

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
22 October 2009 (22.10.2009)

(10) International Publication Number  
**WO 2009/127880 A1**

- (51) **International Patent Classification:**  
A61C 8/00 (2006.01)
- (21) **International Application Number:**  
PCT/GB2009/050388
- (22) **International Filing Date:**  
17 April 2009 (17.04.2009)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**  
0807118.5 18 April 2008 (18.04.2008) GB
- (71) **Applicant (for all designated States except US):** **NEOSS LIMITED** [GB/GB]; Windsor House, Cornwall Road, Harrogate, Yorkshire HG1 2PW (GB).
- (72) **Inventor; and**
- (75) **Inventor/Applicant (for US only):** **ENGMAN, Fredrik Nils** [SE/SE]; Haggvagen 19, S-435 37 Molnlycke (SE).
- (74) **Agent:** **STAINTHORPE, Vanessa**; Harrison Goddard Foote, Fountain Precinct, Balm Green, Sheffield, South Yorkshire S1 2JA (GB).
- (81) **Designated States (unless otherwise indicated, for every kind of national protection available):** AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) **Designated States (unless otherwise indicated, for every kind of regional protection available):** ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR),

[Continued on next page]

(54) **Title:** SPACER ELEMENT FOR USE IN A DENTAL IMPLANT ASSEMBLY

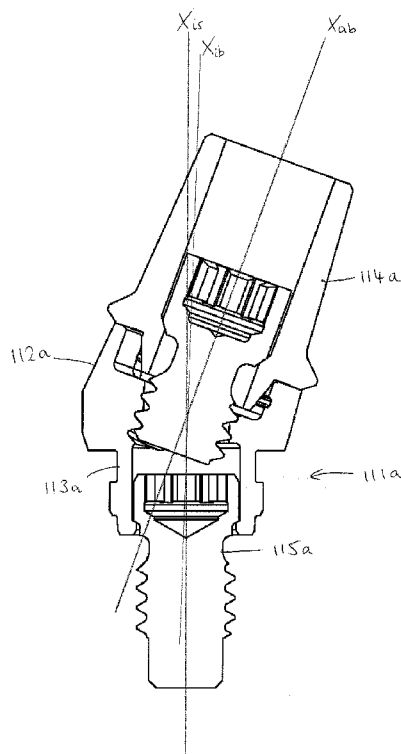


Fig 11

(57) **Abstract:** A spacer element for use in a dental implant assembly having a single aperture therethrough, the single aperture comprising an implant screw access bore and an offset abutment screw bore.

WO 2009/127880 A1

OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG). **Published:**

— with international search report (Art. 21(3))

## SPACER ELEMENT FOR USE IN A DENTAL IMPLANT ASSEMBLY

### FIELD OF THE INVENTION

The present invention relates to the field of a novel spacer element for use in  
5 connection with a dental implant assembly and particularly a spacer element for use  
with an angulated or inclined abutment.

The present invention also relates to the field of a dental implant assembly  
comprising such a novel spacer element and to an implant screw pre-mounted in  
10 such a spacer element. Furthermore the invention relates to the field of a novel  
dental construction e.g. a dental bridge comprising one or more spacer elements and  
to methods related thereto.

### BACKGROUND

15 In a dental implant assembly, there is usually a fixing of some kind for fixing, *inter  
alia*, an abutment or a spacer element to a dental implant. Typically, the fixing is a  
screw known as an implant screw. This implant screw is not the same as the implant  
per se which is itself externally threaded.

20 It is often desirable to have the abutment positioned at an inclined angle relative to  
(i.e. not coaxial with) the implant screw or implant per se. This may be of value in a  
number of different circumstances, however, it is especially advantageous when  
used in connection with dental bridges and the like. It is often desirable to design a  
dental bridge or superstructure with an angled implant screw channel so that, *inter  
25 alia*, the mouth of the channel can be on the interior or the occlusal surface of the  
dental bridge.

However, the provision of an inclined abutment (angulated relative to the implant screw and thereby the implant) is problematical since it makes it difficult or impossible to easily access the head of the implant screw with the usual (substantially straight) tool through the angulated abutment bore. There have been a  
5 number of attempts to try to overcome this problem.

For example, US Patent No. 6,663,388 to Straumann describes a two part dental implant comprising a straight or angular abutment which can be established by means of a base screw and a supporting ring. The abutment is provided with an inlet  
10 in the form of an axial passage. From the side of the root part, a base screw is pushed with its screw head first into the axial passage. The threaded shank of the base screw, when inserted, protrudes from the root part of the abutment. The protruding portion is intended for engagement in the axial internally threaded hole in the implant. Thus, after insertion of the base screw into the abutment, a support ring  
15 is pushed over the threaded shank of the base screw into the mouth of the inlet and is fixed in its intended position. Fixing takes place by radial welding to the lower edge of the abutment.

US Patent No. 6,848,908 to Nobel Biocare describes a dental implant arrangement,  
20 comprising a spacer element provided with a first passage having a centre line and an opening to receive a screw adapted to be fastened in an implant and being capable of receiving a screwdriver, and a second passage having an opening and a centre line along a longitudinal axis arranged at an angle with respect to a direction of screwing, the first passage being arranged at an angle relative to a direction of  
25 screwing of the first screw. The second passage is adapted to receive a second screw and a corresponding screwdriver, the second screw being there to fasten the superstructure to the spacer; wherein the centre lines angled with respect to the direction of screwing.

We provide a novel spacer element and corresponding dental implant assembly which overcomes or mitigates the disadvantages of and/or differs from the prior art assemblies.

5       **STATEMENT OF INVENTION**

Therefore, according to one embodiment of the invention, there is provided a spacer element for use in a dental implant assembly having a single aperture therethrough, the single aperture comprising an implant screw access bore and an offset abutment screw bore.

10

Preferably, the longitudinal axes of the implant screw access bore and the offset abutment screw bore, when projected (for example onto a plane extending substantially vertically through said single aperture), intersect within said single aperture.

15

More particularly, the implant screw access bore is designed such that, in use, the implant screw access bore is substantially coaxial with the implant screw. However, it will be understood that the implant screw access bore may be inclined relative to the implant or the implant screw. The degree of incline at which the implant screw access bore is inclined relative to the implant or the implant screw may vary, but preferably may be from 0 to 10 degrees. The implant screw access bore is preferably threadless or substantially threadless, although it will be understood that the screw access bore may still coincide with a thread. Such an arrangement is advantageous in that, *inter alia*, the dental practitioner is provided with unhindered access to the implant screw.

20

25

Although part of the single aperture, the abutment screw bore is offset, angulated or inclined from the coaxial implant screw access bore and the implant screw. The

degree of offset may vary. Thus, depending upon, *inter alia*, the nature of the implant or construction which is being designed, the angulation of the abutment, the offset may be from 1 to 30 degrees, preferably 15 to 30 degrees, when measured relative to the longitudinal axis of the implant screw access bore. However, as hereinbefore  
5 described, the implant screw access bore may itself be inclined relative to the implant or the implant screw. Thus, in use, the abutment may be positioned at an angle relative to the implant screw, this angle ranging from 1 to 40 degrees, with a subsequent angulation between the implant and abutment connecting surfaces of the spacer. The abutment screw bore is threaded to facilitate engagement with the  
10 abutment. Preferably the thread is cut outwardly into the wall of the abutment screw bore so as not to impede the access into the implant screw access bore. The angulated abutment may find utility in a dental implant assembly or in a dental construction or dental bridge.

15 In one embodiment of the invention there is provided a spacer element comprising a threadless bore and an offset threaded bore. Preferably, the spacer element comprises a threadless implant screw access bore and an offset threaded abutment bore. Preferably, the threadless aperture is substantially coaxial with the implant screw, with the means of engaging an implant screw and the threaded aperture  
20 offset. Thus, in this embodiment the threadless bore will essentially bisect the threaded bore. Therefore, the threaded bore will comprise a bore that is only partially threaded. The amount of thread will vary depending, *inter alia*, upon the angulation of the offset aperture, size of thread, type of thread and size of implant screw access bore. Thus, there is also provided a spacer element comprising single aperture  
25 which is provided with a threadless bore and an offset partially threaded bore. Preferably, the partially threaded bore is offset from the axis of the implant or implant screw, e.g. offset by 1 to 30 degrees. Thus, the threadless bore is preferably coaxial

with the implant or implant screw or is only marginally offset, e.g. offset by from 0 to 10 degrees.

