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Rhoda

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(54) **INTERVERTEBRAL IMPLANT**

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A61F 2/44 (2006.01)

(52) **U.S. Cl.** **623/17.11**

(58) **Field of Classification Search** 623/17.11, 623/17.16, 17.12, 17.13, 17.14, 17.15
See application file for complete search history.

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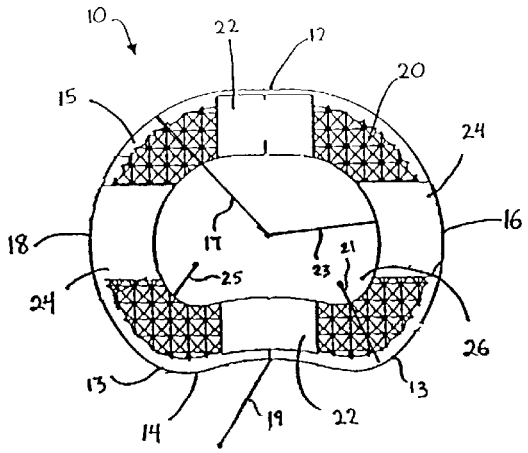
(57) **ABSTRACT**

A vertebral implant for fusing adjacent vertebrae or for replacing vertebral bodies is disclosed. The implant is a biocompatible metal, resorbable, or radiolucent implant conforming substantially in size and shape with an end plate of a vertebra. The implant preferably has a wedge-shaped profile to restore disc height and the natural curvature of the spine. The top and bottom surfaces of the implant have areas with a plurality of teeth to resist expulsion and provide initial stability and areas devoid of any protrusions to receive implantation instrumentation. The implant also has a stackability feature. The implant provides initial stability needed for fusion without stress shielding.

30 Claims, 17 Drawing Sheets



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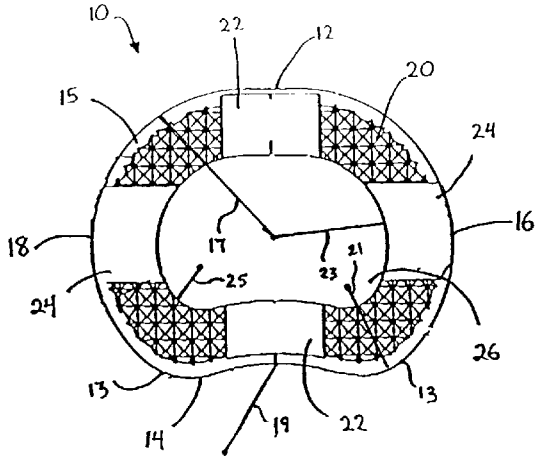

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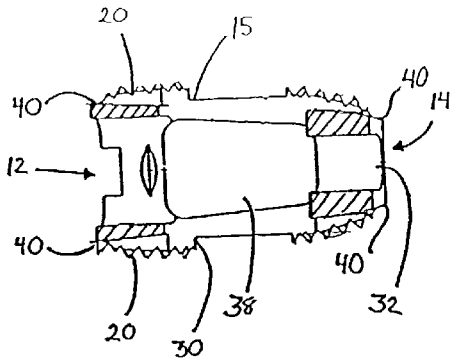

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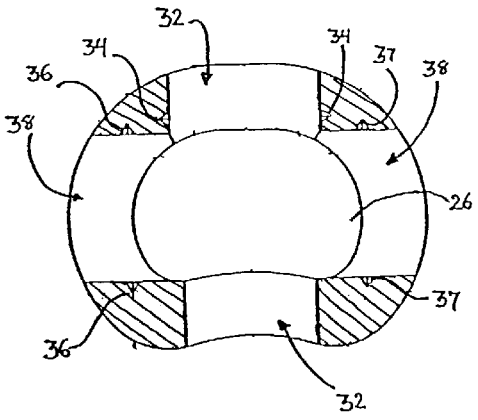

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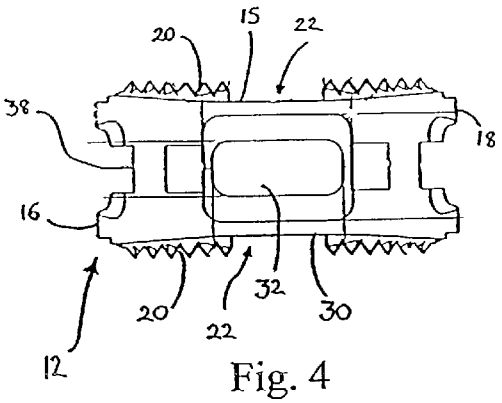

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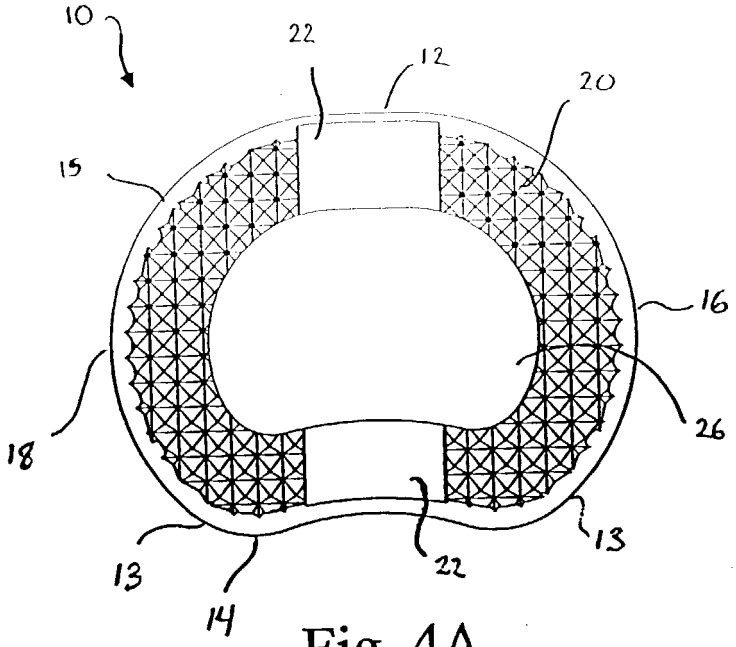
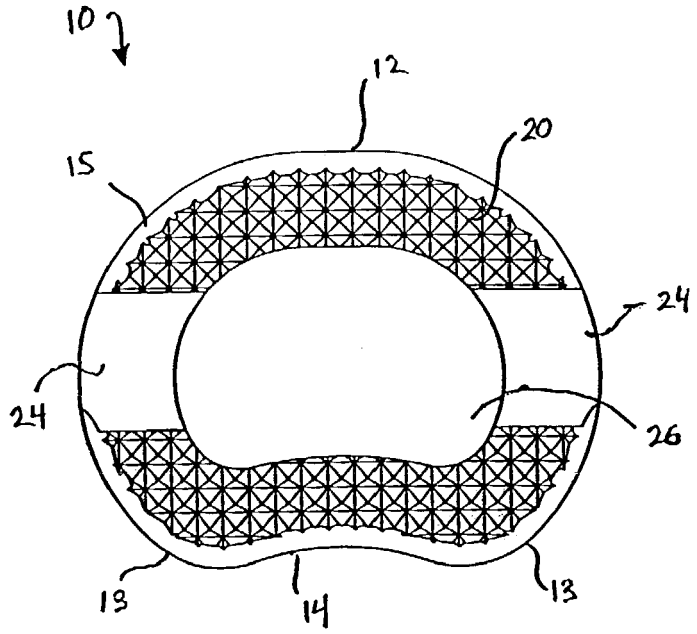


Fig. 4A



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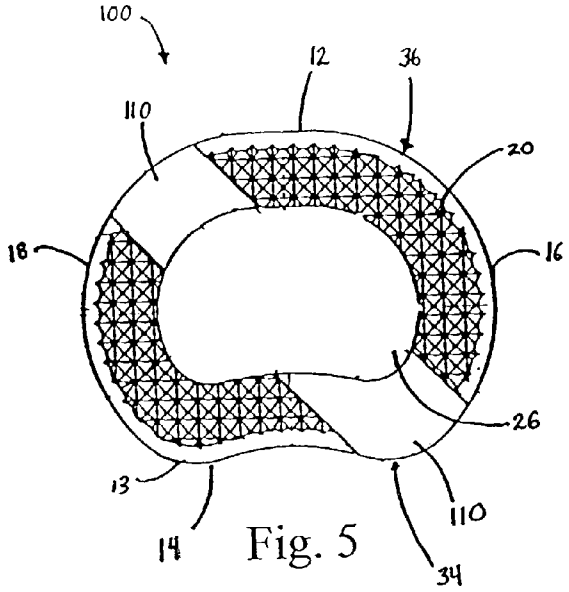

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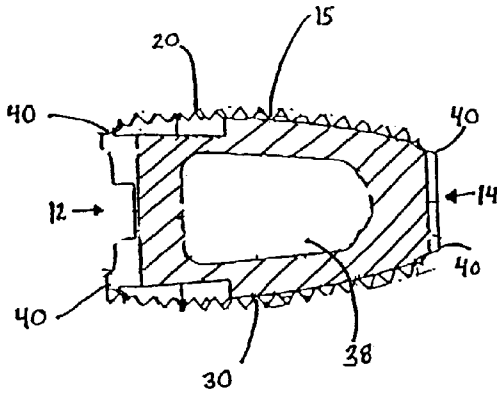

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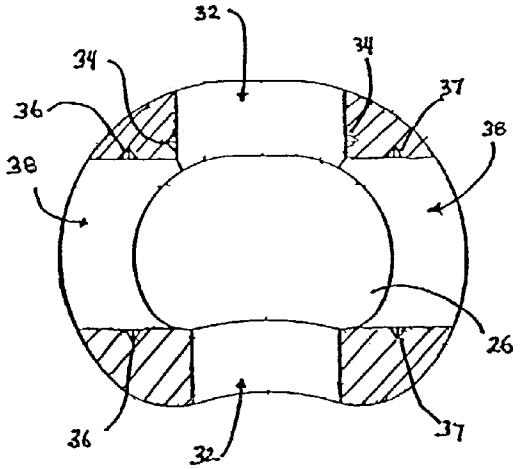

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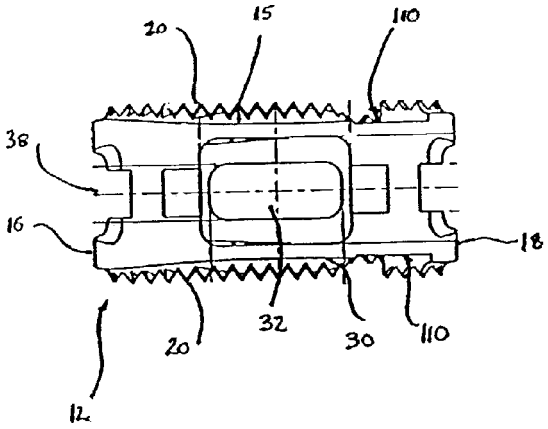

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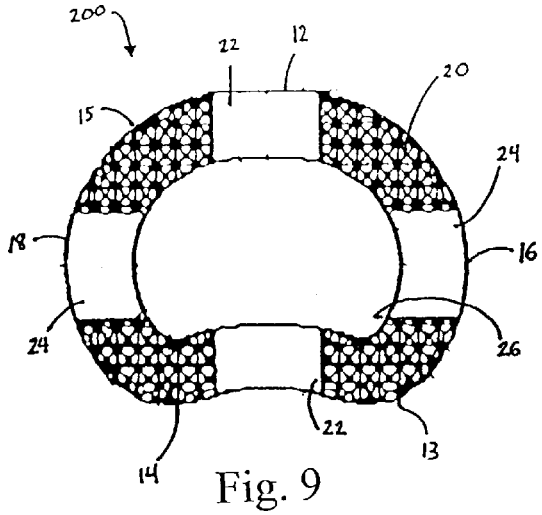

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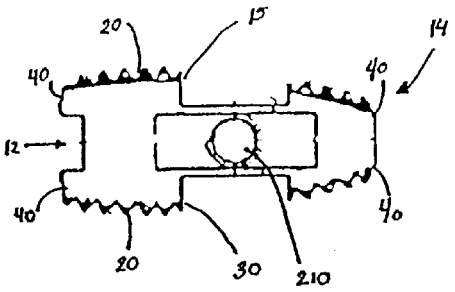

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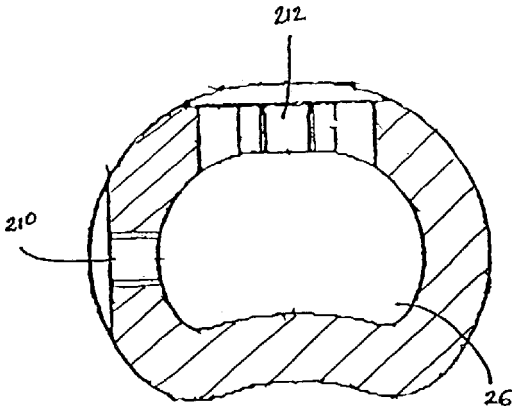

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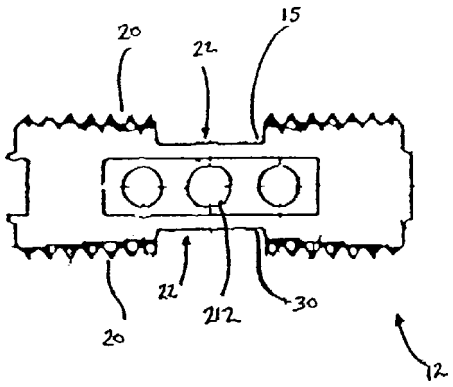

