shape similar to that of the abutment **650** and include a similar connection feature in the form of an annular slot **802** for receiving the retention spring **708**. Other connections features between the alignment tool **800** and coping **700** are also contemplated. For example, the alignment tool **800** can be attached to the coping **700** using other "snap fit" connections as herein described, friction fit connections, clamps, fasteners, and the like. For example, the alignment tool **800** can be inserted into the cavity of the coping **700** with a friction fit connection or the distal portion of the coping **700** can be inserted into a cavity of the alignment tool **800** (e.g., a drill guide) with a friction fit connection. The alignment tool **800** can include an alignment bore **804** to receive and align the drill bit **850** as the drill bit **850** passes through the alignment tool **800**. As shown in the illustrated embodiment, the alignment bore **804** can be aligned with the aperture **724** of the coping **700** such that the drill bit **850** passes through aperture **724**. The drill bit **850** can then be used to create a bore **519** through the plug **722**, portions of the bonding agent **518** and/or acrylic, and the prosthesis **510** as shown in FIG. **9**. As described herein, in some embodiments, an alignment tool **800** might not be used. As also described herein, in some embodiments, after the bore through the prosthesis **510** is created from the coping **700** or provisional crown side, the drill bit **850** or another drill bit can reinforce and/or enlargen the bore by entering from the prosthesis **510** side.

[0134] With reference now to FIG. **12**, an abutment **650** is shown inserted into the cavity **704** of the coping **700** and the elongate member **714** of the coping **700** is shown inserted into a bore **516** of the prosthesis **510** with prosthesis **510** seated on the elongate member **714**. Furthermore, a fastener **750** has been inserted into the bore **519** and into bore **720** such that the head **752** of the fastener **750** is adjacent to and seated on the rim **726** and the shaft **754** is inserted through aperture **724** and into bore **654** of the abutment **650**. In some embodiments, the shaft **754** can be threaded along an exterior surface such that it engages corresponding threading within bore **654**. Accordingly, the coping **700** and prosthesis **510** can be securely attached to the abutment **650** using the threaded screw. In order to reduce the likelihood of foreign material entering into bore **519**, a seal **520** can be introduced into the bore **519**.

[0135] With reference now to FIG. **13**, another embodiment of an upper portion of an abutment **800** (e.g., a multi-unit abutment) and coping **850** is illustrated. The abutment **800** can have a distal portion **802** for attachment to an implant and a proximal portion **804** for attachment to a coping such as coping **850** and/or to a dental component such as, for example, a dental restoration or dental restoration component, such as, for example, a multi-unit bridge and/or restoration. As shown in the illustrated embodiment, the abutment **800** can include a recess slot **806**, such as an annular slot, about a proximal portion **804** of the abutment **800**. Similar to annular slot **652**, slot **806** can serve as a provisional connection feature between the abutment **800** and the coping **850** and/or the coping configurations described above. Other shapes and designs can also be used. For example, in some embodiments, the slot **806** can circumscribe only portions of the abutment **800**. Moreover, the abutment **800** can include annular protrusions or ribs, dimples circumscribing the abutment **800**, or a combination of any of the above. In some embodiments, the abutment **800** can include vertically oriented slots or protrusions which can both facilitate alignment of the abutment **800** with another component, such as a coping **850**. The abutment **800** can include pins or dowels, or holes configured to receive pins or dowels on an attached component, as connection features. In some embodiments, the abutment **800** can omit slot **806**.

[0136] The proximal portion **804** can have a frustoconical shape which tapers towards the proximal end. A tapered portion **807** can be designed to facilitate the placement of the coping over the abutment **800** by providing a lead-in ramp for the provisional connection features of coping **850**, such as spring element **708**, designed to positively engage the slot **806** of the abutment **800**. Of course, it should be understood that the proximal portion of the abutment **800** can have any other type of shape as desired. Moreover, as shown in the illustrated embodiment, the abutment **800** can include a keyed feature **808** such that the component attached thereto, such as the coping **850** is properly aligned prior to coupling with the abutment **800**. This keyed feature **808** can have, for example, a hexagonal cross section designed to engage a corresponding hexagonal recess in the coping. Other shapes

can be used for keyed feature **808** such as other types of polygons, lobular shapes such as trilobular and hexalobular shapes, elliptical shapes, and any other shape as desired.

[0137] In some embodiments, the proximal portion **804** can include a flange forming a seat **810**. The seat **810** can be designed to contact a portion of the coping **850**, such as the distal end surface **856**, upon the coping **850** being coupled via the provisional connection feature, a prosthetic screw, or both. The seat **810** can advantageously serve as a stop element for the coping which can prevent or reduce the likelihood that a clinician overshoots insertion of the coping over the abutment **800**. The seat **810** can also be used to support a final or temporary restoration such as, for example, multiple unit abutment, bridge, and/or restoration.

[0138] With continued reference to FIG. **13**, the coping **850** can have a similar design to that of coping **700**. For purposes of brevity, reference should be made to the discussion of coping **700** for details regarding the internal structure of coping **850**. As shown in FIG. **13**, the coping **850** can include fewer protrusions **852** and slots **854** As described above, the surfaces of components can be surface treated to further enhance bonding. In some embodiments, a primer can be applied to surfaces of components of the provisional dental prosthesis system such as the coping **850**. For example, a metal primer can be applied to metal surfaces of components to enhance the bond between the metal surfaces and the bonding agent **518** and/or acrylic. In some embodiments, the primer can advantageously enhance the bond between the metal surface of the component and an acrylic bonding agent **518** and/or acrylic. The primer can be pre-applied to such surfaces such that the clinician need not apply the primer during the procedure. In some embodiments, the surfaces of components can include other surface treatments for further enhance the bond between the surface and the bonding agent **518** and/or acrylic. For example, the surfaces of components, such as metal components, can be roughed to further enhance the bond between the component and the bonding agent **518** and/or acrylic. This can be achieved by sandblasting or other means of roughening a surface.

[0139] With reference now to FIGS. **14** and **15**, another embodiment of an upper portion of an abutment **900** is illustrated. Abutment **900** can include a distal portion **902** for attachment to an implant and a proximal portion **904** for attachment to a coping such as coping **850** and/or to a dental component such as, for example, a dental restoration or dental restoration component such as, for example, a multi-unit bridge and/or restoration. As shown in the illustrated embodiment, abutment **900** is angled such that the longitudinal axis **906** of the distal portion **902** forms an angle with the longitudinal axis **908** of the proximal portion **904**. Accordingly, when the abutment **900** is attached to an implant and a coping, the coping would form an angle with the implant. Such an angle can be desirable, for example, if the implant is affixed to the jaw such that the implant is not generally orthogonal to the occlusal plane. In some embodiments, a first screw, similar to coupling screw **16**, can be used to couple the abutment **900** to an implant. In some embodiments, the first screw can be oriented parallel to axis **906**. Of course, the first screw can also be oriented along another axis. A second screw, similar to prosthetic screw **138**, can be used to couple the coping, such as coping **850**, to the abutment **900**. In some embodiments, the second screw can be oriented parallel to axis **908**. As with first screw, the second screw can be oriented along another axis. In some embodiments, the first screw and the second screw can be oriented parallel to different axes. Accordingly, it should be understood that the abutment **900** can include one or more bores to receive such screws.