5 Preferably, the spacer element is provided with an implant screw engaging portion or implant engaging portion and an abutment screw engaging portion. Such engaging portions may comprise conventional engaging mechanisms known *per se*, such as internal or external connection arrangements, for example, internal or external versions of a hex or morse taper; and combinations thereof including means to provide options for rotational or non-rotational engagement. Alternatively, the  
10 engaging mechanism may comprise a screw, for example, which may be dropped through the spacer such that it is positioned to engage the implant. When the engaging mechanism comprises a drop through screw as hereinbefore described, the spacer element may advantageously be provided with an internal flange against which the “drop through” screw may rest. In a further alternative, the spacer element  
15 may be provided with a locking ring. The locking ring may be adapted to engage with an implant and/or an implant screw. It is desirable that the locking ring is integral to the spacer element. Alternatively, the locking ring may be fixed onto the spacer element, e.g. by welding. The locking ring may be provided with one or more longitudinal slots in the circumferential wall of the locking ring. Thus, the locking ring  
20 may comprise a resilient material, such as a plastics or metal, so that in use, the one or more longitudinal slots will allow an expansion of the locking ring enabling it to be pushed into position onto, for example, an implant screw being positioned by other means then dropped through as previously described.

25 In most cases, a dental implant is provided with a blind bore for engagement with the implant screw. In addition the implant can provide an annular recess for housing the head of the implant screw. Thus, in a further preferred embodiment of the invention

the locking ring is dimensioned such that it will form a snug fit within the annular recess of the implant.

Alternatively, the locking ring may have a diameter which is less than that of the annular recess of the implant screw. Such an arrangement facilitates the insertion of the locking ring into the recess. However, preferably the outer wall of the cylindrical body may be provided with means of engaging with the annular recess. Preferably, such means is adapted to engage the internal wall of the annular recess of the implant. Although a variety of such means may be used, a simple engaging means may comprise providing the outer wall of the locking ring with a boss, protruding from the wall, preferably, the boss comprises a circumferential ridge, although it will be understood by the person skilled in the art that such a ridge may be continuous or non-continuous.

The spacer element of the invention may be advantageously included in a dental implant assembly. Therefore, in another embodiment there is provided a dental implant assembly comprising a spacer element as hereinbefore described, a dental implant and/or a dental abutment as hereinbefore described. Thus, the spacer element may be pre-mounted on an implant or an implant screw as hereinbefore described.

Furthermore, the abutment may be a conventional abutment used in an implant assembly or a dental construction such as a dental bridge. Thus, the abutment will be provided with an axial bore, said bore being arranged to receive an abutment screw to be attached to the spacer.

The assembly of the invention may also be provided in kit form. Therefore, in one embodiment we provide a kit comprising a spacer element as hereinbefore described

and one or more of a driving tool, a dental implant, a dental abutment, implant screw and abutment screw. Preferably the kit of the invention comprises at least a spacer element, a dental implant and a dental abutment, and optionally a driving tool.

5 In another embodiment of the invention there is provided a method of producing a dental implant assembly which comprises at least an implant screw; arranged in a spacer element as hereinbefore described; and locating an implant abutment in or on the spacer element.

10 There is further provided a method of anchoring an implant abutment to an implant which comprises at least positioning a spacer already equipped with an implant screw on the implant and locating an implant abutment in or on the spacer element.

In the anchoring method as hereinbefore described, the method may comprise  
15 anchoring in a patient or, alternatively, anchoring in a dental bridge or dental construction.

Furthermore, a dental bridge or dental construction comprising the implant assembly of the invention is novel *per se*. Therefore, according to an additional embodiment of  
20 the invention we provide a dental bridge or dental construction comprising one or more dental implant assemblies as hereinbefore described.

The invention will now be exemplified in certain embodiments with reference to the following drawings in which

25 Figures 1a to c are perspective views of the spacer element of one embodiment of the invention;

Figure 2 is a plan view of the spacer element of the spacer shown in Figs. 1a to c;

Figures 3a to b are cut away views of two alternative embodiments of the spacer element of the invention;

Figures 4a to b are cut away perspective views of the spacer element shown in Figures 3a to b respectively;

5 Figure 5 is a perspective view of an assembly that comprises the spacer element of Fig. 3a attached to an implant screw;

Figure 6 is a perspective view of the spacer element and implant screw assembly shown in Fig. 5 in use with a screwdriver in the screw access bore;

10 Figure 7a is a perspective view of a spacer element fitted with a holder and Figure 7b is a cross-sectional view thereof;

Figure 8 is a cross-sectional view of a spacer element fitted with a holder and with a screwdriver in place on the implant screw;

15 Figure 9a is a perspective view of an assembly that includes the spacer element of Fig. 3a attached to an implant screw and with an abutment fitted by means of an abutment screw;

Figure 9b is a cross-sectional view of the assembly shown in Figure 9a;

Figure 10 is a cross-sectional view of the assembly shown in Fig. 9a, including an implant; and

20 Figure 11 is a cross-sectional view of the assembly shown in Fig. 9a with the axes of the three bores indicated.

### **DESCRIPTION OF CERTAIN EMBODIMENTS**

Throughout the description and claims of this specification, the words “comprise” and “contain” and variations of the words, for example “comprising” and “comprises”,  
25 means “including but not limited to”, and is not intended to (and does not) exclude other components, integers or steps.

Throughout the description and claims of this specification, the singular encompasses the plural unless the context otherwise requires. In particular, where the indefinite article is used, the specification is to be understood as contemplating plurality as well as singularity, unless the context requires otherwise.

5

Features, integers, characteristics, compounds or groups described in conjunction with a particular aspect, embodiment or example of the invention are to be understood to be applicable to any other aspect, embodiment or example described herein unless incompatible therewith.

10

Throughout the description and claims of this specification, the terms "aperture" and "bore" include without limitation any aperture, opening, bore, channel, passage or the like.

15

Throughout the description and claims of this specification, the terms "inclined", "angulated" and "offset" may be used interchangeably to refer to a component whose longitudinal axis, in use, is not coaxial with the longitudinal axis of another component (for example a dental implant) with which the first component is to be used.

20

Referring to figures 1a to c and 2, a spacer element 1 comprises an implant facing surface 2 with a circumferential side outer wall 3 and an abutment facing surface 4. The spacer may be made of any suitable material, in particular, titanium or titanium alloy. The spacer element is provided with a single aperture 5 therethrough. The height of the circumferential side wall 3 varies around the circumference of the spacer element 1 such that the abutment facing surface 4 is inclined with respect to the implant facing surface 2.

25

30

The single aperture 5 has two portions, firstly an implant screw access bore 6 with side wall 7 and secondly an abutment screw bore 8 with side wall 9. The side wall 7

of the implant screw access bore 6 comprises a smooth inner surface and the side wall 9 of the abutment screw bore 8 comprises an inner threaded surface 10.

5 The aperture 5 defines a passage via which the implant screw is accessible and via which a substantially linear tool may be inserted to engage and turn the implant screw to secure it to an implant. The opening of the aperture 5 is substantially circular, but may include a notch or cut-away portion 11 therein to facilitate insertion of a tool.

10 It can be seen that the implant screw access bore 6 has a substantially smooth side wall 7 and the abutment screw bore 8 has an at least partially-threaded side wall 9.

Referring to Figures 3a and 3b, the spacer element 31 includes means to connect to an implant engaging portion such as an integral locking ring 32 adapted to engage with an implant screw (not shown). The locking ring 32 is provided with longitudinal slots 34 cutting into an annular side wall 33. The spacer element 32 is provided with an implant screw access bore 35 with an internal side wall 36 and an abutment screw bore 37 with an internal side wall 38. Figure 3a illustrates an abutment screw bore 37 with an incline angle of 20°, relative to the implant screw bore (39) and Figure 3b illustrates an abutment screw bore 37 with an incline angle of 30°, relative to the implant screw bore (39). If viewed alone the implant screw access bore 35 would have a smooth, i.e. threadless, internal side wall 36. Similarly, if viewed alone, abutment screw bore 37 would have a threaded internal side wall 38. In the illustrated spacer element the implant screw access bore 35 and the abutment screw bore 37 overlap or interfere with one another.

Referring to Figures 4a and 4b, the spacer element 41 is provided with an internal connection 42 which is adapted to act as a seat or holder for an abutment (not

shown). It will be understood that the connection may optionally be external. In order for the abutment facing surface 43a to be inclined to 43b, the outer wall 44 of the spacer element 41 exhibits a corresponding change in height as the space difference between 43a and 43b. Thus, in the embodiment illustrated, the wall 44 of the spacer element 41 essentially comprises a high region 45 gradually reducing to a low 46 region. The internal portion 47 of the spacer implant 41 comprises an implant screw head access bore 48 provided with side wall 49, and an abutment screw bore 410 with side wall 411. If viewed alone the implant screw access bore 48 would have a smooth, i.e. threadless, internal side wall 49. Similarly, if viewed alone, abutment screw bore 410 would have a threaded internal side wall 411. In the spacer element of the invention the implant screw access bore 48 and the abutment screw bore 410 overlap or interfere with one another.

