



(51) International Patent Classification:

A61F 2/32 (2006.01) A61F 2/30 (2006.01)
A61F 2/00 (2006.01)

(21) International Application Number:

PCT/US2010/033705

(22) International Filing Date:

5 May 2010 (05.05.2010)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

12/436,225 6 May 2009 (06.05.2009) US

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(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, CL, 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, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, 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, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, 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, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

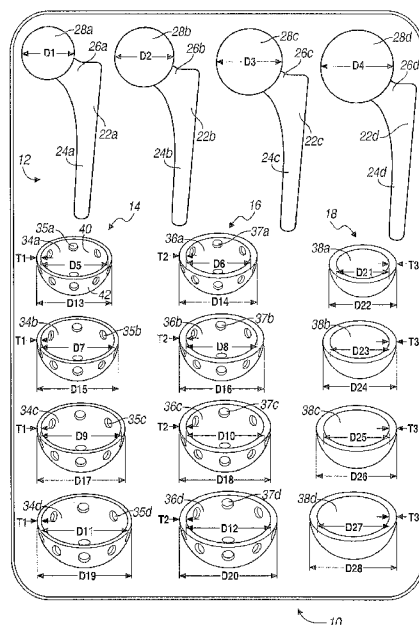
— as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

Published:

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

(54) Title: ACETABULAR CUP SYSTEM

FIG. 1



(57) Abstract: A system for replacing a hip joint can include a first acetabular cup formed of a first material and having a first inner diameter and a first thickness. A second acetabular cup can be formed of a second material and having a second inner diameter and a second thickness. A first femoral hip prosthesis can include a first femoral head that is alternately accommodated by either of the first or second acetabular cups. A bearing can be adapted to be interposed between the first femoral head and one of the first or second acetabular cups. The first and second inner diameters can be the same. The first thickness can be less than the second thickness. The first material can be distinct from the second material.

ACETABULAR CUP SYSTEM

FIELD

5 **[0001]** The present disclosure relates generally to a system and method for use in orthopedic surgery and, more particularly, to an acetabular cup system or kit, which includes a plurality of different sized acetabular cups formed from two different materials having different stiffnesses.

BACKGROUND

10 **[0002]** A natural hip joint may undergo degenerative changes due to a variety of etiologies. When such degenerative changes become so far advanced and irreversible, it may ultimately become necessary to replace a natural hip joint with a prosthetic hip. If the acetabulum needs repair, all remnants of articular cartilage may be removed from the acetabulum and an acetabular prosthesis
15 which will accommodate the head or ball of the hip prosthesis may be affixed to the acetabulum.

[0003] The acetabular prosthesis can include an acetabular cup and a bearing that, in combination, cooperate with the head or ball of the hip prosthesis. One suitable material for such an acetabular cup is titanium.
20 Titanium has the benefit of being biocompatible as well as elastic. Elasticity can be an important material characteristic as most acetabular cups need to deform slightly during press-fitting into a prepared acetabulum. However, because titanium is so elastic, the material generally needs to be a predetermined minimum thickness (e.g., about 3.5 mm or larger) in order to accommodate the
25 loads in this area. This minimum thickness either requires the head of the femoral component to be smaller or additional reaming and bone removal to accommodate an acetabular cup having a larger outer diameter. In most cases however, reducing the size of the femoral head is unfavorable as it may increase the risk of dislocation. Moreover, it is desirable to keep reaming and bone
30 removal at a minimum in order to maximize the amount of host bone in the acetabular socket for receipt of the acetabular cup.

SUMMARY

[0004] This section provides a general summary of the disclosure, and is not a comprehensive disclosure of its full scope or all of its features.

[0005] A system for replacing a hip joint can include a first acetabular cup formed of a first material and having a first inner diameter and a first thickness. A second acetabular cup can be formed of a second material and having a second inner diameter and a second thickness. A first femoral hip prosthesis can include a first femoral head that is alternately accommodated by either of the first or second acetabular cups. A bearing can be adapted to be interposed between the first femoral head and one of the first or second acetabular cups. The first and second inner diameters can be the same. The first thickness can be less than the second thickness. The first material can be distinct from the second material.

[0006] According to additional features, the first acetabular cup can have a first outer diameter. The second acetabular cup can have a second outer diameter. The first outer diameter can be less than the second outer diameter. The second material can be more flexible than the first material. In one example, the first material can be cobalt-chrome molybdenum and the second material can be titanium. The first and second acetabular cups can have substantially similar flexibility.

[0007] A related method can include preparing an acetabular socket of a hip joint. A size of the prepared acetabular socket can then be determined. One of the first or the second acetabular cups can be selected based on the determined size of the prepared acetabular socket. The selected first or second acetabular cup can be impacted into the acetabular socket. The first femoral hip prosthesis can be implanted, and the bearing can be positioned between the femoral head and the selected first or second acetabular cups.

[0008] Further areas of applicability will become apparent from the description provided herein. The description and specific examples in this summary are intended for purposes of illustration only and are not intended to limit the scope of the present disclosure.

DRAWINGS

[0009] The drawings described herein are for illustrative purposes only of selected embodiments and not all possible implementations, and are not intended to limit the scope of the present disclosure.

