



- (51) **International Patent Classification:**
A61F 2/44 (2006.01) A61F 2/30 (2006.01)
- (21) **International Application Number:**
PCT/US2017/019206
- (22) **International Filing Date:**
23 February 2017 (23.02.2017)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
62/298,951 23 February 2016 (23.02.2016) US
- (71) **Applicant:** LIFE SPINE, INC. (A DELAWARE CORPORATION) [US/US]; 13951 South Quality Drive, Huntley, IL 60142 (US).
- (72) **Inventor:** PREDICK, Daniel, P.; 320 Dehart Street, West Lafayette, IN 47906 (US).
- (74) **Agent:** ANDERSON, Scott D.; Foley & Lardner LLP, 3000 K Street NW, 6th Floor, Washington, DC 20007-5109 (US).
- (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, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA,

MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, 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, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, 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, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

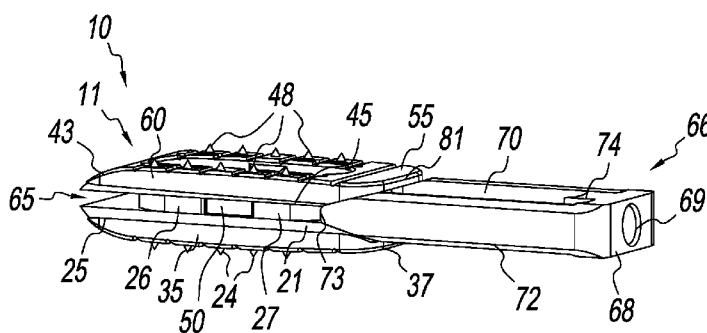
Declarations under Rule 4.17:

- as to the identity of the inventor (Rule 4.17(i))
- 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))
- of inventorship (Rule 4.17(iv))

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

(54) **Title:** EXPANDABLE LATERAL SPINE CAGE WITH REVERSE DOVETAIL CONFIGURATION

**FIG. 13**

(57) **Abstract:** A spinal interbody implant (10) includes a two-component cage (11) and expander (66). The two-component cage (11), when assembled, accepts the expander (66) through a reverse dovetail configuration between the assembled cage (11) and the expander (66). The expander (66) has a pair of legs (70, 72) that move within and along lateral channels (64, 65) formed by and between the two cage components (12, 14) for increasing the height of the two cage components relative to one another. The amount of expansion of the cage (11) is determined by the height of the pair of expander legs (70, 72). The cage (11) accepts different expanders (66) each having pairs of legs of different heights in order to provide different amounts of cage expansion and thus the interbody implant. The front (71, 73) of each expander leg (70, 72) is arch shaped for reception in the lateral channels (64, 65) of the assembled cage (11) and to progressively expand the two cage components (12, 14) relative to one another as the expander (66) is received by the assembled cage (11).

EXPANDABLE LATERAL SPINE CAGE WITH REVERSE DOVETAIL CONFIGURATION

Cross-Reference to Related Applications

5 This U.S. non-provisional patent application claims the benefit of and/or priority under 35 U.S.C. §119(e) to U.S. provisional patent application serial number 62/298,951 filed February 23, 2016 titled “Expandable Lateral Spine Cage With Reverse Dovetail Configuration,” the entire contents of which is specifically incorporated herein by reference.

10 Field of the Invention

 The present invention relates to orthopedic implants for the spine and, particularly, to interbody cages for spinal fusion.

Background of the Invention

15 Many people contend with spine issues as a result of age, disease, and trauma, as well as congenital and acquired complications and conditions. While some of these issues can be alleviated without surgery, other issues respond better to surgery. In some cases, surgery may include placing an implant into the spine. If vertebral fusion is required, a spine implant known as an interbody cage along with bone graft or bone graft material may be used.

20 An interbody cage is a device that is placed in the disc space between adjacent vertebrae of a recipient's spine. The interbody cage includes openings, bores, and/or is porous or the like to permit the introduction and/or carrying of bone graft/bone graft material in order to allow the bone graft/bone graft material to grow from one vertebra through the interbody cage and into the adjacent vertebra. Such interbody cages provide excellent
25 fixation such that most recipients do not require additional implants such as plates and/or bone screws.

 In some instances it is desirable that the interbody cage be able to expand once it has been implanted in the spine. Various expandable interbody cages have been designed, but are either complicated in their expansion mechanisms, are not reliable once implanted, or suffer
30 from other expansion issues.

 It is therefore an object of the present invention to provide an expandable interbody cage that overcomes the deficiencies of the prior art.

SUMMARY OF THE INVENTION

A spinal interbody cage implant includes a two-component cage and expander. The two-component cage, when assembled, accepts the expander through a reverse dovetail configuration between the cage and the expander. The expander has a pair of legs that move
5 within and along lateral channels formed by and between the two cage components in order to expand (i.e. increase the height of) the two cage components relative to one another.

The amount of expansion (height increase) of the cage is determined by the height of the pair of legs of the expander. The cage accepts different expanders each having pairs of legs of different heights in order to provide different amounts of expansion (heights) of the
10 cage and thus the interbody cage implant.

The two components of the cage, when assembled, define an end having an opening with upper and lower sidewalls that are angled inwardly in a generally trapezoidal manner. An end of the expander has upper and lower sidewalls that are angled upwardly in a generally trapezoidal manner, opposite to that of the generally trapezoidal end opening of the
15 assembled cage. The end of the expander is thus shaped for reception in the end opening of the assembled cage in a reverse dovetail configuration.

The front of each leg of the expander is in the shape of an arch for reception in the lateral channels of the assembled cage and to progressively expand the two cage components relative to one another as the expander is inserted into/received by the assembled cage.

The lower component has a central opening with a configured sidewall extending generally transverse to the plane of the lower component. The upper component has a central opening separated by a cross member with a configured sidewall extending generally transverse to the plane of the upper component. When the upper and lower components are assembled, the configured sidewall of the upper component fits within the sidewall of the
20 lower component. In addition, the upper component has openings in its upper surface that receive the configured sidewall of the lower component.

The upper component includes a plurality of spikes, projections or the like that extend generally upwards from the upper surface of the upper component, preferably, but not necessarily, about the central opening. The lower component includes a plurality of spikes, projections or the like that extend generally downwards from the lower surface of the lower
25 component, preferably, but not necessarily, about the central opening.

The lower component has an upwardly curved lower front surface and an angled upper rear surface. The upper component has a downwardly curved upper front surface and an angled lower rear surface. The upwardly curved lower front surface of the lower

component and the downwardly curved upper surface of the upper component provide an angled nose that allows easy insertion of the cage implant into a space between adjacent vertebrae.

The spinal interbody cage implant may be used in a lateral insertion procedure, a posterior insertion procedure, or an anterior insertion procedure.

Further aspects of the present invention will become apparent from consideration of the drawings and the following description of a form of the invention. A person skilled in the art will realize that other forms of the invention are possible and that the details of the invention can be modified in a number of respects without departing from the inventive concept. The following drawings and description are to be regarded as illustrative in nature and not restrictive.

BRIEF DESCRIPTION OF THE DRAWINGS

The features of the invention will be better understood by reference to the accompanying drawings which illustrate a form of the present invention, wherein:

Fig. 1 is an exploded isometric view of the two components of the cage of an exemplary spine cage implant fashioned in accordance with the present principles;

Fig. 2 is an exploded side (lateral) view of the two components shown in Figs. 1;

Fig. 3 is an exploded end view of the two components shown in Fig. 1;

Fig. 4 is a top plan view of the two components shown in Fig. 1 presented side-by-side;

Fig. 5 is a bottom plan view of the two components shown in Fig. 1 presented side-by-side;

Fig. 6 is an isometric upper front lateral view of the assembled cage of the present spine cage implant;

Fig. 7 is an isometric upper view of the assembled cage of the present spine cage implant;

Fig. 8 is a lateral view of the assembled cage of the present spine cage implant;

Fig. 9 is an upper lateral view of the assembled cage of the present spine cage implant;

Fig. 10 is an isometric view of a third component of the present spine cage implant;

Fig. 11 is an isometric front lateral view of the third component shown in Fig. 10;

Fig. 12 is an exploded isometric view of the assembled cage and third component of the present spine cage implant;

Fig. 13 is a partially exploded isometric view of the assembled cage and third component of the present spine cage implant;

Fig. 14 is an isometric upper lateral view of the present spine cage implant;

Fig. 15 is an isometric upper view of the present spine cage implant;

5 Fig. 16 is a sectional upper view of the second component on the third component, assembled, of the present spine cage implant; and

Fig. 17 is an isometric front view of the present spine cage implant.

DETAILED DESCRIPTION OF THE INVENTION

10 Referring to the figures, there is depicted an exemplary form of the present expandable spine cage implant, generally designated 10. The expandable spine cage implant 10 is made from a biocompatible material such as, but not limited to, titanium, stainless steel, an alloy of titanium or steel, or otherwise. The expandable spine cage implant 10 is characterized by a cage 11 and an expander 66, the cage 11 is composed of two components,
15 a first, lower, or inferior component 12 (collectively, lower component 12) and a second, upper, or superior component 14 (collectively, upper component 14), the nomenclature first and second being arbitrary. The expandable spine cage implant 10 may be used between any two vertebrae of the spine.

