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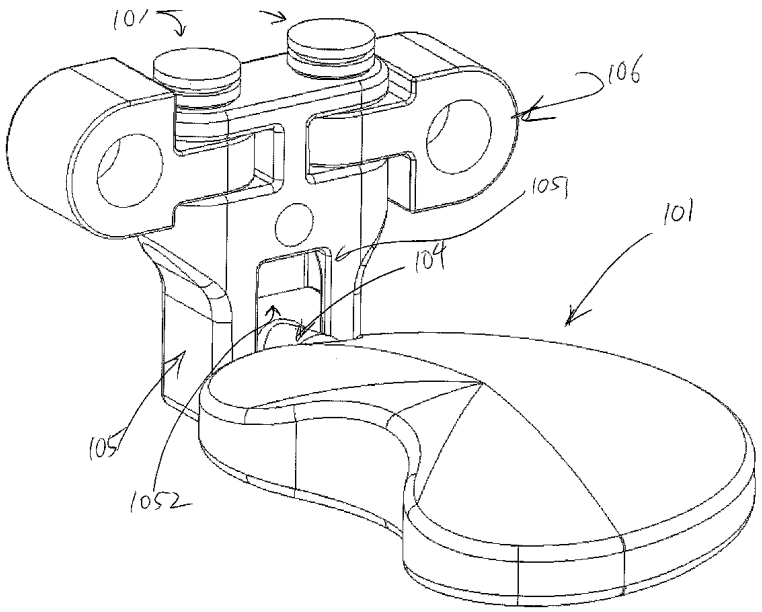
(54) Title: HINGED ARTIFICIAL SPINAL DISK DEVICE



(57) Abstract: An artificial spinal disk prosthesis comprised of an artificial disk (101) , mounting bracket (105) assembly that secures the disk to at least one vertebrae and a sliding rod (104) that connects the two whereby the shape of the components determines the range of motion of the disk, thus allowing desirable motions of the disk consistent with normal body motions and preventing undesirable motions of the artificial disk. In the preferred embodiment, the angular motion of the disk is controlled by a hinge that is on the side of the artificial disk. In the preferred embodiment, the artificial disc is connected to the spine via one vertebra.

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AMENDED CLAIMS
[received by the International Bureau on 11 August 2006 (11.08.06)]

WHAT IS CLAIMED:

I claim:

1. An artificial spinal disk prosthesis (101) for mounting onto a vertebrae using a bracket (105) wherein the improvement is comprised of:

a groove on at least one side of the bracket (1051);

an artificial spinal disk comprised of a hole along the side of the disk (1021);

a rod (104) with a first end and second end, the first end being slidably coupled to the groove (1052) and the second end being slidably coupled to the disk by passing through the hole along the side of the disk (1021).

2. The spinal disk prosthesis of Claim 1 where the second end of the rod (104) is substantially either spherical or ovoid in shape.

3. The spinal disk prosthesis of Claim 1 where the first end of the rod (104) is substantially cylindrical in shape whereby said cylindrical shape has a longitudinal axis substantially perpendicular to the longitudinal axis of the rod.

4. The spinal disk prosthesis of Claim 1 where the rod (104) is comprised of two sections where one section telescopes into the other when the disk moves toward the sliding bracket.

5. The spinal disk prosthesis of Claim 1 where the disk is further comprised of an interior cavity that receives the second end of the rod (1011), said cavity having a dimension along the direction of the longitudinal axis of the rod such that the second end will travel within the disk along the longitudinal axis of the rod as the rod slides in and out of the disk.

6. The spinal disk prosthesis of Claim 1 where the disk is further comprised of a collar (102) that surrounds the hole (1021) where the rod enters the disk, the collar having a cross sectional shape perpendicular to the longitudinal axis of the rod relative to the cross sectional shape of the rod such that the second end cannot be withdrawn through the collar while the rod can rotate within the confines of the collar.

7. The spinal disk prosthesis of Claim 6 where the lateral cross sectional shape of the collar (102) is such that it limits the lateral angular motion of the rod, as measured from the longitudinal axis of the rod to the horizontal axis passing through the center of the hole.

8. The spinal disk prosthesis of Claim 6 where the vertical cross sectional shape of the collar (102) is such that it limits the vertical angular motion of the rod, as measured from the longitudinal axis of the rod to the horizontal axis passing through the center of the hole.

9. The spinal disk prosthesis of Claim 7 where the lateral cross sectional shape of the collar (102) is such that the maximum lateral angular motion of the rod is a value between approximately 0 and approximately 15 degrees.

10. The spinal disk prosthesis of Claim 8 where the lateral cross sectional shape of the collar (102) is such that the maximum vertical angular motion of the sliding rod is a value between approximately 0 and approximately 15 degrees.

11. The spinal disk prosthesis of Claim 1 where the width of the groove (1051) is a dimension such that the maximum range of travel of the first end of the rod within the groove in a direction both substantially perpendicular to the longitudinal axis of the

sliding rod and substantially transverse to the length of the groove is equal to or less than approximately 5 millimeters.

12. The spinal disk prosthesis of Claim 1 where the diameter of the rod (104) is less than approximately 10 millimeters.

13. The spinal disk prosthesis of Claim 3 where the distance of travel of the rod (104) in a direction transverse to the direction of the groove (1051) and along the longitudinal axis of the cylindrical member of the first end is less than approximately 2 millimeters.

14. The spinal disk prosthesis of Claim 1 where the bracket (105) encloses the first end of the rod (104) such that the first end does not appreciably penetrate past the back of the bracket at any point in the travel of the disk along the longitudinal axis of the rod.