5 **[0010]** Fig. 1 is a perspective view of a system or kit for replacing a hip joint and including a plurality of femoral hip prostheses, a first set or plurality of acetabular cups, a second set or plurality of acetabular cups and a first set or plurality of bearings;

[0011] Fig. 2 is an anterior perspective view of an acetabulum being
10 reamed by an exemplary reamer;

[0012] Fig. 3 is an anterior perspective view of a reamed acetabular socket subsequent to reaming;

[0013] Fig. 4 is a perspective environmental view of a surgeon determining suitable components of the kit of Fig. 1 based on measurements of
15 the reamed acetabular socket of Fig. 3; and

[0014] Fig. 5 is an anterior view of a femoral hip prosthesis, a bearing and an acetabular cup selected from the kit and shown in an implanted position in the acetabular socket.

[0015] Corresponding reference numerals indicate corresponding parts
20 throughout the several views of the drawings.

DETAILED DESCRIPTION

[0016] The following description will be specifically directed toward a primary hip replacement procedure wherein a femoral hip prosthesis, an
25 acetabular cup, and a bearing are implanted into the patient. It is appreciated however that the following teachings may also be applied to a surgical procedure for implanting other combinations of acetabular components. Moreover, the following teachings may also be applicable to a hip revision surgical procedure wherein a surgeon may be required to remove entirely or portions of a previously
30 implanted hip prosthesis.

[0017] With initial reference to Fig. 1, a system or kit for use during a surgical hip replacement procedure is shown and generally identified at

reference numeral 10. The kit 10 can generally include a plurality of femoral hip prostheses collectively referred to at reference numeral 12, a first set of acetabular cups collectively referred to at reference numeral 14, a second set of acetabular cups collectively referred to at reference numeral 16 and a set of bearings collectively referred to at reference numeral 18. The femoral hip prostheses 12 can include a first, second, third and fourth femoral hip prosthesis 22a, 22b, 22c and 22d, respectively. The first femoral hip prosthesis 22a can generally include a stem 24a, a neck 26a and a head 28a. The second femoral hip prosthesis 22b can generally include a stem 24b, a neck 26b and a head 28b. The third femoral hip prosthesis 22c can include a stem 24c, a neck 26c and a head 28c. The fourth femoral hip prosthesis 22d can include a stem 24d, a neck 26d and a head 28d. The heads 28a-28d each have a different diameter d1-d4, respectively. In one example, as will be described further below, the diameters d1-d4 can increase in size sequentially from the head 28a to the head 28d. The hip prostheses 12 can be modular having specific head, neck and stem configurations. The hip prosthesis 12 can also be monolithic.

[0018] The first set of acetabular cups 14 can generally include a first acetabular cup 34a, a second acetabular cup 34b, a third acetabular cup 34c and a fourth acetabular cup 34d. Each of the acetabular cups 34a-34d is formed of a first material and has a common thickness T1. In one example, the first material can be cobalt-chrome molybdenum. According to the present teachings, and as will be described further below, the inner diameter and the outer diameter of the first set of acetabular cups 14 is sequentially increased from the first acetabular cup 34a through the fourth acetabular cup 34d. The first set of acetabular cups 14 can each include a plurality of passages 35a-35d formed therethrough.

[0019] The second set of acetabular cups 16 can generally include a first acetabular cup 36a, a second acetabular cup 36b, a third acetabular cup 36c and a fourth acetabular cup 36d. Each of the acetabular cups 36a-36d is formed of a second material and has a thickness T2. In one example, the second material can be titanium. According to the present teachings, and as will be described further below, the inner diameter and the outer diameter of the

second set of acetabular cups 16 is sequentially increased from the first acetabular cup 36a through the fourth acetabular cup 36d. Each of the acetabular cups of the second set of acetabular cups 16 includes a plurality of optional screw receiving passages 37a-37d. Any or all of the first and second
5 sets of acetabular cups 14 and 16 can include an outer layer of porous material to enhance bony ingrowth.

[0020] The first set of bearings 18 can generally include a first bearing 38a, a second bearing 38b, a third bearing 38c and a fourth bearing 38d. Each of the bearings 38a-38d has a common thickness T3. The bearings 18 can have
10 any suitable configuration, such as constrained bearings, high-wall bearings or other bearing configurations.

[0021] According to the teachings of the present disclosure, in the present example, each component in the kit 10 is compatible with other components of the kit 10 having a similar suffix. In other words, in the present
15 example, the femoral hip prosthesis 22a can cooperate with the bearing 38a and either one of the acetabular cups 34a or 36a. Likewise, the femoral hip prosthesis 22b can be used with the bearing 38b and either of the acetabular cups 34b or 36b. The femoral hip prosthesis 22c can be used with the bearing 38c and either of the acetabular cups 34c or 36c. The femoral hip prosthesis
20 22d can be used with the bearing 38d and either of the acetabular cups 34d or 36d.

[0022] Exemplary dimensions of the components of the kit 10 will now be described for exemplary purposes. It is appreciated however that the dimensions may be changed without departing from the scope of the present
25 disclosure. As used herein the phrase "the same" is used to denote an identical or substantially identical dimension within a tolerance. In one example, the dimensions can be the same within a tolerance of about 0.25mm. All of the acetabular cups 34a-34d and 36a-36d have a hemispherical shape and include an inner bearing engaging surface and an outer bone engaging surface 40 and
30 42, respectively (only identified on acetabular cup 34a for clarity). Various diameters can be provided for the acetabular cups 34a-36d as described below. In general, an inner diameter D5 of the acetabular cup 34a is the same or

substantially the same as an inner diameter D6 of the acetabular cup 36a. Likewise, an inner diameter D7 of the acetabular cup 34b is the same or substantially the same as an inner diameter D8 of the acetabular cup 36b. The inner diameter D9 of the acetabular cup 34c is the same or substantially the same as the inner diameter D10 of the acetabular cup 36c. The inner diameter D11 of the acetabular cup 36d is the same or substantially the same as the inner diameter D12 of the acetabular cup 36d.