[0140] As shown in the illustrated embodiment, the abutment **900** can include slot **910**, such as an annular slot, about a proximal portion **904** of the abutment **900**. Similar to annular slot **652**, slot **910** can serve as a provisional connection feature between the abutment **900** and the coping **850**. Other shapes, designs and features described in connection with abutment **800** can also be used with abutment **900**. For purposes of brevity, reference should be made to the discussion of abutment **800** for details regarding such features. In some embodiments, the abutment **900** can omit slot **910**.

[0141] As shown in the illustrated embodiment, the proximal portion of the abutment **900** can have a frustoconical shape which tapers towards the proximal end. However, it should be understood that the proximal portion of the abutment **900** can have any other type of shape and need not exhibit rotational symmetry. Moreover, the abutment **900** can include a keyed feature (not shown) such that the component attached thereto, such as the coping **850** is properly aligned prior to coupling with the abutment **900**.

[0142] With reference now to FIGS. **16** and **17**, an embodiment of an abutment **1000** is illustrated. Abutment **1000** can have features similar to those of abutments **650**, **800**, **900**. As shown in the illustrated embodiment, the abutment **1000** can include a distal portion **1002** for attachment to an implant and a proximal portion **1004** for attachment to a coping such as those described herein. Along the distal portion **1002**, the abutment **1000** can include a threaded portion **1006**, the threaded portion having a shaft **1008** with external threading at least partially, if not entirely, along its length. The threading of the threaded portion **1006** can be designed to couple with a corresponding internally threaded portion of an implant. As shown in the illustrated embodiment, the threaded portion **1006** can be integrally formed with the abutment **1000**. Accordingly, a clinician can attach the abutment **1000** to an implant by rotating the entire abutment **1000**. The monolithic structure can provide greater structural integrity compared to a two-piece structure. In some embodiments, the abutment **1000** can instead utilize a coupling screw, similar to coupling screw **16**, that passes through an internal bore (not shown) of the abutment **1000** similar to the internal bore **125**. The clinician can then attach the abutment **1000** to an implant without rotating the entire abutment **1000**. This can be particularly advantageous in situations where it would be difficult to rotate the abutment **1000**.

[0143] As shown in the illustrated embodiment, the abutment **1000** can include a recess or slot **1010**, such as an annular slot, about a proximal portion **1004** of the abutment **1000**. Similar to annular slot **652**, slot **1010** can serve as a provisional connection feature between the abutment **1000** and a coping, such as coping **1050** described in connection with FIGS. **18** and **19**. Other shapes, designs and features described in connection with abutment **800** can also be used with abutment **1000**. For purposes of brevity, reference should be made to the discussion of abutment **800** for details regarding such structures. In some embodiments, the abutment **1000** can omit slot **1010**.

[0144] The proximal portion **1004** can have a frustoconical shape which tapers towards the proximal end. A tapered portion **1012** can be designed to facilitate the placement of the coping over the abutment **1000** by providing a lead-in ramp for the coping's provisional connection feature, such as spring element **708** or other resilient element, designed to positively engage the slot **1010** of the abutment **1000**. Of course, it should be understood that the proximal portion of the abutment **1000** can have any other type of shape as desired. Moreover, as shown in the illustrated embodiment, the abutment **1000** can include a keyed feature **1014**. The keyed feature **1014** can be designed such that the component attached thereto, such as a coping, is properly aligned prior to coupling with the abutment **1000**. This keyed feature **1014** can have, for example, a hexagonal cross section designed to engage a corresponding hexagonal recess in the coping. Other shapes can be used for keyed feature **1014** such as other types of polygons, lobular shapes such as trilobular and hexalobular shapes, elliptical shapes, and any other shape as desired. The keyed feature **1014** can also be used to engage a driving tool to rotate the abutment **1000** for purposes of coupling the abutment **1000** to an implant. In some embodiments, the keyed feature **1014** can include a chamfered or beveled proximal edge which can facilitate placement of the component over the keyed feature **1014**.

[0145] In some embodiments, the proximal portion **1004** can include a flange forming a seat **1016**. The seat **1016** can be designed to contact a portion of the coping upon the coping being coupled via a provisional connection feature, a prosthetic screw, or both. The seat **1016** can advantageously serve as a stop element for the coping (or other mating component) which can prevent or reduce the likelihood that a clinician overshoots insertion of the coping over the abutment **1000**.

[0146] With reference now to FIGS. **18** and **19**, an embodiment of a coping **1100** is illustrated which can have features similar to those described in connection with copings **130**, **700**, **850** and can be used with the various abutments described herein. As shown in the illustrated embodiment, the coping **1100** can include a distal portion **1102** having a cavity **1104** sized and shaped to receive at least some portion of the proximal portion of an abutment such as abutment **1000**. The cavity **1104** can have a cylindrical shape or any other shape as desired. In some embodiments, the cavity **1104** can be sized and shaped to receive a keyed feature, such as keyed feature **1014**, on the abutment **1000** to further ensure that the abutment **1000** and the coping **1100** are properly aligned and oriented prior to attachment.

[0147] As shown in the illustrated embodiment, the coping **1100** can include a provisional connection feature **1106** integrally formed therein. As shown in the illustrated embodiment, the provisional connection feature **1106** can be in the form of one or more resilient elongate fingers **1108**. The fingers **1108** can be designed to resiliently deform radially outward upon application of a force in that direction. The fingers **1108** can include an engagement protrusion **1110** sized and shaped to be received within a recess or slot, such as slot **1010**, of the abutment **1000**. The fingers **1108** can also have a tapered portion **1112**. This tapered portion **1112** can be designed to abut the tapered portion **1012** of the abutment **1000** thereby enhancing stability of the coping **1100** with respect to the abutment **1000**. Of course, other shapes and sizes for fingers **1108** can be used. For example, the coping **1100** can include an annular rib, protrusion, dimples or similar resilient features to interact with the slot **1010**. Furthermore, the vertically oriented slots or protrusions can also be included along the interior surface of the cavity **1104**. In some embodiments, the provisional connection feature **1106** can be separate from the remainder of the coping **1100** such as is shown in the embodiments of FIGS. **21-26**. The provisional connection feature **1106** can be manufactured separately from the coping **1100** as one or more pieces which are later attached to the remainder of the coping **1100**. In some embodiments, the provisional connection feature **1106** can be removably attached. In other embodiments, the provisional connection feature **1106** can be permanently attached.