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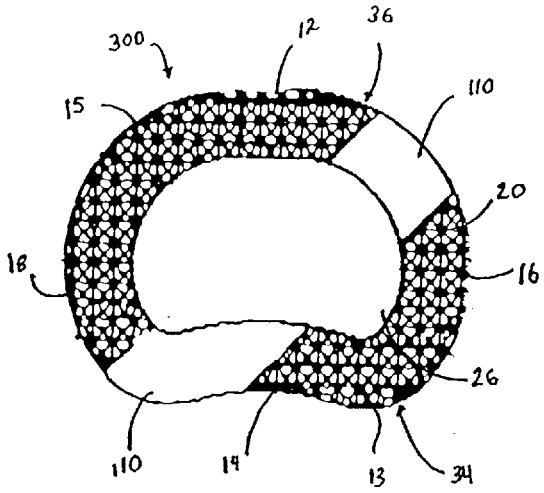

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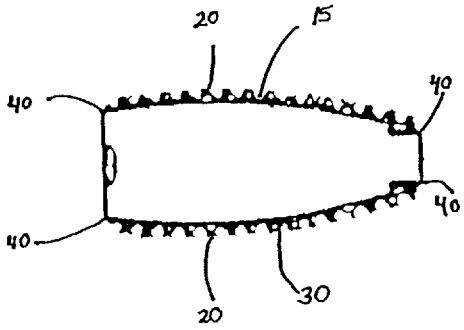

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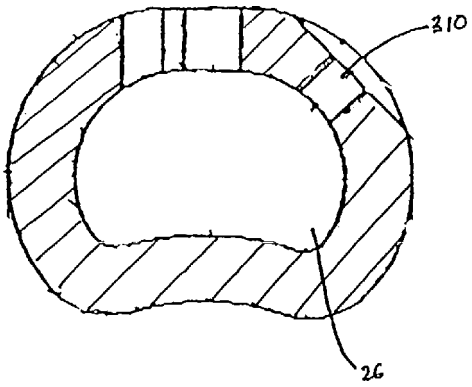

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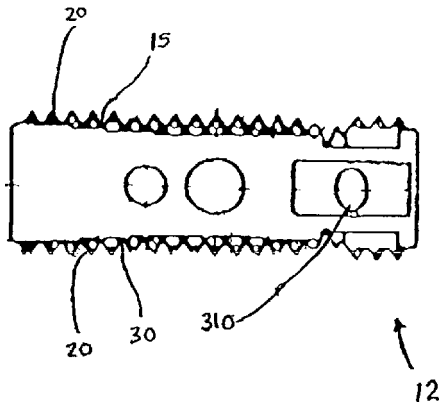

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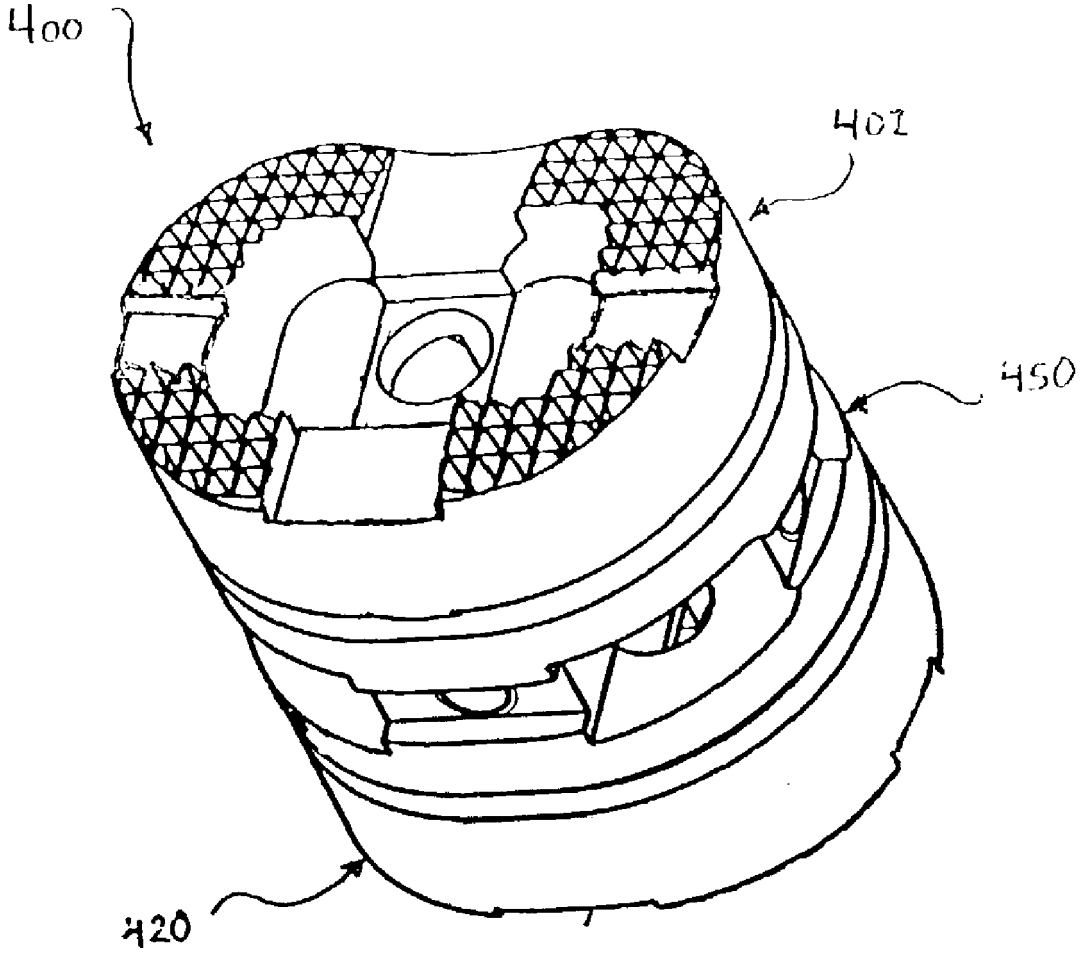

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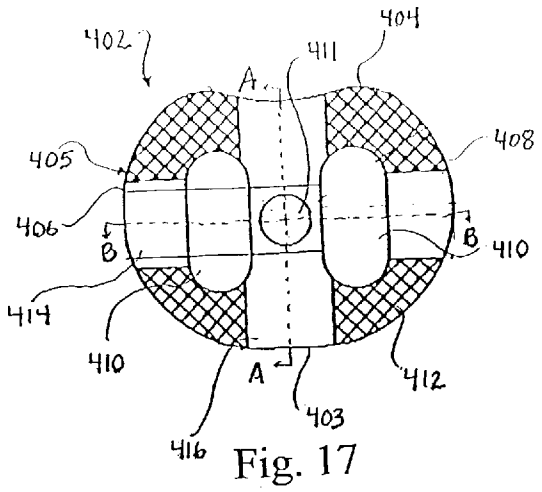

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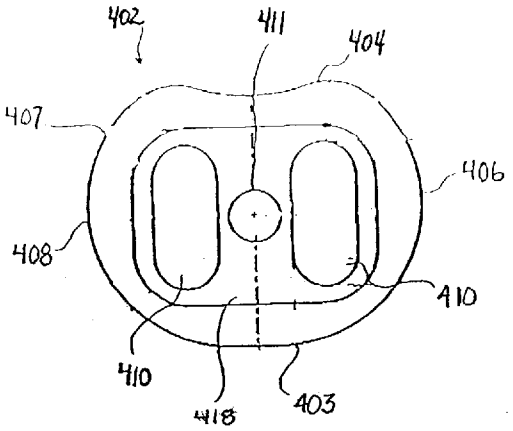

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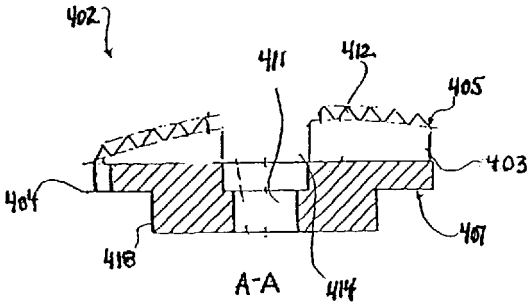

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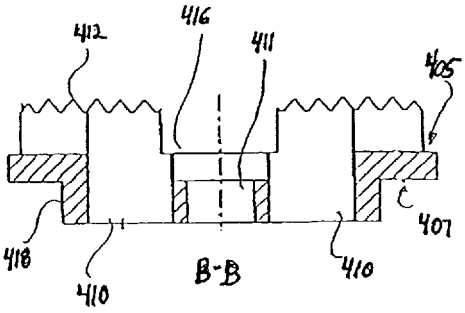

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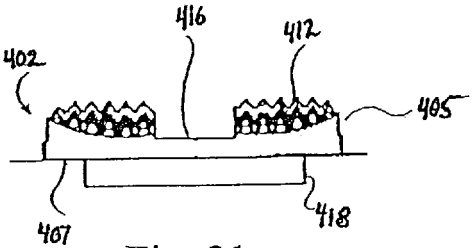

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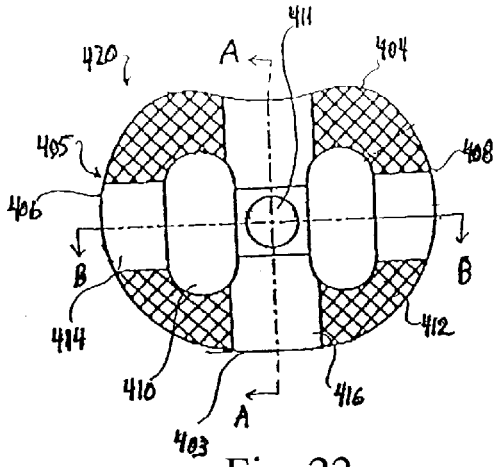

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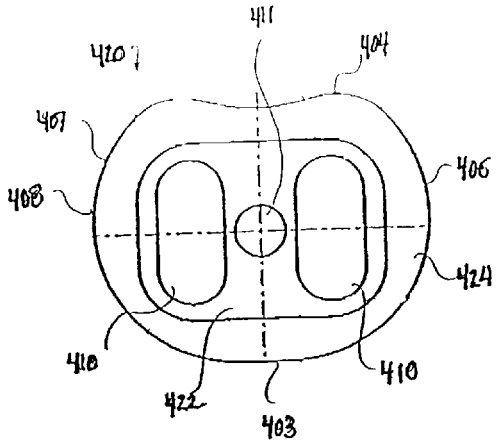

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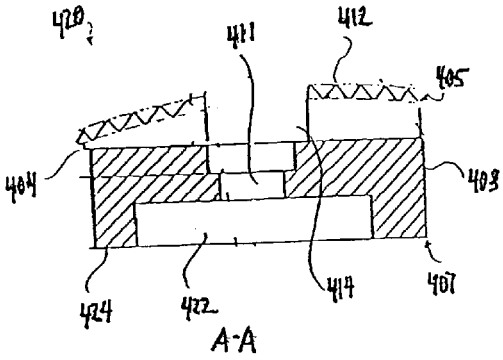

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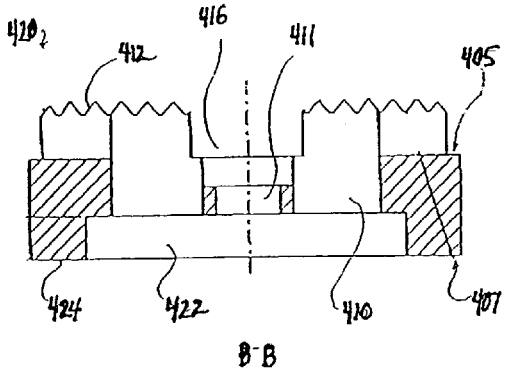

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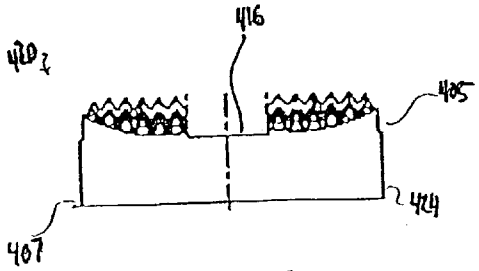

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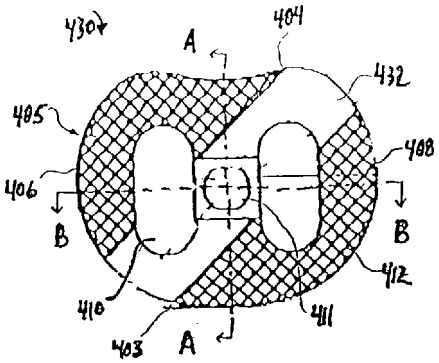
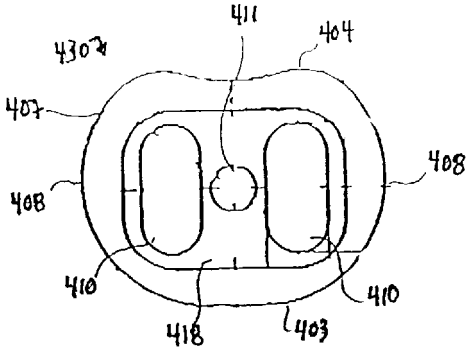