[0023] In one example, the inner diameters D5 and D6 can be 41mm, the inner diameters D7 and D8 can be 45mm, the inner diameters D9 and D10 can be 49mm and the diameters D11 and D12 can be 53mm. In general, the outer diameters D13-D20 sequentially increase by 2mm. Thus, the acetabular cup 34a can have an outer diameter D13 of 46mm. The acetabular cup 36a can have an outer diameter D14 that is 48mm. The acetabular cup 34b can have an outer diameter D15 that is 50mm. The acetabular cup 36b can have an outer diameter D16 that is 52mm. The acetabular cup 34c can have an outer diameter D17 that is 54mm. The acetabular cup 36c can have an outer diameter D18 that is 56mm. The acetabular cup 34d can have an outer diameter D19 that is 58mm. The acetabular cup 36d can have an outer diameter D20 that is 60mm. In one example, the thickness T1 is 2.5mm and the thickness T2 is 3.5mm.

[0024] In the present example, the bearing 38a has an inner diameter D21 of 32mm and an outer diameter D22 of 41mm. The bearing 38b has an inner diameter D23 of 36mm and an outer diameter D24 of 45mm. The bearing 38c has an inner diameter D25 of 40mm and an outer diameter D26 of 49mm. The bearing 38d has an inner diameter D27 of 44mm and an outer diameter D28 of 53mm. In this example, the thickness T3 of each of the bearings 38a-38d can be 4.5mm.

[0025] The diameter of the head 28a of the femoral hip prosthesis 22a can be 32mm. The diameter of the head 28b of the femoral hip prosthesis 22b can be 36mm. The diameter D3 of the head 28c of the femoral hip prosthesis 22c can be 40mm. The diameter D4 of the head 28d of the femoral hip prosthesis 22d can be 44mm. Again it will be appreciated that the dimensions set forth herein are merely exemplary. Furthermore, the dimensions may be

approximate. Again, inner diameters of various acetabular cups 14, 16 that are described as being the same or substantially the same are so within specific tolerances.

[0026] With additional reference now to Figs. 2-5, an exemplary method for using the kit 10 to replace a hip joint according to one example of the present teachings will now be described. Initially, an acetabulum 50 can be reamed, such as with a reamer 52. The exemplary reamer 52 can comprise a reamer drive shaft 54 that is rotatably supported within a cannulated shaft 56. A cutting member 60 can be selectively coupled at a distal end 62 of the reamer drive shaft 54. A mating structure 64 can be provided at a proximal end of the reamer drive shaft 54. A driver (not shown) may be operably coupled with the mating structure 64 to impart rotational force through the reamer drive shaft 54 to the cutting member 60. The acetabulum 50 may be generally hemispherically reamed until concentric removal of all acetabular cartilage and/or bone cement and portions of host bone if necessary (e.g., such as during a revision procedure) is achieved. Once the acetabulum 50 has been appropriately reamed, trial gauges (not shown), which are well known in the art, may be used to determine the size of the reamed acetabulum 50. A corresponding outer diameter of a suitable acetabular cup (e.g., a corresponding acetabular cup from the first and second sets of acetabular cups 14 and 16) is then known.

[0027] As illustrated in Fig. 3, the acetabulum 50 is shown having a reamed acetabular socket 68. Again, it can be desirable to leave as much host bone from the acetabulum 50 in place. As explained above, the first set of acetabular cups 14 are all formed by cobalt-chrome molybdenum and have a thickness of 2.5mm. The second set of acetabular cups 16 are all formed of titanium and have a thickness of 3.5mm. As is known, the stiffness of cobalt-chrome molybdenum per unit thickness is higher than titanium. Moreover, titanium has a higher flexibility per unit thickness than cobalt-chrome molybdenum. Because each acetabular cup 34a-34d of the first set of acetabular cups 14 is thinner than each acetabular cup 36a-36d of the second set of acetabular cups 16 (2.5 mm vs. 3.5mm), the stiffness of an acetabular cup 34a-34d of the first set of acetabular cups 14 relative to a corresponding

acetabular cup 36a-36d of the second set of acetabular cups 16 is the same or substantially the same. In this way, a surgeon 70 (Fig. 4) is able to achieve a desired stiffness utilizing any of the acetabular cups from the first or second sets of acetabular cups 14 and 16 to attain a desired press-fit relationship into the reamed acetabular socket 68 of patient 72.