[0148] The distal portion **1102** of the coping **1100** can include a distal surface **1114**. For example, as shown in the illustrated embodiment, the distal surface **1114** can form an annular rim. The distal surface **1114** can contact the seat **1016** of the abutment **1000** when the coping **1100** is engaged to the abutment **1000**. In some embodiments, contact between the seat **1016** and the surface **1114** can form a seal to prevent or reduce the likelihood of foreign matter entering into the cavity **1104**.

[0149] The proximal portion **1116** of the coping **1100** can have a similar design to that of copings **130**, **700**, and **850**. In some embodiments, the coping **1100** can include an elongate member **1118** extending in a longitudinal direction. The elongate member **1118** can include multiple projections **1120** or ribs which project radially outwardly from the elongate member **1118**. The projections **1120** can be spaced apart to form annular slots **1122**. As shown in the illustrated embodiment, protrusions **1120** can extend only partially around the elongate member **1118** and can extend only partially along the length of the elongate member **1118**. Other structures as described herein can be also used for providing a similar benefit. For example, dimples or bosses can also be used with or without the protrusions **1120** and slots **1122**. Furthermore, the surfaces of the coping **1100** can be roughened. In some embodiments, these protrusions **1120**, slots **1122**, dimples, and/or bosses can also be included on interior surfaces of the elongate member **1118** and therefore be located within a bore **1124**.

[0150] As shown in the illustrated embodiment, the elongate member **1118** can include a longitudinal bore **1124** through at least a portion of the elongate member **1118**. As will be described in further detail below, this bore **1124** can be sized and shaped to allow a fastener to pass therethrough, similar to bores **139**, **720**. The bore **1124** can form an opening **1126** at a proximal end of the elongate member **1118**. Of course, similar to other embodiments described herein, a plug, such as plug **722**, to initially cover the opening **1126**. At an opposite end of the bore **1124**, the coping **1100** can include an aperture **1128** and a rim **1130**, similar to aperture **724** and rim **726**, designed to allow a fastener **1132** to pass therethrough and couple the coping **1100** to an abutment such as abutment **1000** as shown in FIG. **20**.

[0151] With reference now to FIGS. **21-23**, an embodiment of a coping **1200** is illustrated which can have features similar to those described in connection with copings **130**, **700**, **850**, **1100** and can be used with the various abutments described herein. As shown in the illustrated embodiment, the coping **1200** can include a body component **1202** and a connector component **1204**. As shown in the illustrated embodiment, the body component **1202** and the connector

component **1204** can be two separate pieces which can advantageously facilitate manufacture of the coping **1200**. The connector portion **1204** can be designed such that it can be removably attached to the body component **1202** or can be designed such that, once attached, the connector portion **1204** can be difficult to remove.

[0152] With continued reference to FIGS. **21-23**, the connector component **1204** can include a head portion **1206** and a foot portion **1208**. The foot portion **1208** can include a provisional connection feature such as resilient fingers **1209** similar to those of coping **1100**. In some embodiments, the foot portion **1208** can include any other provisional connection feature including spring elements such as annular ring spring **730**, wave spring **732**, and any other provisional connection feature. The resilient fingers **1209** can be used to couple the coping **1200** to an abutment such as abutment **1250** or any other abutment such as abutments **120**, **650**, **800**, **900**. A connecting screw **1260** can be used to couple the coping **1200** to the abutment **1250**.

[0153] The head portion **1206** can be sized to be received within a cavity **1210** of the body component **1202**. In some embodiments, the head portion **1206** can have one or more cross-sectional dimensions equal to, or greater than, one or more cross-sectional dimensions of the cavity **1210**. For example, in some embodiments, the cross-sections of the head portion **1206** and/or the cavity **1210** are circular and the head portion **1206** can have a diameter equal to, or greater than, the diameter of the cavity **1210**. In this manner, the head portion **1206** and the cavity **1210** can be coupled via a friction fit or interference fit. In order to facilitate this friction fit, the top edge of the head portion **1206** can be beveled or tapered. In some embodiments, the head portion **1206** can have a cross-section less than that of the cavity **1210**. In such an embodiment, as well as any other embodiment described herein, another fastening mechanism, such as an adhesive or fastener, can be used to couple the body component **1202** and the connector component **1204** together. The head portion **1206** can include a keyed feature which corresponds to a keyed feature of cavity **1210** which can facilitate proper orientation of the body component **1202** with the connector component **1204** in embodiments where there are one or more proper orientations. The engagement between the body component **1202** and the connector component **1204** can be chosen such that the force required to separate the two components **1202**, **1204** is greater than the force required to separate the coping **1200** from the abutment, such as abutment **1250**, to which it is attached.

[0154] With reference now to FIGS. **24-26**, an embodiment of a coping **1300** is illustrated which can have features similar to those described in connection with copings **130**, **700**, **850**, **1100**, **1200** and can be used with the various abutments described herein. Similar to coping **1200**, the coping **1300** can include a body component **1302** and a connector component **1304**. The connector component **1304** can include a head portion **1306** and a foot portion **1308**. The foot portion **1308** can include a provisional connection feature such as resilient fingers **1309** similar to those of coping **1100**, **1200**. In some embodiments, the foot portion **1308** can include any other provisional connection feature including spring elements such as annular ring spring **730**, wave spring **732**, and any other provisional connection feature. The resilient fingers **1309** can be used to couple the coping **1300** to an abutment such as abutment **1250** or any other abutment such as abutments **120**, **650**, **800**, **900**. A connecting screw **1260** can be used to couple the coping **1300** to the abutment **1250**. As shown in the illustrated embodiment, the head portion **1306** can include external threads **1310** which can engage corresponding internal threads **1312** of the body component **1302**. In some embodiments, the head portion **1306** can include internal threads and the body component **1302** can include internal threading.

[0155] With reference now to FIGS. **27**A and **27**B, an embodiment of an abutment **1400** (e.g., a combined abutment and coping) is illustrated which can have any one or more of the features described herein with respect to other embodiments. As shown in the illustrated embodiment, the abutment **1400** can include a distal portion **1402** sized and shaped to be inserted into a recess, bore, or cavity of a proximal portion of an implant. The distal portion **1402** can include an annular surface **1414** and can have a cylindrical shape, a tapered shape, or any other shape as desired.

[0156] As shown in the illustrated embodiment, the abutment **1400** can include a provisional connection feature **1406**. The provisional connection feature **1406** can be in the form of one or more elongate fingers **1408**. The fingers **1408** can be similar to other fingers described herein. For example, the fingers **1408** can be resilient fingers. As shown in the illustrated embodiment, the fingers **1408** can include a straight portion **1409** and an engagement protrusion **1410**. Of course, other shapes, sizes, and elements for the provisional connection feature **1406** can be used.