Fig. 27



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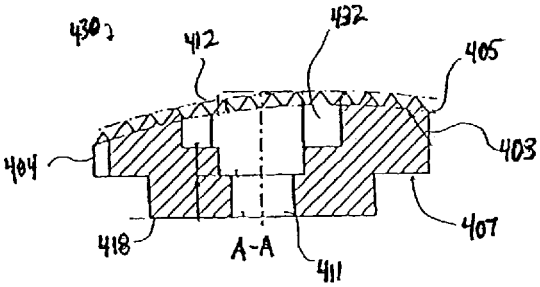

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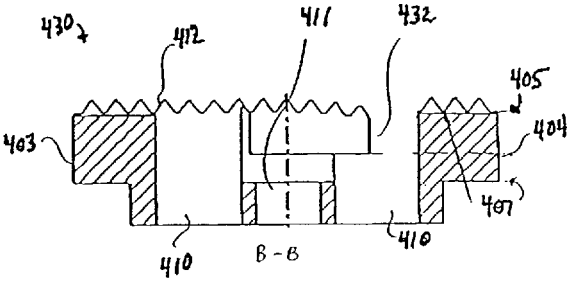

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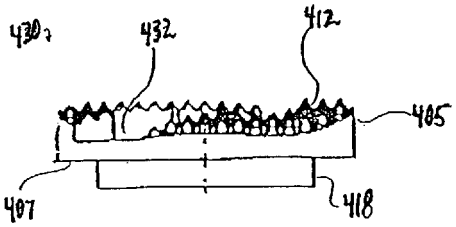

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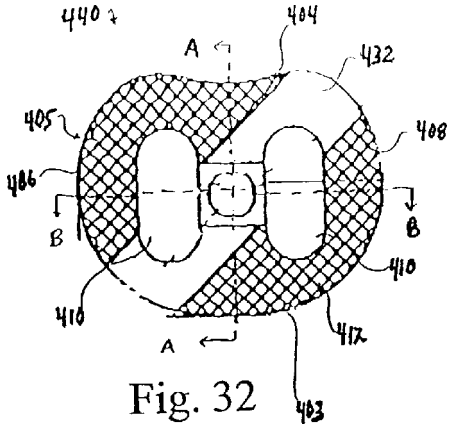

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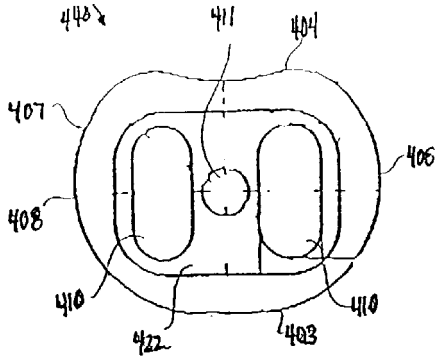

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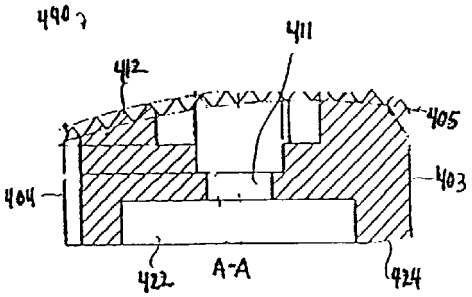

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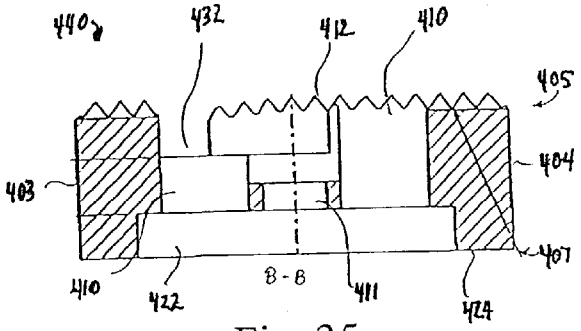

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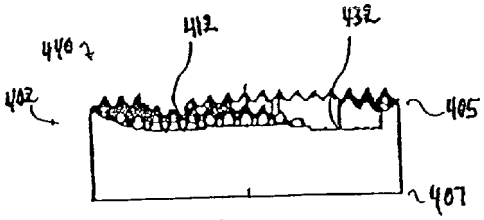

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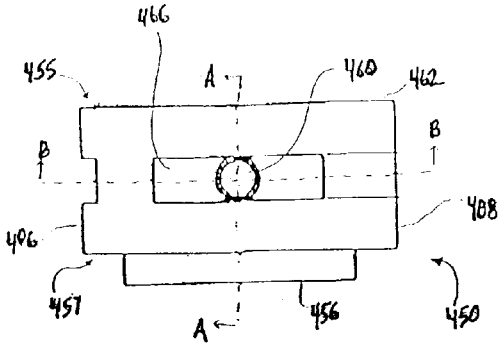

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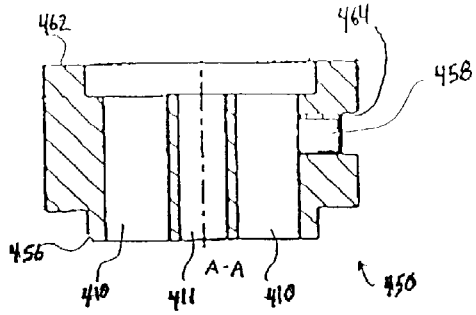

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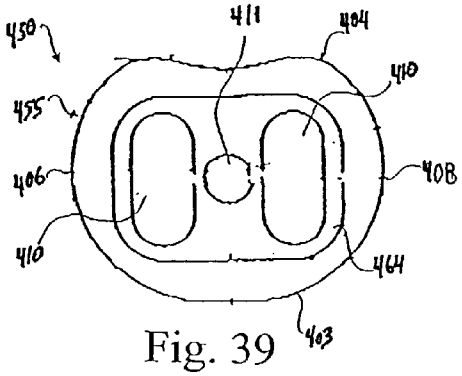

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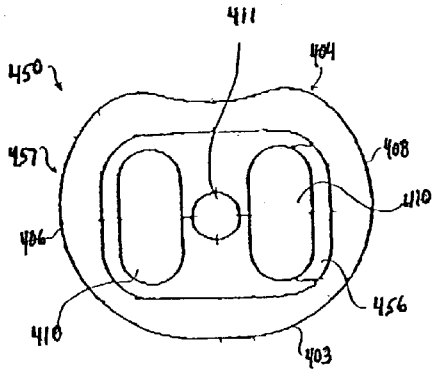

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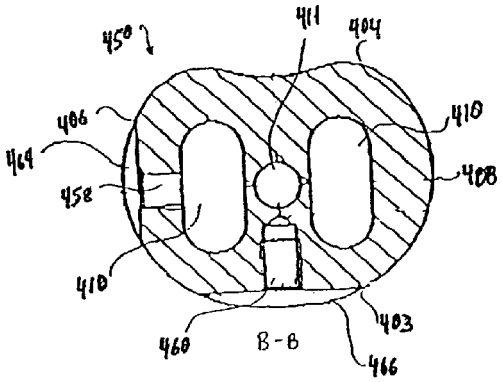

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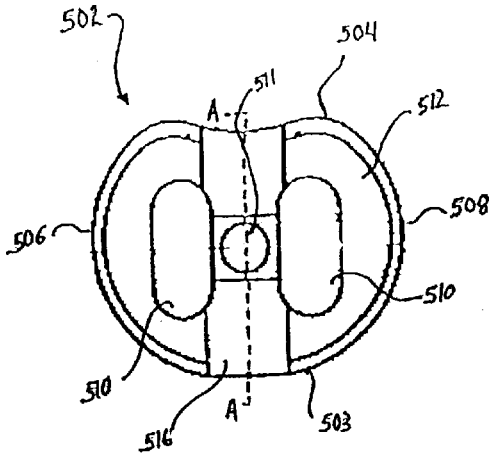

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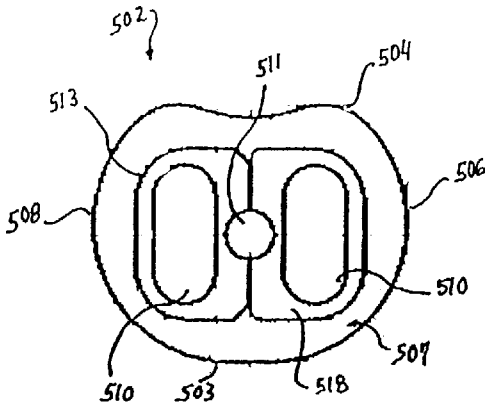
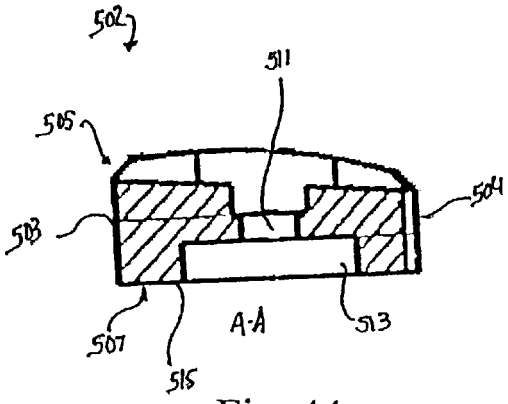


Fig. 43



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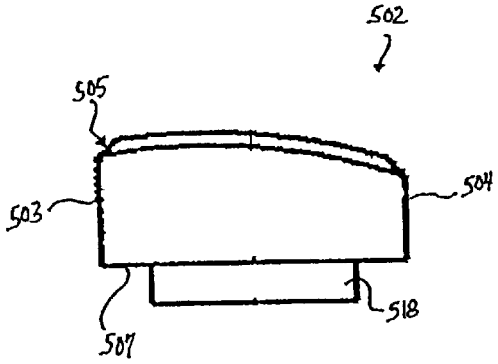
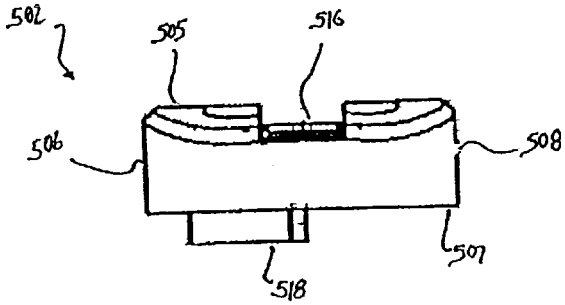


Fig. 45



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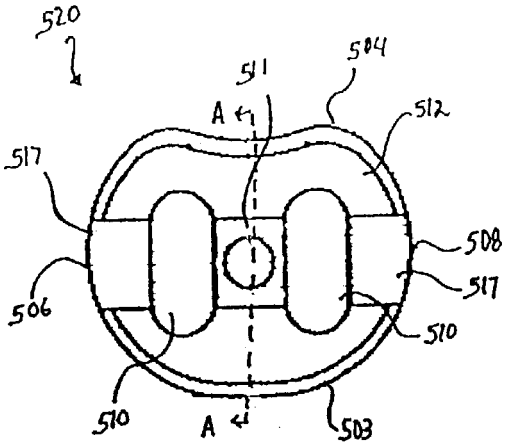

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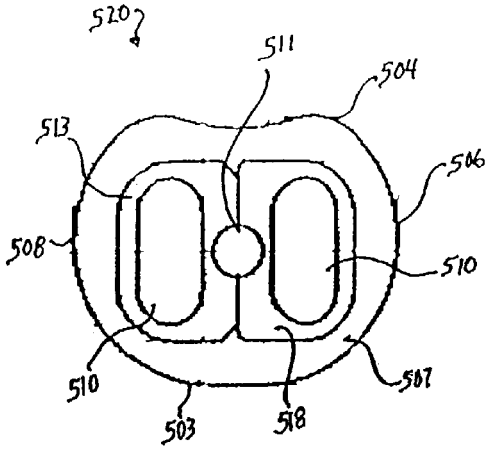

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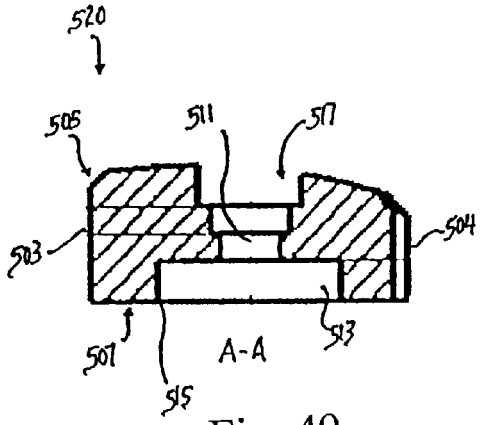
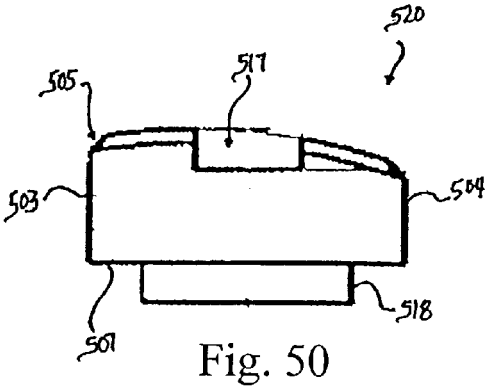


Fig. 49



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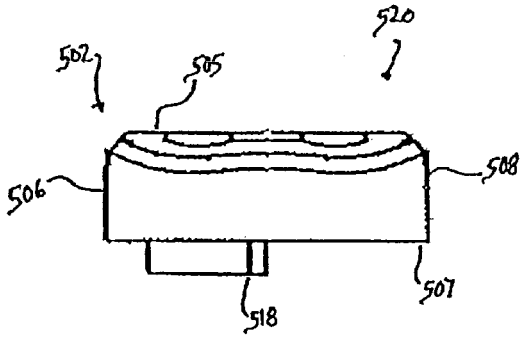

