

WHAT IS CLAIMED IS:

1. A prosthesis coupling configured to rotatably and releasably engage with a race of a socket coupling, the prosthesis coupling comprising:
 - 5 a. a first sleeve including a first annular ball race section;
 - b. a second sleeve having a second annular ball race section; and
 - c. bearings provided within a race formed by the first ball race section and the second ball race section;wherein the first and second sleeves may be relatively moved such that:
 - 10 i. in a first configuration, in which the first ball race section and the second ball race section are brought together, the bearings are constrained to an outer annular zone, preventing removal of the prosthesis coupling when engaged with a socket coupling; and
 - ii. in a second configuration, in which the first ball race section and the second ball race section are moved apart, the bearings may move to
15 an inner annular zone, allowing removal of the connector from a socket.
2. A prosthesis connector as claimed in claim 1 wherein the first and second sleeves are relatively rotatable and have ramp sections configured such that upon relative
20 rotation of the inner and outer sleeves the spacing between the first ball race section and the second ball race section may be varied.
3. A prosthesis coupling as claimed in claim 1 or claim 2 wherein a locking mechanism prevents relative movement between the first and second sleeves unless actuated.

4. A prosthesis coupling as claimed in claim 2 or claim 3 wherein the locking mechanism engages with locking features provided on the sleeves in its locking position to prevent relative rotation with respect to the other sleeve.
5. A prosthesis coupling as claimed in claim 4 wherein the locking mechanism moves axially between the locking position and an unlocked position.
6. A prosthesis coupling as claimed in claim 4 wherein the locking mechanism moves transversely to the axis of the coupling between the locking position and an unlocked position.
7. A prosthesis coupling as claimed in claim 4 wherein the locking mechanism rotates relative to the socket coupling between locked and an unlocked positions.
8. A prosthesis coupling as claimed in claim 4 wherein the locking mechanism is in the form of a locking ring having a plurality of axial projections which engage with a plurality of locking features provided on the sleeves.
9. A prosthesis coupling as claimed in claim 8 wherein the locking ring is moved axially between locked and unlocked positions by the movement of opposing first and second ramps and a linkage between the locking ring and the second ramp.
10. A prosthesis coupling as claimed in claim 9 wherein a button is linked to the first ramp and configured so that movement of the button effects relative movement between the first and second ramps.
11. A prosthesis coupling as claimed in claim 10 wherein a plurality of buttons are connected to respective ramps.
12. A prosthesis coupling as claimed in claim 3 wherein the locking mechanism engages features of both the first and second sleeves to prevent relative rotation between the sleeves.
13. A prosthesis coupling as claimed in claim 12 wherein the locking mechanism is a pin movable relative to the sleeves between a first position in which the pin engages

features of the first and second sleeves to prevent rotation and a second position in which relative rotation of the sleeves is allowed.

14. A prosthesis coupling as claimed in claim 13 wherein the features are apertures in the sleeves.
- 5 15. A prosthesis coupling as claimed in claim 1 wherein an actuating mechanism moves the first and second sleeves relatively in the axial direction between the first and second configurations.
16. A prosthesis coupling as claimed in claim 13 where the actuating mechanism is in the form of a lever and cam arrangement.
- 10 17. A prosthesis coupling as claimed in any one of the preceding claims wherein the bearings are ball bearings.
18. A prosthesis coupling as claimed in any one of the preceding claims wherein the first and second sleeves are biased towards the second configuration.
- 15 19. A prosthesis coupling as claimed in claim 18 wherein a spring biases the first and second sleeves towards the second configuration.
20. A prosthesis coupling as claimed in claim 19 wherein a torsion spring biases the first and second sleeves towards the second configuration.
21. A prosthesis coupling as claimed in claim 20 wherein a helical torsion spring biases the first and second sleeves towards the second configuration.
- 20 22. A prosthesis coupling as claimed in claim 21 wherein the helical torsion spring is provided within the first sleeve and includes a leg passing through a slot in the first sleeve to engage with the second sleeve.
23. A prosthesis coupling configured to rotatably and releasably engage with a race of a socket coupling, the prosthesis coupling comprising:
- 25 a. a body having an annular section;

- b. a first annular ball race section provided on the annular section;
 - c. a second annular ball race section movable between first and second positions on the annular section;
 - d. bearings provided within a race formed by the first ball race section and the second ball race section; and
 - e. a release actuator movable in a first direction with respect to the body to move the second annular ball race section between:
 - i. a first configuration in which the first ball race section and the second ball race section are brought together such that the bearings are constrained to an outer annular zone, preventing removal of the connector when engaged with a socket coupling; and
 - ii. a second configuration in which the first ball race section and the second ball race section are moved apart such that the bearings may move to an inner annular zone, allowing removal of the prosthesis coupling from a socket coupling.
24. A prosthesis coupling as claimed in claim 23 wherein the release actuator is hand operated.
25. A prosthesis coupling as claimed in claim 24 wherein the release actuator is moved in a first direction, lateral to the axis of the body, to move the second annular ball race.
26. A prosthesis coupling as claimed in any one of claims 23 to 25 wherein release actuator includes a push button.
27. A prosthesis coupling as claimed in claim 26 wherein the push button is recessed within the body.