[0157] In various embodiments, the distal portion **1402** of the abutment **1400** can be used to mate with the proximal portion of an implant. In some such embodiments, the abutment **1400** can form a snap-fit connection with the implant via the provisional connection feature **1406**. For example, one or more fingers **1408** can be resilient. One or more engagement protrusions **1410** of one or more fingers **1408** can snap-fit into a groove or similar feature of the implant. In some other embodiments, the abutment **1400** can form a friction fit connection with the implant via the provisional connection feature **1406**. For example, one or more engagement protrusions **1410** of one or more fingers **1408** can press against an interior surface (e.g., an interior surface of a recess, bore, or cavity) of the implant.

[0158] In various embodiments, the proximal portion **1416** of the abutment **1400** can include an elongate member **1418** extending in a longitudinal direction as described herein with respect to other embodiments. For example, the elongate member **1418** can include multiple projections **1420** spaced apart to form annular slots **1422**. The proximal portion **1416** and the distal portion **1402** can be formed integrally or manufactured separately. In some embodiments, the proximal portion **1416** and the distal portion **1402** are made with the same material(s), while in other embodiments, they are made with different materials. In one example, the distal portion **1402** including the fingers **1408** is made of a metal (e.g., titanium) and the proximal portion **1416** including the elongate member **1418** is made of a polymer (e.g., a PEEK material). In another example, the distal **1402** and proximal **1416** portions are both made of a metal (e.g., the same metal). In another example, the distal **1402** and proximal **1416** portions are both made of a polymer (e.g, the same polymer). In some embodiments, a portion of the distal portion **1402** can be made of a different material from another portion of the distal portion **1402**. In

some embodiments, a portion of the proximal portion **1416** can be made of a different material from another portion of the proximal portion **1402**.

[0159] As described herein, features can vary in size, shape, and elements. For example, FIGS. **27**C-**27**E illustrate other embodiments of an abutment (e.g., a combined abutment and coping) having a variation in the distal portion. In particular, compared to the embodiment shown in FIGS. **27**A and **27**B, the fingers **1468**, **1478**, **1488** in abutments **1460**, **1470**, **1480** respectively are different in size, shape, and location. Other examples are possible. FIGS. **28**A and **28**B illustrate another embodiment of an abutment (e.g., a combined abutment and coping) having a variation in the proximal portion. For example, the elongate member can vary in height, material, and color depending on the individual patient. As one example, the elongate member **1518** of the example abutment **1500** shown in FIGS. **28**A and **28**B is shorter than the elongate member **1418** of the example abutment **1400** shown in FIGS. **27**A and **27**B. In some embodiments, the elongate member can be about 30-50% shorter. In various embodiments, the elongate member can also be adjustable to accommodate the individual patient by removing material from the elongate member. By having a pre-shortened elongate member, time for intraoral adjustment can be reduced.

[0160] With reference now to FIGS. **29**A and **29**B, another embodiment of an abutment **1600** (e.g., a combined abutment and coping) is illustrated. As described herein, the abutment **1600** can vary in size shape, and elements. As shown in the illustrated embodiment, the abutment **1600** can include a provisional connectional feature **1606** comprising a plurality of spaced apart elongate elements **1608** coupled together by a circumferential rim **1614**. In some embodiments, the elongate elements **1608** and/or the circumferential rim **1614** can be made of a resilient material. As another example, the circumferential rim **1614** can include a spring element (not shown), such as those described herein with respect to other embodiments. In various embodiments, the abutment **1600** can form a friction fit connection with an implant via the provisional connection feature **1606**. For example, the elongate elements **1608** and/or the circumferential rim **1614** of the provisional connection feature **1606** of the abutment **1600** can press against an interior surface (e.g., of a recess, bore, or cavity) of the implant.

[0161] With reference now to FIGS. **30**A and **30**B, an example coping **1700** is illustrated. The coping **1700** can include any one or more features described herein with respect to other embodiments. As one example, the coping **1700** can include similar features as the example coping **1100** shown in FIGS. **18** and **19**. As illustrated in FIGS. **30**A and **30**B, the coping **1700** can have a distal surface **1710** such as a flange or collar. However, compared to the coping **1100** shown in FIGS. **18** and **19**, the distal surface **1710** of the coping **1700** can include features such as grooves **1715** (or protrusions and/or slots). In some embodiments, such features can facilitate the retention of a bonding agent or cement used when attaching (intra-orally or extra-orally) a crown or other restoration over the coping **1700**. Furthermore, the coping **1700** can include fingers **1708** as described herein with respect to other embodiments (e.g., FIGS. **18** and **19**). The fingers **1708** can include engagement protrusions **1709** sized and shaped to be received within a recess or slot of an abutment. For example, FIG. **31** shows an example abutment **1800** including a slot **1809** configured to receive the engagement protrusion **1709** of the coping **1700** shown in FIGS. **30**A and **30**B. The grooves **1715** can be used in combination with the embodiments described above (e.g., FIGS. **7**A and **18**) or as a separate independent feature.

[0162] With reference now to FIGS. **32**A-**32**C, an embodiment of a method **2000** is illustrated for coupling a dental prosthesis **2510** to a dental implant **2110**. The method **2000** is an example of the method **300** described with reference to FIG. **3**. For example, the dental implant **2110** can be coupled to a patient's bone (not shown) or in some instances, may not be coupled to a patient's bone (e.g., prepared at a laboratory). Of course, the dental implant **2110** shown in FIG. **32**A is for illustrational purposes and it is understood that other types of dental implants can be used. For example, the example implant **2110** is shown as having a recess **2120** at the proximal end, while an implant with an external boss can also be contemplated.

[0163] As shown in FIG. **32**A, the method **2000** can include coupling a dental component **2700** to the implant **2110**. For illustrational purposes, FIG. **32**A shows the dental component **2700** as the example abutment **1400** shown in FIGS. **27**A-**27**B. However, the dental component **2700** can include any dental component having any of the various features (e.g., a provisional connection feature) described herein with respect to other embodiments. For example, the dental component **2700** can include any one or more copings, abutments, combined copings/abutments, or combinations thereof. In the case where multiple dental components are used (e.g., a multi-unit abutment or a coping used with an abutment), at least one of the dental components can include a provisional connection feature as described herein with respect to other embodiments.

[0164] A distal portion of the dental component **2700** can be coupled to a proximal portion of the implant **2110**. In FIG. **32**A, the dental component **2700** can be inserted into the recess **2120** of the implant **2110** and coupled together via the provisional connection feature **2706** of the dental component **2700**. For example, the provisional connection feature **2706** can include a snap-fit, friction fit, or other provisional connection feature as disclosed herein.