[0028] With continued reference now to Fig. 4, by initially starting with cobalt-chrome molybdenum, a thinner 2.5mm thickness acetabular cup (such as acetabular cup 34a) can be used to accommodate a first femoral head size (i.e., D1 of femoral head 28a). When the surgeon 70 may require the next larger size outer diameter acetabular cup (such as the acetabular cup 36a), the same femoral head 28a can be used since the inner diameter (i.e., D5 vs. D6) stays the same and the material of the acetabular cup changes to titanium having a thickness of 3.5mm (and consequently the acetabular cup outer diameter increases by 2mm). If the surgeon 70 determines that the next larger size femoral head (i.e., femoral head 28b) should be used, the surgeon 70 can select the cobalt-chrome molybdenum acetabular cup 34b having the thickness of 2.5mm. If it is determined that the next size larger outer diameter acetabular cup is required, the surgeon 70 can select the titanium acetabular cup 36b having a thickness of 3.5mm. Again, it is appreciated that the femoral hip prosthesis 22b having the head 28b can be used for either of the acetabular cups 34b or 36b because the inner diameters D7 vs. D8 are the same or substantially the same. As can be appreciated, the surgeon 70 can make similar decisions as to whether other acetabular cups, such as 34c-36d or others may be particularly suited for a given patient 72. Nevertheless, the kit 10 can be used by the surgeon 70 to minimize host bone loss without having to compromise head size of the femoral hip prosthesis while at the same time providing the surgeon 70 with the desired acetabular cup flexibility during implantation. Furthermore, with the kit 10, a larger diameter head can be used 50% of the time as a cobalt-chrome molybdenum cup can be used having the same outer diameter as a comparable titanium cup while offering a larger inner diameter that accommodates the larger diameter head. As used herein, the term "kit" or "system" is used to denote a collection of readily available components (i.e., acetabular cups, bearings and/or

femoral hip prostheses) available for a surgeons easy selection. The collection of readily available components can be grouped or arranged in any manner that provides the surgeon with comprehensive access and ease of identification. In this way, each of the components may be prepackaged individually in sterile
5 containers while still being offered as a collective kit or set of components.

[0029] Turning now to Fig. 5, an acetabular cup 36a is shown implanted into the reamed acetabular socket 68. The cup 36a can be implanted by any suitable method. According to one such method, an impacting instrument (not shown) may be used to properly position the acetabular cup 36a. In one
10 example, the impacting instrument may be threadably secured to an apical hole (not specifically shown) of the acetabular cup 36a. Once the orientation of the acetabular cup 36a is acceptable, the inserting instrument may be solidly impacted to fully seat (or press-fit) the acetabular cup 36a into the acetabular socket 68, such that firm rim fixation is achieved. Once the acetabular cup 36a
15 has been solidly impacted, the inserting instrument may be carefully removed from the acetabular cup 36a.

[0030] A plurality of bone screw holes (not specifically shown) may be bored into the acetabulum 50 while aligning with existing holes 37a already formed in the acetabular cup 36a. Once the bone screw holes have been
20 formed in the acetabulum 50, as is also known in the art, a depth gauge (not shown) may be used to determine the length of the fixation screws. With the length of the screws determined, a fixation screw or multiple fixation screws 76 may be advanced through the respective holes 37a in the acetabular cup 36a and driven into the screw holes in the acetabulum 50. In other examples, the
25 acetabular cup 36a additionally or alternatively may be cemented into the acetabulum 50.

[0031] The foregoing description of the embodiments has been provided for purposes of illustration and description. It is not intended to be exhaustive or to limit the disclosure. Individual elements or features of a
30 particular embodiment are generally not limited to that particular embodiment, but, where applicable, are interchangeable and can be used in a selected embodiment, even if not specifically shown or described. The same may also be

varied in many ways. Such variations are not to be regarded as a departure from the disclosure, and all such modifications are intended to be included within the scope of the disclosure.

CLAIMS

What is claimed is:

1. A system for use in replacing a hip joint comprising a first
5 acetabular cup, a second acetabular cup, a first femoral hip prosthesis and a
bearing, wherein the first acetabular cup is formed of a first material and includes
a first inner diameter and a first thickness, the second acetabular cup formed of
a second material and including the first inner diameter and a second thickness,
the first femoral hip prosthesis including a first femoral head that is alternately
10 accommodated by either of the first or second acetabular cups, and the bearing
adapted to be interposed between the first femoral head and one of the first or
second acetabular cups;

wherein the first thickness is less than the second thickness and
the first material differs from the second material.

15

2. The system of claim 1 wherein the first acetabular cup has a first
outer diameter and the second acetabular cup has a second outer diameter,
wherein the first outer diameter is less than the second outer diameter.

20 3. The system of claim 1 wherein the second material has a higher
stiffness than the first material.

4. The system of claim 3 wherein the first material is cobalt-chrome
molybdenum and the second material is titanium.

25

5. The system of claim 4 wherein the first and second acetabular
cups have substantially similar stiffness .

6. The system of claim 1, further comprising:
30 a third acetabular cup having a third inner diameter and a third
thickness;

a fourth acetabular cup having a fourth inner diameter and a fourth thickness; and

a second femoral hip prosthesis including a second femoral head that is alternately accommodated by either of the third or fourth acetabular cups;

5 wherein the third and fourth inner diameters are the same as each other and greater than the first and second inner diameters, the third thickness is less than the fourth thickness and the third acetabular cup is formed of the first material and the fourth acetabular cup is formed of the second material.

10 7. The system of claim 6 wherein the first material of the first and third acetabular cups is less flexible than the second material of the second and fourth acetabular cups.

15 8. The system of claim 7 wherein the first material is cobalt-chrome molybdenum and the second material is titanium.