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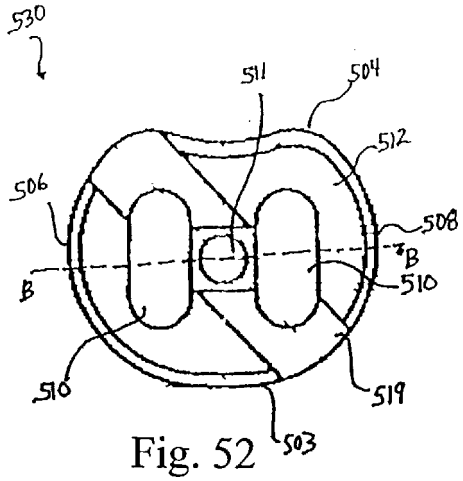

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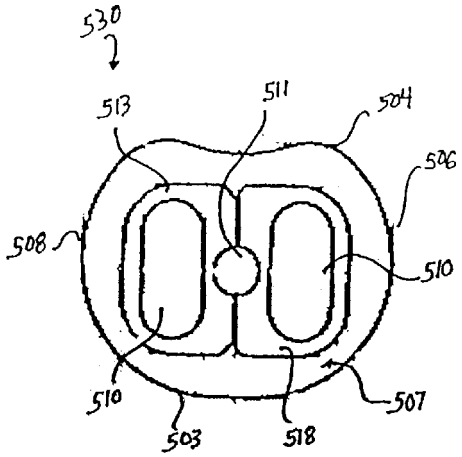

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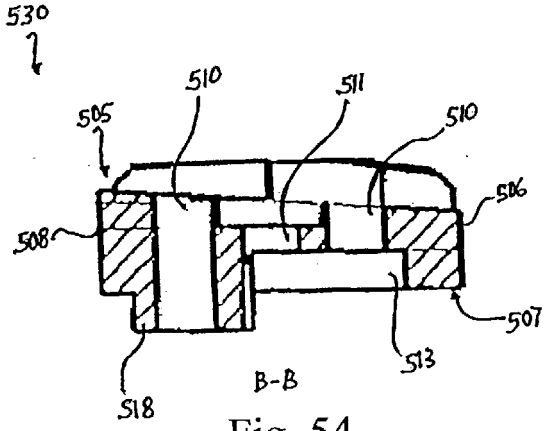

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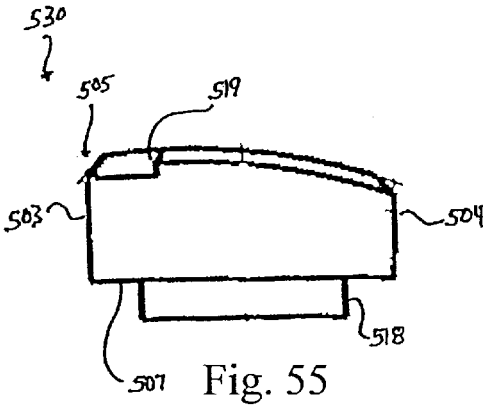

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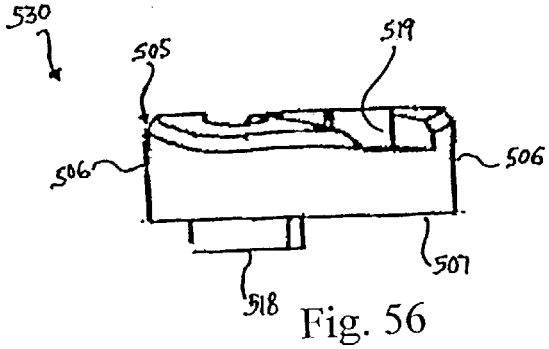

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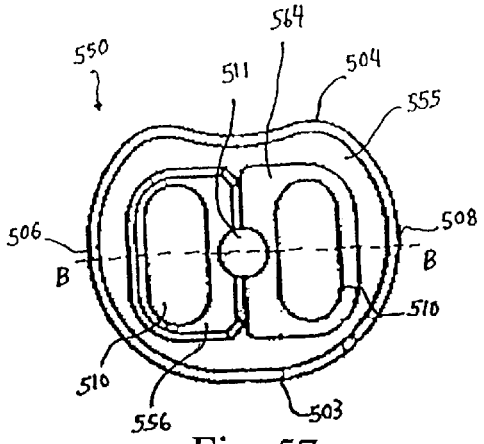

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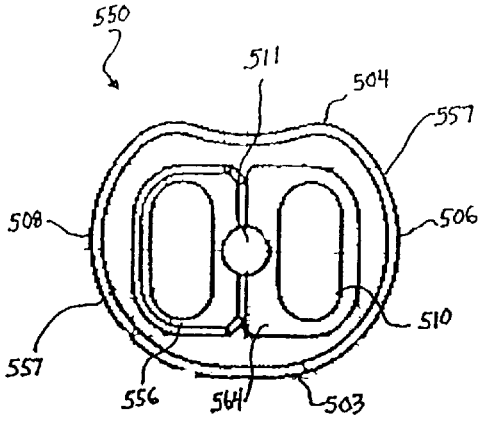

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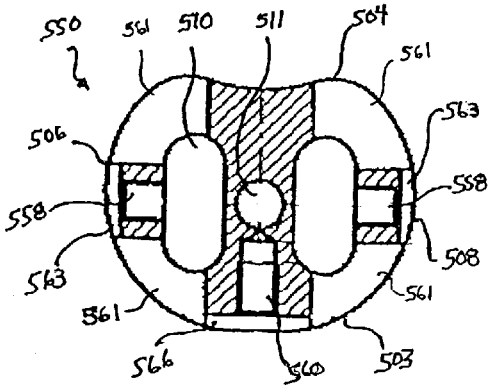

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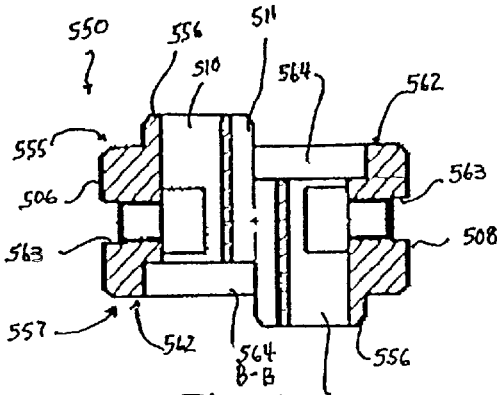


Fig. 60

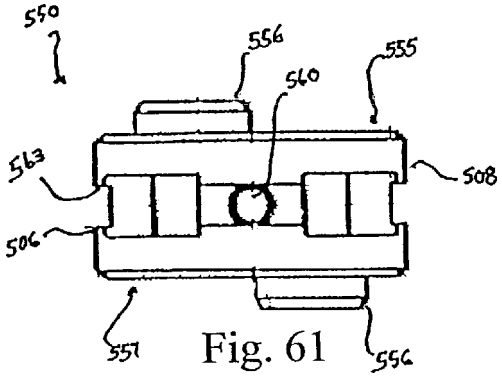


Fig. 61

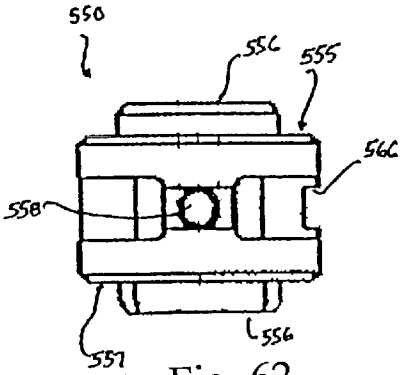


Fig. 62

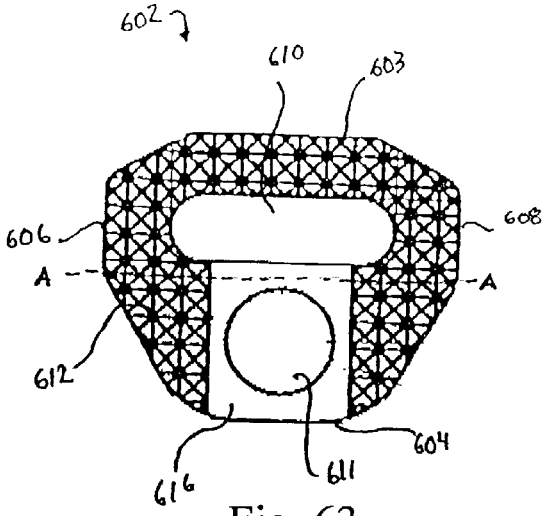
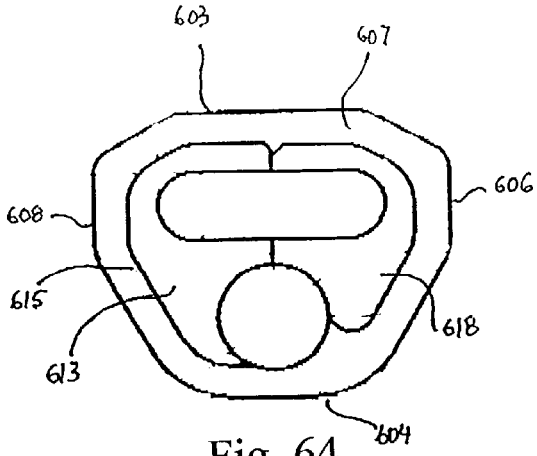


Fig. 63



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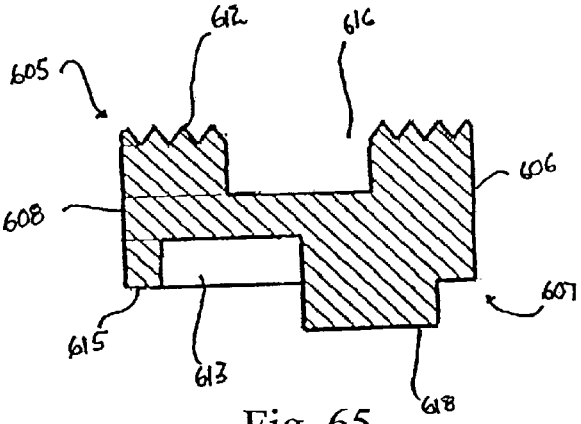


Fig. 65

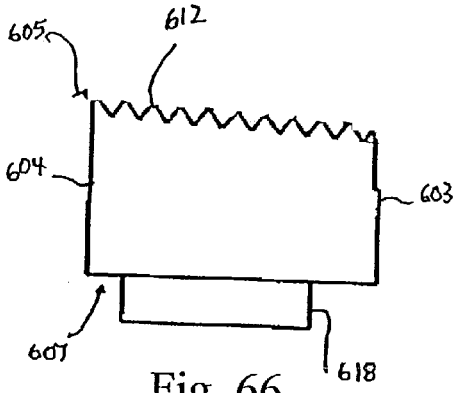


Fig. 66

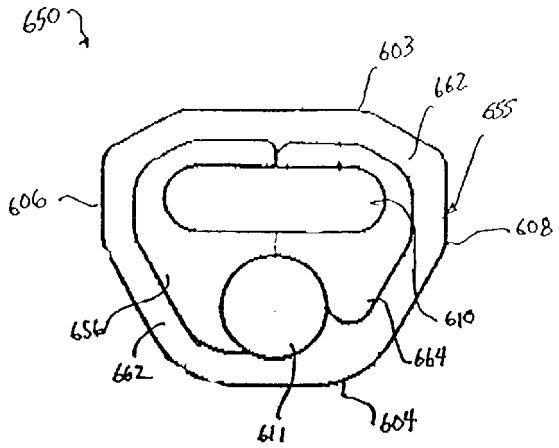
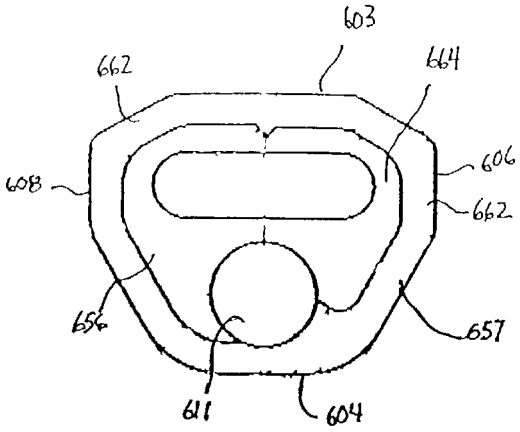


Fig. 67



600 Fig. 68

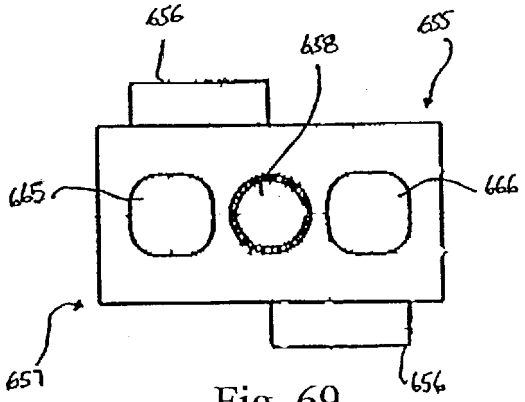


Fig. 69

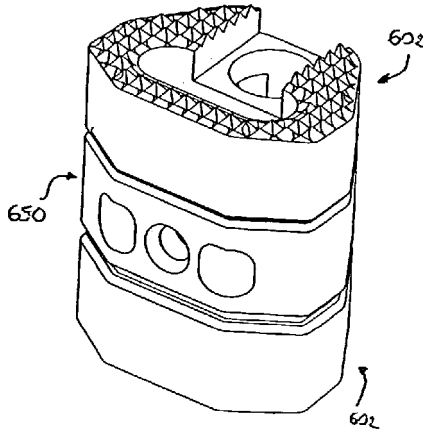


Fig. 70

INTERVERTEBRAL IMPLANT

FIELD OF THE INVENTION

This invention relates to an artificial biocompatible vertebral device and, more particularly, to an intervertebral spinal implant for use in the treatment of back pain.