[0165] The method **2000** can include bonding the prosthesis **2510** to the dental component **2700**. The prosthesis **2510** is illustrated as a single tooth crown. In other embodiments, the prosthesis **2510** can be a multi-tooth restoration such as a partial or full bridge. As described herein, a bonding agent can be applied to the dental component **2700** and to the prosthesis **2510** and/or backfilling holes formed in the prosthesis **2510** with an acrylic, such as a self-curing acrylic or a light cured composite.

[0166] As shown in FIG. **32**B, the bonded prosthesis **2510** and dental component **2700** can be decoupled from the implant **2110** via the provisional connection feature **2706**. In instances where multiple dental components (e.g., a multi-unit abutment or a coping and an abutment) are used, at least one of the dental components can be decoupled from the implant **2110**. For example, as shown in FIGS. **8-12**, the coping **700** can be decoupled from the implant via the provisional connection feature (e.g., the retention spring **708**), while the abutment **650** remains coupled to the implant.

[0167] With continued reference to FIG. **32**B, the method **2000** can also include forming a through-hole (not shown) in both the decoupled dental component **2700** and the prosthesis **2510**. For example, as described herein with respect to

other embodiments, the through-hole can be created using a cutting tool **2850** (e.g., a drill bit) from a distal side of the dental component **2700**. In some instances, an alignment tool (e.g., a drill guide) can be used to facilitate the alignment with the cutting tool **2850**. For example, in some embodiments, the distal portion of the dental component **2700** can be coupled to at least the proximal portion of the alignment tool **2800**. In some instances, the dental component **2700** can be inserted into a cavity **2820** of the alignment tool **2800** and coupled together via the provisional connection feature **2706** (e.g., snap-fit, friction fit, or other provisional connection feature) of the dental component **2700**. However, in various embodiments, an alignment tool might not be needed. For example, the bore within the provisional connection feature **2706** and/or the decoupled dental component **2700** can, in some embodiments serve as an alignment tool. In some such embodiments, eliminating the steps of coupling and decoupling an alignment tool can simplify the procedure and reduce patient chairtime, In certain embodiments, after creating the through-hole through the prosthesis **2510** from the distal side (e.g., apical to occlusal), the cutting tool **2850** can reinforce the through-hole from a proximal side (e.g., occlusal to apical) of the prosthesis **2510**. In some embodiments, as shown in FIG. **32**C, after creating the through-hole through the prosthesis **2510** from the distal side (e.g., apical to occlusal), another cutting tool **2855** (e.g., having a different diameter such as a larger diameter than the cutting tool **2850** creating the original through-hole) can enlargen the through-hole from a proximal side (e.g., occlusal to apical) of the prosthesis **2510**. As described herein, this hole can have a greater diameter than the original through-hole. For example, the cutting tool **2850** creating the original through-hole can have a cutting diameter of about 1.5 mm, while the other cutting tool **2855** can have a cutting diameter of about 2.0 mm. The cutting diameters can be based on the size of the prosthesis, dental components, implant, and/or fasteners, and are not particularly limited. This step can be performed when a fastener being used is larger than the original through-hole. The method **2000** can further include recoupling the dental component **2700** and the prosthesis **2510** to the implant **2110**. As shown in FIG. **32**D, a fastener (e.g., a screw) **2900** can be inserted into the through-hole to couple the prosthesis **2510** to the implant **2110**.

[0168] Certain embodiments of systems and methods can provide an efficient workflow execution post-surgery, which can reduce the risk of site contamination and extensive tissue swelling, thus reducing healing time. For example, systems and methods using a provisional connection feature as described herein can reduce (e.g., substantially eliminate) the use of screwing and unscrewing components in patients which takes chairtime. In addition, certain embodiments described herein can provide a screw access hole which is easy to locate, but not too large.

[0169] As described herein, e.g., with reference to FIG. **1**, in various embodiments, a dental implant **110** can have a distal end **112** designed to be placed within a patient's jaw and a proximal end **114** designed to allow attachment of another dental component such as the abutment **120**, the coping **130**, or the combined coping **130**/abutment **120**. The dental component is not particularly limited. For example, the dental component can include an adapter.

[0170] With reference now to FIG. **33**A, an embodiment of an adapter **3000** is illustrated which can have any one or more of the features described herein with respect to other embodiments. For example, the adapter **3000** can have a distal portion **3002**, a proximal portion **3004**, or both a distal portion **3002** and a proximal portion **3004** having a provisional connection feature. In the illustrated embodiment, the adapter **3000** has a distal portion **3002** having a provisional connection feature **3006**. The provisional connection feature **3006** can be in the form of any of the provisional connection features described herein. In the illustrated embodiment, the provisional connection feature **3006** includes elongate fingers **3008** similar to other fingers described herein. Of course, as described herein, other shapes, sizes, and elements (e.g., springs) for the provisional connection feature **3008** can be used. Furthermore, the material or materials of the adapter **3000** are not particularly limited and can include those described herein for other components. For example, the adapter **3000** can be made of a metal.

[0171] In various embodiments, the distal portion **3002** of the adapter **3000** can be used to mate with the proximal portion of an implant. In some such embodiments, the adapter **3000** can form a snap-fit and/or a friction fit connection (as described herein with respect to other embodiments) with the implant via the provisional connection feature **3006**. The implant is not particularly limited and can include a conical connection, a tri-lobe connection, a hexagonal connection, etc. Advantageously, certain embodiments of the adapter **3000** having a provisional connection feature **3006** can provide a system that is relatively easy to use (e.g., having less parts such as less screws).

[0172] In various embodiments, the adapter **3000** can be configured to be coupled to one or more other dental components, e.g., on a side opposite the implant. For example, the adapter **3000** can be designed to have a proximal portion **3004** (e.g., a conical connection, a tri-lobe connection, a hexagonal connection, etc.) configured to be coupled to a variety of components (e.g., a prosthesis such as a single or multi-tooth restoration, an abutment, an impression component such as an impression post, a healing cap, scan body etc.). The components that can be used are not particularly limited and can include standard, temporary or customer made (CAD/CAM) components. In some embodiments, the components can have a provisional connection feature configured to mate with the adapter **3000** via a snap-fit and/or a friction fit connection. In some embodiments, the components can have an angulated screw channel. In some embodiment, at least a portion of an adapter is designed to face soft tissue when the adapter is coupled with the dental implant. During a healing phase, the soft tissue can adhere to said portion of the adapter. In some embodiments the portion facing the soft tissue has a width "w" measured along a vertical axis of the adapter of at least 4 mm (see FIG. **36**). Advantageously, certain adapters **3000** can remain coupled with the implant, e.g., during the impression and/or healing period, for better soft tissue management and can allow for use of a variety of components. In other words, the adapter may act as a platform that remains coupled to the implant and at least partially contacting the soft tissue to which other dental component can be connected. This avoids destruction of the adhesion between the adapter and the soft tissue that is created during healing of the soft tissue and result in better soft tissue management.