20 Figs. 1-3 depict the lower component 12 and the upper component 14 in exploded views, while Figs. 4-5 depict top plan and bottom plan views of the lower and upper components 12, 14. The exploded views show how the two components are assembled or received on one another thereby forming the cage 11. The plan views show details of the two cage components.

25 The lower component 12 is characterized by a body 16 of a generally rectangular shape having a generally planar lower or inferior surface 17 and a generally planar upper or superior surface 18. The body 16 has a first, generally elongated lateral side 34 and a second, generally elongated lateral side 35, the nomenclature first and second being arbitrary. A first end 36 of the body 16 has a generally planar platform 19 at its upper/superior surface and its lower/inferior surface 25 curved upwardly, while a second end 37 of the body 16 has a
30 generally planar lower/inferior surface and an upwardly angled portion 31 that meets with its generally planar upper/superior surface 19, the nomenclature first and second being arbitrary. The body 16 further has a central opening, window or the like 32 that is generally oval in shape. The opening 32 is provided with a configured sidewall 33 that extends about a majority of the opening 32, with the exception of an area proximate the second end 37.

The configured sidewall 33 has a first portion 26 situated proximate the second end 37 and lateral side 34 of the body 16 that extends upwardly or transverse to the plane of the body 16. The first portion 26 is slightly curved near the second end 37, the curved section following the curvature of the opening 32. The configured sidewall 33 also has a second portion 27 situated proximate the first end 36 and lateral side 34 of the body 16 that extends upwardly or transverse to the plane of the body 16. The second portion 27 is generally curved near the first end 36, the curved section following the curvature of the opening 32. The second portion 27 of the sidewall 33 is spaced from the first portion 26 of the sidewall 33 to provide a space or gap between the first and second portions 26, 27. The configured sidewall 33 further has a third portion 28 situated proximate the front 36 and lateral side 35 of the body 16 that extends upwardly or transverse to the plane of the body 16. The third portion is generally curved near the first end 36, the curved section following the curvature of the opening 32. The third portion 28 of the sidewall 33 is spaced from the second portion 27 of the sidewall 33 to provide a space or gap between the second and third portions 27, 28 such that the third portion 28 is generally opposite to the second portion 27. The height of the first, second and third portions 26, 27, 28 are preferably, but not necessarily, all the same. The configured sidewall 33 furthermore has a fourth portion 30 that is adjacent to the third portion 28 proximate the lateral side 35 of the body 16 that extends upwardly or transverse to the plane of the body 16. The fourth portion 30 is generally planar and has a height that is preferably, but not necessarily, less than the height of the first, second and third portions 26, 27, and 28. The configured sidewall moreover has a fifth portion 29 situated proximate the second end 37 and the lateral side 35 of the body 16 that extends upwardly or transverse to the plane of the body 16. The fifth portion is generally curved near the second end 37, the curved section following the curvature of the opening 32. The fifth portion 29 of the sidewall 33 is adjacent the fourth portion 30. The height of the fifth portion 29 is preferably, but not necessarily, the same as the height of the first, second and third portions 26, 27, and 28. Because of the difference in height of the fourth portion 30 relative to the adjacent third and fifth portions 28, 29 a gap or space is defined between the third and fifth portions 28, 29. It should be appreciated that the nomenclature first, second, third, fourth, and fifth is arbitrary here and throughout.

Situated laterally along the first and second sidewalls 26, 27 is a first rail 20 that extends along the upper surface 18 of the body 16 from the raised superior surface 19 to the upwardly angled portion 31. Situated laterally along the third, fourth and fifth sidewalls 28, 29, 30 is a second rail 21 that extends along the upper surface 18 of the body 16 from the

raised superior surface 19 to the upwardly angled portion 31. As best seen in Fig. 3, a first angled trough or channel 22 is formed at the lower outwardly lateral side of the first rail 20 adjacent the lateral side 34. A second angled trough or channel 23 is formed at the lower outwardly lateral side of the second rail 21 adjacent the lateral side 35. The first angled
5 trough 22 forms part of an elongate lateral dovetail groove 64 between the assembled lower component 12 and the upper component 14 (see, e.g. Fig. 8, and below). The second angled trough 23 forms part of an elongate lateral dovetail groove 65 between the assembled lower component 12 and the upper component 14 (see, e.g. Fig. 8, and below).

The lower component 12 lastly has a plurality of spikes, projections, or the like 24
10 (collectively, spikes 24) situated on the lower or inferior side 17 of the body 16. As best seen in Fig. 5, the plurality of spikes 24 are linearly arranged laterally adjacent the opening 32. While only a single row of spikes 24 is provided on each side of the opening 32, more or less spikes may be provided in any pattern as desired. The shape of the spikes 24 may also be changed as desired.

The upper component 14 is characterized by a body 40 of a generally rectangular
15 shape having a generally planar upper or superior surface 42 and a generally planar lower or inferior surface 41. The body 40 has a first, generally elongated lateral side 59 and a second, generally elongated lateral side 60, the nomenclature first and second being arbitrary. A first end 80 of the body 40 has a downwardly curved upper/superior front surface 43 with a
20 generally planar lower/inferior surface 49, while a second end 81 of the body 40 has a generally planar upper/superior surface 55 and a downwardly angled lower portion 41 that meets with its generally planar lower/inferior surface 42. The body 40 further has a central opening, window or the like 82 that is generally oval in shape with a cross bar 56 extending between lateral sides of the oval opening 82 thereby dividing the oval opening 82 into a first
25 opening 57 and a second opening 58, the nomenclature first and second being arbitrary. As best seen in Fig. 8, the cross bar 56 has a central bore 61 with a first configured window 62 on a first lateral side of the bore 61 and a second configured window 63 on a second lateral side of the bore 61, the windows allowing bone graft material to migrate between the openings 57, 58. The opening 82 is provided with a configured sidewall 50 that extends
30 about a majority of the opening 82, with the exception of an area proximate the second end 81. The configured sidewall 50 extends downwardly or transverse to the plane of the body 40.

Situated laterally along the sidewall 50 adjacent the lateral end 59 of the body 40 is a third rail 44 that extends along the upper surface 41 of the body 40. Situated laterally along

the sidewall 50 adjacent the lateral end 60 of the body 40 is a fourth rail 45 that extends along the upper surface 41 of the body 40. As best seen in Fig. 3, a third angled trough or channel 46 is formed at the upper outwardly lateral side of the third rail 44 adjacent the lateral side 59. A fourth angled trough or channel 47 is formed at the upper outwardly lateral side of the fourth rail 45 adjacent the lateral side 60. The third angled trough 46 forms part of the elongate lateral dovetail groove 64 between the assembled lower component 12 and the upper component 14 (see, e.g. Fig. 8, and below). The fourth angled trough 47 forms part of the elongate lateral dovetail groove 65 between the assembled lower component 12 and the upper component 14 (see, e.g. Fig. 8, and below).

As best seen in Fig. 4, the upper component 14 has four arced openings 51, 52, 53, 54 extending from the upper/superior surface to the lower/inferior surface of the body 40 that are situated about the opening 82. A first arced opening 51 is situated proximate to the lateral side 59 and the rear 81 of the body 40. A second arced opening 52 is situated proximate to the lateral side 59 and the first end 80 of the body 40. A third arced opening 53 is situated proximate to the lateral side 60 and the first end 80 of the body 40, opposite to the second arced opening 52. A fourth arced opening 54 is situated proximate to the lateral side 60 and the second end 81 of the body 40, opposite to the first arced opening 51. The first arced opening 51 corresponds in placement to the first portion 26 of the configured sidewall 33 of the lower component 12 when the upper and lower components 14, 12 are joined (assembled) such that the first portion 26 can be received in the first arced opening 51. The second arced opening 52 corresponds in placement to the second portion 27 of the configured sidewall 33 of the lower component 12 when the upper and lower components 14, 12 are joined (assembled) such that the second portion 27 can be received in the second arced opening 52. The third arced opening 53 corresponds in placement to the third portion 28 of the configured sidewall 33 of the lower component 12 when the upper and lower components 14, 12 are joined (assembled) such that the third portion 28 can be received in the third arced opening 53. The fourth arced opening 54 corresponds in placement to the fifth portion 29 of the configured sidewall 33 of the lower component 12 when the upper and lower components 14, 12 are joined (assembled) such that the fifth portion 29 can be received in the fourth arced opening 54.

The upper component 14 lastly has a plurality of spikes, projections, or the like 48 (collectively, spikes 48) situated on the upper or superior side 42 of the body 40. As best seen in Fig. 4, the plurality of spikes 48 are linearly arranged laterally adjacent the opening 82. While only a single row of spikes 48 is provided on each side of the opening 82, more or

less spikes may be provided in any pattern as desired. The shape of the spikes 48 may also be changed as desired.

Figs. 6-9 depict the upper and lower components 14, 12 joined or assembled together to form the cage 11 of the present expandable spinal cage implant. These figures depict the cage 11 at its smallest height, i.e. before expansion. The sidewall 50 of the upper component 14 fits inside the first, second, third, fourth, and fifth portions 26, 27, 28, 30, 29 of the sidewall 33 of the lower component 12. The first rail 20 of the lower component 12 and the third rail 44 of the upper component 14 abut one another such that their respective troughs 22, 46 form the elongated dovetail groove 64 along the lateral sides 34, 59 of the cage 11. The second rail 21 of the lower component 12 and the fourth rail 45 of the upper component 14 abut one another such that their respective troughs 23, 47 form the elongated dovetail groove 65 along the lateral sides 35, 60 of the cage 11. The configurations of the second end 37 of the lower component 12 and of the second end 81 of the upper component 14 define a reverse dovetail opening of the cage 11.