BACKGROUND OF THE INVENTION

A number of medical conditions such as compression of spinal cord nerve roots, degenerative disc disease, tumor, and trauma can cause severe back pain. Intervertebral fusion is one surgical method of alleviating back pain. In intervertebral fusion, two adjacent vertebral bodies are fused together by removing the affected intervertebral disc and inserting an implant that would allow for bone to grow between the two vertebral bodies to bridge the gap left by the disc removal. Another surgical method of relieving back pain is by corpectomy. In corpectomy, a diseased or damaged vertebral body along with the adjoining intervertebral discs are removed and replaced by a spinal implant that would allow for bone to grow between the closest two vertebral bodies to bridge the gap left by the spinal tissue removal.

A number of different implant materials and implant designs have been used for interbody fusion and for vertebral body replacement with varying success. Current implant materials used include metals, radiolucent materials including plastics, elastic and polymeric materials, ceramic, and allografts. Current implant designs vary from threaded cylindrical implants to rectangular cages with teeth-like protrusions.

For example, U.S. Pat. No. 5,782,919 to Zdeblick et. al. discloses an interbody fusion device which has a tapered body defining a hollow interior for receiving a bone graft or bone substitute material. Furthermore, the body of the device defines exterior threads for gripping the adjacent vertebrae and has a series of vascularization openings for promoting bony ingrowth. A variant on this design is shown in U.S. Pat. No. 4,961,740 to Ray et. al. The Ray patent illustrates a hollow, cylindrical fusion cage having a helical thread disposed on the outer surface of the cage with a plurality of holes leading to the hollow center between the threads.

U.S. Pat. No. 5,766,252 to Henry et. al. discusses a rectangular interbody spinal spacer that has vertically opposite upper and lower load bearing surfaces spaced apart a distance corresponding to the desired spacing. The rigid member has a wedge-shaped configuration with an ogival tip at the front end of the member.

While each of the foregoing prosthesis, address some problems relating to intervertebral disc replacements or vertebral body and intervertebral disc replacements, they present others. Thus, there is a need for an intervertebral implant whose design takes into consideration the anatomy and geometry of the intervertebral space sought to be filled by the intervertebral prosthesis as well as the anatomy and geometry of the end plates of the adjacent vertebral bodies. There is also a need for a spinal disc implant which integrates well with the vertebral bone tissue of the adjacent vertebral bodies between which the implant is to be inserted.

SUMMARY OF THE INVENTION

The present invention relates to an intervertebral implant for use when surgical fusion of vertebral bodies is indicated.

The implant may be used to replace a diseased or damaged intervertebral disc or may be used to replace a diseased or damaged partial or complete vertebral body, or may be used to replace a diseased or damaged vertebral body and adjacent intervertebral discs.

In one embodiment, the implant comprises a body made from a biocompatible metal, radiolucent material, allograft, or resorbable material conforming substantially in size and shape with the end plates of the vertebrae, has a wedge-shaped profile, and has a central bore for receiving an osteoconductive material to promote the formation of new bone. The top and bottom surfaces may be flat planar surfaces, wedged, or curved surfaces. Preferably, the top and bottom surfaces mimic the topography of the vertebral end plates. The top and bottom surfaces each may have areas extending from an outer periphery of the implant to the central bore having a plurality of teeth for engaging the end plates of adjacent vertebra and each may also have areas extending from the outer periphery of the implant to the central bore that are substantially smooth for receiving a surgical instrument. The substantially smooth areas may extend in an anterior-posterior direction, a lateral direction, or may run in both directions. In addition, the substantially smooth area may run in an anterio-lateral direction.

The implant may have at least one channel on at least one side of the implant for receiving a surgical tool or instrument. This channel may also extend in at least an anterior-posterior direction, a lateral direction, or in both directions.

In another embodiment, instead of instrument receiving channels, the implant may have a threaded hole on the anterior, anterio-lateral, or lateral side of the implant for receiving a threaded arm of an insertion tool.

In yet another embodiment, the implant may have a stackability feature wherein the implant is modular and comprises an upper endcap, and a lower endcap; or an upper endcap, a lower endcap, and at least one body portion.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a top view of a first embodiment of the implant according to the present invention;

FIG. **2** is a cross-sectional side view of the implant of FIG. **1**;

FIG. **3** is an axial cross-sectional view of the implant of FIG. **1**;

FIG. **4** is a front or anterior view of the implant of FIG. **1**;

FIG. **4**A is a top view of a another embodiment of the implant of FIG. **1**;

FIG. **4**B is a top view of a another embodiment of the implant of FIG. **1**;

FIG. **5** is a top view of a second embodiment of the present invention;

FIG. **6** is a cross-sectional side view of the implant of FIG. **5**;

FIG. **7** is an axial cross-sectional view of the implant of FIG. **5**;

FIG. **8** is a front or anterior view of the implant of FIG. **5**;

FIG. **9** is a top view of a third embodiment of the present invention;

FIG. **10** is a side view of the implant of FIG. **9**;

FIG. **11** is an axial cross-sectional view of the implant of FIG. **9**;

FIG. **12** is a front or anterior view of the implant of FIG. **9**;

FIG. **13** is a top view of a fourth embodiment of the present invention;

FIG. **14** is a side view of the implant of FIG. **13**;

FIG. **15** is an axial cross-sectional view of the implant of FIG. **13**;

FIG. **16** is a front or anterior view of the implant of FIG. **13**;

FIG. **16**A is a perspective view of a fifth embodiment of the present invention;

FIG. **17** is a top view of an upper endcap of the implant of FIG. **16**A;

FIG. **18** is a bottom view of the upper endcap of FIG. **17**;

FIG. **19** is a cross-sectional view taken at line A—A of the upper endcap of FIG. **17**;

FIG. **20** is a cross-sectional view taken at line B—B of the upper endcap of FIG. **17**;

FIG. **21** is a front or anterior view of the upper endcap of FIG. **17**;

FIG. **22** is a top view of a lower endcap of the implant of FIG. **16**A;

FIG. **23** is a bottom view of the lower endcap of FIG. **22**;

FIG. **24** is a cross-sectional view taken at line A—A of the lower endcap of FIG. **22**;

FIG. **25** is a cross-sectional view taken at line B—B of the lower endcap of FIG. **22**;

FIG. **26** is a front or anterior view of the lower endcap of FIG. **22**;

FIG. **27** is a top view of an alternate upper endcap of a fifth embodiment of the present invention;

FIG. **28** is a bottom view of the upper endcap of FIG. **27**;

FIG. **29** is a cross-sectional view taken at line A—A of the upper endcap of FIG. **27**;

FIG. **30** is a cross-sectional view taken at line B—B of the upper endcap of FIG. **27**;

FIG. **31** is a front or anterior view of the upper endcap of FIG. **27**;

FIG. **32** is a top view of an alternate lower endcap of a fifth embodiment of the present invention;

FIG. **33** is a bottom view of the lower endcap of FIG. **32**;

FIG. **34** is a cross-sectional view taken at line A—A of the lower endcap of FIG. **32**;

FIG. **35** is a cross-sectional view taken at line B—B of the lower endcap of FIG. **32**;

FIG. **36** is a front or anterior view of the lower endcap of FIG. **32**;

FIG. **37** is a front or anterior view of a body portion of the implant of FIG. **16**A;

FIG. **38** is a cross-sectional view taken at line A—A of the body portion of FIG. **37**;

FIG. **39** is a top view of the body portion of FIG. **37**;

FIG. **40** is a bottom view of the body portion of FIG. **37**;

FIG. **41** is a cross-sectional view taken at line B—B of the body portion of FIG. **37**;

FIG. **42** is a top view of an endcap of a sixth embodiment of the present invention;

FIG. **43** is a bottom view of the endcap of FIG. **42**;

FIG. **44** is a cross-sectional view taken at line A—A of the endcap of FIG. **42**;

FIG. **45** is a side or lateral view of the endcap of FIG. **42**;

FIG. **46** is a front or anterior view of the endcap of FIG. **42**;

FIG. **47** is a top view of an alternate endcap of a sixth embodiment of the present invention;

FIG. **48** is a bottom view of the endcap of FIG. **47**;

FIG. **49** is a cross-sectional view taken at line A—A of the endcap of FIG. **47**;

FIG. **50** is a side or lateral view of the endcap of FIG. **47**;

FIG. **51** is a front or anterior view of the endcap of FIG. **47**;

FIG. **52** is a top view of an alternate endcap of a sixth embodiment of the present invention;

FIG. **53** is a bottom view of the endcap of FIG. **52**;

FIG. **54** is a cross-sectional view taken at line B—B of the endcap of FIG. **52**;

FIG. **55** is a side or lateral view of the endcap of FIG. **52**;

FIG. **56** is a front or anterior view of the endcap of FIG. **52**;

FIG. **57** is a top view of a body portion of a sixth embodiment of the present invention;

FIG. **58** is a bottom view of the body portion of FIG. **57**;

FIG. **59** is a cross-sectional view of the body portion of FIG. **57**;

FIG. **60** is a cross-sectional view taken at line B—B of the body portion of FIG. **57**;

FIG. **61** is a front or anterior view of the body portion of FIG. **57**;

FIG. **62** is a side or lateral view of the body portion of FIG. **57**;

FIG. **63** is a top view of an endcap of a seventh embodiment of the present invention;

FIG. **64** is a bottom view of the endcap of FIG. **63**;

FIG. **65** is a cross-sectional view taken at line A—A of the endcap of FIG. **63**;

FIG. **66** is a side or lateral view of the endcap of FIG. **63**;

FIG. **67** is a top view of a body portion of a seventh embodiment of the present invention;

FIG. **68** is a bottom view of the body portion of FIG. **67**;

FIG. **69** is a side or lateral view of the body portion of FIG. **67**; and

FIG. **70** is a perspective view of an implant of a seventh embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. **1** shows a top view of a first embodiment of intervertebral spacer or implant **10** according to the present invention. Implant **10** has a generally kidney-bean shaped footprint which includes anterior side **12**, posterior side **14**, and first and second lateral sides **16**, **18**. Anterior side **12** and lateral sides **16**, **18** are all substantially arcuate, preferably convex, in shape while posterior side **14** is substantially arcuate, preferably concave, in shape.

Implant **10** further includes central bore **26** which can be filled with bone growth inducing substances to allow bony ingrowth and to further assist in the fusion of the adjacent vertebrae and the implant. Central bore **26** has a generally kidney-bean shape that substantially conforms to the kidney-bean shaped footprint of implant **10**. The radius of curvature **23** of the arcuate, preferably convex, sides of central bore **26** may be about 6.5 mm to about 8.5 mm, preferably about 7.5 mm, and the radius of curvature **25** of the areas between the preferably convex and concave sides are about 3 mm to about 3.4 mm, preferably about 3.2 mm.

In addition, implant **10**, on its upper **15** and lower **30** surfaces, has sections or areas having teeth **20**, spikes, or similar gripping structures to facilitate engagement of implant **10** with the end plates of the adjacent vertebra. The teeth may be pyramidal, saw toothed or other similar shapes. Ridges may also be used to facilitate gripping adjacent vertebrae. Implant **10** may also have sections or areas **22** or **24** or both which are essentially smooth and devoid of any

protrusions. Sections **22**, **24** are provided to assist the surgeon in implantation of the spacer as will be discussed below.

As mentioned above, implant **10** has a generally kidney-bean shaped footprint. This footprint is designed to conform in size and shape with the general perimeter and shape of the end plates of the vertebrae between which implant **10** is to be implanted thereby providing maximum support while avoiding the intravertebral foramen of the vertebral bodies. The intravertebral foramen or the spinal canal is the portion of the vertebral body that houses the spinal cord and nerve roots. Generally, a portion of the intravertebral foramen extends into the body portion or end plate portion of the vertebra. This portion of the intravertebral foramen, in effect, changes the perimeter of the body portion of the vertebra from substantially an oval shape to substantially a kidney-bean shape. Accordingly, the footprint of implant **10** is kidney-bean shaped to emulate the general shape and perimeter of the body portion of the adjacent vertebrae.

Implant **10** preferably also has a generally wedge-shaped, side-view profile that is designed to restore the natural curvature or lordosis of the spine after the affected disc or affected vertebral body and adjoining discs have been removed. As shown in FIGS. **2** and **4**, this wedge shape results from a gradual increase in height from anterior side **12** followed by a decrease in height as posterior side **14** is approached. The implant has a generally constant height from lateral side **16** to lateral side **18**. In another preferred embodiment, the implant may have a gradual increase in height followed by a gradual decrease in height from lateral side **16** to lateral side **18**. The substantially convex curvature of upper surface **15** and lower surface **30** change the height of implant **10** in the anterior to posterior direction. In another preferred embodiment, the substantially convex curvature of upper surface **15** and lower surface **30** change the height of implant **10** in the lateral direction. Implant **10** preferably has the greatest height generally midway between anterior side **12** and the center of implant **10**. In an exemplary embodiment, upper surface **15** and lower surface **30** may also be flat planar surfaces or flat angled surfaces. Alternatively, the upper surface **15** and lower surface **30** may be substantially curved surfaces, preferably shaped to mimic the topography of the vertebral end plates.