[0173] FIG. **33**B illustrates an embodiment of an adapter **3100** including a proximal portion **3104** having a provisional connection feature **3010** configured to mate with one or

more dental components. The illustrated provisional connection feature **3010** includes a slot, e.g., configured to mate with a corresponding snap-fit element. However, of course, as described herein, other provisional connection features can be used.

[0174] FIGS. **34**, **35** and **36** illustrate example components that can be coupled to an adapter. For example, as shown in FIG. **34**, after the implant (not shown) is placed within a patient's jaw, an adapter **3200** coupled with an impression component **3300** (e.g., an open or closed tray impression post) can be mounted on the implant. The upper part of the impression post can remain in impression material and can act as a connection member for the implant replica. Alternatively, the impression post can act as an intra-oral scan post. As another example, the adapter **3200** coupled with a healing cap **3400**, can be mounted on the implant. The impression can be taken on the healing cap **3400** and scanned with a desktop or intra-oral scanner on the healing cap **3400**. Other examples are possible, for example, the adapter can be mounted on the implant, and a temporary, a standard or a individualized (CAD/CAM) abutment can be coupled with the adapter. FIGS. **35** and **36** illustrates yet another example embodiment. The adapter **3500** can be mounted on the implant **3501**. A prosthesis **3510** (only partially shown on FIG. **36**) can be coupled to the adapter **3500** by a fastener **3590**. In some embodiments, the prosthesis **3510** can include an angulated screw channel **4000** (e.g., up to about 25 degrees from the axis of the implant **3501**) for receiving the fastener **3590**. It should be appreciated that the adapter can be configured to couple with various designs of dental components and various materials of dental components (e.g., dental components made of titanium, titanium alloy, PEEK, zirconia, gold, CoCr, etc.). In certain embodiments, the adapter can be used to create a "tissue level implant". Once placed, the adapter is normally not removed and other dental components can therefore be connected to the adapter at its proximal (coronal) end. This can be done for example by using a screw passing through the adapter and received within a socket of the implant. Therefore, the adapter is provided with a friction fit retention connection allowing connection to the implant, but also allowing disconnection of the adapter to the implant in case of need.

[0175] It should be emphasized that many variations and modifications may be made to the herein-described embodiments, the elements of which are to be understood as being among other acceptable examples. All such modifications and variations are intended to be included herein within the scope of this disclosure and protected by the following claims. Moreover, any of the steps described herein can be performed simultaneously or in an order different from the steps as ordered herein. Moreover, as should be apparent, the features and attributes of the specific embodiments disclosed herein may be combined in different ways to form additional embodiments, all of which fall within the scope of the present disclosure.

[0176] Conditional language used herein, such as, among others, "can," "could," "might," "may," "e.g.," and the like, unless specifically stated otherwise, or otherwise understood within the context as used, is generally intended to convey that certain embodiments include, while other embodiments do not include, certain features, elements and/or states. Thus, such conditional language is not generally intended to imply that features, elements and/or states are in any way required for one or more embodiments or that one or more embodiments necessarily include logic for deciding, with or without author input or prompting, whether these features, elements and/or states are included or are to be performed in any particular embodiment.

LISTING OF EMBODIMENTS

[0177] 1. A system for coupling a dental component to a dental implant, the device comprising:

[0178] a coping comprising a provisional connection feature.

[0179] 2. The system of Embodiment 1, further comprising:

[0180] an abutment comprising a provisional connection feature and a second connection feature;

[0181] wherein the coping and the abutment are configured to be temporarily coupled together via the provisional connection feature; and

[0182] wherein the abutment is configured to be coupled to the implant.

[0183] 3. The system of Embodiment 2, further comprising a fastener comprising threading, the threading configured to engage the second connection feature to couple the coping with the abutment.

[0184] 4. The system of any of Embodiments 1-3, wherein the coping further comprises an elongate member, the elongate member comprising a plurality of protrusions and slots.

[0185] 5. The system of any of Embodiments 1-4, wherein the provisional connection feature of the coping comprises a resilient member.

[0186] 6. The system of Embodiment 5, wherein the resilient member comprises a wave spring.

[0187] 7. The system of Embodiment 6, wherein the wave spring is received within a slot of the provisional coping.

[0188] 8. The system of Embodiment 5, wherein the provisional connection feature of the coping comprises one or more resilient fingers.

[0189] 9. The system of any of Embodiments 1-8, wherein the coping comprises a body component and a connector component, wherein the connector component comprises the provisional connection feature of the coping.

[0190] 10. The system of Embodiment 9, wherein the body component comprises the elongate member.

[0191] 11. The system of any of Embodiments 9 or 10, wherein the body component and the connector component are configured to be coupled together.

[0192] 12. The system of Embodiment 11, wherein the body component and the connector component are configured to be coupled via a friction fit.

[0193] 13. The system of Embodiment 11, wherein the connector component comprises threading configured to engage corresponding threading on the body component.

[0194] 14. The system of any of Embodiments 1-13, further comprising a cutting tool.

[0195] 15. The system of Embodiment 14, further comprising an alignment tool configured to be removably coupled to the coping via the provisional connection feature of the coping.

[0196] 16. The system of Embodiment 15, the alignment tool further comprising an alignment feature through which the cutting tool can pass.

[0197] 17. A method of coupling a dental prosthesis to an implant and an abutment in a patient's jaw, the method comprising:

[0198] coupling a coping to the abutment using a snap-fit connection;

[0199] bonding the prosthesis to the coping;

[0200] decoupling the prosthesis and coping from the abutment via the snap-fit connection,

[0201] forming a through-hole in both the coping and the prosthesis; and

[0202] coupling the coping and prosthesis to the abutment using a fastener inserted into the through-hole.

[0203] 18. A method of coupling a dental prosthesis to an implant and an abutment in a patient's jaw, the method comprising:

[0204] temporarily coupling a coping to the abutment via a provisional connection feature;

[0205] modifying the alignment between the prosthesis and coping and coupling the prosthesis to the coping;

[0206] removing the prosthesis and coping from the abutment such that the prosthesis and coping remain in the modified alignment.

[0207] 19. The method of Embodiment 18, further comprising forming a hole through at least the prosthesis using a cutting tool.

[0208] 20. The method of Embodiment 19, wherein the step of forming a hole through at least the prosthesis comprises attaching an alignment tool to the coping and using the alignment tool to align the cutting tool with respect to the prosthesis.

[0209] 21. The method of any of Embodiments 18 or 19, further comprising coupling the coping to the abutment via a second connection feature, the second connection feature being different from the provisional connection feature.