Figs. 10-11 depict the expander 66 of the present expandable spine cage implant 10. The expander 66 is characterized by a generally elongated U-shaped body 67 having a base 68, a first elongated leg 70 extending from one lateral side of the base 68, and a second elongated leg 72 extending from another lateral side of the base 68. The base 68 has a boss 74 extending from an inner side thereof having an arced end 75. The boss 74 further includes a first angled cutout 76 on a first lateral side and a second angled cutout 77 on a second lateral side. A bore 69 extends through the base 68 and the boss 74. The first elongated leg 70 has a first height that is preferably, but not necessarily, constant along its length and terminates in a distal, arched end 71. The second elongated leg 72 has a second height that is preferably, but not necessarily, constant along its length and terminates in a distal, arched end 73. The first height of the first elongated leg 70 and the second height of the second elongated leg 72 are preferably, but not necessarily, the same. The base 68 is generally dovetail-configured for reception in the reverse dovetail opening of the cage 11.

Figs. 12-14 depict the sequence of expanding the cage 11 once the cage 11 has been assembled (i.e. the upper and lower components 14, 12 have been joined). Fig. 12 depicts the alignment of the expander 66 relative to the cage 11. The legs 70, 72 are directed into respective elongated lateral dovetail grooves 64, 65. As the legs 70, 72 are received in the elongated lateral dovetail grooves 64, 65 (Fig. 13), the height of the legs 70, 72 separates or expands the upper and lower components 14, 12 relative to one another, the amount of expansion dependent upon the height of the legs 70, 72. Fig. 14 depicts the expander 66 fully

received by the cage 11 with the dovetail base 68 of the expander 66 received in the reverse dovetail opening of the rear of the cage 11.

Fig. 15 shows an upper view of the expanded spine cage implant 10. Fig. 17 is a rear view of the expanded spine cage implant 10. Fig. 16 is a sectional view of the expanded spine cage implant 10 cut along a plane of the expander 66 illustrating how the sidewalls 26-30 of the lower component 12 are received about the sidewall 50 of the upper component 14, and the expander 66 is received on the lower component 12.

The present expandable spine cage implant may be used in a lateral insertion procedure, an anterior insertion procedure, or a posterior insertion procedure.

It should be appreciated that dimensions of the components, structures, and/or features of the present expandable spine cage implant may be altered as desired within the scope of the present disclosure.

CLAIMS

What is claimed is:

1. A lateral spinal interbody implant (10) comprising:
 - a first cage section (14);
 - 5 a second cage section (12); and
 - an expander (66);
 - the first and second cage sections (14, 12) received together to create an interbody cage (11) whose height is determined by reception of the expander (66).
- 10 2. The lateral spinal interbody implant (10) of claim 1, wherein:
 - the first cage section (14) has a first lateral side slot (46), and a second lateral side slot (47);
 - the second cage section (12) has a third lateral side slot (22), and a fourth lateral side slot (23); and
 - 15 the first lateral side slot (46) of the first cage section (14) and the third lateral side slot (22) of the second cage section (12) forming a first lateral channel (64) along a first lateral length of the assembled first and second cage sections (11), and the second lateral side slot (47) of the first cage section (14) and the fourth lateral slot (23) of the second cage section (12) forming a second lateral channel (65) along a second lateral length of the assembled first
 - 20 and second cage sections (11);
 - the expander (66) having an end (68), a first leg (70) extending from the end (68) and defining a first proximal end adjacent a first side of the end (68) and a first distal end (71), and a second leg (72) extending from the end (68) and defining a second proximal end adjacent a second side of the end (68) and a second distal end (73), the reception of the first
 - 25 leg (70) in the first lateral length of the assembled first and second cage sections (11) and of the second leg (72) in the second lateral length of the assembled first and second cage sections (11) causing height of the assembled first and second cage sections (11) to increase corresponding to height of the first and second legs (70, 72).
- 30 3. The lateral spinal interbody implant (10) of claim 2, wherein:
 - a first reverse dovetail opening is formed at a first end of the first lateral length of the assembled first and second cage sections (11);
 - a second reverse dovetail opening is formed at a second end of the second lateral length of the assembled first and second cage sections (11);

the first proximal end of the first leg (70) having a first wedge shape complementary of the first reverse dovetail; and

the second proximal end of the second leg (72) having a second wedge shape complementary of the second reverse dovetail;

5 the first wedge shape received in the first reverse dovetail and the second wedge shape received in the second reverse dovetail when the expander (66) is received in first and second lateral lengths of the assembled first and second cage sections (11).

4. The lateral spinal interbody implant (10) of claim 3, wherein:

10 the first distal end (71) of the first leg (70) is angled; and
the second distal end (73) of the second leg (72) is angled.

5. The lateral spinal interbody implant (10) of claim 4, further comprising:

15 a plurality of expanders (66), each expander having differing heights of first and second legs.

6. The lateral spinal interbody implant (10) of claim 2, wherein the assembled first and second cage sections (11) define a central cavity (57, 58) extending from an upper side thereof to a lower side thereof.

20

7. The lateral spinal interbody implant (10) of claim 6, wherein the upper side of the assembled first and second cage sections (11) includes first projections (48), and the lower side of the assembled first and second cage (11) sections includes second projections (24).

25 8. The lateral spinal interbody implant (10) of claim 7, wherein the first projections (48) are situated about the central cavity (57, 58), and the second projections (24) are situated about the central cavity (57, 58).

9. The lateral spinal interbody implant (10) of claim 6, wherein the end (68) of the expander
30 (66) has a central bore (69) providing communication with the central cavity (57, 58).

10. The lateral spinal interbody implant (10) of claim 9, wherein the central cavity (57, 58) is divided into first and second chambers (57, 58) by a wall (56).

11. A lateral spinal interbody implant (10) comprising:

an upper cage section (14) having a first lateral side slot (46) and a second lateral side slot (47);

a lower cage section (12) having a third lateral side slot (22) and a fourth lateral side slot (23);

the upper and lower cage sections (14, 12) received together to create an interbody cage (11) with the first lateral side slot (46) of the upper cage section (14) and the third lateral side slot (22) of the lower cage section (12) forming a first lateral channel along a first lateral length of the interbody cage (11), and the second lateral side slot (47) of the upper cage section (14) and the fourth lateral side slot (23) of the lower cage section (12) forming a second lateral channel along a second lateral length of the interbody cage (11); and

an expander (66) having an end (68), a first leg (70) extending from the end (68) and defining a first proximal end adjacent a first side of the end (66) and a first distal end (71), and a second leg extending from the end (68) and defining a second proximal end adjacent a second side of the end and a second distal end (73), the reception of the first leg (70) in the first lateral length of the interbody cage (11) and of the second leg (72) in the second lateral length of the interbody cage (11) causing height of the interbody cage (11) to increase corresponding to height of the first and second legs (70, 72) of the expander (66).

12. The lateral spinal interbody implant (10) of claim 11, wherein:

a first reverse dovetail opening is formed at a first end of the first lateral length of the interbody cage (11);

a second reverse dovetail opening is formed at a second end of the second lateral length of the interbody cage (11);

the first proximal end of the first leg (70) having a first wedge shape complementary of the first reverse dovetail; and

the second proximal end of the second leg (72) having a second wedge shape complementary of the second reverse dovetail;

the first wedge shape received in the first reverse dovetail and the second wedge shape received in the second reverse dovetail when the expander (66) is received in first and second lateral lengths of the interbody cage (11).

13. The lateral spinal interbody implant (10) of claim 12, wherein:

the first distal end (71) of the first leg (70) is angled; and

the second distal end (73) of the second leg (72) is angled.

14. The lateral spinal interbody implant (10) of claim 13, further comprising:

5 a plurality of expanders (66), each expander having differing heights of first and second legs.

15. The lateral spinal interbody implant (10) of claim 12, wherein the interbody cage (11) defines a central cavity (57, 58) extending from an upper side thereof to a lower side thereof.

10 16. The lateral spinal interbody implant (10) of claim 15, wherein the upper side of the interbody cage (11) includes first projections (48), and the lower side of the interbody cage (11) includes second projections (24).

15 17. The lateral spinal interbody implant (10) of claim 16, wherein the first projections (48) are situated about the central cavity (57, 58), and the second projections (24) are situated about the central cavity (57, 58).

20 18. The lateral spinal interbody implant (10) of claim 15, wherein the end (68) of the expander (66) has a central bore (69) providing communication with the central cavity (57, 58).

19. The lateral spinal interbody implant (10) of claim 18, wherein the central cavity (57, 58) is divided into first and second chambers (57, 58) by a wall (56).