The thread 412 is cut outwardly from the wall 411 so as not to impede the access into the implant screw access bore 48 from the abutment surface 43a direction.

It will be appreciated by the person skilled in the art that the number of thread turns may vary, but in the embodiment shown, may include two or three threads whereas the low side may comprise only a single thread.

Referring to Figure 5 the spacer element 51 is located on an implant screw 52 by way of an integral locking ring 53 prior to fitting into a patient with subsequent connection to a dental restoration, such as a prefabricated dental bridge (not shown).

Referring to Figure 6, in use, the spacer 64 may be screwed into position by the use of a conventional dental screwdriver 62 or other driving tool using the implant screw 61. The substantially linear screwdriver 62 or driving tool passes through the implant screw access bore 63 of the spacer element 64.

Referring to Figures 7a and 7b, a spacer element 71 is provided with an integral locking ring 72. An upper surface 73 of the spacer element 71 is provided with a handle 74. The handle 74 comprises a longitudinal substantially cylindrical body 75. One side of the cylindrical body 75 has a cut-away portion 76, such that, *in situ*, the cut-away portion 76 provides access to the bore(s) 77 of the spacer element 71. The handle 74 may be pre-mounted through means like the groove 78 on the spacer element 71 (into which the handle can snap-fit) and is used to carry and position the spacer element onto the implant.

10

Referring to Figure 8, there is shown a spacer element 81 provided with an integral locking ring 82. The locking ring is engaged with an implant screw 83. An upper surface 84 of the spacer element 81 is provided with a handle 85. The handle 85 comprises a longitudinal substantially cylindrical body 86, one side of which has a cut-away portion 87, such that, *in situ*, the cut-away portion 86 provides access to the bore(s) 88 of the spacer element 81. A screwdriver 89 can be passed through the cut-away portion to engage with the head 810 of the implant screw 83.

15

Referring to Figures 9a and 9b, once the implant (not shown) is *in situ*, a spacer 93 with a preferably pre-mounted implant screw 91 is placed into the implant through the support of the handle before the handle is removed. An impression is taken with an impression coping (not shown) and a healing abutment (not shown) is placed in the spacer 93. After tissue healing and the abutment 92 being incorporated into a dental construction, the construction is placed on the spacer 93 and fastened with the abutment screw 95. The construction can be made in a solid piece, for example in metal, ceramic or polymer, in such a way that it includes the abutment in order to provide access and space for the abutment screw 95 and a connection to the spacer 93. The abutment 92 comprises a collar 94 and an abutment screw 95. The

20

25

abutment screw 95 is positioned inside the angulated threaded abutment screw bore 96.

The abutment screw 95 can be the same type as the implant screw 98 or different, for example, the thread can be of a wider diameter for the abutment screw 95 to allow provision of a larger screw access bore for better accessibility to the implant screw 91. The screwdriver connection 99a and 99b of the abutment screw 95 and implant screw 98 can be different or are preferably the same.

Referring to Figure 10, an implant assembly 101 includes an implant 102 and an implant screw 103 located in the implant 102. The implant screw 103 comprises a shaft portion 104 and a head 105, the head 105 being located within a spacer 106 substantially as described above. The spacer 106 is also connected to an abutment 107 by means of an abutment screw 108.

Referring to Figure 11, an implant assembly 111a includes a spacer element 112a provided with a locking ring 113a and an abutment 114a located in the spacer element 112a. An implant screw 115a is located in the locking ring 113a. The lines show the longitudinal axes of the implant screw ( $X_{is}$ ), the implant screw access bore ( $X_{ib}$ ) and the abutment screw bore ( $X_{ab}$ ). In Figure 11, the longitudinal axes of the implant screw access bore ( $X_{ib}$ ) and the abutment screw bore ( $X_{ab}$ ) are shown intersecting at a point within the aperture of the spacer element 112a. It is not essential for these axes to intersect at such a point; they may be laterally offset from one another (e.g. into or out of the page, as illustrated). However, even in such a case, when the longitudinal axes of the implant screw access bore ( $X_{ib}$ ) and the abutment screw bore ( $X_{ab}$ ) are projected onto a plane extending substantially vertically through the aperture of the spacer element, the projected axes intersect.

Further structural modifications can be realised with respect to the exemplary embodiments described above.

5 The appended claims are incorporated by reference into the disclosure. All references, including publications, patent applications, and patents, cited herein are hereby incorporated by reference. The description or connotation, if any, of certain embodiments as “preferred” embodiments, and other recitation of embodiments, features, or ranged as being preferred, is not deemed to be limiting, and the invention is deemed to encompass embodiments that are presently deemed to be less  
10 preferred.

All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g., “such as”) provided herein, is  
15 intended to illuminate the invention and does not pose a limitation on the scope of the invention unless otherwise claimed. Any statement herein as to the nature or benefits of the invention or of the preferred embodiments is not intended to be limiting, and the appended claims should not be deemed to be limited by such statements. More generally no language in the specification should be construed as  
20 indicating any non-claimed element as being essential to the practice of the invention. This invention includes all modifications and equivalents of the subject matter recited in the claims appended hereto as permitted by applicable law. Moreover, any combination of the above-described elements in all possible variation thereof is encompassed by the invention unless otherwise indicated herein or  
25 otherwise clearly contradicted by context. The description herein of any reference or patent or equipment, even if identified as “prior, is not intended to constitute a concession that such reference or patent is available as prior art against the present invention.

## Claims

1. A spacer element for use in a dental implant assembly having a single  
5 aperture therethrough, the single aperture comprising an implant screw access bore  
and an offset abutment screw bore.
2. A spacer element as claimed in claim 1, wherein the longitudinal axes of the  
implant screw access bore and the offset abutment screw bore, when projected,  
10 intersect within said single aperture.
3. A spacer element according to claim 1 or claim 2 wherein, in use, the implant  
screw access bore is inclined relative to an implant screw to which the spacer  
element is attached and the degree of incline is from 0 to 10 degrees.  
15
4. A spacer element according to claim 1 or claim 2 wherein, in use, the implant  
screw access bore is substantially parallel to or coaxial with the longitudinal axis of  
an implant screw to which the spacer element is attached.
- 20 5. A spacer element according to any of the preceding claims wherein the  
implant screw access bore is substantially threadless.
6. A spacer element according to any of the preceding claims further comprising  
an implant screw engaging portion or implant engaging portion and/or an abutment  
25 screw engaging portion.
7. A spacer element according to any of the preceding claims wherein the  
abutment screw bore is offset or inclined from the implant screw access bore.

8. A spacer element according to claim 7 wherein the abutment screw bore is offset or inclined from the implant screw access bore at an angle in the range 1 to 30 degrees.

5

9. A spacer element according to any of the preceding claims wherein, in use, the spacer element is intermediate an abutment and an implant or implant screw and the angle between the longitudinal axes of the abutment and the implant or implant screw is in the range 10 to 40 degrees.

10

10. A spacer element according to any of the preceding claims wherein the abutment screw bore is or is partially provided with an internal screw thread.

15

11. A spacer element for use in a dental implant assembly having a single aperture therethrough, the aperture comprising a threadless bore and an offset but overlapping threaded bore.

20

12. A spacer element according to claim 11 wherein, in use, the threadless bore is inclined relative to an implant screw to which the spacer element is attached and the degree of incline is from 0 to 10 degrees.

25

13. A spacer element according to claim 12 wherein the threadless bore is substantially coaxial with the implant screw.

14. A spacer element for use in a dental implant assembly having a single aperture therethrough, the aperture comprising a threadless bore and an offset but non-overlapping threaded bore.

15. A spacer element according to any of the preceding claims wherein the spacer element is provided with means for engaging an abutment screw.

16. A dental implant assembly comprising a spacer element according to any of the preceding claims, and one or more of a dental implant, a dental abutment or a dental bridge.

17. A dental implant assembly according to claim 16 including one or more of an implant screw and an abutment screw.

10

18. A dental implant assembly kit comprising a spacer element as claimed in any of claims 1-15 and one or more of a driving tool, a dental implant and a dental abutment.

19. A kit according to claim 18 wherein the kit includes one or more of an implant screw and an abutment screw.

20. A method of producing a dental implant assembly including the steps of:  
providing a spacer element according to any of claims 1-15;  
locating said spacer element on the implant screw; and  
locating an abutment in the spacer element.

21. A method of anchoring a dental abutment including the steps of:  
equipping a spacer element according to any of claims 1-15 with an implant screw;  
positioning said spacer element on a dental implant; and  
locating a dental abutment in the spacer element.

