CLAIMS

What is claimed is:

1. A bone implant comprising

~~i. one or more bone attachment components for securing the implant into a bone, wherein each bone attachment component includes an internally threaded bore hole for receiving a connector component; and~~

~~ii. a head component independent of and separable from the bone attachment components, wherein the head component is adapted so as to be secured to the one or more bone attachment components at the time of initial implantation of the bone attachment components and the head component into the bone; wherein the head component is adapted to be oriented relative to at least one of the one or more bone attachment components at a predetermined tilt angle, so that the implant generally conforms with a natural root structure of a missing tooth.~~

i. a head component for securing the implant into a bone, wherein the head component has a proximal end and distal end and is adapted along its entire length to be implanted entirely in the bone, wherein the proximal end has a long direction and a short direction both orthogonal to the length of the head component, and the head component is adapted for orienting the long direction parallel to a long axis of the bone;

ii. one or more bone attachment components including a first bone attachment component, each independent of and separate from the head component for securing the implant into a bone, wherein each bone attachment component has a proximal end and a distal end and is adapted along its entire length to be implanted in the bone and includes an internally threaded bore hole for receiving a connector component;

wherein the head component is further adapted to be secured to each of the bone attachment components with the connector components at the time of initial implantation of the bone attachment component and the head component into the bone; and

wherein the first bone attachment component oriented at a tilt angle to the proximal end of the head component is secured to the head component at the tilt angle, wherein the tilt angle is an acute angle between the length direction of the head component and an axis of rotation of the first bone attachment component; and

iii. an abutment adapted to be secured independently to the head component in an overlying relation to the head component.

2. The bone implant of claim 1, wherein the bone implant is a dental implant and the tilt angle is an acute angle of ~~between~~ 0.5° or more ~~and 90° relative to the bone attachment component~~.

3. The bone implant of claim 1 or 2, wherein the bone implant comprises two or more bone attachment components including two bone attachment components having longitudinal ~~axis~~ axes that are not parallel.

4. The bone implant of any of claims 1 to 3, wherein the bone implant includes two or more bone attachment components including two bone attachment components each having a predetermined tilt angle with respect to the head component, wherein the two tilt angles diverge outwardly, are non-planar, differ in magnitude, or any combination thereof.

5. The bone implant of any of claims 1 to 4, wherein each bone attachment component has a distal end and the head component has a proximal surface for mating with the distal end of the bone attachment component, wherein the bone implant includes one or more first connector components, wherein each first connector component secures a bone attachment component to the head component in an angled relation to the head component, so that the proximal surface of the head component rests on the distal ends of the respective angled one or more bone attachment components.

~~6. The bone implant of claim 5, wherein the head component and one or more bone attachment component are secured by the one or more first connectors at the time of initial implantation of the head component and the one or more bone attachment components into the bone~~

~~7.~~6. The bone implant of any of claims 1 to ~~6~~5, wherein the head component has one or more bore holes, wherein each bore hole is divided into two or more sections including:

i. an upper bore hole section having a generally vertical orientation aligned with a length direction of the head component, wherein the length direction is orthogonal to the short direction and the long direction; and

ii. a lower bore hole section oriented at a~~n~~ tilt angle relative to the orientation of the upper bore hole section, and which includes an ~~angled~~ internal limiting flange along ~~its~~ a proximal end of the lower bore hole section, wherein the internal limiting flange is oriented at a corresponding angle to the lower bore hole section~~,~~ for enabling the ~~first~~ connector component to securely fasten ~~the head component to~~ the bone attachment component to the head component at the ~~predetermined~~ tilt angle~~, wherein the angled flange separates the distal head of said first connector from said head component and said bone attachment component~~.

~~8.~~7. The bone implant of Claim ~~7~~6, wherein the head component includes two bore holes having lower sections that are not parallel to each other.

~~9.~~8. The bone implant of claim ~~7~~6 or ~~8~~7, wherein the relation of each of the separate angled bone attachment components to the separate head component forms a stress breaker between the head component and the bone attachment components.