1/14

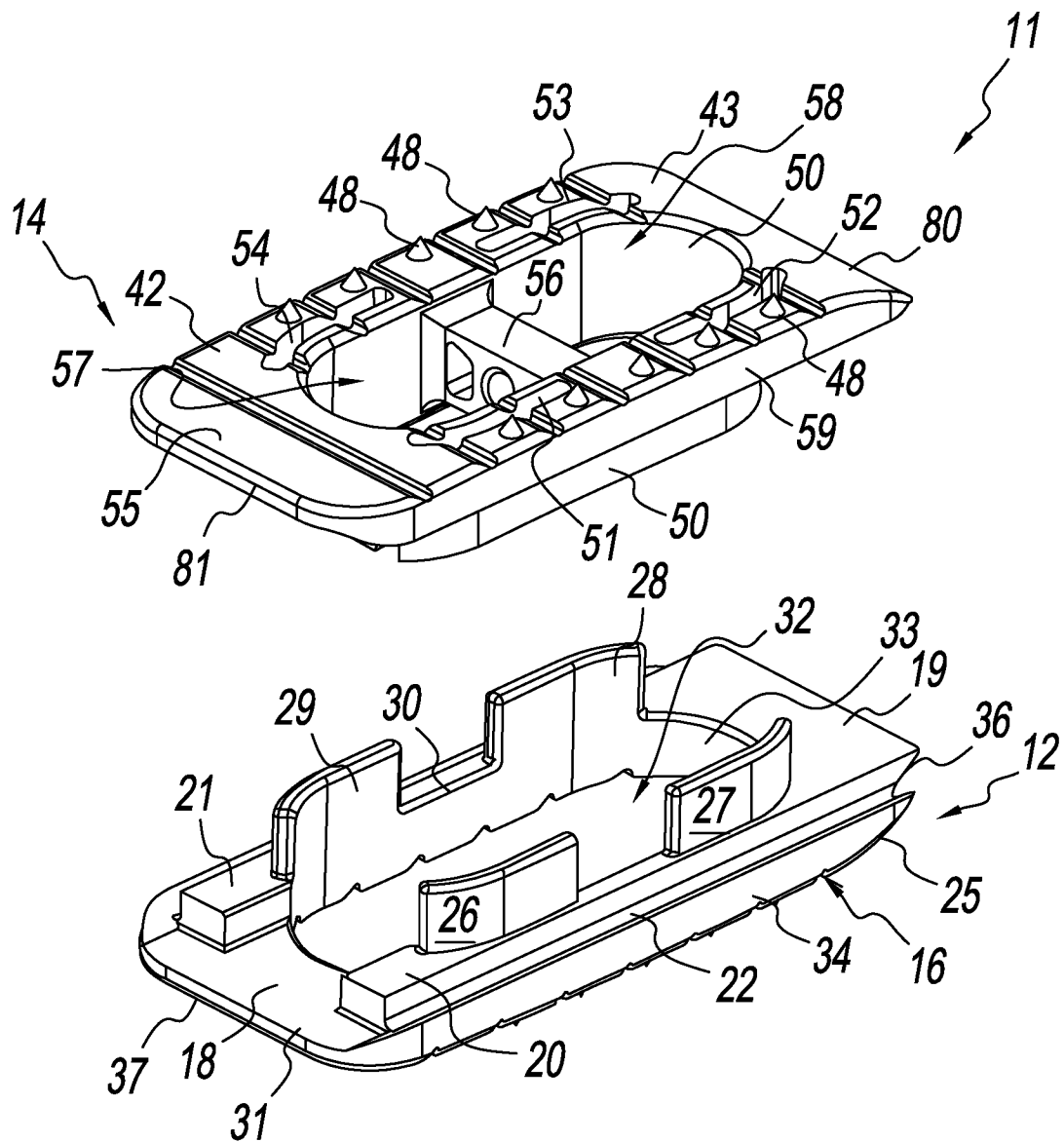


FIG. 1

2/14

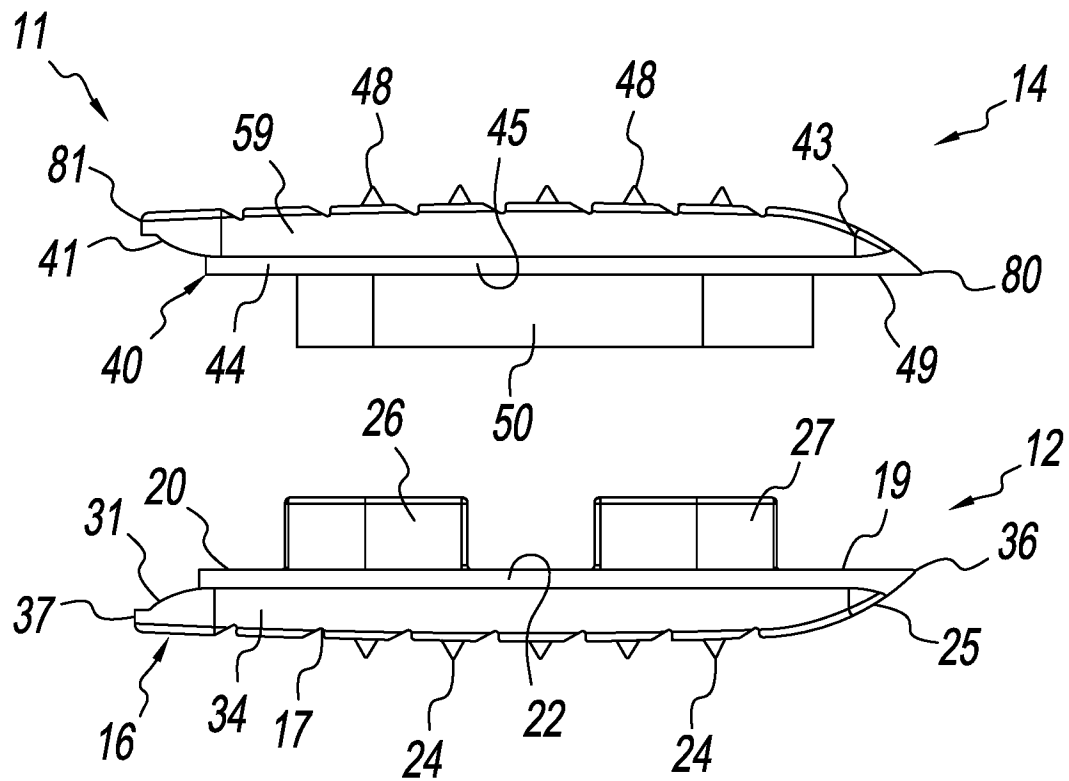


FIG. 2

3/14

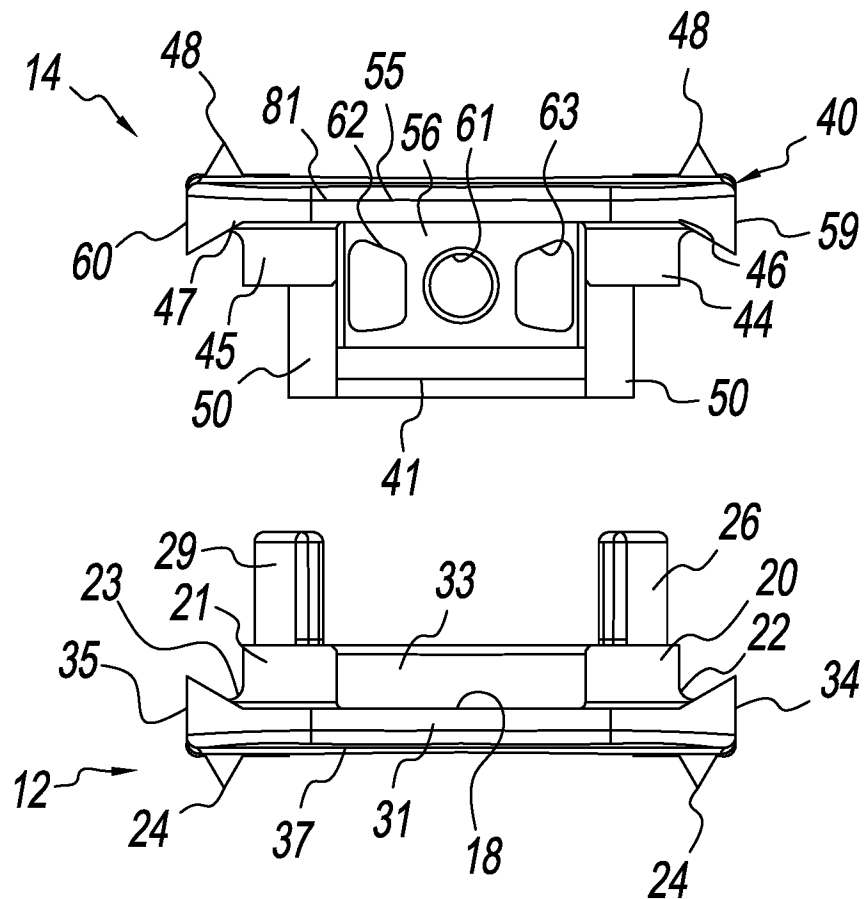


FIG. 3

4/14

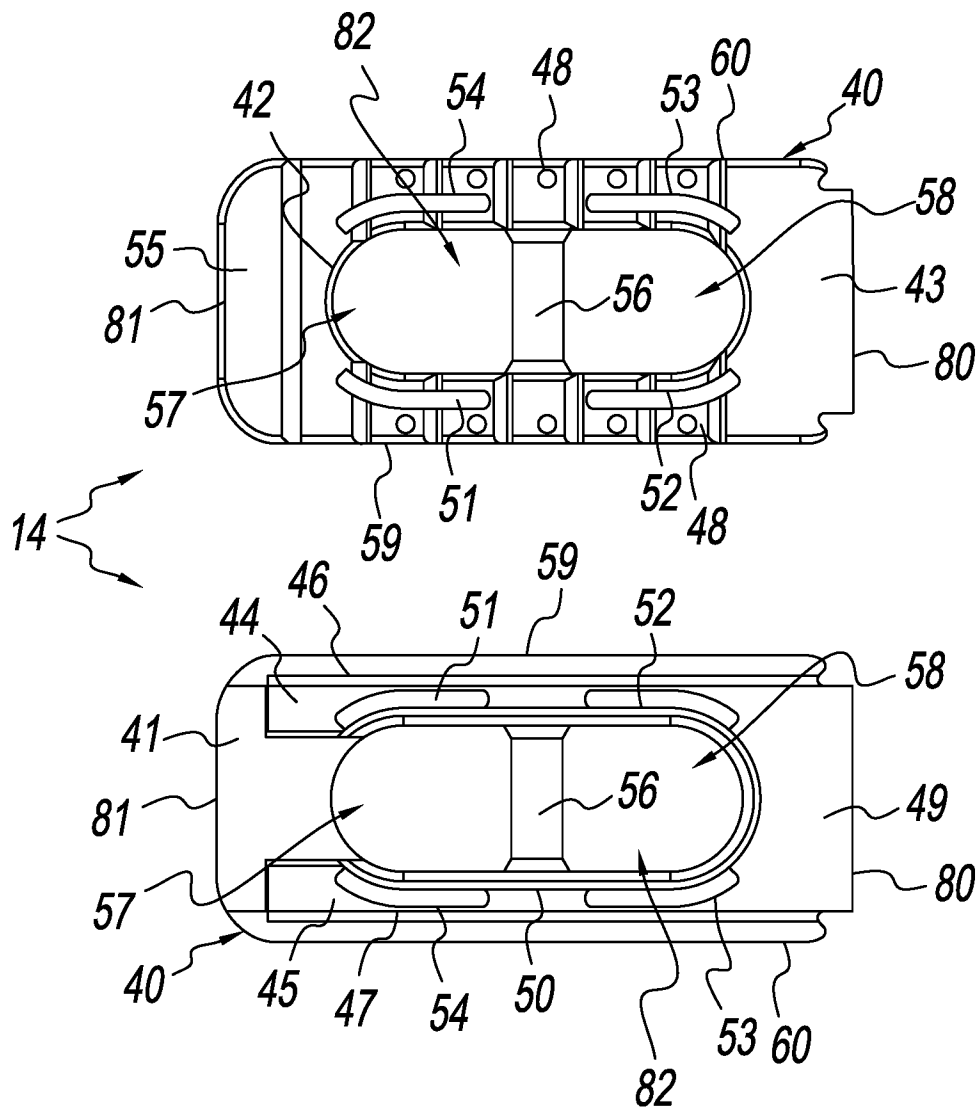


FIG. 4

5/14

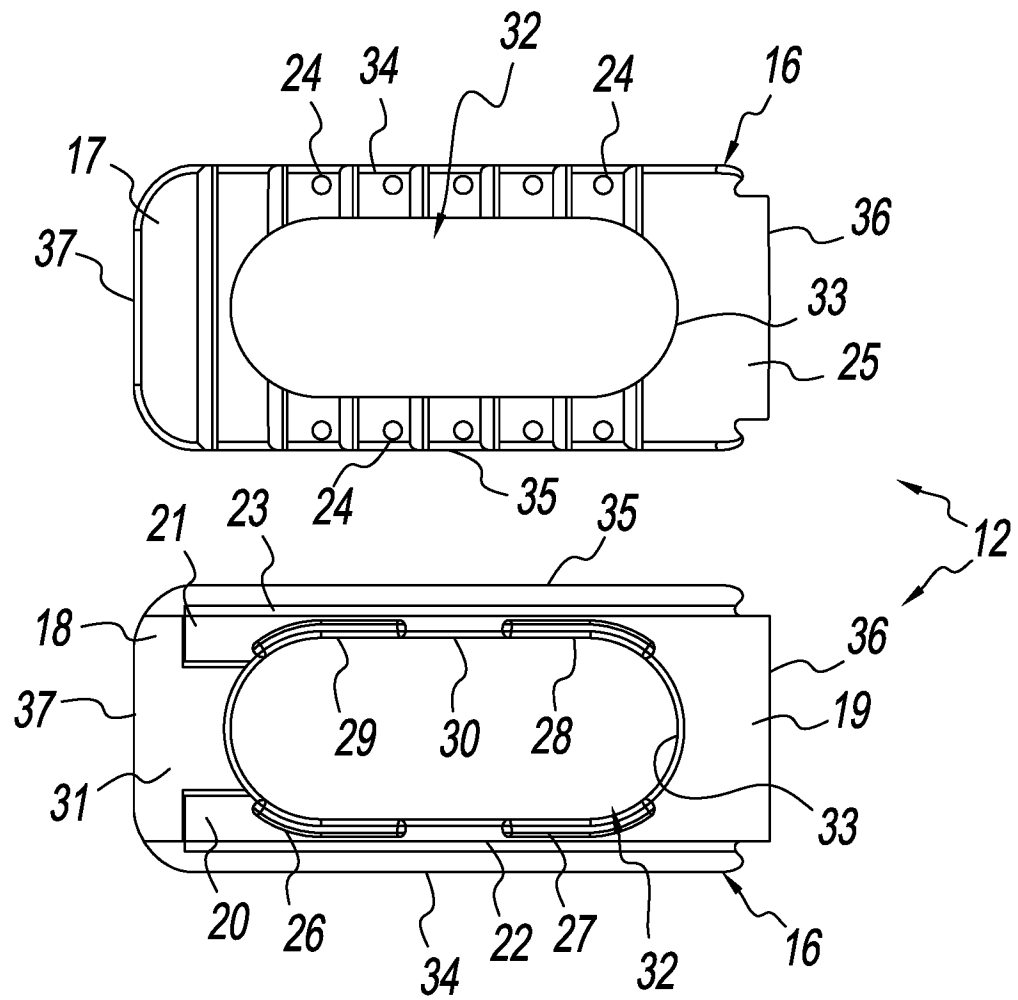


FIG. 5

6/14

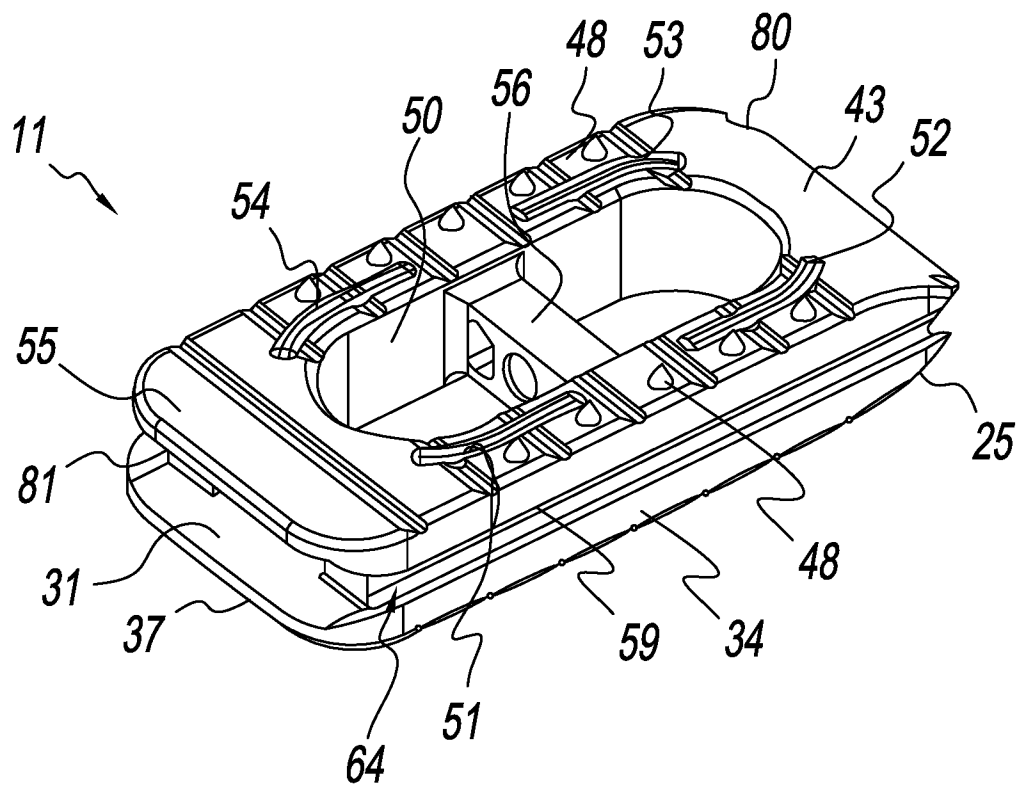


FIG. 6

7/14

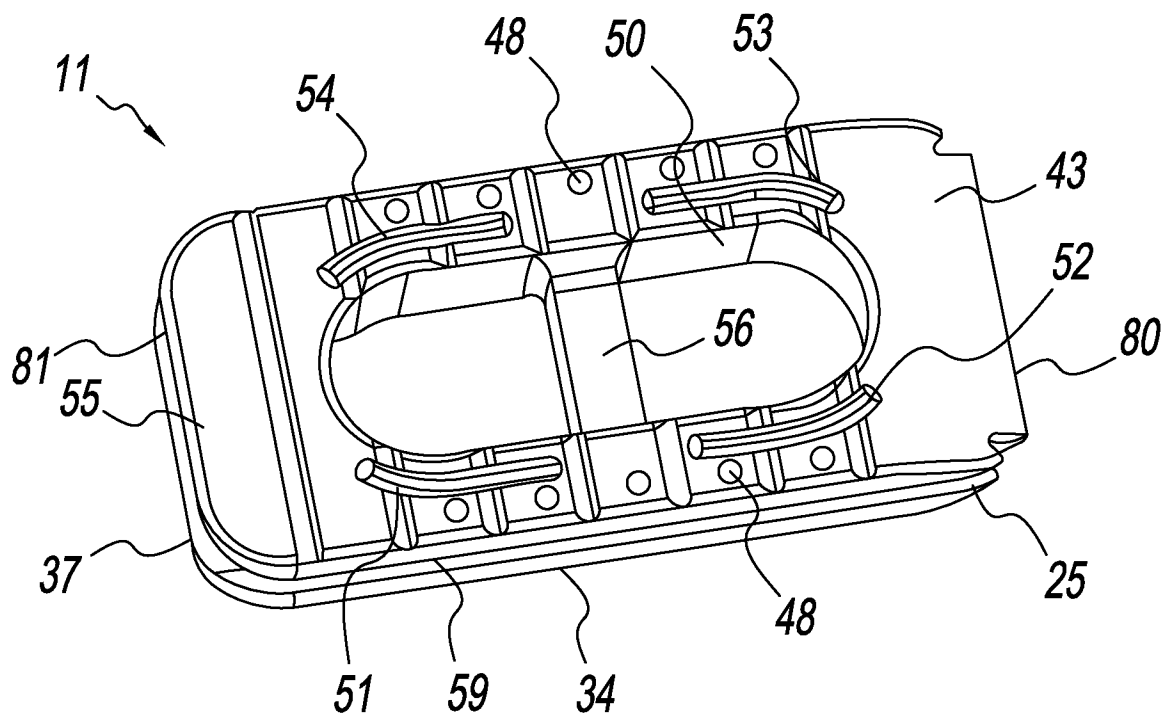


FIG. 7

8/14

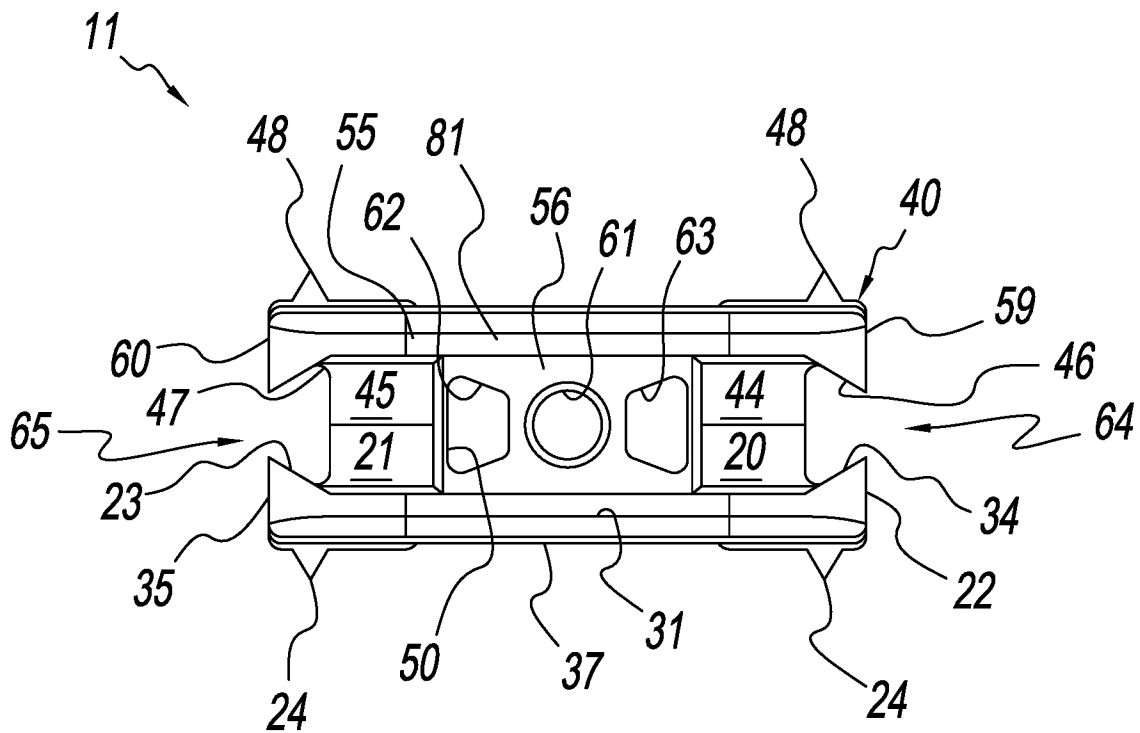


FIG. 8

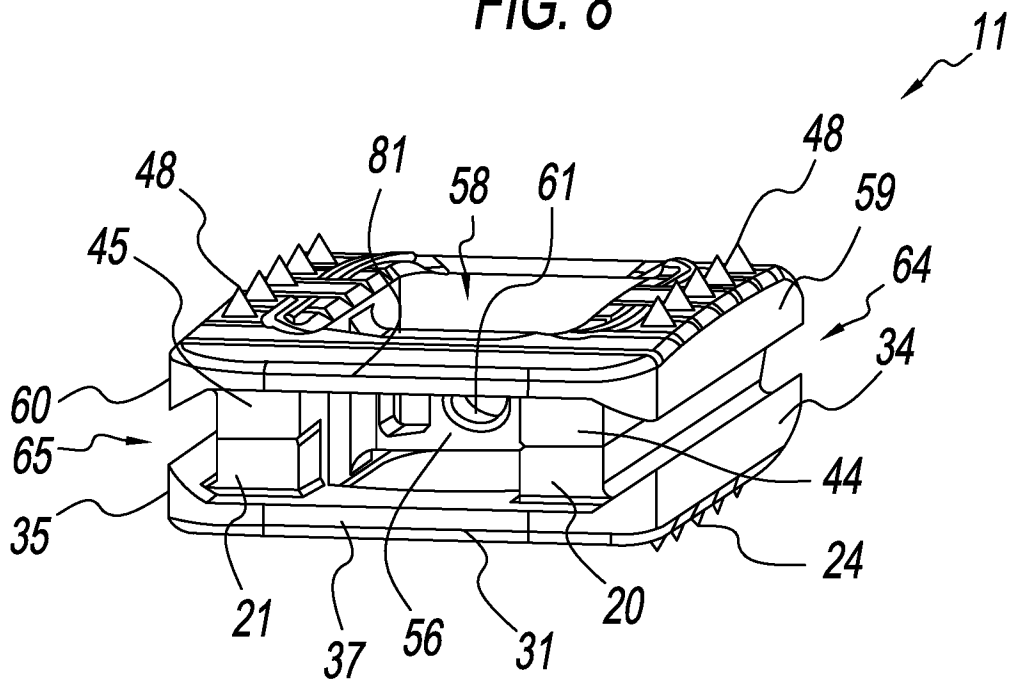


FIG. 9

9/14

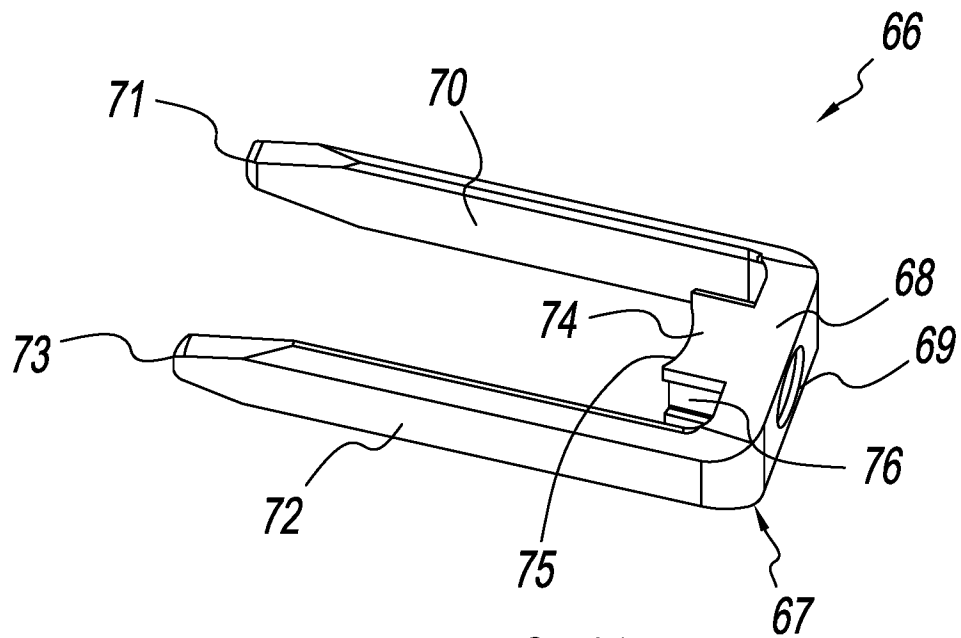


FIG. 10

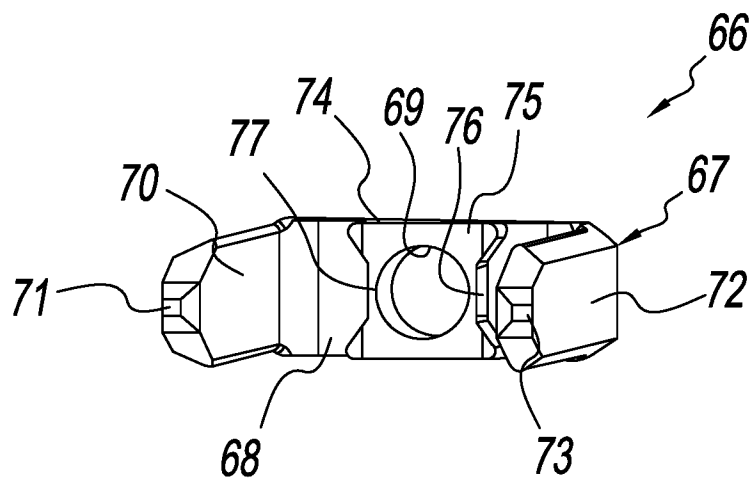


FIG. 11

10/14