 9. The system of claim 1, further comprising:
 a first plurality of acetabular cups formed of the first material and having the first thickness;
20 a second plurality of acetabular cups formed of the second material and having the second thickness;
 wherein each acetabular cup of the first plurality of acetabular cups has a corresponding acetabular cup of the second plurality of acetabular cups that has substantially the same inner diameter and a larger outer diameter.

25 10. The system of claim 9 wherein each corresponding acetabular cup has substantially the same stiffness.

30 11. The system of claim 10 wherein each pair of corresponding acetabular cups are adapted to alternately accommodate a common femoral head of a femoral hip prosthesis.

12. A method for replacing a hip joint comprising:

providing a first acetabular cup, a second acetabular cup, a first femoral hip prosthesis, the first acetabular cup having a first inner diameter and a first thickness, the second acetabular cup being formed of a different material
5 relative to the first acetabular cup and having a second inner diameter that is substantially identical to the first inner diameter and a second thickness that is greater than the first thickness;

providing a first femoral head on the first femoral hip prosthesis that is alternately accommodated by either of the first or second acetabular cups;

10 providing a bearing adapted to be alternately interposed between the femoral head and either of the first or second acetabular cups;

preparing an acetabular socket of the hip joint;

determining a size of the prepared acetabular socket;

15 intraoperatively selecting one of the first or the second acetabular cups based on the determined size of the prepared acetabular socket;

impacting the selected first or second acetabular cup into the acetabular socket; and

implanting the first femoral hip prosthesis and positioning the bearing between the femoral head and selected first or second acetabular cups.

20

13. The method of claim 12, further comprising:

providing a third acetabular cup, a fourth acetabular cup and a second femoral hip prosthesis, the third acetabular cup having a third inner diameter and a third thickness, the fourth acetabular cup being formed of the
25 same material as the second acetabular cup and having a fourth inner diameter that is the same as the third inner diameter and a fourth thickness that is greater than the third thickness, the third and fourth inner diameters being greater than the first and second inner diameters, the second femoral hip prosthesis including a second femoral head that has a diameter larger than a diameter of the first
30 femoral head and that is alternately accommodated by either of the third or fourth acetabular cups; and

selecting one of the first, second, third or fourth acetabular cups based on the larger of the first or second femoral heads that is accommodated by the prepared acetabular socket.

5 14. The method of claim 13 wherein providing the first and third acetabular cups includes providing the first and third acetabular cups formed of cobalt-chrome molybdenum and wherein providing the second and fourth acetabular cups includes providing the second and fourth acetabular cups formed of titanium.

10

15 15. A system for replacing a hip joint comprising:
a kit having a first and second plurality of acetabular cups, the first plurality of acetabular cups formed of a first material all having the same first thickness and having incrementally larger outer diameters, the second plurality of acetabular cups formed of a second material all having the same second thickness and having incrementally larger outer diameters;

20 wherein each acetabular cup of the first plurality of acetabular cups has a corresponding acetabular cup of the second plurality of acetabular cups that has the same inner diameter and a larger outer diameter wherein the first thickness is less than the second thickness and the first material is stiffer than the second material.

25 16. The system of claim 15, further comprising a plurality of femoral hip components, each femoral hip component configured to alternatively cooperate with one acetabular cup of the first plurality and one acetabular cup of the second plurality.

30 17. The system of claim 15 wherein each acetabular cup of the first plurality of acetabular cups has a corresponding acetabular cup of the second plurality of acetabular cups that is of substantially the same flexibility.

18. The system of claim 17 wherein the first material is cobalt-chrome molybdenum and the second material is titanium.

19. The system of claim 17 wherein outer diameters of the first and
5 second plurality of acetabular cups are incrementally larger by 2mm.