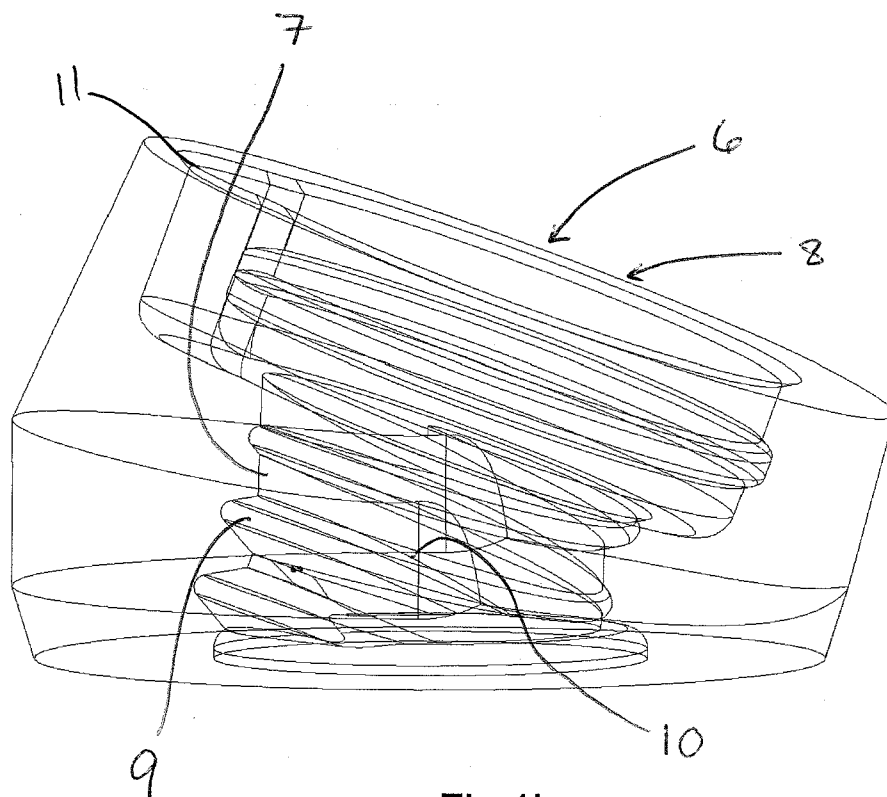
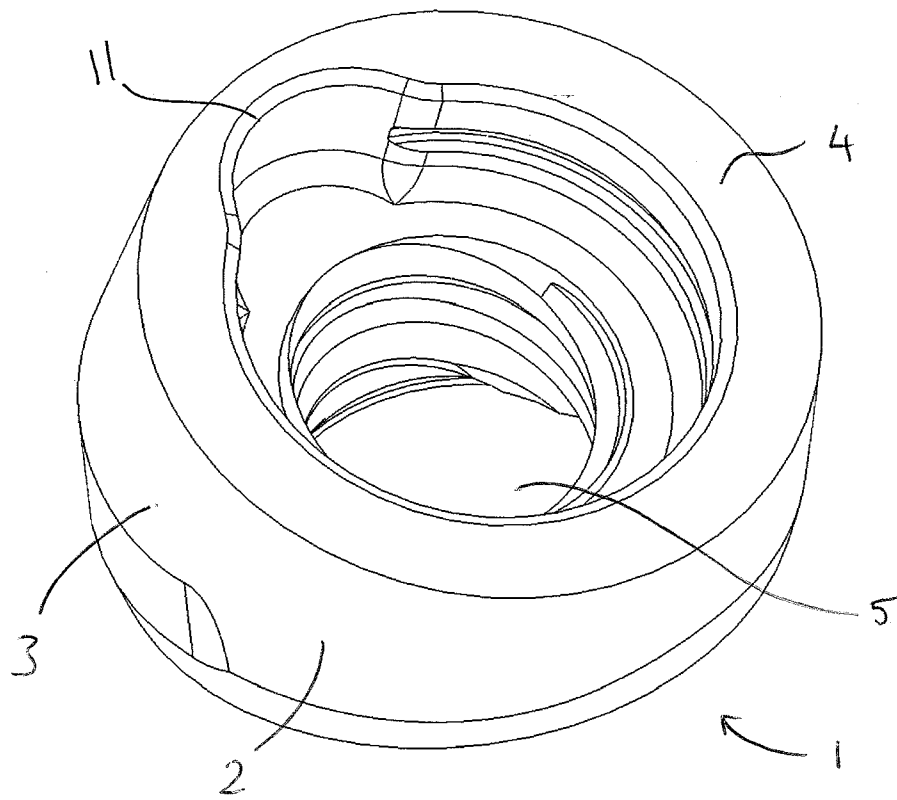
25

22. A dental construction or dental bridge including a spacer element according to any of claims 1-15.

23. A spacer element according to any of claims 1-15 wherein at least a portion of the single aperture includes a connection portion for a handle to be attached for carrying and positioning the spacer to an implant.

24. A spacer element according to any of claims 1-15 wherein at least a portion of the single aperture includes a notch or cut-away portion to facilitate insertion of a substantially linear tool therein.

25. The spacer element, assembly, kit, method or bridge substantially as herein described with reference to any appropriate combination of the accompanying drawings.