15. The spinal disk prosthesis of Claim 1 where the groove width (1051) relative to the width of the first end of the rod is dimensioned such that the maximum amount of travel of the rod is less than approximately 5 millimeters along the anterior-posterior axis.

16. The spinal disk prosthesis of Claim 5 where the depth of the cavity along the longitudinal axis of the rod (1011) is such that the distance of travel within the cavity along the longitudinal axis of the rod is equal to or greater than zero and less than approximately 5 millimeters.

17. An artificial spinal disk device (101) to be inserted between two vertebrae, the device being comprised of an artificial disk and a rod (104) with a first end and second end, wherein the improvement is comprised of the second end being slidably coupled to the disk by passing through an entry hole along the side of the disk (1021).

18. The device of Claim 17 further comprising a collar (102) that surrounds the entry hole (1021), the shape of the collar formed such that it limits the angular range of movement of the rod, as measured from the longitudinal axis of the rod to the horizontal axis passing through the center of the hole.

19. The device of Claim 18 where the shape of the collar (102) is such that the maximum angle of the longitudinal axis of the rod to the horizontal axis of the disk is a value equal to or less than approximately 15 degrees.

20. The device of Claim 18 where the shape of the collar (102) is such that the maximum angle of the longitudinal axis of the rod to the longitudinal axis of the entry hole is a value less than approximately 15 degrees.

21. The device of Claim 17 where the disk is further comprised of a cavity (1011) into which the second end of the rod fits, said cavity having a dimension along the longitudinal axis of the rod such that the cavity permits the second end of the rod to travel within the cavity along the longitudinal axis of the rod.

22. The device of Claim 21 where the dimension is such that the distance of travel of the second end of the rod (104) within the cavity (1011) is less than or equal to approximately 5 millimeters.

23. The spinal disk prosthesis of Claim 1 where the hole (1021) is located at a position along the side of the disk such that the longitudinal axis of the rod is substantially perpendicular to the anterior-posterior axis.

24. The spinal disk prosthesis of Claim 23 where the length of the groove (1051) is less than approximately 10 millimeters.

25. The spinal disk prosthesis of Claim 23 where the bracket (105) encloses the first end such that the first end does not appreciably protrude out of the back of the bracket when the disk travels toward the bracket.

26. The spinal disk prosthesis of Claim 1 where the groove width (1051) relative to the width of the first end of the rod and the shape of the collar (102) are both dimensioned such that the maximum amount of travel of the disk edge immediately adjacent to the spinal chord is less than approximately 5 millimeters along the anterior-posterior axis.

27. The spinal disk prosthesis of Claim 1 where the rod is hollow.

28. The spinal disk prosthesis of Claim 1 where the rod is solid.

29. The spinal disk prosthesis of Claim 1 where the hole (1021) is located at a position along the side of the disk such that the longitudinal axis of the rod is substantially along the anterior-posterior axis.

30. The spinal disk prosthesis of Claim 29 where the length of the groove (1051) is less than approximately 10 millimeters.

31. The spinal disk prosthesis of Claim 29 where the bracket (105) encloses the first end such that the first end does not appreciably protrude out of the back of the bracket when the disk travels toward the bracket.

32. The spinal disk prosthesis of Claim 1 where the hole (1021) is located at a position along the side of the disk such that the longitudinal axis of the rod is between

approximately zero degrees and approximately 90 degrees from the anterior-posterior axis.

33. The spinal disk prosthesis of Claim 32 where the length of the groove (1051) is less than approximately 10 millimeters.

34. The spinal disk prosthesis of Claim 32 where the bracket (105) encloses the first end such that the first end does not appreciably protrude out of the back of the bracket when the disk travels toward the bracket.

35. The device of Claim 18 where the shape of the collar (102) is such that the maximum vertical angle of the longitudinal axis of the rod to the longitudinal axis of the entry hole is a value less than approximately 15 degrees.

36. The device of Claim 18 where the shape of the collar (102) is such that the maximum lateral angle of the longitudinal axis of the rod to the longitudinal axis of the entry hole is a value less than approximately 15 degrees.

37. A spinal disk prosthesis comprised of:

a bracket with a groove (1051);

a rod (104) with a first end and a second end, the first end coupled to the groove with a first coupling means;

an artificial disk (101) coupled to the second end with a second coupling means.

STATEMENT

1. The last sentence of page 13 in the specification is deleted. Applicant does not concede the scope or breadth of any claim as a result of conforming to Examiner's suggestion.

2. Claims 1 and 17 are amended to conform to Rule 6.3. Applicant does not concede that the re-formatting of the claim changes the scope or breadth thereof.

3. Claims 1-37 are amended to include references to the figures.

4. Claim 2 is also amended to fix a typographic error.

5. Claim 37 is left as-is. Rule 6.3 states that the form of claiming rules are subject to local national patent law. In this case, Claim 37 is acceptable under U.S. 37 U.S.C. § 112 and is distinguished from Ferree because the embodiment disclosed in this application is distinct from that disclosed by Ferree.

DELETED SHEETS:

Page 13 of the specification and sheets 1,3 and 6 of the claims have been deleted, and replaced with the attached sheets.

REPLACEMENT SHEETS:

A new sheet 13 of the specification is attached hereto. The Claim replaced with sheets 1,3 and 6, attached hereto.

CLAIM AMENDMENT UNDER PCT ARTICLE 19:

The following sheets 1, 3 and 6 of the Claims replaces sheet 1, 3 and 6 of the Claims.

any suitable combination.