20. The system of claim 17 wherein the first thickness is 2.5mm and the second thickness is 3.5mm.

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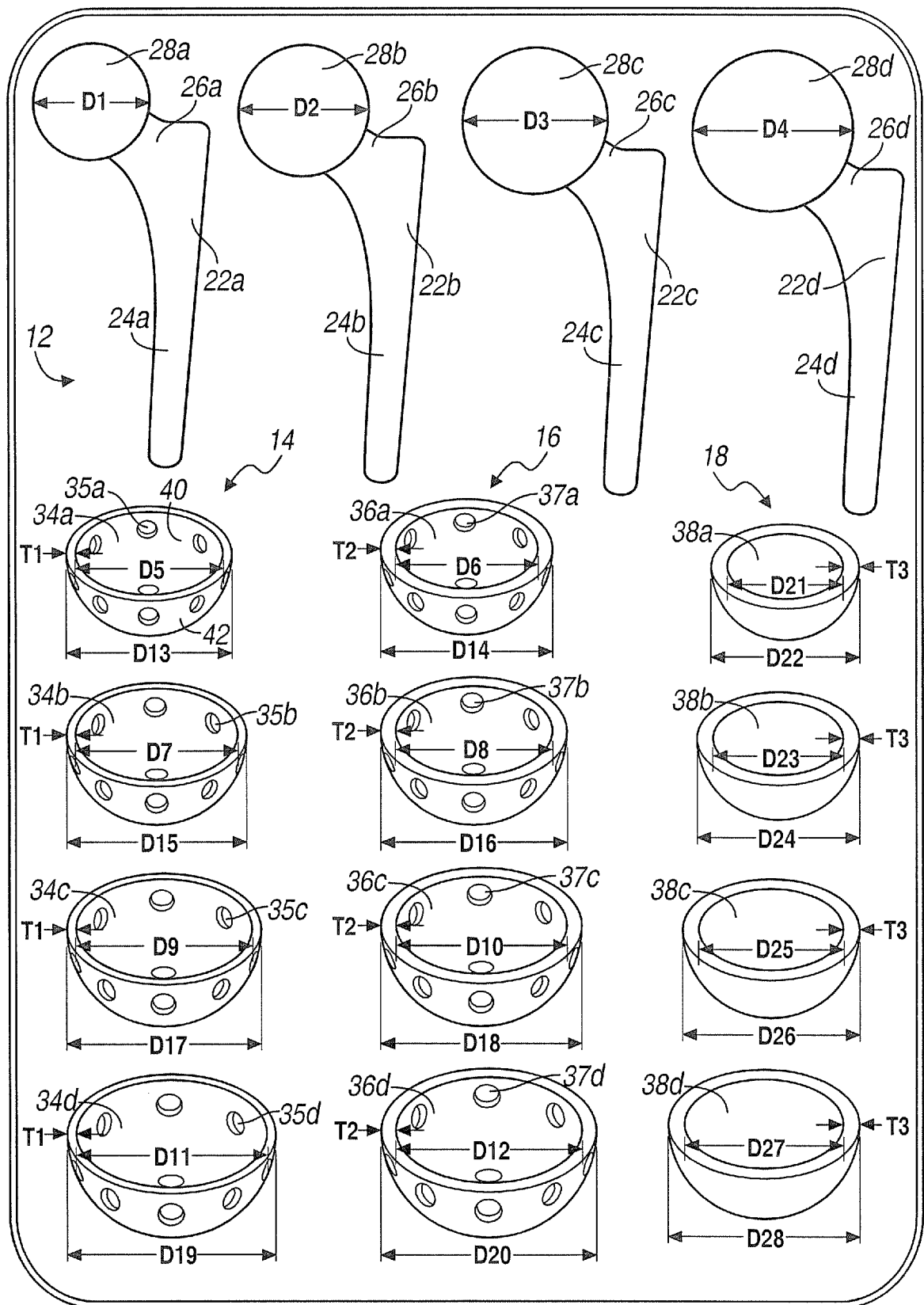


FIG. 1

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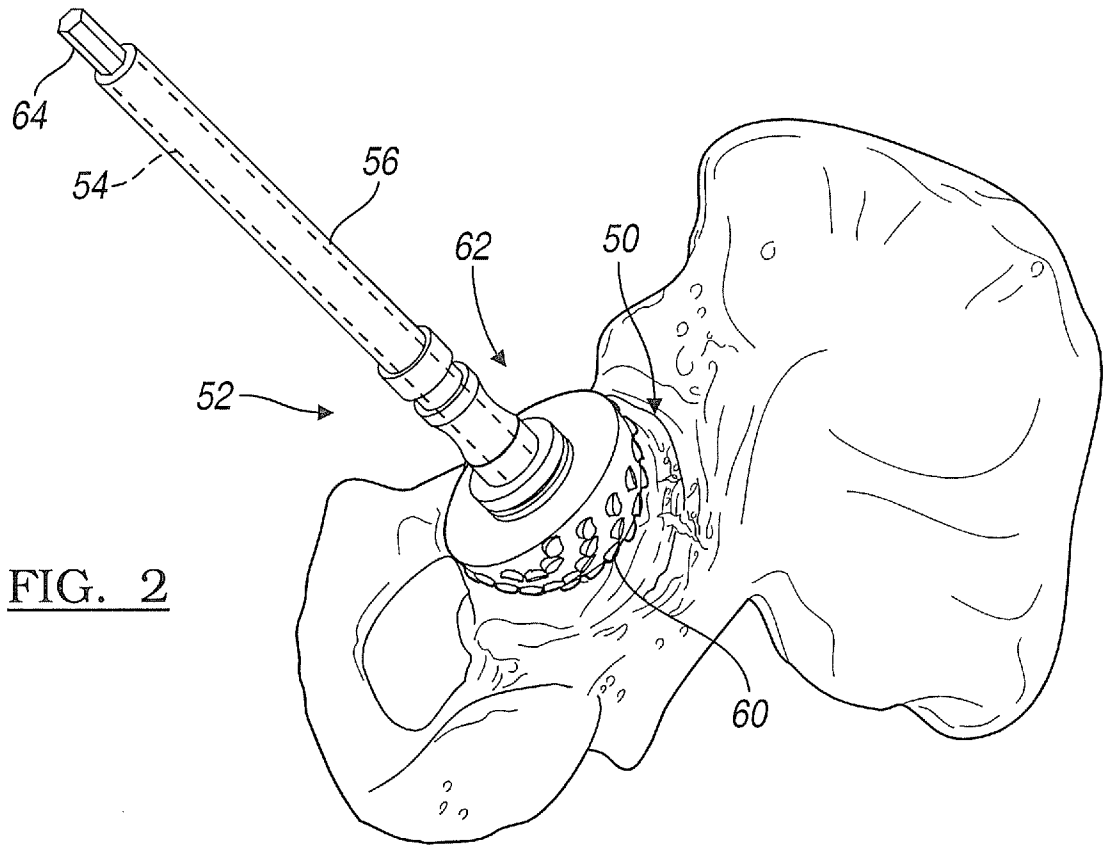