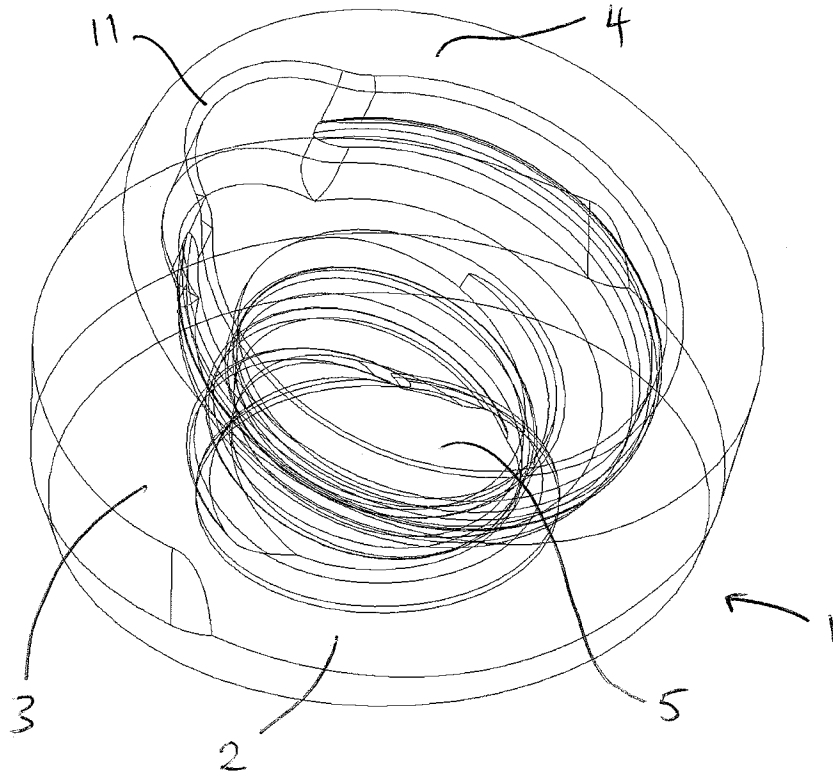


Fig 1c

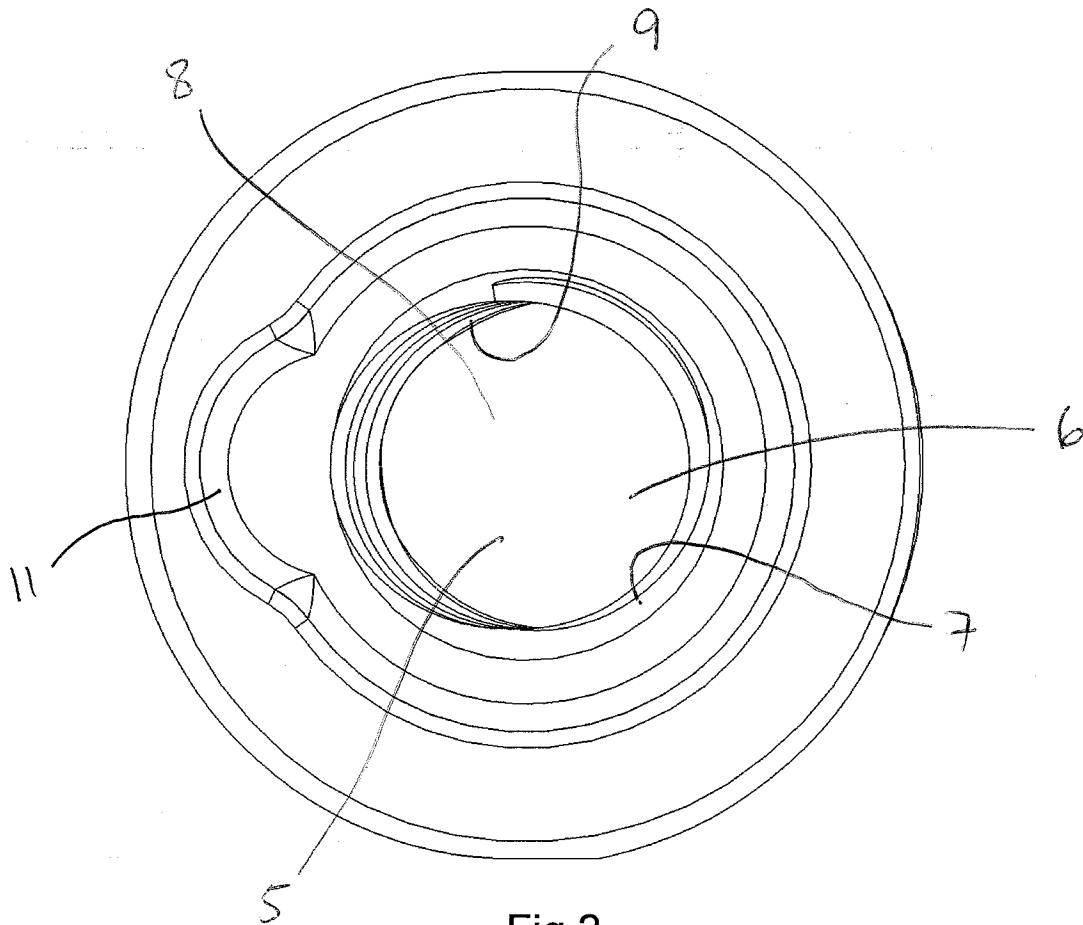


Fig 2

Fig 3a

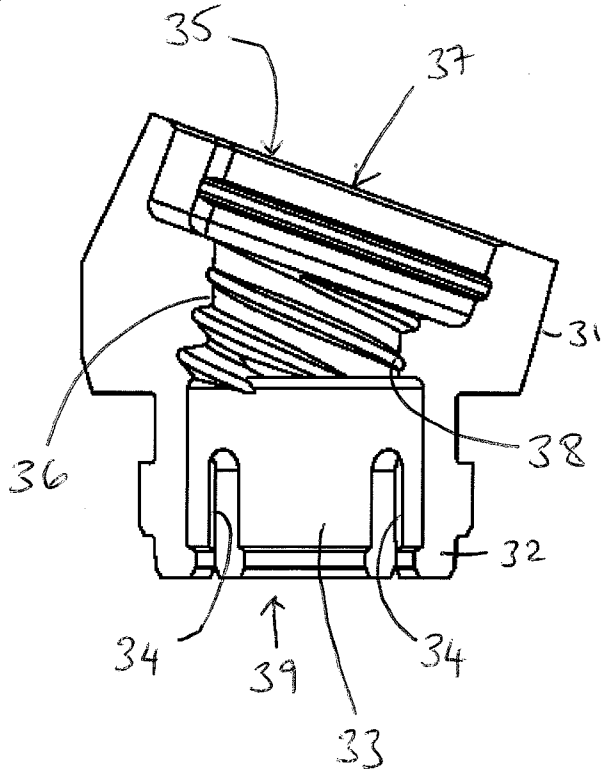


Fig 3b

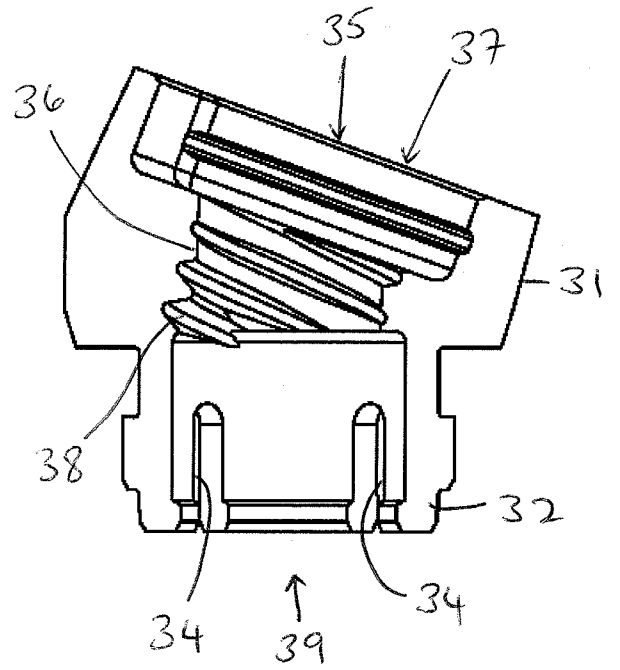


Fig 4a

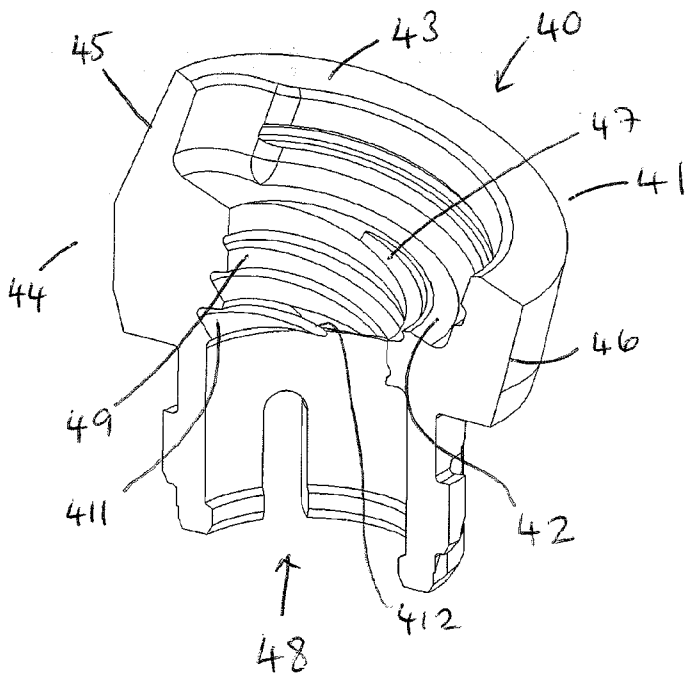
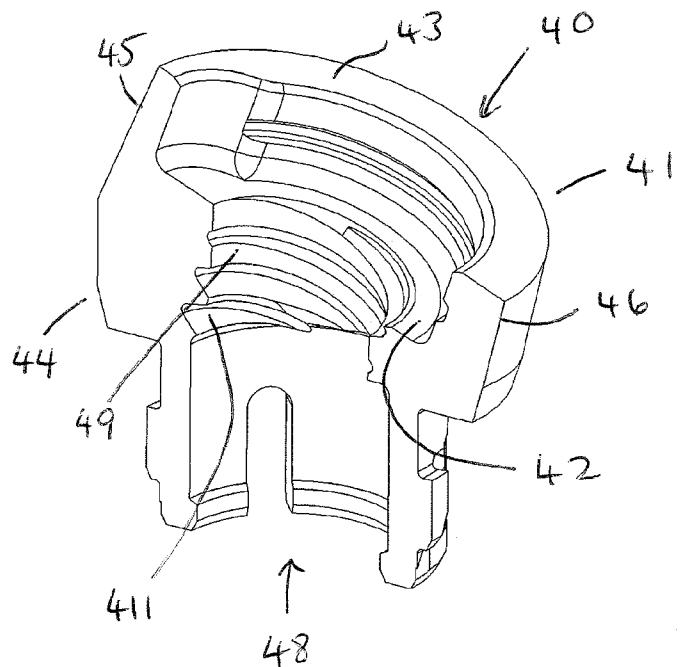