In order to facilitate insertion of implant **10**, posterior side **14** and anterior side **12** transition to upper and lower surfaces **15**, **30** with rounded edges **40**. Rounded edges **40** may enable implant **10** to slide between the end plates while minimizing the necessary distraction of the end plates. In a preferred embodiment, rounded edges **40** have a radius of curvature ranging from about 0.75 mm to 1.75 mm, but preferably is about 1.25 mm. In another preferred embodiment, rounded edges **40** may extend around the periphery of implant **10**. Rounded edges **40** may also be used as a means to clean the edges of the implant **10** by eliminating any half or partial teeth located on or near the edge of the implant **10**.

As shown in FIG. **2** and FIG. **3**, channel **32** runs through implant **10** from anterior side **12** through central bore **26** to posterior side **14**. Channel **32** is sized to receive a surgical instrument such as an inserter for implantation of implant **10**. In addition, located along the side of channel **32**, near anterior side **12**, are retaining grooves **34** which further assist with coupling the implantation instrument to implant **10**. Using the implantation instrument with channel **32** and retaining grooves **34**, implant **10** can be inserted in an anterior approach where posterior end **14** is the first side to be introduced to the intervertebral space.

Extending from a first lateral side **16** to a second lateral side **18** may be a second instrument receiving channel **38**. Channel **38** is also sized to receive a surgical instrument such as an inserter for implantation of implant **10** and has retaining grooves **36** and **37** to further assist with coupling the implantation instrument to implant **10**. Using the implantation instrument with channel **38** and retaining grooves **36**, implant **10** can be inserted in a lateral approach where lateral side **16** is the first side to be introduced into the intervertebral space. Alternatively, using the implantation instrument with channel **38** and retaining grooves **37**, implant **10** can be inserted in a lateral approach where lateral side **18** is the first side to be introduced into the intervertebral space.

Although spinal spacer insertion instruments are well known in the art, an inserter used with implant **10** may be modified to optionally include releaseable engaging members configured and dimensioned to mate with retaining grooves **34**, **36**, **37** to further assist with holding the implant during the insertion and installation procedure.

As can be seen in FIGS. **2** and **3**, channel **32** is shown extending the entire length of the lateral sides **16**, **18** of the implant **10**. However, in an exemplary embodiment, channel **32** may extend only a portion of the length of lateral sides **16**,**18**, or may extend the length of only one of the lateral sides **16**, **18**. Likewise, channel **38** may extend only a portion of the length of sides **12**, **14** or may extend along one of the sides **12**, **14**.

To further assist with the insertion and implantation of implant **10**, implant **10** has areas **22** and **24**, located on the upper **15** and lower **30** surface of implant **10**, which are substantially smooth and are sized to receive an instrument such as a distractor, which is well known in the art. In this particular embodiment, area **22** extends in an anterior-posterior direction helping facilitate anterior implant insertion and area **24** extends in a transverse or lateral direction helping facilitate transverse implant insertion. Although in FIG. **1** area **22** is shown as extending along the entire longitudinal length of implant **10**, from the perimeter edge of anterior side **12** to the perimeter edge of posterior side **14**, area **22** may extend only partially along the longitudinal length of implant **10**. The preceding is also applicable to area **24**. Area **24** is shown to extend along the entire transverse length of implant **10**, however, area **24** may extend only partially along the transverse length of implant **10**. Furthermore, in an exemplary embodiment, only area **22**, as shown in FIG. **4**A, or only area **24**, as shown in FIG. **4**B, may be present on upper and lower surfaces **15**, **30** of implant **10**.

Implant **10** may be fabricated from pure titanium or an alloy thereof, preferably anodized to increase its biocompatiblity by making it more inert. Implant **10** may also be fabricated from a radiolucent material, such as polyetheretherketone or polyetherketoneketone, and may include a radiopaque marker, such as a titanium alloy pin. The radiopaque marker may be located along any of the implant sides such as anterior side **12**, posterior side **14**, or lateral sides **16**, **18**. By using a radiolucent material, the progression and status of the fusion can be tracked through the use of X-rays or similar devices while the radiopaque marker will indicate the position of the implant with respect to the adjacent vertebral bodies. Implant **10** may also be fabricated from other biocompatible materials, such as allografts, and/or other resorbable materials.

The dimensions of the implant **10** may vary depending on where in the spine the implant will be inserted. The vertebral bodies in the lumbar area of the spine, for example, are larger than the vertebral bodies in the thoracic area. Therefore, an implant intended for the thoracic region would be

smaller than one for the lumbar region. Likewise, lower lumbar disc replacements would be larger than upper ones. A person of ordinary skill could adapt the basic dimensions of the implant to make them occupy the space formerly occupied by the particular vertebral disc which needs replacement. Implant **10** is generally sized for anterior, lateral, or anterio-lateral approaches where inserting the implant around the spinal cord or spinal dural sac is not necessary as in a posterior approach. An exemplary embodiment of implant **10** may have a width (extending from anterior side **12** to posterior side **14**) ranging from 15 mm–40 mm, but preferably about 22–26 mm, and most preferably about 24 mm, and a length (extending from lateral side **16** to lateral side **18**) ranging from 20 mm–50 mm, but preferably about 28–32 mm, and most preferably about 30 mm. In addition, in an exemplary embodiment, the height of implant **10**, measure as the distance between upper surface **15** and lower surface **30**, when used as an intervertebral spacer, may be in the range of about 5 mm to about 25 mm. When using implant **10** as a corpectomy device, the height of implant **10** may range from about 17 mm to about 100 mm. Furthermore, in an exemplary embodiment, the radius of curvature **19** (shown in FIG. **1**) of the concave and the radius of curvature **17** (shown in FIG. **1**) of the convex sides may range from about 8 mm to about 30 mm, but preferably are about 13 mm. The radius of curvature **21** (shown in FIG. **1**) of transition areas **13** which connect concave side **14** with convex sides **16**, **18** may be about 4 mm to about 8 mm, but preferably are about 6 mm. Also, in an exemplary embodiment, the radius of curvature of the upper and lower surfaces of implant **10** from anterior side **12** to posterior side **14** may range from about 40 mm to about 100 mm, but preferably about 50 mm. The upper and lower surfaces **15**, **30** are preferably flat between lateral sides **16**, **18**.

FIG. **5** shows a top view of a second embodiment of an implant **100**. In general, most of the structure of implant **100** is similar or comparable to the structure of implant **10**. Accordingly, the equivalent structures of implant **100** have been numbered the same as implant **10** and discussion of the similar components and features is not believed necessary. In this particular embodiment, located on upper surface **15** and lower surface **30** of implant **100**, is area **110**. Area **110** extends simultaneously in a longitudinal and lateral direction diagonally across implant **110** to facilitate anterio-lateral implant insertion. Although in FIG. **5** area **110** is shown as extending along the entire length of implant **100**, area **110** may extend only partially along the length of implant **100**.

Similar to implant **10** discussed above, implant **100** has the two sets of instrument receiving channels to increase surgical flexibility when inserting implant **100** and to facilitate the insertion process by creating more surgical insertion alternatives. In the case of an anterio-lateral insertion, either channel **38** with retaining grooves **36** and **37** may be used or channel **32** with retaining grooves **34** may be used.

FIG. **9** shows a top view of a third embodiment of an implant **200**. In general, most of the structure of implant **200** is similar or comparable to the structure of implant **10**. Accordingly, the equivalent structures of implant **200** have been numbered the same as implant **10** and discussion of the similar components and features is not believed necessary. In this particular embodiment, instead of having instrument receiving channels, implant **200** has threaded bores **210**, **212**. Threaded bores **210**, **212** are sized to receive an implantation instrument such as a threaded inserter.

As can best be seen in FIGS. **10** and **11**, threaded bore **210** is located on lateral side **18**. This location allows for insertion of implant **200** in a lateral fashion. Although, threaded bore **210** is located on lateral side **18**, it may also be located on lateral side **16**. This location also allows for insertion of implant **200** in a lateral direction. FIGS. **11** and **12** show threaded bore **212** which is located on anterior side **12** of implant **200**. This location allows for insertion of implant **200** in an anterior direction with posterior side **14** being the first side to be introduced to the intervertebral space.

FIG. **13** shows a top view of a fourth embodiment of an implant **300**. In general, most of the structure of implant **300** is similar or comparable to the structure of implant **100**. Accordingly, the equivalent structures of implant **300** have been numbered the same as implant **100** and discussion of the similar components and features is not believed necessary. In this particular embodiment, instead of having instrument receiving channels, implant **300** has threaded bore **310**. Threaded bore **310**, is sized to receive an implantation instrument such as a threaded inserter.

As can best be seen in FIGS. **15** and **16**, threaded bore **310** is located on an anterio-lateral side (between anterior side **12** and lateral side **16**) of implant **300**. This location allows for insertion of implant **200** in an anterio-lateral fashion. Although, threaded bore **310** is located on an anterio-lateral side (between anterior side **12** and lateral side **16**), it can also be located on an opposite anterio-lateral side (between anterior side **12** and lateral side **18**) also allowing for an anterio-lateral implantation.

In a fifth embodiment, implant **400** is similar to the previously disclosed embodiment but now has a stackability feature. As will be further explained below, implant **400** includes an upper endcap and a lower endcap which may be stacked to form the spacer or implant. As shown in FIG. **16**A, implant **400** may also include at least one body portion which may be stacked between the upper endcap and the lower endcap to form the spacer or implant. FIG. **17** shows a top view of upper endcap **402** of implant **400**. Upper endcap **402** has a generally kidney-bean shaped footprint which includes anterior side **403**, posterior side **404**, and first and second lateral sides **406**, **408**. Anterior side **403** and lateral sides **406**, **408** are all substantially arcuate, preferably convex, in shape while posterior side **404** is substantially arcuate, preferably concave, in shape.

As shown in FIGS. **17**–**20**, upper endcap **402** also includes two elongated bores **410** which can be filled with bone growth inducing substances to allow bony ingrowth and to further assist in the fusion of the adjacent vertebrae. Upper endcap **402** further includes a central bore **411** for receiving a fastening member, such as a screw. In addition, upper endcap **402**, on its upper surface **405**, has sections or areas having teeth **412** or similar gripping means to facilitate engagement of implant **400** with the end plates of the adjacent vertebra, and has sections or areas **414**, **416** which are substantially smooth and devoid of any protrusions. Although in FIG. **17** sections **414**, **416** are shown as extending along the entire length of upper endcap **402**, from perimeter edge to perimeter edge, sections **414**, **416** may extend only partially along the length of upper endcap **402**. Sections **414**, **416** are provided to assist the surgeon in anterior or lateral implantation of the implant as was discussed above with respect to sections **22**, **24**. As can be seen in FIGS. **18** and **21**, upper endcap **402** has a generally rectangular protrusion **418** configured and dimensioned to interface and mate with a recess portion of the implant body or with the lower endcap. While protrusion **418** has been

shown and described as generally rectangular, it can be appreciated that protrusion **418** can be any shape desired. A lower surface **407** surrounds the protrusion **418**. Lower surface **407** is illustrated as surrounding and encircling completely protrusion **418**, but it can be appreciated that lower surface **407** may only partially surround protrusion **418**.

Upper endcap **402** may have a generally wedge-shaped, side profile that is designed to restore the natural curvature or lordosis of the spine after the affected disc or affected vertebral body and adjoining discs have been removed. As shown in FIG. **19**, this wedge shape results from a gradual increase in height from anterior side **403** followed by a decrease in height as posterior side **404** is approached. The substantially convex curvature of upper surface **405** changes the height of implant **400** along its width. In an exemplary embodiment, upper surface **405** may also be a flat planar surface, a flat angled surface, or a substantially curved surface, preferably shaped to mimic the topography of the adjacent vertebral end plates. The radius of curvature for upper surface **405** may be the same as described for the one-piece implant described earlier.

FIG. **22** shows a top view of a lower endcap **420**. In general, most of the structure of endcap **420** is similar or comparable to the structure of endcap **402**. Accordingly, the equivalent structures of endcap **420** have been numbered the same as endcap **402** and discussion of the similar components and features is not believed necessary. As discussed with endcap **402**, endcap **420** also has a generally kidney-bean shaped footprint which includes anterior side **403**, posterior side **404**, and first and second lateral sides **406**, **408**. Anterior side **403** and lateral sides **406**, **408** are all substantially arcuate, preferably convex, in shape while posterior side **404** is substantially arcuate, preferably concave, in shape. As can be seen in FIGS. **37–41**, on lower surface **407**, lower endcap **420** has a shoulder **424** defining a cavity **422** configured and dimensioned to interface and mate with a portion of the implant body. Shoulder **424** has been shown as surrounding cavity **422** entirely, but it should be appreciated that shoulder **424** may only partially surround cavity **422**.