~~10.~~9. The bone implant of any of claims 1 to ~~9~~8, wherein the proximal end of the head component has an undersurface and includes one or more ~~angled~~ set rings ~~inset into the~~ angled relative to the undersurface of the head component's exterior proximal surface, wherein each ~~inset~~ set ring allows for an intimate seating of the distal end of one of the bone attachment components at the ~~predetermined~~ tilt angle to the under surface of the proximal end of the head component.

~~11.~~10. The bone implant of claim ~~10~~9, wherein the angled ~~inset~~ set ring is substantially spherical in contour and the distal end of the bone attachment component is substantially spherical, the contours of both being adapted to provide a ball and socket coupling of the distal end of the bone attachment component to the set ring.

~~12.~~11. The bone implant of any of claims 1 to ~~11~~19, wherein the natural root structure includes a trunk section, wherein the head component has a cross-sectional outer wall shape that

relates to the natural cross-sectional form of the trunk section of the natural root structure of the missing tooth.

~~13.~~12. The bone implant of claim ~~12~~11, wherein the head component has a cross-sectional shape selected from the group consisting of an oval, a rhomboid, or a kidney-shape.

~~14.~~13. The bone implant of any of claims 1 to ~~13~~12, wherein the implant includes an ~~abutment~~oval head component and ~~,~~ wherein the abutment is shaped to conform to the shape of the head component ~~it rests on and to provide a substantially rotation-free fit relative to the head component~~.

~~15.~~14. The bone implant of any of claims 1 to ~~14~~13, wherein the head component is attached to the~~has one or more indentations on its top surface to allow for greater frictional fit and proper positioning of an~~ abutment component, wherein the abutment component has one or more bore holes aligned with the one or more bore holes of the head component.

~~16.~~15. The bone implant of any of claims 1 to ~~15~~14, wherein the~~–~~ assembled bone implant is capable of being installed in the natural extraction socket of a missing tooth with either minimal or no bone preparation and minimal or no bone filling material~~–~~ in the absence of re-grown bone.

~~17.~~16. The bone implant of any of claims 1 to ~~16~~15, wherein each of the one or more bone attachment components has a distal neck with a convex collar surrounding the neck, wherein the neck has a lip region that surrounds the internally threaded bore hole of each of the one or more bone attachment components, and the neck has an external petal shaped locking feature incorporated on the lip region; the head component includes a bore hole for attaching the head component to one of the one or more bone attachment components using the connector component; wherein the neck inserts into the bore hole of the head component and the convex collar of the neck seats onto a matching concave limiting flange of the bore hole of the head component while the petal shaped locking feature on the neck of each of the one or more bone attachment components extends beyond the limiting flange and couples with a matching petal shaped locking feature incorporated in the bore hole of the head component above the limiting concave flange.

~~18.~~17. The bone implant of any of claims 1 to ~~17~~16, wherein the head component has a bore hole; the bone attachment is a root screw having an externally threaded shaft for screwing into a bone, wherein the diameter of the externally threaded shaft is greater than the diameter of the bore hole of the head component in the proximal region of the head component where the head component rests on a distal end of the root screw.

~~19.~~18. A bone implant comprising:

i. one or more bone attachment components each adapted along its entire length to be implanted in a bone for securing the implant into a bone, wherein each bone attachment component has an axis of rotation and includes an internally threaded bore hole for receiving a connector component;

ii. a head component independent of and separable from the bone attachment component, wherein the head component has a proximal end and is adapted along its entire length to be implanted in a bone wherein the proximal end has a long direction and a short directions both orthogonal to the length of the head component, and wherein the head component is adapted to be secured in the bone to the bone attachment component at the time of the initial implantation of the bone

implant into a bone, and wherein the head component is further adapted to be secured to an abutment component at a later time; and

iii. one or more first connector components having an axis of rotation and that temporarily secures the head component to the bone attachment component at the time of initial implantation of the bone component and the head component in a bone;

wherein the head component includes one bore hole per bone attachment component, each bore hole of the head component having an internal limiting seat circumferential flange oriented at a tilt angle for receiving one of the first connector components; wherein each first connector component has a distal head section that substantially fills the distal region of the bore hole of the head component; and

each first connector component is removable so that it may be replaced by a second connector component that is sufficiently long for securing an abutment component that is distally positioned to the bone attachment component with the head component interposed between the abutment component and the bone attachment component; wherein a corresponding set of one of the bone attachment components and one of the first connector components are axially aligned and tilted relative to the head component at a tilt angle, wherein the tilt angle is the acute angle between the length direction and the axes of rotation.