Fig 4b



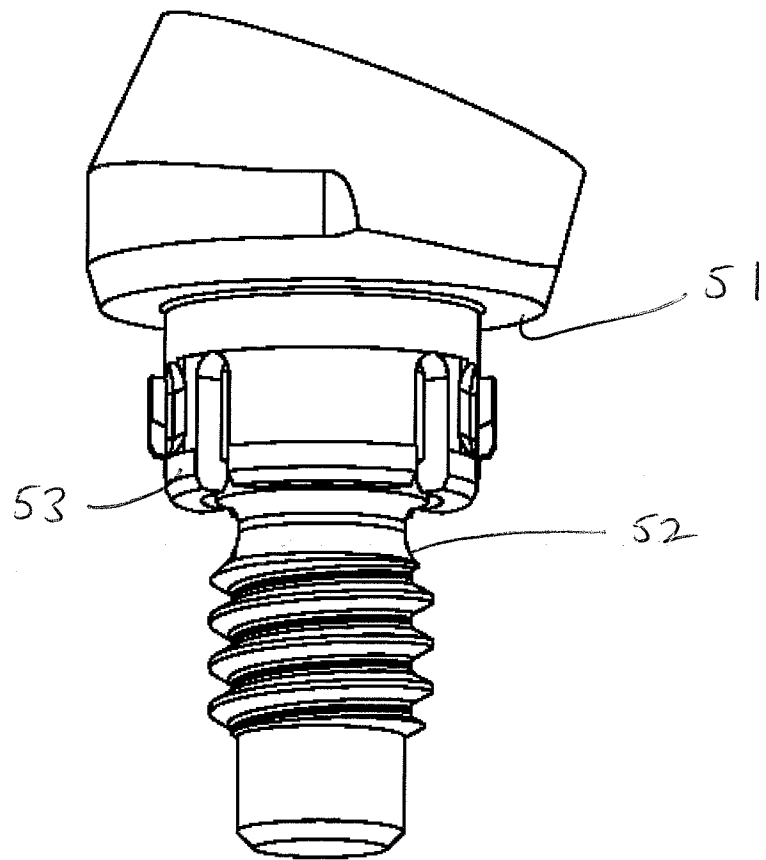


Fig 5

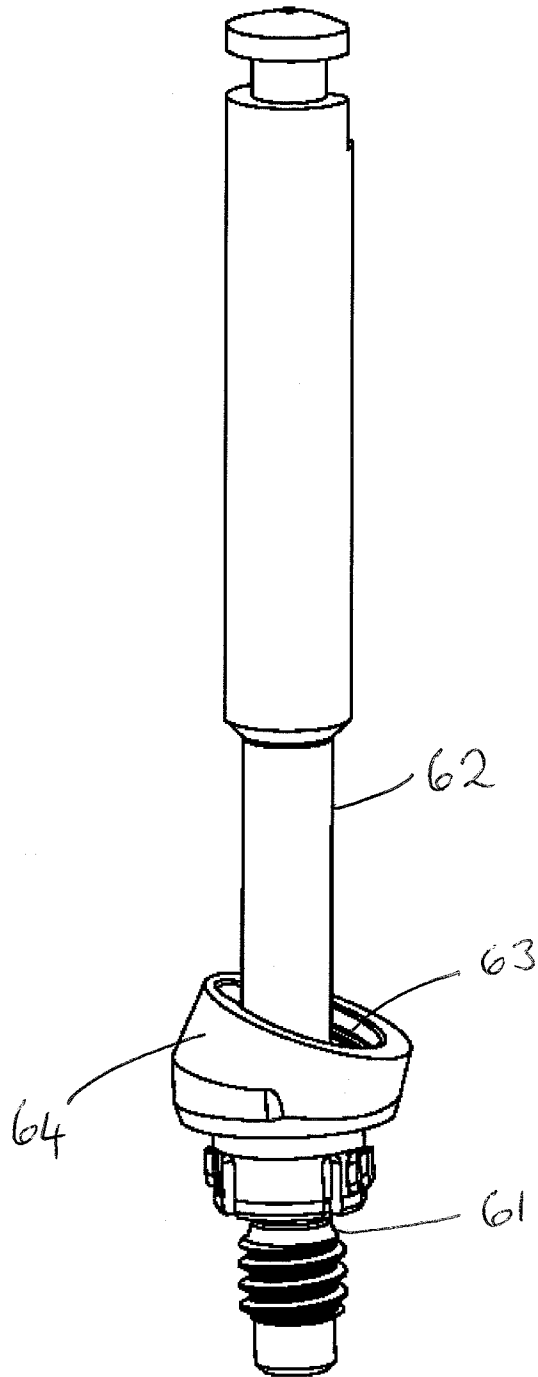


Fig 6

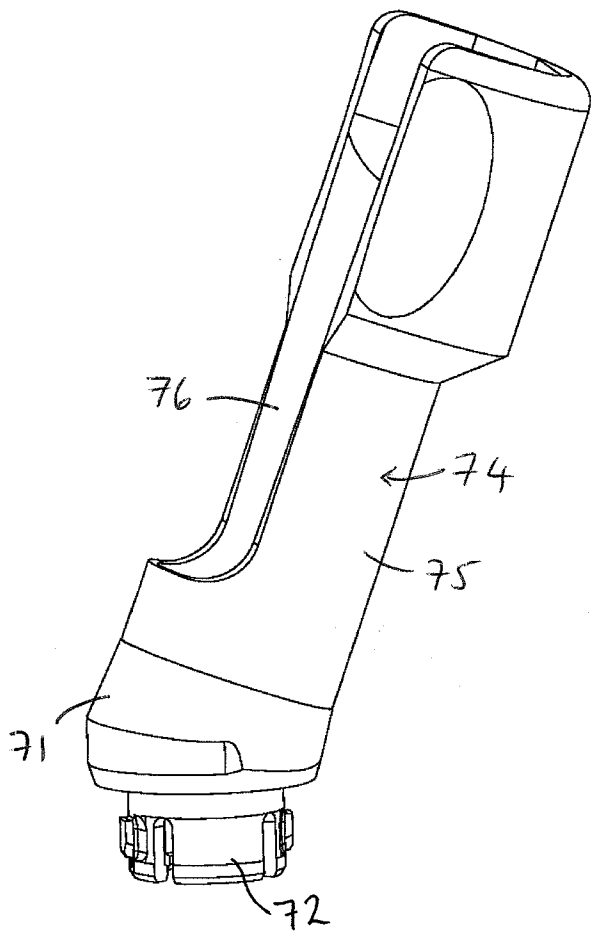


Fig 7a

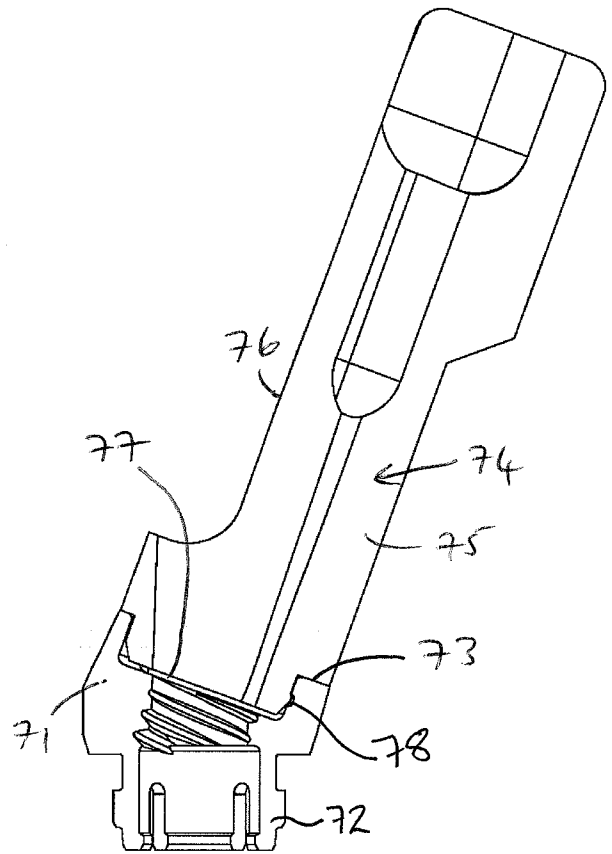


Fig 7b

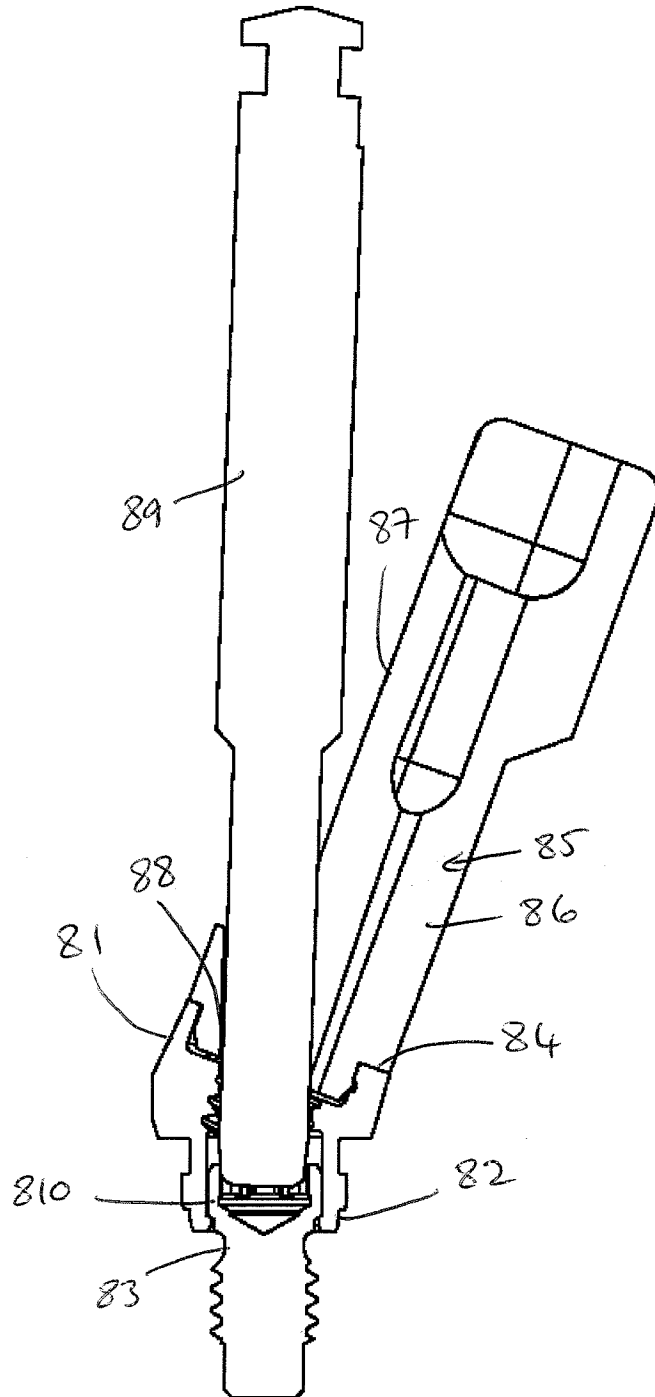


Fig 8

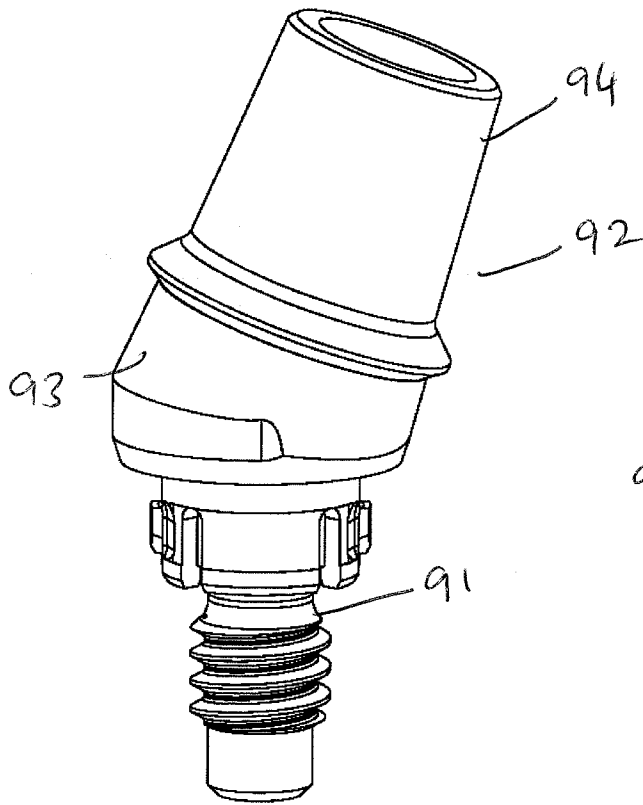


Fig 9a

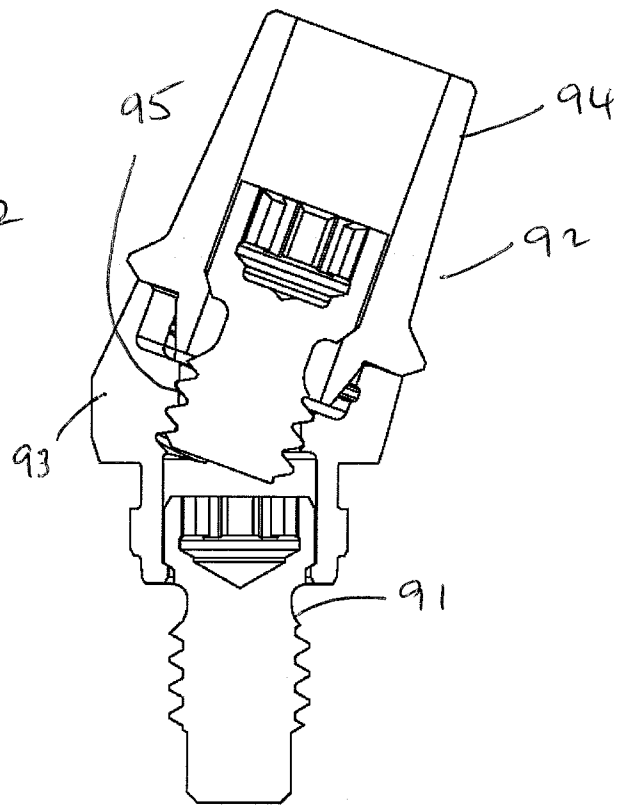


Fig 9b

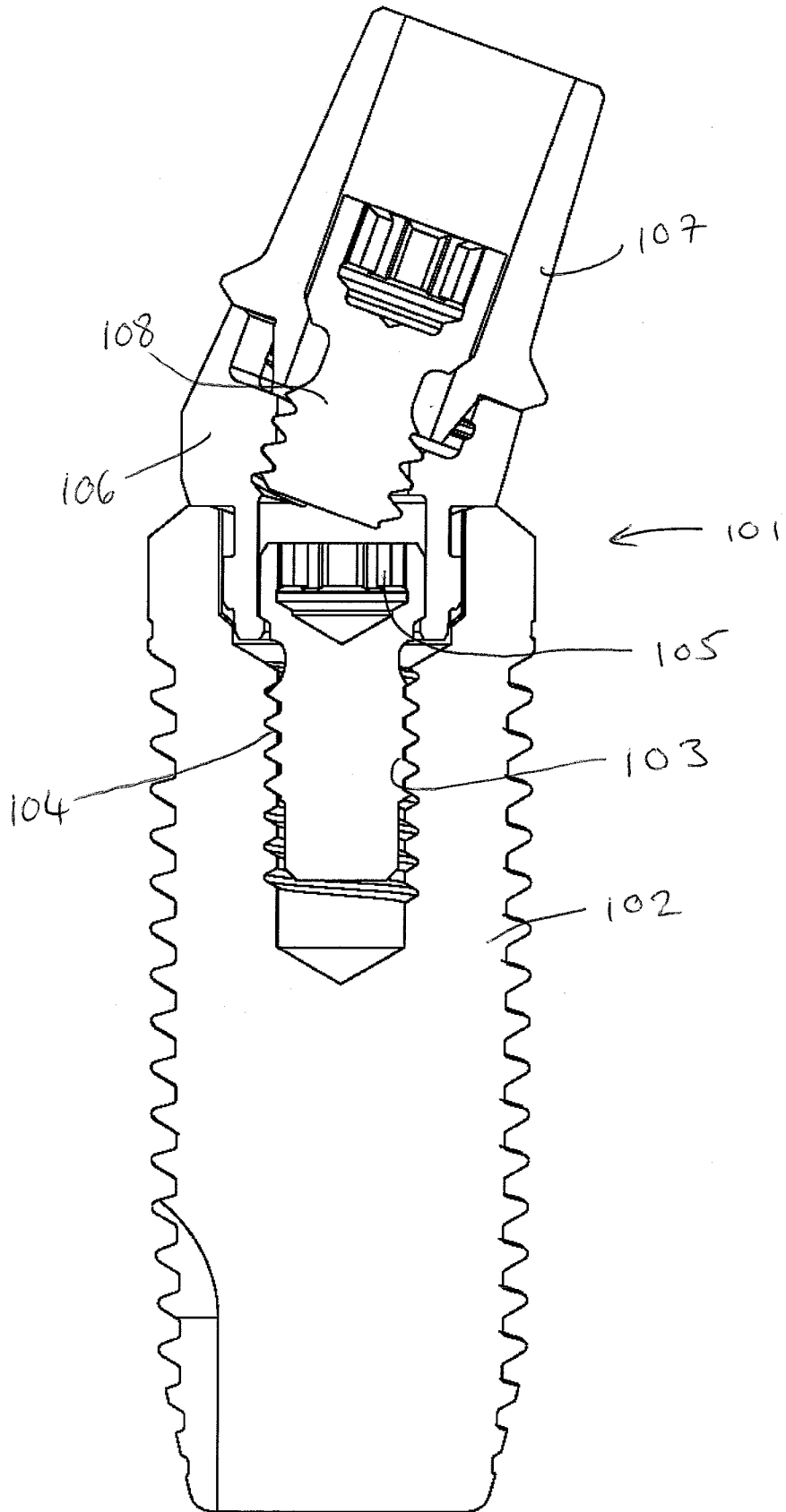


Fig 10

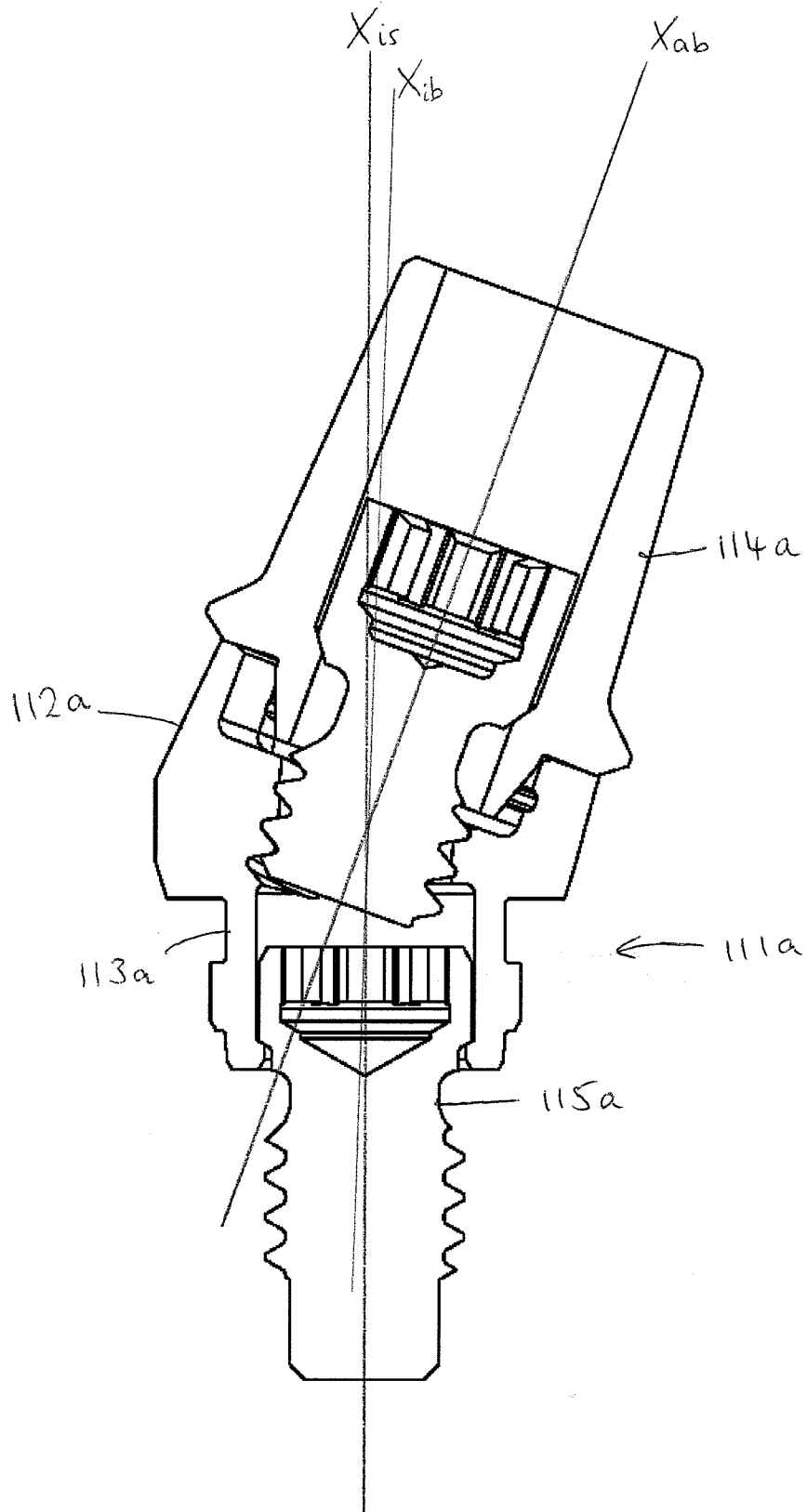


Fig 11

# INTERNATIONAL SEARCH REPORT

International application No  
PCT/GB2009/050388

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> INV. A61C8/00		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols) A61C		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal, WPI Data		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 97/14371 A1 (STRAUMANN INST AG [CH]; SUTTER FRANZ [CH]; GRANDE VINCENZO [CH]; TSCHI) 24 April 1997 (1997-04-24) page 12, line 27 - page 13, line 31 page 16, line 17 - page 17, line 11 page 18, line 14 - page 19, line 14 figures 2B, 2C, 3B, 3C, 4D, 4E	1-19, 22-24
X	WO 98/52488 A1 (FRIATEC AG [DE]; SUTTER FRANZ [CH]) 26 November 1998 (1998-11-26) page 19, lines 18-32 page 20, lines 20-30 figures 10, 13, 14, 25	1-19, 22-24
X	WO 2007/078137 A1 (LEE JONGHO [KR]) 12 July 2007 (2007-07-12)  figures 3-5	1-9, 15-19, 22-24
----- -/--		
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C.		
<input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents :		
*A* document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. *&* document member of the same patent family	
