Abstract: A guide for the preparation of an end of a bone to receive a prosthetic, the guide including a main body portion; and, one or more holes passing through the main body portion structured to allow a drill bit to pass there through. A method of affixing a prosthesis onto a bone.
DEVICE AND METHOD FOR ATTACHING A PROSTHESIS TO A BONE

The present invention relates to drilling guides for use in attaching a prosthesis to a bone and/or a method of affixing a prosthesis to a bone.

Background

Whilst the present invention is described with reference to drilling guides and/or methods for use in attaching a prosthesis to a bone during knee replacement surgery, it is to be appreciated that the present invention may be equally applied to other surgical procedures that involve affixing a prosthesis to a bone.

Failures in cemented total knee replacement surgery are commonly due to loosening or disruption of the cement bond between the prosthesis and the bone. In actuality, the cement resembles a grout having little or no intrinsic adhesive properties.

It is known that some surgeons drill holes, such as three millimetre diameter hole one centimetre into the tibial and femoral bone surfaces to improve penetration of the cement and enhance the adhesion of the tibial and femoral components by increasing the surface area of the joint between the component and the bone.

The present invention seeks to provide a method and apparatus for enhancing the cement bond between the prosthesis and the bone. The present invention also seeks to provide a drill guide and methods for using them that allow a surgeon to drill an array of holes into a bone.

Summary

According to one aspect the present invention provides a guide for the preparation of an end of a bone to receive a prosthetic, the guide including:

a main body portion; and,
one or more holes passing through the main body portion structured to allow a drill bit to pass there through.

According to another aspect the present invention provides a guide for the preparation of the proximal end of a tibia to receive a tibial tray, the guide including:
a substantially planar main body portion including a top surface and a bottom surface; and,
one or more holes passing through the main body portion from the top surface to the bottom surface,
wherein the one or more holes are structured to allow a drill bit to pass through the main body portion.

In one form the one or more holes passing from the top surface to the bottom surface are of sufficient length to prevent a drill bit inserted therein from substantially deviating from a longitudinal axis of the one or more holes.

In one form the main body portion is shaped to correspond to a proximal end of a tibia that has been cut to receive a tibial tray.

In one form the main body portion further includes a keel portion that is integrally connected to the main body portion and extends away from the bottom surface. In one form the keel portion is structured to be received by a hole that has been prepared at the proximal end of a tibia to receive an anchor portion of a tibial tray.

In one form the one or more holes are located around the periphery of the top surface. In one form the longitudinal axis of the one or more holes is directed towards a region that is interior of the opening of the one or more holes in the top surface. In one form the longitudinal axis of the one or more holes extends at an angle of about 25° to about 70° from the top surface. In a further form the longitudinal axis of the one or more holes extends at an angle of about 45° from the top surface.
In one form the main body portion included at least two holes spaced around the periphery of the top surface wherein the longitudinal axis of the at least two holes converge at a point adjacent or below a bottom surface of the keel portion.

In one form there are six holes spaced around the periphery of the top surface.

In a further form the holes are equally spaced around the periphery.

According to another aspect the present invention provides a guide for the preparation of an end of a femur to receive a femoral component, the guide including:

a main body portion in the form of a 'C' shaped channel including a top surface and an inner surface, the inner surface being structured to correspond to the distal end of the femur; and,

one or more holes passing through the main body portion from the top surface to the inner surface,

wherein the one or more holes a structured to allow a drill bit to pass through the main body portion.

In one form the one or more holes passing from the top surface to the inner surface are of sufficient length to prevent a drill bit inserted therein from substantially deviating from a longitudinal axis of the one or more holes.

In one form the inner surface of the main body portion includes a top portion between two side wall portions wherein the top portion of the inner surface is structured to be positioned on the end surface of the femur.

In one form the main body portion further includes one or more alignment pins that are integrally connected to the main body portion and extend away from the top portion of the inner surface. In one form the main body portion includes two alignment pins. In one form the alignment pins are structured to be received in holes that have been prepared at the end of a femur to receive anchor portions for locating the femoral component.
In one form the top surface of the main body portion includes an upper surface located between two side wall surfaces which extend away from the upper surface. In one form the one or more holes are located on one or both of the two side wall surfaces of the top surface. In one form at least two holes located on one or both of the two side wall surfaces of the top surface wherein the longitudinal axis of the at least two holes converge at a point adjacent or below a bottom surface of one or more alignment pins. In one form there are six holes spaced around one or both of the two side wall surfaces of the top surface.