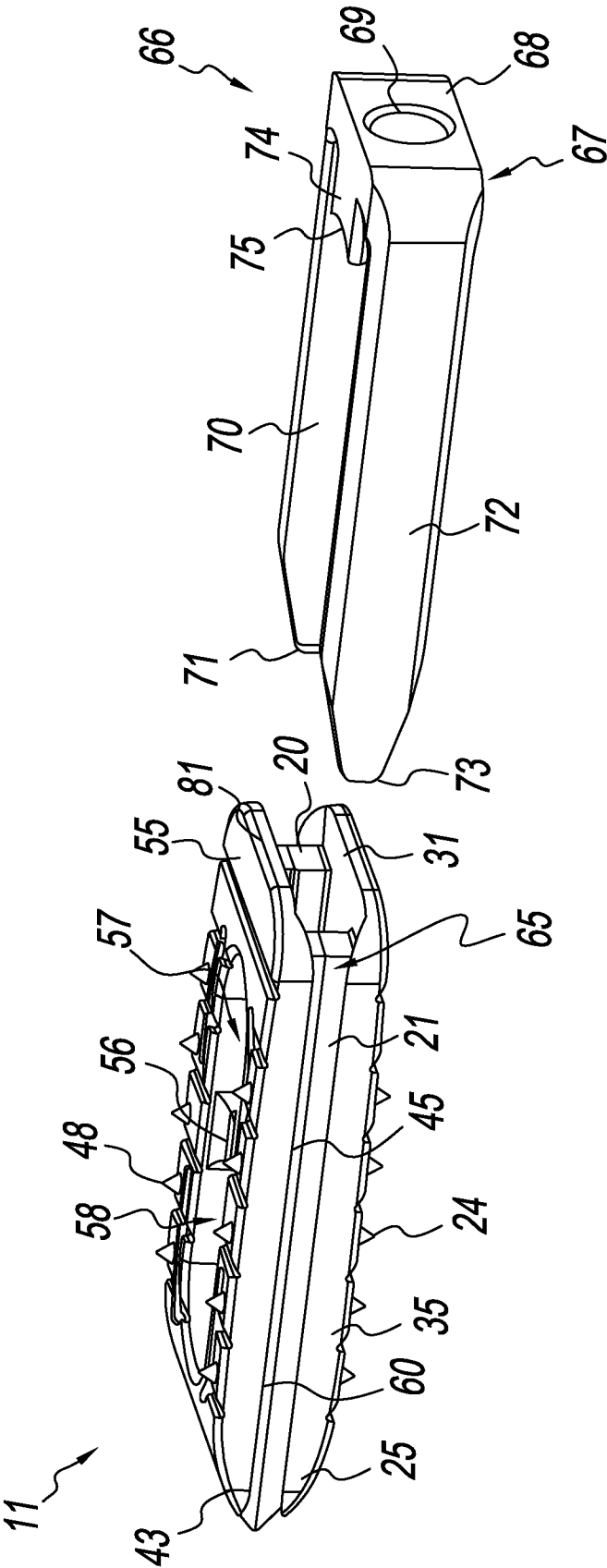


FIG. 12

11/14

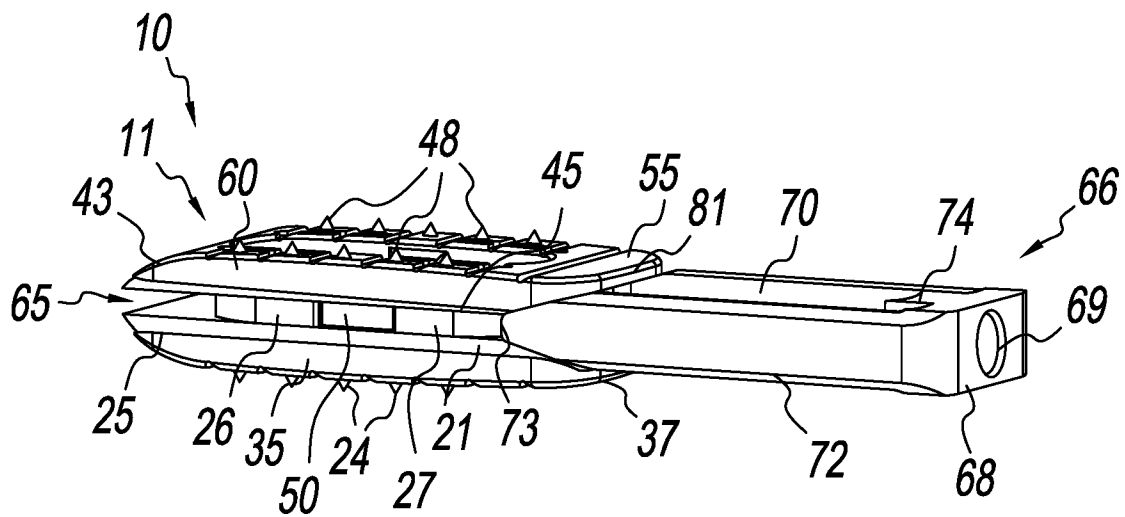


FIG. 13

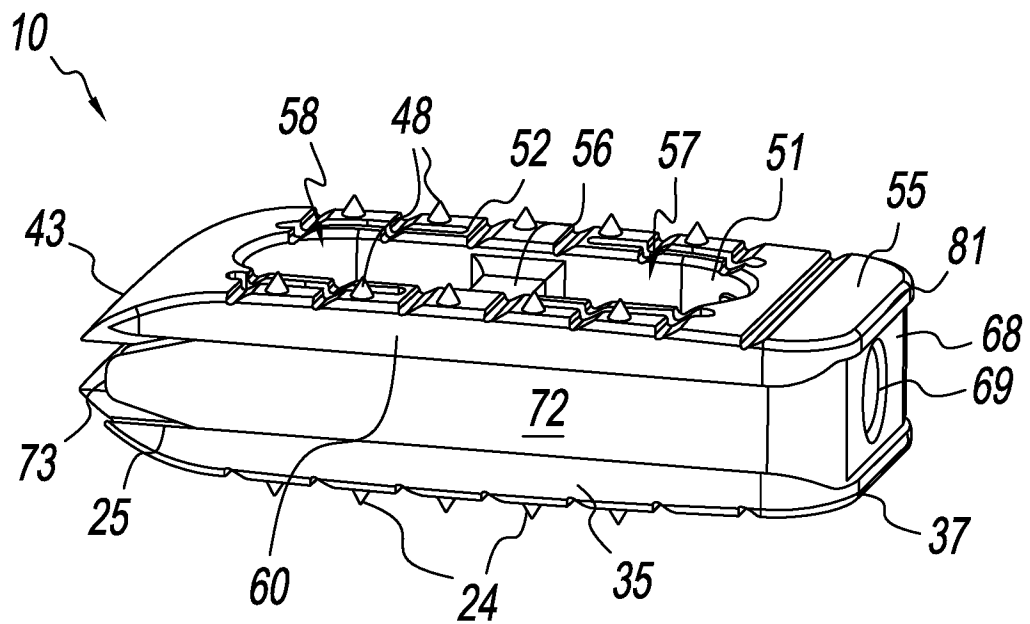


FIG. 14

12/14

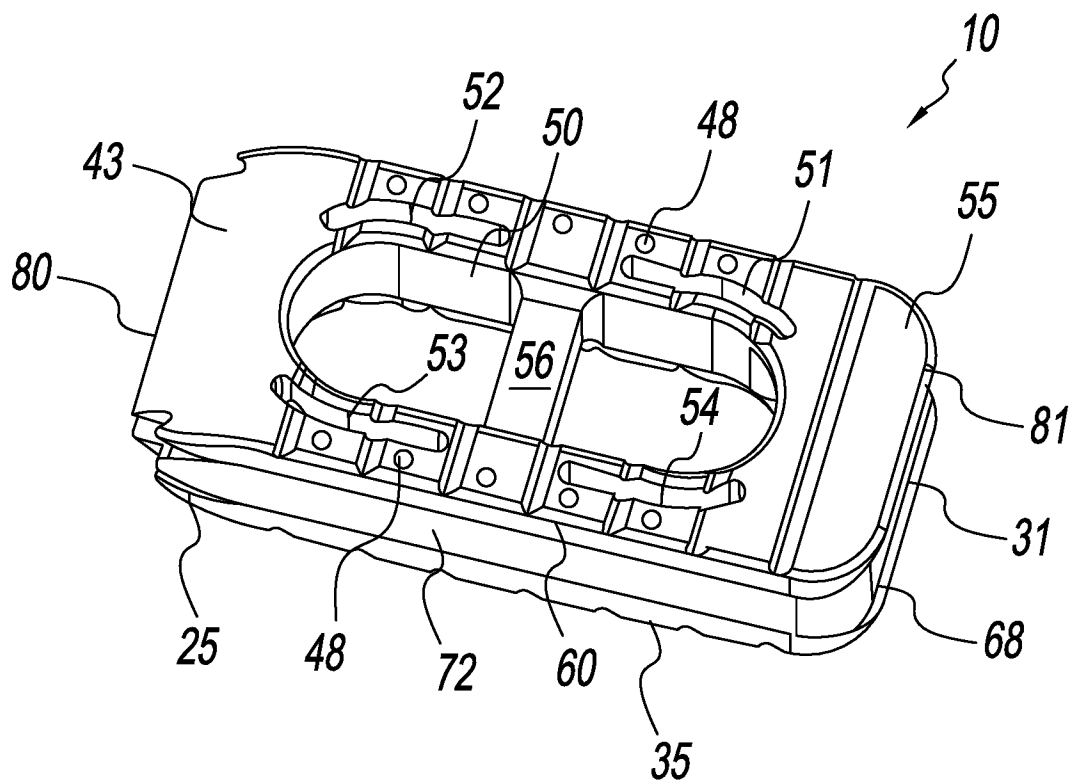


FIG. 15

13/14

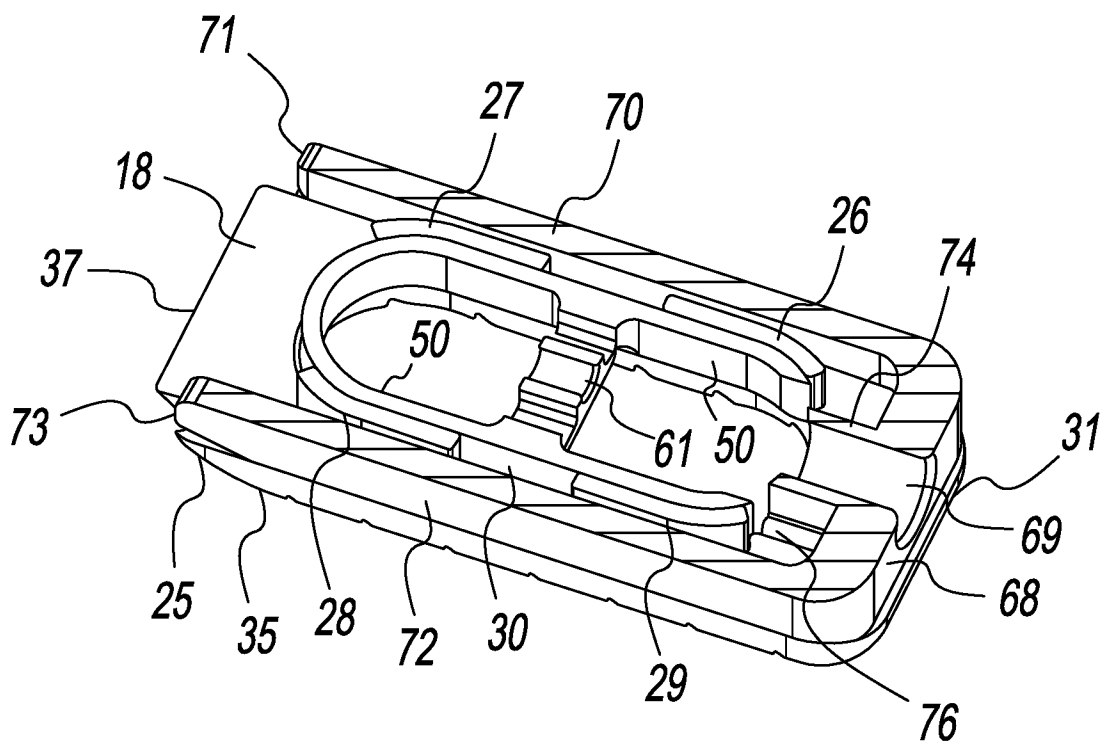


FIG. 16

14/14

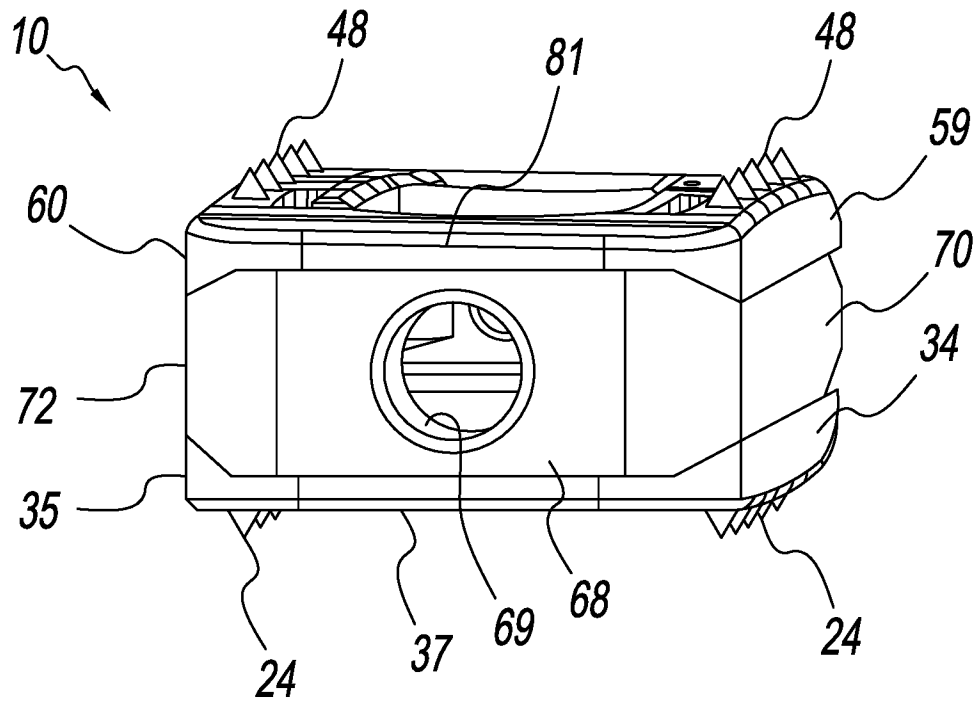


FIG. 17

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2017/019206

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61F2/44 A61F2/30
ADD.

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 practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2015/182346 A1 (EMERICK BRIAN G [US] ET AL) 2 July 2015 (2015-07-02) paragraphs [0093] - [0109]; figures 18-20,22-27 -----	1-19