Date of the actual completion of the international search  <p style="text-align: center; font-size: 1.2em;">15 July 2009</p>	Date of mailing of the international search report  <p style="text-align: center; font-size: 1.2em;">23/07/2009</p>	
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer  <p style="text-align: center; font-size: 1.2em;">Chabus, Hervé</p>	

## INTERNATIONAL SEARCH REPORT

International application No

PCT/GB2009/050388

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 116 225 A (RIERA JUAN C A [UY]) 26 May 1992 (1992-05-26)  column 6, lines 36-68 figures 1-4	1-4, 6-10, 15-16, 18-19, 22-24

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/GB2009/050388

## Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.: 20-21  
because they relate to subject matter not required to be searched by this Authority, namely:  
see FURTHER INFORMATION sheet PCT/ISA/210
2.  Claims Nos.: 25  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:  
see FURTHER INFORMATION sheet PCT/ISA/210
3.  Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1.  As all required additional search fees were timely paid by the applicant, this international search report covers allsearchable claims.
2.  As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

### Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

# INTERNATIONAL SEARCH REPORT

International Application No. PCT/GB2009 /050388

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.1

Claims Nos.: 20-21

Method claim 20 refers to a method of producing a dental implant assembly. It is clear from the description that this method occurs in the patient mouth. Assembling restorative elements, in particular an abutment in the oral cavity is considered as a surgical activity. Therefore, the subject of claim 20 is considered as a method of treatment of the human body by surgery (Rule 39.1 (iv) PCT). For the same reason method claim 21 which is directed to a method of anchoring a dental abutment is considered as a method of treatment of the human body by surgery (Rule 39.1 (iv) PCT).

-----  
Continuation of Box II.2

Claims Nos.: 25

Claim 25 does not specify any technical feature but refers instead to the description and drawings. The scope of protection defined by the claim is so unclear (Article 6 PCT) that a meaningful search is not possible.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.2), should the problems which led to the Article 17(2) declaration be overcome.

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/GB2009/050388

Patent document cited in search report	Publication date	Publication date	Patent family member(s)	Publication date
WO 9714371	A1	24-04-1997	AT 174198 T	15-12-1998
			AU 7123896 A	07-05-1997
			BR 9610906 A	13-07-1999
			CA 2232822 A1	24-04-1997
			DE 59600962 D1	21-01-1999
			EP 0801544 A1	22-10-1997
			JP 11506688 T	15-06-1999
			US 5947733 A	07-09-1999
WO 9852488	A1	26-11-1998	AT 250898 T	15-10-2003
			BR 9809683 A	03-10-2000
			DE 59809821 D1	06-11-2003
			EP 1014883 A1	05-07-2000
			ES 2205504 T3	01-05-2004
			JP 3481257 B2	22-12-2003
			JP 2000512883 T	03-10-2000
			US 6227859 B1	08-05-2001
WO 2007078137	A1	12-07-2007	CN 101365395 A	11-02-2009
			DE 112007000093 T5	20-11-2008
			GB 2454625 A	20-05-2009
			JP 2009522038 T	11-06-2009
			KR 20060012036 A	06-02-2006
			US 2008311544 A1	18-12-2008
US 5116225	A	26-05-1992	NONE	