According to another aspect the present invention provides a method of affixing a prosthesis onto a bone, the method including the following steps:

a. providing one or more openings in the bone to receive one or more corresponding anchor portions of the prosthesis;
b. drilling one or more holes into the bone such that the longitudinal axis of the one or more holes converges with a bottom section of the one or more openings;
c. providing an amount of an adhesive composition into the one or more openings;
d. inserting the anchor portions of the prosthesis into the one or more openings wherein the anchor portions displace the adhesive composition such that at least part of the adhesive composition is pushed out of the one or more openings and into the one or more holes; and,
e. allowing the adhesive composition to set and/or cure.

In one form, the bone is the proximal end of a tibia and the prosthesis is a tibial tray. In one form at step b. the drilling of the one or more holes is assisted by using the guide for the preparation of the proximal end of a tibia as herein described.

In one form the bone is the distal end of a femur and the prosthesis is a femoral head. In one form at step b. the drilling of the one or more holes is assisted by using the guide for the preparation of an end of a femur as herein described.

**Brief Description of the Accompanying Figures**
The present invention will become better understood from the following detailed description of various non-limiting embodiments thereof, described in connection with the accompanying figures, wherein:

Figure 1 is a top view of drilling guide for use in the preparation of the proximal end of a tibia to receive a tibial tray;

Figure 2 is a front view of the drilling guide depicted in figure 1;

Figure 3 is the same front view of the drilling guide depicted in figure 2 and further showing the outline of the tibia including a vent opening located therein;

Figure 4 is side elevation view of a drill guide for the preparation of an end of a femur to receive a femoral component;

Figure 5 is a perspective view of the drill guide depicted in figure 4;

Figure 6 is a side elevation of the drill guide depicted in figure 5; and,

Figure 7 is a front elevation of the drill guide depicted in figures 4 to 6.

Detailed Description of Embodiments and the Accompanying Figures

The foregoing describes only some embodiments of the present invention, and modifications and/or changes can be made thereto without departing from the scope and spirit of the invention, the embodiments being illustrative and not restrictive.

In the context of this specification, the word “comprising” means “including principally but not necessarily solely” or “having” or “including”, and not “consisting only of”. Variations of the word "comprising", such as “comprise” and “comprises” have correspondingly varied meanings.

In certain embodiments, the present invention provides a method of affixing a prosthesis to a bone of a subject by creating one or more holes that are interconnected with an anchor region, or opening, locating the prosthesis onto the bone. When the one or more holes are filled with cement, or adhesive, together with the anchor region they combine to form a solid matrix thereby increasing the bond of the prosthesis to the bone. This matrix of holes
filled with the cement serves to anchor the prosthesis onto the bone and is particularly useful when the bone is hard and when penetration and adhesion are often otherwise inadequate.

5 Embodiments of the present invention will be described with reference to a total knee replacement procedure. However, it is understood that this example is not considered to be limiting with regard to the scope of the present invention. For example, the guide and method described herein could be used in hip resurfacing procedures where a prosthetic femoral component is affixed to the head of the femur to cooperate with a matching cup that is placed in the pelvis.

A total knee replacement eliminates damage to bearing surfaces in the knee and replaces them with prosthetic parts. The long bones connected by the knee are the tibia and femur. The upper most portion of the tibia is removed and replaced with a tibial component sometimes referred to as a tibial tray.

Typically, a tibial tray is relatively flat so that it can support a polyethylene insert or bearing surface. The tibial tray includes an integral anchor portion that is inserted into an opening made by the surgeon in the patient's tibial bone to stabilise the tibial tray. The upper part of the replacement knee joint consists of a contoured metal or ceramic cap or femoral head. The inner surfaces of the femoral head are fixed to the cut bone surfaces of the femur with cement. The femoral head also includes two anchor portions which correspond with two openings which are also made by the surgeon in the patient's femoral bone to locate the femoral head.

In order to fit the prosthetic components to the tibia and the femur, the ends of these bones are accurately cut to fit the prosthetic components using cutting guides that are oriented to the long axis of each of the long bones. Metal trial components can then be impacted onto the bone to assist the surgeon in providing the openings for orienting the final components being the tibial plate and the femoral head. These final components are then fixed to the bones using a surgical cement, or adhesive, such as polymethacrylate cement.
Referring now to figures 1 and 2, a drill guide 10 for preparing the proximal end of a tibia to receive a tibial tray is depicted. The drill guide 10 includes a main body portion 11, in the form of a generally flat plate, which includes a top surface 19 and a bottom surface 21. The main body portion 11 further includes an integral keel portion 12 that extends from the bottom surface 21 of the main body portion 11. The drill guide 10 further includes an array of through holes 14 that act as a guide through which to drill into the bone of a subject when the guide 10 is located on the proximal end of a tibia.