Turning now to FIGS. **27–31**, an alternative embodiment of upper endcap **430** can be seen. In general, most of the structure of upper endcap **430** is similar or comparable to the structure of upper endcap **402**. Accordingly, the equivalent structures of upper endcap **430** have been numbered the same as upper endcap **402** and discussion of the similar components and features is not believed necessary. In this particular embodiment, located on upper surface **405** of upper endcap **430**, is area **432**. Area **432** extends simultaneously in a longitudinal and lateral direction diagonally across upper endcap **430** to facilitate anterio-lateral implant insertion. Although in FIGS. **27–31**, area **432** is shown as extending along the entire length of upper endcap **430**, area **432** may extend only partially along the length of upper endcap **430**.

FIG. **32** shows a top view of a lower endcap **440**. In general, most of the structure of lower endcap **440** is similar or comparable to the structure of lower endcap **420**. Accordingly, the equivalent structures of lower endcap **440** have been numbered the same as lower endcap **420** and discussion of the similar components and features is not believed necessary. As can be seen in FIGS. **32–36**, located on lower surface **405** of lower endcap **440**, is area **432**. Area **432** extends simultaneously in a longitudinal and lateral direction diagonally across lower endcap **440** to facilitate anterio-lateral implant insertion. Although in FIGS. **32–35**, area **432** is shown as extending along the entire length of lower endcap **440**, area **432** may extend only partially along the length of upper endcap **440**.

FIG. **37** shows a front or anterior view of a body portion **450**. In general, some of the structure of body portion **450** is similar or comparable to the structure of upper and lower endcaps **402**, **420**, **430**, **440**. Accordingly, the equivalent structures of body portion **450** have been numbered the same as upper and lower endcaps **402**, **420**, **430**, **440** and discussion of the similar components and features is not believed necessary. As can be seen in FIGS. **37–40**, body portion **450** has a generally kidney-bean shape footprint. Located on upper surface **455**, body portion **450** has a shoulder **462** defining a cavity **464** and located on lower surface **457**, body portion **450** has a generally rectangular protrusion **456**. While shoulder **462** is shown as completely enclosing and surrounding cavity **464**, shoulder **462** may only partially surround cavity **464**. Likewise, lower surface **457** is shown as completely surrounding protrusion **456**, but it can be appreciated that lower surface **457** may only partially surround protrusion **456**. Shoulder **462** and cavity **464** are configured and dimensioned to interface and mate with either rectangular protrusion **418** of upper endcaps **402**, **430** or rectangular protrusion **456** of another body portion **450**. Protrusion **456** of body portion **450** is configured and dimensioned to interface and mate with either cavity **422** of lower endplates **420**, **440** or cavity **464** of another body portion **450**. Again, while the protrusions have been described as rectangular, any geometric shape is contemplated.

As mentioned above, implant **400** is a stackable implant comprising an upper endcap **402**, **430**, a lower endcap **420**, **440**, and, if necessary, at least one body portion **450**. It is also possible for implant **400** to include an upper endcap **402**, **430** and a lower endcap **420**, **440**. The modularity of implant **400**, allows implant **400** to have a variable height, thereby allowing a surgeon to create an implant sized to appropriately fit the surgical space. In use, once the implant height that will be needed for the surgical procedure is determined, the desired implant can be created from the endcaps and, if necessary, one or more body portions. If a smaller implant is needed, implant **400** may comprise upper endcap **402**, **430**, and lower endcap **420**, **440**. If a larger implant is needed, implant **400** may comprise upper endcap **402**, **430**, lower endcap **420**, **440** and at least one body portion **450**. Body portions **450** may be the same size or of various sizes. Upper and lower endcaps **402**, **420**, **430**, **440** and body portion **450** are configured and dimensioned to mate with each other via an interference or similar fit. For further fixation of the endcaps and body portion together, a fixation screw may be threaded into central bore **411**. Additional screws and bores my also be used.

Body portion **450** also may include channels **464**, **466** or threaded bores **458**, **460** for implantation of the assembled implant **400**. Channel **464** runs anterior to posterior through body portion **450** from anterior side **403** to posterior side **404**. Channel **464** is sized to receive a surgical instrument such as an inserter for implantation of implant **400**. Using the implantation instrument, implant **400** can be inserted in a lateral approach where the contra-lateral side is the first side to be introduced into the intervertebral space. Alternatively, using the implantation instrument with channel **464**, implant **400** may be inserted in a lateral approach where lateral side **408** is the first side to be introduced to the intervertebral space.

Extending from a first lateral side **406** to a second lateral side **408** may be a second instrument receiving channel **466**

(not shown). Channel **466** is also sized to receive a surgical instrument such as an inserter for implantation of implant **400**. Using the implantation instrument with channel **466**, implant **400** may be inserted in an anterior approach where posterior end **404** is the first side to be introduced to the intervertebral space.

Although channel **464** is described as extending the entire length of the lateral sides **406**, **408** of the implant **400**, channel **464** may extend only a portion of the length of lateral sides **406**,**408**, or may extend the length of only one of the lateral sides **406**, **408**. Likewise, channel **466** may extend the length of one of the sides **403**, **404** or may extend only a portion of the length of sides **403**, **404**.

Implant **400**, instead of having instrument receiving channels, may have threaded bores **458**, **460**. Threaded bores **458**, **460** are sized to receive an implantation instrument such as a threaded inserter.

As can best be seen in FIGS. **37** and **41**, threaded bore **458** is located on lateral side **406**. This location allows for insertion of implant **400** in a lateral fashion. Although, threaded bore **458** is located on lateral side **406**, it may also be located on lateral side **408**. This location also allows for insertion of implant **400** in a lateral direction. FIG. **41** shows threaded bore **460** which is located on anterior side **403** of implant **400**. This location allows for insertion of implant **400** in an anterior direction with posterior side **404** being the first side to be introduced to the intervertebral space.

In a sixth embodiment, implant **500** is similar to the previously disclosed stackable embodiment, however implant **500** has a different coupling configuration for stacking. As will be further explained below, implant **500** includes a plurality of endcaps which may be stacked to form the spacer or implant. Implant **500** may also include at least one body portion which may be stacked between the endcaps to form the implant. FIG. **42** shows a top view of endcap **502** of implant **500**. Endcap **502** has a generally kidney-bean shaped footprint which includes anterior side **503**, posterior side **504**, and first and second lateral sides **506**, **508**. Anterior side **503** and lateral sides **506**, **508** are all substantially arcuate, preferably convex, in shape while posterior side **504** is substantially arcuate, preferably concave, in shape.

As shown in FIGS. **42**–**46**, endcap **502** also includes two elongated bores **510** which can be filled with bone growth inducing substances to allow bony ingrowth and to further assist in the fusion of the adjacent vertebrae. Endcap **502** further includes a central bore **511** for receiving a fastening member, such as a screw, sleeve, or nut. In addition, endcap **502**, on its upper surface **505**, has sections or areas having gripping structures **512** to facilitate engagement of implant **500** with the end plates of the adjacent vertebra, and has sections or areas **516** which are substantially smooth and devoid of any protrusions. Although in FIG. **42** sections **516** are shown as extending along the entire length of endcap **502**, from perimeter edge to perimeter edge, sections **516** may extend only partially along the length of endcap **502**. Sections **516** are provided to assist the surgeon in anterior or lateral implantation of the implant as was discussed above with respect to section **22**. As can be seen in FIGS. **43** and **46**, endcap **502** has a generally rectangular protrusion **518** configured and dimensioned to interface and mate with a recess portion of the implant body or another endcap. While protrusion **518** has been shown and described as generally rectangular, it can be appreciated that protrusion **518** can be any shape desired. A lower surface **507** surrounds the protrusion **518**. Lower surface **507** is illustrated as surrounding and encircling completely protrusion **518**, but it can be appreciated that lower surface **507** may only partially surround protrusion **518**. Located proximate to protrusion **518**, on lower surface **507**, is a shoulder **515** defining a cavity **513**. Cavity **513** is configured and dimensioned to interface and mate with a portion of the implant body or another endcap. Shoulder **515** has been shown as surrounding cavity **513** entirely, but it should be appreciated that shoulder **515** may only partially surround cavity **513**. This different coupling configuration allows for interchangeability of the endcaps.

Endcap **502** may have a generally wedge-shaped, side profile that is designed to restore the natural curvature or lordosis of the spine after the affected disc or affected vertebral body and adjoining discs have been removed. As shown in FIG. **44**, this wedge shape results from a gradual increase in height from anterior side **503** followed by a decrease in height as posterior side **504** is approached. The substantially convex curvature of upper surface **505** changes the height of implant **500** along its width. In an exemplary embodiment, upper surface **505** may also be a flat planar surface, a flat angled surface, or a substantially curved surface, preferably shaped to mimic the topography of the adjacent vertebral end plates. The radius of curvature for upper surface **505** may be the same as described for the one-piece implant described earlier.

FIG. **47** shows a top view of another endcap **520**. In general, most of the structure of endcap **520** is similar or comparable to the structure of endcap **502**. Accordingly, the equivalent structures of endcap **520** have been numbered the same as endcap **502** and discussion of the similar components and features is not believed necessary. As discussed with upper endcap **502**, endcap **520** also has a generally kidney-bean shaped footprint which includes anterior side **503**, posterior side **504**, and first and second lateral sides **506**, **508**. Anterior side **503** and lateral sides **506**, **508** are all substantially arcuate, preferably convex, in shape while posterior side **504** is substantially arcuate, preferably concave, in shape. As can be seen in FIGS. **47**–**51**, endcap **520** also includes two elongated bores **510** which can be filled with bone growth inducing substances to allow bony ingrowth and to further assist in the fusion of the adjacent vertebrae. Endcap **520** further includes a central bore **511** for receiving a fastening member, such as a screw, sleeve or nut. In addition, endcap **520**, on its upper surface **505**, has sections or areas having gripping structures **512** to facilitate engagement of implant **500** with the end plates of the adjacent vertebra, and has sections or areas **517** which are substantially smooth and devoid of any protrusions. Although in FIG. **47** sections **517** are shown as extending along the entire length of endcap **520**, from perimeter edge to perimeter edge, sections **517** may extend only partially along the length of endcap **520**. Sections **517** are provided to assist the surgeon in transverse implantation of the implant as was discussed above with respect to section **24**. As can be seen in FIGS. **48** and **51**, endcap **520** has a generally rectangular protrusion **518** configured and dimensioned to interface and mate with a recess portion of the implant body or another endcap. While protrusion **518** has been shown and described as generally rectangular, it can be appreciated that protrusion **518** can be any shape desired. A lower surface **507** surrounds the protrusion **518**. Lower surface **507** is illustrated as surrounding and encircling completely protrusion **518**, but it can be appreciated that lower surface **507** may only partially surround protrusion **518**. Located proximate to protrusion **518**, on lower surface **507**, is a shoulder **515** defining a cavity **513**. Cavity **513** is configured and dimensioned to interface and mate with a

portion of the implant body or another endcap. Shoulder **515** has been shown as surrounding cavity **513** entirely, but it should be appreciated that shoulder **515** may only partially surround cavity **513**.

Endcap **520** may have a generally wedge-shaped, side profile that is designed to restore the natural curvature or lordosis of the spine after the affected disc or affected vertebral body and adjoining discs have been removed. As shown in FIG. **49**, this wedge shape results from a gradual increase in height from anterior side **503** followed by a decrease in height as posterior side **504** is approached. The substantially convex curvature of upper surface **505** changes the height of implant **500** along its width. In an exemplary embodiment, upper surface **505** may also be a flat planar surface, a flat angled surface, or a substantially curved surface, preferably shaped to mimic the topography of the adjacent vertebral end plates. The radius of curvature for upper surface **505** may be the same as described for the one-piece implant described earlier.

Turning now to FIGS. **52–56**, an alternative embodiment of endcap **530** can be seen. In general, most of the structure of endcap **530** is similar or comparable to the structure of endcap **502**. Accordingly, the equivalent structures of endcap **530** have been numbered the same as endcap **502** and discussion of the similar components and features is not believed necessary. In this particular embodiment, located on upper surface **505** of endcap **530**, is area **519**. Area **519** extends simultaneously in a longitudinal and lateral direction diagonally across endcap **530** to facilitate anterio-lateral implant insertion. Although in FIGS. **52–56**, area **519** is shown as extending along the entire length of endcap **530**, area **519** may extend only partially along the length of endcap **530**.

FIG. **57** shows a top view of a body portion **550**. In general, some of the structure of body portion **550** is similar or comparable to the structure of endcaps **502**, **520**, and **530**. Accordingly, the equivalent structures of body portion **550** have been numbered the same as endcaps **502**, **520**, and **530** and discussion of the similar components and features is not believed necessary. As can be seen in FIGS. **57–62**, body portion **550** has a generally kidney-bean shape footprint. Located on upper surface **555** and lower surface **557**, body portion **550** has a shoulder **562** defining a cavity **564** and a generally rectangular protrusion **556**. While shoulder **562** is shown as completely enclosing and surrounding cavity **564**, shoulder **562** may only partially surround cavity **564**. Likewise, upper surface **555** and lower surface **557** are shown as completely surrounding protrusions **556**, but it can be appreciated that upper surface **555** and lower surface **457** may only partially surround protrusions **556**. Shoulder **562** and cavity **564** are configured and dimensioned to interface and mate with either rectangular protrusion **518** of endcaps **502**, **520**, **530** or rectangular protrusion **556** of another body portion **550**. Protrusion **556** of body portion **550** is configured and dimensioned to interface and mate with either cavity **513** of endcaps **502**, **520**, **530** or cavity **564** of another body portion **550**. Again, while the protrusions have been described as rectangular, any geometric shape is contemplated.