X	US 8 545 567 B1 (KRUEGER DAVID [US]) 1 October 2013 (2013-10-01) column 6, line 3 - column 10, line 19; figures 1-9,44-50 column 14, line 35 - column 15, line 8 -----	1-19
X	US 2003/074063 A1 (GERBEC DANIEL E [US] ET AL) 17 April 2003 (2003-04-17) paragraphs [0042] - [0069]; figures 1-6 ----- -/--	1-19



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 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

"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

7 June 2017

Date of mailing of the international search report

16/06/2017

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

Cesari, Aude

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2017/019206

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 8 715 351 B1 (PINTO FABIO AMARAL [US]) 6 May 2014 (2014-05-06) column 2, line 57 - column 6, line 34; figures 1-12	1-19
X	----- US 2005/060034 A1 (BERRY BRET M [US] ET AL) 17 March 2005 (2005-03-17) paragraphs [0060] - [0065]; figures 4a,4b -----	1-9, 11-18

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2017/019206

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2015182346 A1	02-07-2015	AU 2013271549 A1 CA 2876118 A1 EP 2858595 A1 US 2015182346 A1 WO 2013184946 A1	22-01-2015 12-12-2013 15-04-2015 02-07-2015 12-12-2013
US 8545567 B1	01-10-2013	NONE	
US 2003074063 A1	17-04-2003	AU 2002348443 A1 US 2003074063 A1 US 2003074064 A1 US 2003130739 A1 US 2004054412 A1 WO 03032812 A2	28-04-2003 17-04-2003 17-04-2003 10-07-2003 18-03-2004 24-04-2003
US 8715351 B1	06-05-2014	US 8715351 B1 US 2014236298 A1 WO 2014085448 A1	06-05-2014 21-08-2014 05-06-2014
US 2005060034 A1	17-03-2005	AU 2004273860 A1 CA 2538566 A1 EP 1673045 A2 JP 2007505652 A US 2005060034 A1 US 2007250173 A1 WO 2005027800 A2	31-03-2005 31-03-2005 28-06-2006 15-03-2007 17-03-2005 25-10-2007 31-03-2005