~~20.~~19. The implant of claim ~~19~~18, wherein the head section of the first connector is adapted to function as a cover for the head component bore hole while the head attachment and the bone attachment components undergo osseo-integration in a bone.

~~21.~~20. A method comprising:

a step of replacing the first connector component of claim ~~19~~ 18 or ~~20~~ 19 with a second connector component adapted to secure an abutment component to the head component and to the bone attachment component, wherein the step of replacing is following osseo-integration of the bone attachment component, the head component or both.

~~22. A dental implant drilling apparatus for implanting the bone implant of any of claims 1 to 20, the apparatus comprising:~~

~~a removable dental hand piece guide sleeve that securely attaches to a working head of a dental drill, wherein the guide sleeve has a cut-out slot adapted to be attached and removed from a drill head, and wherein the guide sleeve includes a separate hole cut into the guide sleeve to allow for the unimpeded spray of irrigating solution from the drill head when drilling into a hard tissue.~~

~~23. The apparatus of claim 22, wherein the apparatus comprises a surgical jig device with a drilling platform for securing to a patient bone, said jig device including: clamping elements and/or polymerized dental composite materials for securing the jig device to the patient's bone; a separate and removable sliding first drill guide assembly wherein said assembly attaches and is secured to the surgical jig to enable a controlled milling procedure in the bone of a symmetrical or asymmetrical first bone preparation location.~~

~~24. The apparatus of claim 23, wherein the apparatus includes a separate and removable second drill assembly guide wherein said assembly attaches and is secured to the surgical~~

~~jig for the accurate bone drilling preparation of one or more straight or angled bore shafts into the floor of the previously prepared first bone preparation.~~

~~25. The apparatus of claim 24, wherein the separate and removable second drill guide assembly can be removed from the surgical jig and then reattached and secured back to it after turning said drill guide 180 degrees so as to allow for the drilling of a second bore shaft into the floor of~~

the previously prepared first bone preparation at a different location and different angle in relation to the first bore shaft that was already drilled into the floor.

26. The apparatus of any of claims 22 to 25, wherein the drilling platform of the surgical jig allows for the attachment and securing to said platform of multiple first and second drill guide assemblies so as to allow for the controlled preparation of multiple sets of first and second bone preparations and the controlled insertion and securing to each other in said bone preparations of multiple sets of a head component and bone attachment components.

27. The apparatus of any of claims 22 to 26, wherein the apparatus includes a driver tool for screwing the bone attachment component into a bone, wherein the driver tool is adapted to be inserted into the drill guide assembly for controlling the precise location and depth that the bone attachment component is screwed into the bone.

28. The apparatus of claim27, wherein the driver tool comprises an inner adjustable screw which can be turned to engage the internally threaded bore of the bone attachment component.

29. The apparatus of any of claims 22 to 28, wherein the apparatus includes a first template to check the dimensions of the first bone preparation during the initial implantation procedure.

30. The apparatus of any of claims 22 to 29, wherein the apparatus includes a second template adapted to check the dimensions of one or more prepared bore shaft bone preparations during the initial implantation procedure.

31. The apparatus of any of claims 22 to 30, wherein the apparatus includes a third template to check the precise placement of multiple bone attachment components during the initial implantation procedure once the bone attachment components have been screwed into their respective prepared bore shafts, wherein the placement is determined relative to the floor of the previously prepared first bone preparation.

~~32.~~21. A kit for the bone implant of any of claims 1 to ~~20~~19, wherein the kit includes one or more of the bone attachment components and a plurality of the head components including at least two head components that differ with respect to at least one of their tilt angles.

~~33.~~22. The bone implant of claim 1, wherein each bone attachment component has a longitudinal axis, and wherein the head component has a longitudinal axis generally orthogonal to a jawbone into which it is installed, and wherein the head component is tilted relative to the bone attachment component, such that the tilt angle is defined by the acute angle between the longitudinal axis of the bone attachment component and the longitudinal axis of the head component.