As mentioned above, implant **500** is a stackable implant comprising two endcaps **502**, **520**, **530**, and, if necessary, at least one body portion **550**. The modularity of implant **500**, allows implant **500** to have a variable height, thereby allowing a surgeon to create an implant sized to appropriately fit the surgical space. In use, once the implant height that will be needed for the surgical procedure is determined, the desired implant can be created from the endcaps and, if necessary, one or more body portions. If a smaller implant is needed, implant **500** may comprise two endcaps **502**, **520**, **530**. If a larger implant is needed, implant **500** may comprise endcaps **502**, **520**, **530**, and at least one body portion **550**. Body portions **550** may be the same size or of various sizes. Endcaps **502**, **520**, **530**, and body portion **550** are configured and dimensioned to mate with each other via an interference or similar fit. For further fixation of the endcaps or the endcaps and body portion together, a fixation screw may be threaded into central bore **511**. Additional screws and bores my also be used.

Body portion **550** also may include channels **563**, **566** and/or threaded bores **558**, **560** for implantation of the assembled implant **500**. Channel **563** runs anterior to posterior through body portion **550** from anterior side **503** to posterior side **504**. Channel **563** is sized to receive a surgical instrument such as an inserter for implantation of implant **500**. Using the implantation instrument, implant **500** can be inserted in a lateral approach where the contra-lateral side is the first side to be introduced into the intervertebral space. Alternatively, using the implantation instrument with channel **563**, implant **500** may be inserted in a lateral approach where lateral side **508** is the first side to be introduced to the intervertebral space.

Extending from a first lateral side **506** to a second lateral side **508** may be a second instrument receiving channel **566**. Channel **566** is also sized to receive a surgical instrument such as an inserter for implantation of implant **500**. Using the implantation instrument with channel **566**, implant **500** may be inserted in an anterior approach where posterior end **504** is the first side to be introduced to the intervertebral space.

Although channel **563** is described as extending the entire length of the lateral sides **506**, **508** of the implant **500**, channel **563** may extend only a portion of the length of lateral sides **506**,**508**, or may extend the length of only one of the lateral sides **506**, **508**. Likewise, channel **566** may extend the length of one of the sides **503**, **504** or may extend only a portion of the length of sides **503**, **504**.

Implant **500**, instead of or in addition to having instrument receiving channels, may have threaded bores **558**, **560**. Threaded bores **558**, **560** are sized to receive an implantation instrument such as a threaded inserter.

As can best be seen in FIGS. **59**, **61**, and **62**, threaded bore **558** is located on lateral sides **506**, **508**. This location allows for insertion of implant **500** in a lateral fashion. FIG. **59** shows threaded bore **560** which is located on anterior side **503** of implant **500**. This location allows for insertion of implant **500** in an anterior direction with posterior side **504** being the first side to be introduced to the intervertebral space.

As can best be seen in FIG. **59**, body portion **550** may also include openings **561**, which preferably extend from the outer surface of body portion **550** to elongated bores **510**. Openings **561** may be packed with bone growth inducing substances to further aid in the fixation and fusion of the implant.

In a seventh embodiment, implant **600** is similar to the previously disclosed stackable embodiment, however implant **600** has a slightly different structure and footprint. Preferably, the structure and footprint of implant **600** allows implant **600** to be particularly suited for implantation in the cervical region of the spine. FIG. **63** shows a top view of endcap **602** of implant **600**. Endcap **602** has a generally oblong octagonal shaped footprint which includes anterior side **603**, posterior side **604**, and first and second lateral sides **606**, **608**.

As shown in FIGS. **63–66**, endcap **602** also includes an elongated bore **610** which can be filled with bone growth inducing substances to allow bony ingrowth and to further assist in the fusion of the adjacent vertebrae. Endcap **602** further includes a central bore **611** for receiving a fastening member, such as a screw. In addition, endcap **602**, on its upper surface **605**, has sections or areas having gripping structures **612** to facilitate engagement of implant **600** with the end plates of the adjacent vertebra, and has sections or areas **616** which are substantially smooth and devoid of any protrusions. Although in FIG. **63** section **616** is shown as extending along a partial length of endcap **602**, sections **616** may extend along the entire length of endcap **602**, from perimeter edge to perimeter edge. Section **616** may be provided to provide a recess allowing a screw head to be recessed so as not to extend upwardly beyond the upper ends of the gripping structures **612**. As can be seen in FIGS. **65** and **66**, endcap **602** has a protrusion **618** configured and dimensioned to interface and mate with a recess portion of the implant body or another endcap. It can be appreciated that protrusion **618** may be any shape desired. A lower surface **607** surrounds the protrusion **618**. Lower surface **607** is illustrated as surrounding and encircling completely protrusion **618**, but it can be appreciated that lower surface **607** may only partially surround protrusion **618**. Located proximate to protrusion **618**, on lower surface **607**, is a shoulder **615** defining a cavity **613**. Cavity **613** is configured and dimensioned to interface and mate with a portion of the implant body or another endcap. Shoulder **615** has been shown as surrounding cavity **613** entirely, but it should be appreciated that shoulder **615** may only partially surround cavity **513**.

Endcap **602** may have a generally wedge-shaped, side profile that is designed to restore the natural curvature or lordosis of the spine after the affected disc or affected vertebral body and adjoining discs have been removed. As shown in FIG. **66**, this wedge shape results from a gradual increase in height from anterior side **603** to the posterior side **604**. In an exemplary embodiment, upper surface **605** may also be a flat planar surface, a convexly-curved surface, or a substantially curved surface, preferably shaped to mimic the topography of the adjacent vertebral end plates. The radius of curvature for upper surface **605** may be the same as described for the one-piece implant described earlier.

FIG. **67** shows a top view of a body portion **650**. In general, some of the structure of body portion **650** is similar or comparable to the structure of endcap **602**. Accordingly, the equivalent structures of body portion **650** have been numbered the same as endcap **602** and discussion of the similar components and features is not believed necessary. As can be seen in FIGS. **67–69**, body portion **650** has a generally oblong octagonal shape footprint. Located on upper surface **655** and lower surface **657**, body portion **650** has a shoulder **662** defining a cavity **664** and a protrusion **656**. While shoulder **662** is shown as completely enclosing and surrounding cavity **664**, shoulder **662** may only partially surround cavity **664**. Likewise, upper surface **655** and lower surface **657** are shown as completely surrounding protrusions **656**, but it can be appreciated that upper surface **655** and lower surface **657** may only partially surround protrusions **656**. Shoulder **662** and cavity **664** are configured and dimensioned to interface and mate with either protrusion **618** of endcap **602**, or protrusion **656** of another body portion **650**. Protrusion **656** of body portion **650** is configured and dimensioned to interface and mate with either cavity **613** of endcaps **602** or cavity **664** of another body portion **650**. Again, the protrusions may be any contemplated geometric shape.

As mentioned above, implant **600** is a stackable implant comprising two endcaps **602**, and, if necessary, at least one body portion **650**. The modularity of implant **600**, allows implant **600** to have a variable height, thereby allowing a surgeon to create an implant sized to appropriately fit the surgical space. In use, once the implant height that will be needed for the surgical procedure is determined, the desired implant can be created from the endcaps and, if necessary, one or more body portions. If a smaller implant is needed, implant **600** may comprise two endcaps **602**. If a larger implant is needed, implant **600** may comprise endcaps **602**, and at least one body portion **650**. Body portions **650** may be the same size or of various sizes. Endcap **602**, and body portion **650** are configured and dimensioned to mate with each other via an interference or similar fit. For further fixation of the endcaps or the endcaps and body portion together, a fixation screw may be threaded into central bore **611**. Additional screws and bores my also be used.

Body portion **650** also may include windows **665**, **666** which can be filled with bone growth inducing substances to further allow for bony ingrowth and to further assist in the fusion of the adjacent vertebrae. Windows **665**, **666** may also be used to mate with the implant holder to assist with the implantation of the implant.

Body portion **650** may also have a threaded bore **658**. Threaded bore **658** is sized to receive an implantation instrument such as a threaded inserter for implantation of the assembled implant **600**. As can best be seen in FIG. **69**, threaded bore **558** is located on lateral sides **606**, **608**. This location allows for insertion of implant **600** in a lateral fashion.

FIG. **70** shows a perspective view of one embodiment of implant **600** which includes two endcaps **602** and one body portion **650**.

The embodiments disclosed herein are illustrative and exemplary in nature and it will be appreciated that numerous modifications and other embodiments of the implant disclosed may be devised by those skilled in the art.

What is claimed is:

1. An intervertebral implant comprising a body having a convexly curved anterior side substantially opposing a concavely curved posterior side spaced apart by first and second convexly curved lateral sides to define a central bore, the body further having top and bottom surfaces, each of the top and bottom surfaces are configured to contact an endplate of an adjacent vertebrae so that an outer periphery of the top and bottom surfaces substantially conforms in size and shape with the end plates of adjacent vertebra, and wherein each of the top and bottom surfaces have a plurality of gripping structures for engaging the end plates of the adjacent vertebra and have areas extending from the outer periphery to the central bore that are substantially smooth for receiving a surgical instrument; wherein the central bore has a substantially concavely curved anterior surface, a substantially convexly curved posterior surface, and first and second concavely curved lateral surfaces; and wherein at least one of the top and bottom surface is continuous around its respective outer periphery.

2. The implant of claim **1**, wherein the radius of curvature of the convexly curved anterior side and the pair of convexly curved lateral sides is substantially the same.

3. The implant of claim **1**, wherein at least one side has a channel for receiving a surgical instrument.

4. The implant of claim 3, wherein the channel runs in at least an anterior-posterior direction or a lateral direction.

5. The implant of claim 1, wherein the top and bottom surfaces are substantially flat planar surfaces having a downward taper at an anterior end of the implant and at a posterior end of the implant to facilitate insertion of the implant.

6. The implant of claim 1, wherein the central bore of the implant is configured and adapted to receive an osteoconductive material.

7. The implant of claim 1, wherein the areas of the top and bottom surfaces of the implant which are substantially smooth extend in at least one of a lateral direction, an anterior-posterior direction, or an anterio-lateral direction.

8. The implant of claim 1, wherein the implant is made from a biocompatible metal.

9. The implant of claim 1, wherein the implant is made from a radiolucent material.

10. The implant of claim 9, wherein the implant further comprises a radiopaque marker.

11. The implant of claim 1, wherein the implant is made from a resorbable material.

12. The implant of claim 1, wherein the implant has at least one bore transverse to the central bore extending from a side of the body to the central bore.

13. The implant of claim 1, wherein the profile of the implant is substantially wedge-shaped.

14. An intervertebral implant comprising a top surface, a bottom surface, a substantially convexly curved anterior side, a substantially concavely curved posterior side, first and second convexly curved lateral sides, and a central bore extending from the top surface to the bottom surface, wherein the top surface and the bottom surface include a plurality of teeth and at least one substantially smooth area extending from a periphery of the implant, the substantially smooth area being sized and configured to receive a surgical instrument and wherein the central bore has a substantially concavely curved anterior surface, a substantially convexly curved posterior surface, and first and second concavely curved lateral surfaces; and wherein at least one of the top and bottom surface completely encloses the central bore.

15. The implant of claim 14, wherein the substantially smooth areas formed in the top surface and the bottom surface extend in a direction generally from the anterior side to the posterior side.

16. The implant of claim 14, wherein the substantially smooth areas formed in the top surface and the bottom surface extend in a direction generally from the first lateral side to the second lateral side.

17. The implant of claim 14, wherein the substantially smooth areas formed in the top surface and the bottom surface extend in a longitudinal direction and a lateral direction diagonally across the implant.

18. The implant of claim 14, wherein the top surface and the bottom surface include a first substantially smooth area extending from a periphery of the implant and a second substantially smooth area extending from the periphery of the implant, the substantially smooth areas being sized and configured to receive a surgical instrument.

19. The implant of claim 18, wherein the first substantially smooth area formed in the top surface and the bottom surface extends in a direction generally from the anterior side to the posterior side and the second substantially smooth area formed in the top surface and the bottom surface extends in a direction generally from the first lateral side to the second lateral side.

20. The implant of claim 14, wherein the first and second lateral sides each include a channel sized and configured to receive a second surgical instrument, the channels extending at least partially from the anterior side to the posterior side.

21. The implant of claim 20, wherein the channels extend completely from the anterior side to the posterior side.

22. The implant of claim 20, wherein the channels further include at least one retaining groove for mating with a projection formed on the second surgical instrument.

23. The implant of claim 22, wherein the at least one retaining groove is disposed near the anterior side.

24. The implant of claim 20, wherein the posterior and anterior sides each include a second channel sized and configured to receive the second surgical instrument, the second channel extending at least partially from the first lateral side to the second lateral side.

25. The implant of claim 24, wherein the second channels extend completely from the first lateral side to the second lateral side.

26. The implant of claim 14, wherein at least one of the anterior side, posterior side, first lateral side and second lateral side includes a threaded bore sized and configured to receive a second surgical instrument.

27. The implant of claim 14, wherein the implant has a generally wedge-shaped profile.

28. The implant of claim 14, wherein the top surface and the bottom surface define a height dimension h_1 at the posterior side and a height dimension h_2 at the anterior side, wherein h_2 is larger than h_1.

29. The implant of claim 28, wherein the top surface and the bottom surface define a height dimension h_3 at an intermediate point between the anterior side and the posterior side, h_3 being larger than h_2.

30. The implant of claim 14, wherein the implant has at least one bore transverse to the central bore extending from one of the anterior side, the posterior side, the first lateral side and the second lateral side to the central bore.

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