[0210] 22. The method of Embodiment 21, wherein the step of coupling the coping to the abutment via a second connection feature comprises fastening the coping to the abutment using a threaded fastener.

[0211] 23. The method of any of Embodiments 18-22, wherein the step of temporarily coupling the coping to the abutment via a provisional connection feature comprises engaging a snap fit connection feature on the coping with a corresponding snap fit connection feature on the abutment.

[0212] 24. The method of any of Embodiments 18-23, wherein the step of coupling the prosthesis to the coping comprises applying a bonding agent to the coping and to the prosthesis.

[0213] 25. The method of Embodiment 24, wherein the prosthesis comprises one or more blind holes and the step of applying the bonding agent to the prosthesis comprising introducing the bonding against into the one or more blind holes.

[0214] 26. The method of any of Embodiments 18-25, wherein the step of modifying the alignment between the prosthesis and coping comprises orienting occlusal surfaces and establishing vertical dimension of the prosthesis with occlusal surfaces of opposing dentition.

[0215] 27. The method of any of Embodiments 18-26, further comprising determining a preliminary fit of the prosthesis with respect to the coping prior to the step of attaching the prosthesis to the coping.

[0216] 28. The method of Embodiment 27, further comprising modifying the coping to alter the fit of the prosthesis with respect to the coping.

[0217] 29. A method of attaching and aligning a dental prosthesis to an abutment and coping in a patient's jaw, the method comprising:

[0218] coupling the coping to the abutment via a provisional connection feature;

[0219] bonding the prosthesis to the coping;

[0220] modifying the alignment between the prosthesis and the coping while the prosthesis is being bonded to the coping;

[0221] removing the prosthesis and coping from the abutment.

[0222] 30. The method of Embodiment 29, further comprising forming one or more blind holes in the prosthesis and the step of bonding the prosthesis to the coping comprises bonding the coping within the one or more blind holes.

[0223] 31. The method of Embodiment 29, further comprising forming a hole through the prosthesis using a cutting tool.

[0224] 32. The method of Embodiment 31, wherein the step of forming a hole through the prosthesis comprises attaching an alignment tool to the coping and using the alignment tool to align the cutting tool with respect to the prosthesis.

[0225] 33. The method of Embodiment 31, further comprising coupling the coping to the abutment using a threaded fastener.

[0226] 34. The method of Embodiment 29, wherein the step of modifying the alignment between the prosthesis and coping comprises placing occlusal surfaces of the prosthesis in contact with occlusal surfaces of opposing dentition.

[0227] 35. A system for coupling one or more dental components to a dental implant, the system comprising:

[0228] at least one dental component of the one or more dental components comprising a provisional connection feature.

[0229] 36. The system of Embodiment 35, wherein the at least one dental component comprises an abutment configured to couple with the dental implant via the provisional connection feature.

[0230] 37. The system of Embodiment 36, wherein the abutment comprises an abutment integrated with a coping.

[0231] 38. The system of Embodiment 36, wherein the provisional connection feature of the abutment comprises one or more fingers.

[0232] 39. The system of Embodiment 36, wherein the provisional connection feature of the abutment comprises a spring.

[0233] 40. The system of Embodiment 36, wherein the abutment and the implant are configured to be coupled via a snap-fit.

[0234] 41. The system of Embodiment 36, wherein the abutment and the implant are configured to be coupled via a friction fit.

[0235] 42. The system of Embodiment 35, wherein the one or more dental components comprise a coping and an abutment,

[0236] wherein the at least one dental component comprises the coping configured to couple with the abutment via the provisional connection feature, or

[0237] wherein the at least one dental component comprises the abutment configured to couple with the coping via the provisional connection feature.

[0238] 43. The system of Embodiment 42, wherein the abutment comprises a second connection feature, and the abutment is configured to be coupled to the implant via the second connection feature.

[0239] 44. The system of Embodiment 42, wherein the provisional connection feature comprises one or more fingers.

[0240] 45. The system of Embodiment 42, wherein the provisional connection feature comprises a spring.

[0241] 46. The system of Embodiment 42, wherein the coping and the abutment are configured to be coupled via a snap-fit.

[0242] 47. The system of Embodiment 42, wherein the coping and the abutment are configured to be coupled via a friction fit.

[0243] 48. The system of Embodiment 42, wherein the coping comprises an elongate member, the elongate member comprising a plurality of protrusions and slots.

[0244] 49. The system of Embodiment 42, wherein the coping comprises a flange, the flange comprising a plurality of grooves.

[0245] 50. The system of Embodiment 35, further comprising a cutting tool.

[0246] 51. The system of Embodiment 35, wherein the at least one dental component comprises an adapter configured to couple with the dental implant via the provisional connection feature.

[0247] 52. The system of Embodiment 51, wherein the provisional connection feature comprises one or more fingers.

[0248] 53. The system of Embodiment 51, wherein the provisional connection feature comprises a spring.

[0249] 54. The system of Embodiment 51, wherein the adapter and the implant are configured to be coupled via a snap-fit.

[0250] 55. The system of Embodiment 51, wherein the adapter and the implant are configured to be coupled via a friction fit.

[0251] 56. The system of Embodiment 51, wherein the adapter is configured to be coupled to one or more other dental components on a side opposite the dental implant.

[0252] 57. The system of Embodiment 56, wherein the one or more other dental components comprise at least one of a prosthesis, an abutment, an impression post, and a healing cap.

[0253] 58. The system of Embodiment 57, wherein the one or more other dental components comprise an angulated screw channel.

[0254] 59. A method of creating a dental prosthesis configured to be coupled to a dental implant, the method comprising:

[0255] coupling one or more dental components to the implant, at least one dental component of the one or more dental components having a provisional connection feature;

[0256] bonding the prosthesis to the one or more dental components;

[0257] decoupling the prosthesis and the at least one dental component from the implant via the provisional connection feature; and

[0258] forming a through-hole in both the at least one dental component and the prosthesis, wherein the through-hole is configured to receive a fastener configured to couple with the prosthesis and the at least one dental component to the dental implant.

[0259] 60. The method of Embodiment 59, wherein forming the through-hole comprises forming the through-hole using a cutting tool from a distal side of the at least one dental component.

[0260] 61. The method of Embodiment 60, wherein forming the through-hole further comprises forming the through-hole using the cutting tool or another cutting tool from an occlusal side of the prosthesis.

[0261] 62. The method of Embodiment 59, further comprising coupling the at least one dental component and the prosthesis to the implant using the fastener inserted into the through-hole.

[0262] 63. The method of Embodiment 59, wherein the provisional connection feature comprises a snap-fit connection feature.

[0263] 64. The method of Embodiment 59, wherein the provisional connection feature comprises a friction fit connection feature.