As described above, when typically preparing the tibia to receive a tibial plate, the top of the tibial bone is prepared in the conventional way by forming a flat upper surface on the proximal end of the tibial bone and providing an opening by impacting onto the bone for locating the anchor portion of the tibial plate. The opening is created in the end of the tibia to accommodate an anchor portion of a tibial tray. After such an opening is created, the guide 10 may be placed on the top of the tibia which is shown underneath the guide 10 that is superimposed in Figure 1. A drill may then be used to drill through the openings of the guide 10 into the bone forming holes throughout the proximal end of the tibia.

In certain embodiments, the longitudinal axis 15 of some or all of the holes 14 of the guide form holes in the tibia which converge in a region 16 that is located at the distal end of the longitudinal opening made by the surgeon to receive the anchor portion of the tibial plate.

In such embodiments, the longitudinal opening may be made longer than the anchor portion for the tibial plate. As such, the opening may comprise a cavity or well at the terminal end (below the anchor point for the tibial plate). The bottom surface 17 of the keel 12 of the drill guide 10 when it is located on top of the tibia may form a sealing to the well 18. In this embodiment, the upper opening of the through holes 14 are located adjacent to the periphery 23 of the upper surface 19 and are in an approximate way, spaced equally away from each other around the periphery of the upper surface 19.
The openings 14 include a longitudinal axis of sufficient length to provide that the drill does not deviate from the longitudinal axis 15 when passing through the guide 10 into the bone of the tibia. The drill will begin to penetrate into the tibial bone once the tip of the drill extends past the lower surface 21 of the drill guide 10. The drilled holes converge and extend at least as far as the interior of the otherwise empty cavity or well 16.

In certain embodiments, the drill guide may be provided with a central through opening 22 that is adapted to receive the tip of a surgical cement gun. Cement is introduced into the well 16 via the opening 22. Pressure applied when delivering the cement forces the cement through the opening 22, into the cavity 16 and then into the holes that have previously been drilled using through openings 14 as guides. After a sufficient quantity of cement has been dispensed, the drill guide 10 can be removed and the tibial anchor can be inserted fixing the tibial plate to the femoral bone.

In some embodiments the tip of the cement gun is applied directly the tibial bone over the cavity 18 and similarly filling the cavity 16 and the holes that have been drilled using the openings 14 as guides. Insertion of the anchor of the tibial plate will force excess cement from the cavity or well 16 into the drilled holds that lead into the cavity 16. An excess of cement is used so that the final fitting of the tibial component serves to force the excess cement out of the cavity 16 and into the drilled holes. Once the cement cures in this form it provides an array of cured cement forming a matrix which fixes the tibial tray to the proximal end of the tibia.

The drill guide 10 may be fabricated from any suitable rigid material such as metal or rigid polymer materials.

Turning to Figure 3 there is shown a further embodiment wherein a vent opening 54 has been drilled into the side of the tibia 55 which meets up with the bottom end of the cavity 16. The vent opening 54 allows venting of any blood and bone debris that may exist as a result of the drilling step. The vent opening 54 may also provide further promotion of the integration of the cement.
In one form a thread 56 is tapped into the vent opening 54 to allow a screw 57 to be attached which will then provide a fitting to attach suction hosing 58. Once applied, the suction provided through the suction hosing will draw the liquid cement down into the collection of holes promoting further integration of the cement throughout the matrix of holes throughout the bone.

In other forms the device is used in a similar fashion to cement prostheses in the shoulder, elbow and foot and in the insertion of prostheses in animals.

Turning now to figures 4 to 7, there is shown an example of a guide 30 for the preparation of the distal end of the femur to receive a femoral head in knee replacement surgery. As can be seen the drill guide 30 for the femoral component comprises a main body portion in the form of a generally c-shaped channel 31. The c-shaped channel 31 includes a top surface 46 and an inner surface 32. The inner surface 32 of the guide 30 being structured and sized to fit closely over the prepared end of the femur. The guide 30 further includes a plurality of holes 40 passing through the main body portion 31 which are structured to allow a drill bit to pass through the main body portion 31.

As seen in figure 5 where the guide 30 is superimposed over the distal end of a femur, the prepared end of the femur included a pair of pre-drilled alignment openings 39. These openings are eventually used to locate anchor portions of the femoral head prosthetic. As shown in figures 6 and 7, the drill guide 30 may include a pair of alignment pins 33 that extend toward the alignment openings 39. However, the alignment pins 33 are not intended to reach the bottom surface 34 of the alignment openings 39. The alignment pins 33 are depicted where they are not as long as the alignment openings 39, which provides a well or cavity 35 below the alignment pins 33 when located on the end of the prepared femur.