FIG. 2

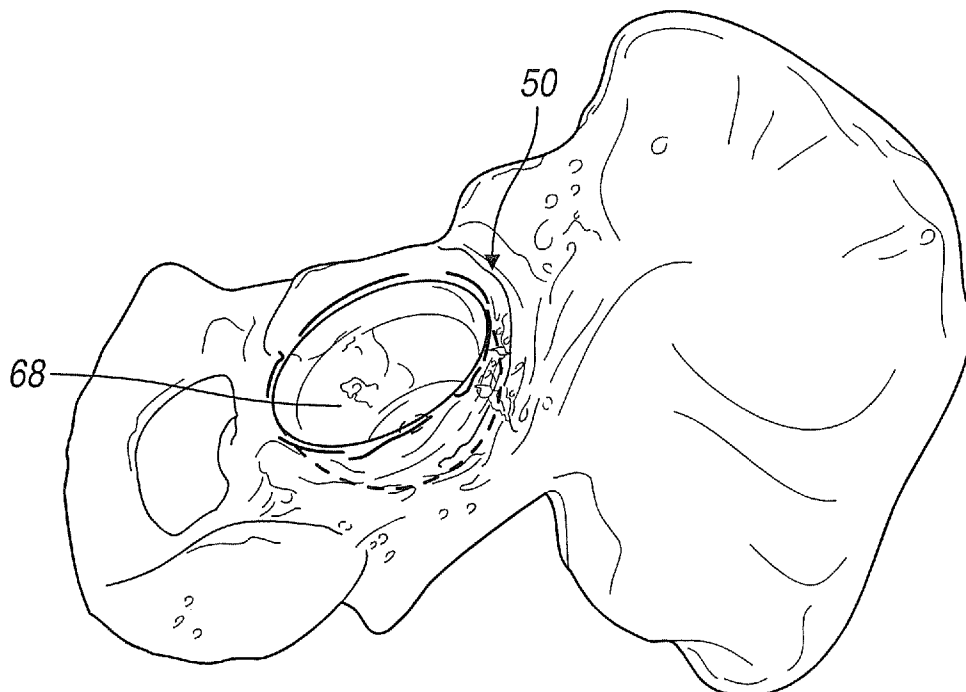
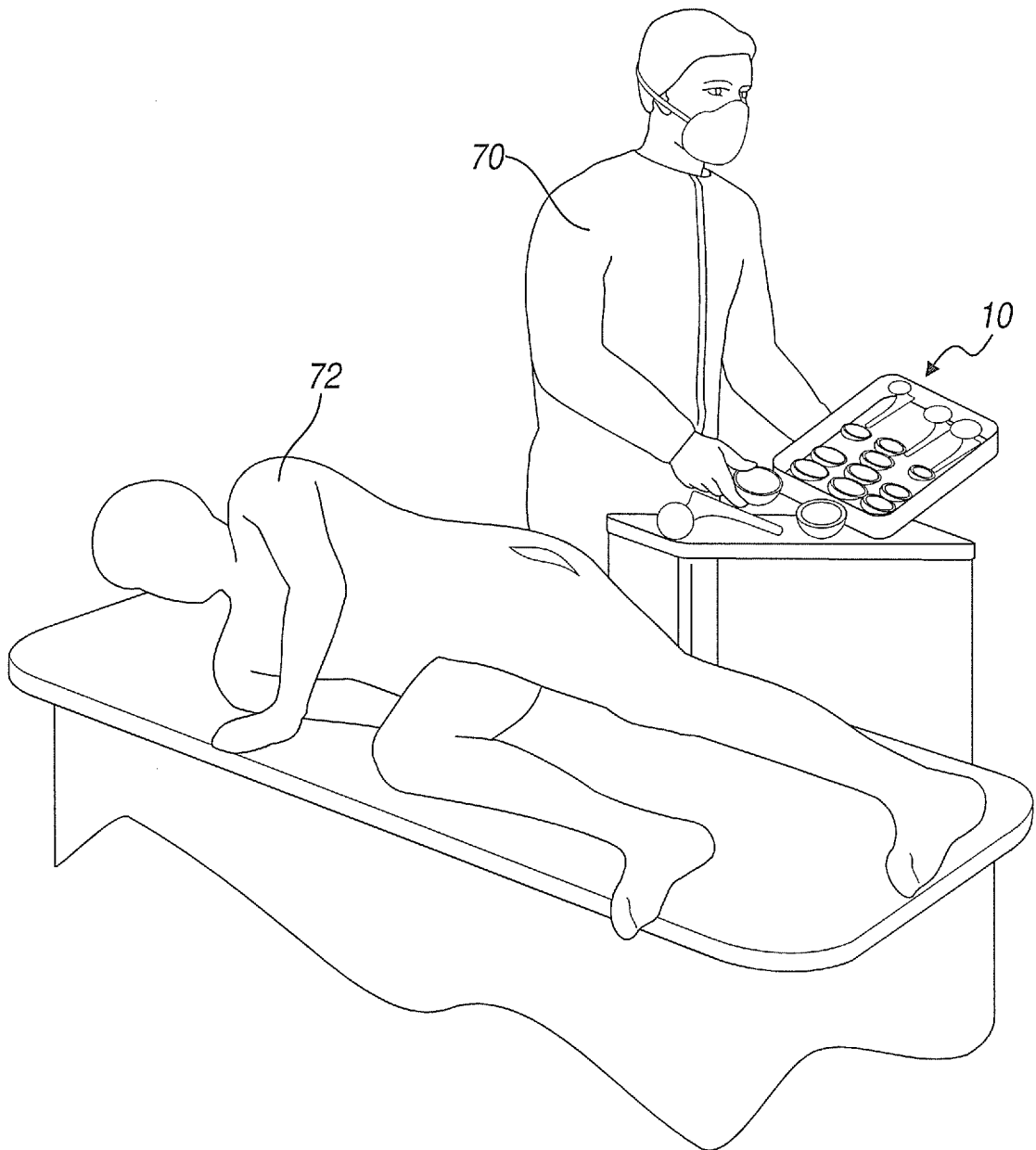