28. A prosthesis coupling as claimed in any one of claims 23 to 27 wherein the release actuator must be released before it can be actuated.
29. A prosthesis coupling as claimed in claim 28 wherein the release actuator is configured to be released by moving it laterally to the first direction.
- 5 30. A prosthesis coupling as claimed in claim 28 wherein the release actuator is configured to be released when rotated about the axis of the first direction.
31. A prosthesis coupling as claimed in any one of claims 23 to 30 wherein the release actuator includes a first ramp configured to engage with a second ramp to effect movement of the second ball race section away from the first ball race section.
- 10 32. A prosthesis coupling as claimed in claim 31 wherein the second ramp acts via a series of pins to move the second ball race section away from the first ball race section.
33. A prosthesis coupling as claimed in 23 wherein the release actuator moves about the axis of rotation to move the second annular ball race.
- 15 34. A prosthesis coupling as claimed in claim 33 wherein the release actuator includes a first ramp configured to engage with a second ramp to effect movement of the second ball race section away from the first ball race section.
35. A prosthesis coupling as claimed in 23 wherein the release actuator includes a cam configured to move the second annular ball race.
- 20 36. A prosthesis coupling as claimed in any one of claims 23 to 35 wherein the ball race sections are snap rings.
37. A prosthesis coupling as claimed in claim 36 wherein the second race section is movably mounted on a sleeve and is movable between axially separated annular recesses.

38. A prosthesis coupling as claimed in any one of claims 23 to 37 wherein the bearings are ball bearings.
39. A socket coupling including a socket body for receiving a wrist coupling having a rotary connector core extending from the socket body wherein the rotary connector core is compliantly mounted to the socket body.
40. A socket coupling as claimed in claim 39 wherein a compliant mounting element is provided between the rotary connector core and the socket body.
41. A socket coupling as claimed in claim 40 wherein the compliant mounting element provides a waterproof seal between the rotary connector core and the socket body.
42. A socket coupling as claimed in claim 41 wherein the seal is waterproof to any one of the standards IPx4, IPx5, IPx6, IPx6K, IPx7 and IPx8.
43. A socket coupling as claimed in any one of claims 39 to 42 wherein the compliant mounting element allows the rotary connector core to non-destructively deflect by more than 15 degrees with respect to the socket body.
44. A socket coupling as claimed in any one of claims 39 to 43 wherein the compliant mounting element allows the rotary connector core to non-destructively deflect by at least 5 degrees, preferably 10 degrees and more preferably 15 degrees.
45. A socket coupling as claimed in any one of claims claim 40 to 43 wherein the compliant mounting element is formed from a resilient material having a resilience of between 20% to 60% and a Shore A hardness between 10 and 90, more preferably a Shore A hardness of between 30 to 60 or alternatively a Shore D hardness of between 40 to 90.
46. A socket coupling as claimed in any one of claims claim 40 to 45 wherein the compliant mounting element is formed from an elastomer, rubber, silicone, a compressible polymer, a thermoplastic elastomer, a thermoset rubber hydrocarbon, a fluorocarbon or a silica-based thermoset elastomer.

47. A socket coupling as claimed in any one of claims 39 to 46 wherein the rotary connector core is engaged with the socket body by a mounting mechanism.
48. A socket coupling as claimed in claim 47 wherein the mounting mechanism allows engagement and disengagement of the connector core from the socket body.
- 5 49. A socket coupling as claimed in claim 48 wherein the mounting mechanism allows engagement and disengagement by relative rotation between the connector core and the socket body.
50. A socket coupling as claimed in claim 49 wherein the compliant mounting is connected to the connector core and the mounting mechanism is formed by
10 cooperating elements on the compliant mounting and the socket body.
51. A socket coupling as claimed in claim 50 wherein the mounting mechanism is a twist lock mechanism.
52. A socket coupling as claimed in any one of claims 47 to 51 wherein the mounting mechanism allows engagement of the connector core from the distal end of the
15 socket body.
53. A socket coupling as claimed in claim 39 wherein a compliant mounting element is provided within the rotary connector core.
54. A socket coupling as claimed in claim 39 wherein a compliant mounting element is provided within the socket body.
- 20 55. A rotary connector core including a compliant mounting element.
56. A rotary connector core as claimed in claim 55 including a plurality of stacked sections held in a stack by a tensioning element.
57. A rotary connector core as claimed in claim 56 wherein the stacked sections consist of alternating conductive sections and insulating sections.

58. A rotary connector core as claimed in claim 56 or 57 wherein the tensioning element includes a threaded shaft which engages with a complementary threaded element to tension the stacked sections in a cylindrical form.
59. A compliant mounting element configured to engage with a socket coupling and a rotary connector core so as to allow movement between the socket coupling and rotary connector core about the compliant mounting element.
60. A compliant mounting element as claimed in claim 59 configured to provide a waterproof seal between the rotary connector core and the socket body.
61. A rotary connector core comprising a plurality of stacked sections consist of alternating conductive sections and insulating sections tensioned together to maintain a cylindrical form by a tensioning element between the top and bottom of the stack.
62. A socket body including a compliant mounting element.
63. A socket coupling as claimed in any one of claims 39 to 43 wherein the compliant mounting element allows the rotary connector core to non-destructively deflect by at least 3 degrees, preferably at least 5 degrees, when a force of between 2.5 and 20 Newtons applied laterally or normal to the distal end of the rotary connector core.
64. A socket coupling as claimed in any one of claims 39 to 43 wherein the compliant mounting element is formed of a material having a DMTA damping factor of between 0.05 to 0.8, preferably between 0.05 to 0.5, over a temperature range of -20°C . to 100°C .