In the embodiment shown in figures 4 to 7, the drill alignment holes 40 of the guide 30 are provided in distinct arrays 41, 42. Each array of through holes 40 have a longitudinal axis
43 that can converge and preferably intersect within the cavity or well 35 located beneath an alignment pin 33.

In certain embodiments, a through opening 40 include a first portion 50 that extends through one side wall 51 of the drill guide 30 and aligns with the second portion 52 that extends to the other side wall 53. Thus, this example, each cavity is provided with six distinct openings through which cement can flow, along three separate drilling axes.

In use, the guide 30 is inserted over the prepared end of the femur with the guide pins 33 located into the alignment openings 39. The surgeon then drills through the guide openings 40 until each cavity 35 has been adequately ventilated. The drill guide can then be removed and cement forced under pressure into the guide openings 39. Cement under pressure will flow through the alignment openings 39 and into each of the holes that intercept the cavity 35. After sufficient cement has been introduced, the femoral head can be located over the prepared end of the femur. The anchor portions of the femoral head will pressurise the cement in the alignment openings 39 and force excess cement out through the drilled holes that were formed using the drill guide 30.

In some embodiments the tibial and femoral drilling guides will be shaped in the shape of the tibial and femoral component doubling as the trial components.

Thus, the aforementioned drill guide creates an array of holes served to form a matrix of cement once the prosthetic has been fixed to the bone using a cement or adhesive. This matrix of approximately 2 to 4 millimetre holes, and preferably 3mm holes, serves to anchor the cement into the tibial or femoral bones and is particularly useful when the bone is hard and when penetration and adhesion are often otherwise inadequate.

Many modifications will be apparent to those skilled in the art without departing from the scope of the present invention.
The Claims:

1. A guide for the preparation of an end of a bone to receive a prosthetic, the guide including:
   a main body portion; and,
   one or more holes passing through the main body portion structured to allow a drill bit to pass there through.

2. A guide according to claim 1 wherein the end of the bone is the proximal end of a tibia and the prosthetic is a tibial tray, wherein:
   the main body portion is substantially planar and includes a top surface and a bottom surface; and,
   the one or more holes pass through the main body portion from the top surface to the bottom surface.

3. A guide according to claim 1 or claim 2 wherein the one or more holes passing from the top surface to the bottom surface are of sufficient length to prevent a drill bit inserted therein from substantially deviating from a longitudinal axis of the one or more holes.

4. A guide according to any one of claims 1 to 3 wherein the main body portion is shaped to correspond to a proximal end of a tibia that has been cut to receive a tibial tray.

5. A guide according to any one of the preceding claims wherein the main body portion further includes a keel portion that is integrally connected to the main body portion and extends away from the bottom surface.

6. A guide according to claim 5 wherein the keel portion is structured to be received by a hole that has been prepared at the proximal end of a tibia to receive an anchor portion of a tibial tray.
7. A guide according to any one of claims 2 to 6 wherein the one or more holes are located around the periphery of the top surface.

8. A guide according to any one of claims 3 to 7 wherein the longitudinal axis of the one or more holes is directed towards a region that is interior of the opening of the one or more holes in the top surface.

9. A guide according to any one of claims 3 to 8 wherein the longitudinal axis of the one or more holes extends at an angle of about 25° to about 70° from the top surface.

10. A guide according to claim 9 wherein the longitudinal axis of the one or more holes extends at an angle of about 45° from the top surface.

11. A guide according to any one claims 5 to 10 including at least two holes spaced around the periphery of the top surface wherein the longitudinal axis of the at least two holes converge at a point adjacent or below a bottom surface of the keel portion.

12. A guide according to claim 11 wherein there are at least six holes spaced around the periphery of the top surface.

13. A guide according to claim 11 or claim 12 wherein the holes are about equally spaced around the periphery.

14. A guide according to claim 1 wherein the end of the bone is the end of a femur and the prosthetic is a femoral component, wherein:

the main body portion is in the form of a 'C' shaped channel including a top surface and an inner surface, the inner surface being structured to correspond to the end of the femur; and,
the one or more holes pass through the main body portion from the top surface to the inner surface.

15. A guide according to claim 14 wherein the one or more holes passing from the top surface to the inner surface are of sufficient length to prevent a drill bit inserted therein from substantially deviating from a longitudinal axis of the one or more holes.

16. A guide according to claim 14 or claim 15 wherein the inner surface of the main body portion includes a top portion between two side wall portions wherein the top portion of the inner surface is structured to be positioned on the distal end surface of the femur.