[0264] 65. The method of Embodiment 59, wherein the at least one dental component comprises an abutment configured to couple with the implant via the provisional connection feature.

[0265] 66. The method of Embodiment 65, wherein the abutment comprises an abutment integrated with a coping.

[0266] 67. The method of Embodiment 59, wherein the one or more dental components comprise a coping and an abutment,

[0267] wherein the at least one dental component comprises the coping configured to couple with the abutment via the provisional connection feature, or

[0268] wherein the at least one dental component comprises the abutment configured to couple with the coping via the provisional connection feature.

[0269] 68. The method of Embodiment 67, wherein the abutment comprises a second connection feature, and the abutment is configured to be coupled to the implant via the second connection feature.

[0270] 69. A Method of creating a dental restoration comprising:

[0271] a) coupling a first dental components, such as an adapter to a dental implant installed in a jaw bone using a snap fit and/or a friction fit connection such that at least a portion of said first dental component faces soft tissue, said first dental component being designed not to be removed from the dental implant;

[0272] b) coupling at least another dental component to said first dental component.

[0273] 70. The method of embodiment 69 wherein coupling another dental component comprises coupling a healing abutment, an impression component or an intra-oral scan post a to the first dental component.

[0274] 71. The method of embodiment 69 wherein coupling another dental component comprises coupling a prosthesis including an angulated screw channel to the first dental component using a fastener.

1. A system for coupling a dental component to a dental implant, the device comprising:

a coping comprising a provisional connection feature; and

an alignment tool configured to be removably coupled to the coping via the provisional connection feature of the coping, the alignment tool comprising an alignment feature through which the cutting tool can pass.

2. The system of claim 1, further comprising:
an abutment comprising a provisional connection feature and a second connection feature;
wherein the coping and the abutment are configured to be temporarily coupled together via the provisional connection feature; and
wherein the abutment is configured to be coupled to the implant.

3. The system of claim 2, further comprising a fastener comprising threading, the threading configured to engage the second connection feature to couple the coping with the abutment.

4. The system of claim 1, wherein the coping further comprises an elongate member, the elongate member comprising a plurality of protrusions and slots.

5. The system of claim 1, wherein the provisional connection feature of the coping comprises a resilient member.

6. (canceled)

7. (canceled)

8. (canceled)

9. The system of claim 1, wherein the coping comprises a body component and a connector component, wherein the connector component comprises the provisional connection feature of the coping.

10. (canceled)

11. (canceled)

12. (canceled)

13. (canceled)

14. The system of claim 1, further comprising a cutting tool.

15. (canceled)

16. (canceled)

17. A method of coupling a dental prosthesis to an implant and an abutment in a patient's jaw, the method comprising:
coupling a coping to the abutment using a snap-fit connection;
bonding the prosthesis to the coping;
decoupling the prosthesis and coping from the abutment via the snap-fit connection,
forming a through-hole in both the coping and the prosthesis; and
coupling the coping and prosthesis to the abutment using a fastener inserted into the through-hole.

18. A method of coupling a dental prosthesis to an implant and an abutment in a patient's jaw, the method comprising:
temporarily coupling a coping to the abutment via a provisional connection feature;
modifying the alignment between the prosthesis and coping and coupling the prosthesis to the coping;
removing the prosthesis and coping from the abutment such that the prosthesis and coping remain in the modified alignment; and
forming a hole through at least the prosthesis using a cutting tool.

19. (canceled)

20. The method of claim 19, wherein the step of forming a hole through at least the prosthesis comprises attaching an alignment tool to the coping and using the alignment tool to align the cutting tool with respect to the prosthesis.

21. The method of claim 18, further comprising coupling the coping to the abutment via a second connection feature, the second connection feature being different from the provisional connection feature.

22. (canceled)

23. The method of claim 18, wherein the step of temporarily coupling the coping to the abutment via a provisional connection feature comprises engaging a snap fit connection feature on the coping with a corresponding snap fit connection feature on the abutment.

24. The method of claim 18, wherein the step of coupling the prosthesis to the coping comprises applying a bonding agent to the coping and to the prosthesis.

25. (canceled)

26. The method of claim 18, wherein the step of modifying the alignment between the prosthesis and coping comprises orienting occlusal surfaces and establishing vertical dimension of the prosthesis with occlusal surfaces of opposing dentition.

27. The method of claim 18, further comprising determining a preliminary fit of the prosthesis with respect to the coping prior to the step of attaching the prosthesis to the coping.

28. The method of claim 27, further comprising modifying the coping to alter the fit of the prosthesis with respect to the coping.

29. (canceled)

30. (canceled)

31. (canceled)

32. (canceled)

33. (canceled)

34. (canceled)

35. (canceled)

36. (canceled)

37. (canceled)

38. (canceled)

39. (canceled)

40. (canceled)

41. (canceled)

42. (canceled)

43. (canceled)

44. (canceled)

45. (canceled)

46. (canceled)

47. (canceled)

48. (canceled)

49. (canceled)

50. (canceled)

51. (canceled)

52. (canceled)

53. (canceled)

54. (canceled)

55. (canceled)

56. (canceled)

57. (canceled)

58. (canceled)

59. A method of creating a dental prosthesis configured to be coupled to a dental implant, the method comprising:
coupling one or more dental components to the implant, at least one dental component of the one or more dental components having a provisional connection feature;
bonding the prosthesis to the one or more dental components;
decoupling the prosthesis and the at least one dental component from the implant via the provisional connection feature; and
forming a through-hole in both the at least one dental component and the prosthesis, wherein the through-hole is configured to receive a fastener configured to

couple with the prosthesis and the at least one dental component to the dental implant.

60. The method of claim **59**, wherein forming the through-hole comprises forming the through-hole using a cutting tool from a distal side of the at least one dental component.

61. The method of claim **60**, wherein forming the through-hole further comprises forming the through-hole using the cutting tool or another cutting tool from an occlusal side of the prosthesis.

62. The method of claim **59**, further comprising coupling the at least one dental component and the prosthesis to the implant using the fastener inserted into the through-hole.

63. The method of claim **59**, wherein the provisional connection feature comprises a snap-fit connection feature.

64. The method of claim **59**, wherein the provisional connection feature comprises a friction fit connection feature.

65. The method of claim **59**, wherein the at least one dental component comprises an abutment configured to couple with the implant via the provisional connection feature.

66. (canceled)

67. The method of claim **59**, wherein the one or more dental components comprise a coping and an abutment,

wherein the at least one dental component comprises the coping configured to couple with the abutment via the provisional connection feature, or

wherein the at least one dental component comprises the abutment configured to couple with the coping via the provisional connection feature.

68. The method of claim **67**, wherein the abutment comprises a second connection feature, and the abutment is configured to be coupled to the implant via the second connection feature.

69. (canceled)

70. (canceled)

71. (canceled)

* * * * *