FIG. 3

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FIG. 4

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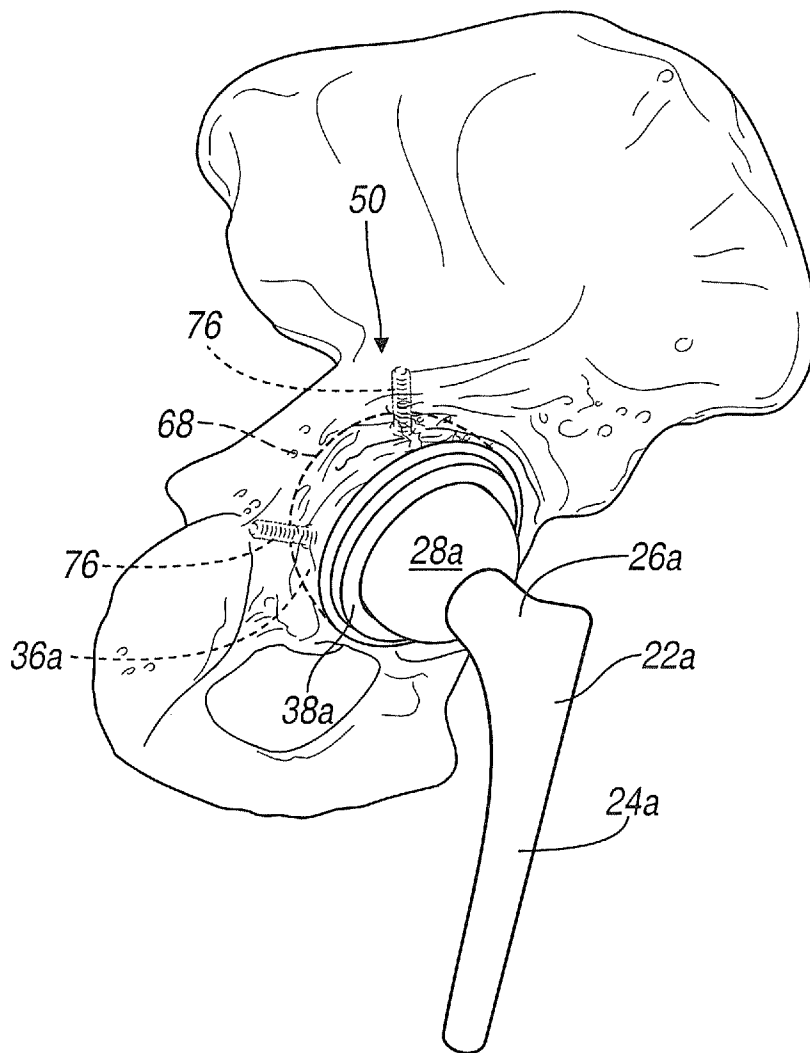


FIG. 5

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2010/033705

A. CLASSIFICATION OF SUBJECT MATTER

INV. A61F2/32

ADD. A61F2/00 A61F2/30

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)

A61F

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 20 2008 008565 U1 (AESCULAP WERKE AG [DE]) 21 August 2008 (2008-08-21) paragraphs [0099], [0100]; figures 6a, 6b, 7	1-11, 15-20
A	FR 2 903 881 A1 (TORNIER SAS [FR]) 25 January 2008 (2008-01-25) the whole document	1-11, 15-20
A	WO 03/092557 A2 (LAZENNEC JEAN-YVES [FR]; CRUCHET-BOUCHER CHRISTIANE [FR] LAZENNEC JEAN) 13 November 2003 (2003-11-13) the whole document	1-11, 15-20

☐

Further documents are listed in the continuation of Box C.

☒

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

10 June 2010

Date of mailing of the international search report

20/07/2010

Name and mailing address of the ISA/

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Authorized officer

Cuiper, Ralf

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2010/033705

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.: 12-14
because they relate to subject matter not required to be searched by this Authority, namely:
The method is clearly surgical, see for example the step of "impacting the selected first or second acetabular cup into the acetabular socket" - R. 39 (iv) PCT.
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:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable 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

Information on patent family members

International application No

PCT/US2010/033705

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 202008008565 U1	21-08-2008	NONE	
FR 2903881 A1	25-01-2008	NONE	
WO 03092557 A2	13-11-2003	AU 2004210449 A1	19-08-2004
		CA 2512274 A1	19-08-2004
		CN 1774217 A	17-05-2006
		EP 1585469 A2	19-10-2005
		FR 2827154 A1	17-01-2003
		JP 4417373 B2	17-02-2010
		JP 2006516216 T	29-06-2006
		JP 2010012288 A	21-01-2010
		US 2006167556 A1	27-07-2006