17. A guide according to claim 16 wherein the main body portion further includes one or more alignment pins that are integrally connected to the main body portion and extend away from the top portion of the inner surface.

18. A guide according to claim 17 including two alignment pins.

19. A guide according to claim 17 or claim 18 wherein the alignment pins are structured to be received in holes that have been prepared at the end of a femur to receive anchor portions for locating the femoral component.

20. A guide according to any one of claims 14 to 17 wherein the top surface of the main body portion includes an upper surface located between two side wall surfaces which extend away from the upper surface.

21. A guide according to claim 20 wherein the one or more holes are located on one or both of the two side wall surfaces of the top surface.
22. A guide according to claim 21 including at least two holes located on one or both of the two side wall surfaces of the top surface wherein the longitudinal axis of the at least two holes converge at a point adjacent or below a bottom surface of one or more alignment pins.

23. A guide according to claim 22 wherein there are at least six holes spaced around one or both of the two side wall surfaces of the top surface.

24. A method of affixing a prosthesis onto a bone, the method including the following steps:
   a. providing one or more openings in the bone to receive one or more corresponding anchor portions of the prosthesis;
   b. drilling one or more holes into the bone such that the longitudinal axis of the one or more holes converges with a bottom section of the one or more openings;
   c. providing an amount of an adhesive composition into the one or more openings;
   d. inserting the anchor portions of the prosthesis into the one or more openings wherein the anchor portions displace the adhesive composition such that at least part of the adhesive composition is pushed out of the one or more openings and into the one or more holes; and,
   e. allowing the adhesive composition to set and/or cure.

25. A method according to claim 24 wherein the bone is the proximal end of a tibia and the prosthesis is a tibial tray.

26. A method according to claim 25 wherein at step b, the drilling of the one or more holes is assisted by using the guide according to any one of claims 1 to 13.

27. A method according to claim 24 wherein the bone is the distal end of a femur and the prosthesis is a femoral component.
28. A method according to claim 27 wherein at step b. the drilling of the one or more holes is assisted by using the guide for the preparation of an end of a femur according to any one of claims 14 to 23.

29. A method according to claim 24 wherein at step b. the drilling of the one or more holes is assisted by using the guide for the preparation of an end of a bone to receive a prosthetic according to claim 1.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.

A61B 17/17 (2006.01)

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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 practicable, search terms used)

WPI, EPDOC and Google Patents. IPC: A61B17/- Keywords: bone, drill, guide, jig, knee, tibia, femur, keel, post and similar terms.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
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<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
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<tr>
<td>X</td>
<td>US5634927 A (HOUSTON et al.) 3 June 1997 See whole document especially Figure 2; column 2 lines 43–47; column 3 line 6</td>
<td>1–4, 7, 8</td>
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<tr>
<td>P, X</td>
<td>EP2389904 A1 (EPISURF MEDICAL AB) 30 November 2011 See whole document especially paragraphs [0035], [0080]; figures 4a, 4b, 6a, 6b, 9a–9f</td>
<td>1, 14–16</td>
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[ ] Further documents are listed in the continuation of Box C [X] 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 application or patent 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

**I** 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

14 February 2012

Date of mailing of the international search report

20 FEBRUARY 2012

Name and mailing address of the ISA/AU

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### 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.:
   because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
   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:

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:

See Supplemental Box

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<td>3.</td>
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<td>4.</td>
<td>☐ 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.:</td>
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**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.
The specification is not unified because the claims do not relate to one invention only. I have found different inventions based on the following features that separate the claims into distinct groups:

- Claims 1–23 and 26–29 (in part) are directed towards a guide for the preparation of an end of a bone to receive a prosthesis. The feature of one or more holes passing through the main body portion structured to allow a drill bit to pass there through is specific to this group of claims.

- Claims 24–25 and 26–29 (in part) are directed towards a method of affixing a prosthesis onto a bone. The feature of drilling one or more holes into the bone such that the longitudinal axis of the one or more holes converges with a bottom section of the one or more openings is specific to this group of claims.

Unity of invention is only fulfilled when there is at least one "special technical feature" present in the claims that both:

- provides a technical relationship among all the claims; and,
- makes a contribution over the prior art.

When there is no special technical feature common to all the claimed inventions there is no unity of invention.

In the above groups of claims, the identified distinguishing features may have the potential to make a contribution over the prior art but are not common to all the claimed inventions and therefore cannot provide the required technical relationship.

Only claims 26–29 share the technical feature from both groups.

Therefore there is no special technical feature common to all the claimed inventions and the requirements for unity of invention are consequently not satisfied a priori.

Since it is considered that all the claims can be searched without extra effort, no extra fees have been invited.
This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX