

CLAIMS

1. A catheter assembly comprising:

5 a catheter hub having a chamber therein, the catheter hub having a distal end and a proximal end, the catheter hub being connectable at its proximal end to a device for the infusion or withdrawal of fluids to or from the chamber within the catheter hub;

10 a hollow tubular catheter having a proximal end and a distal end, the catheter being connected at its proximal end to the distal end of the catheter hub, the interior of the catheter opening into the chamber within the catheter hub;

15 a needle having a sharpened needle tip, in a ready position the needle extending through the chamber in the catheter hub and the catheter with the needle tip extending beyond the distal end of the catheter;

20 a hollow extension tube having a distal end and a proximal end, the extension tube being connected at its distal end to the catheter hub between the proximal and distal ends thereof, the extension tube opening at its distal end into the chamber within the catheter hub, the extension tube connectable at its proximal end to a device for infusing fluid into the chamber within the catheter hub;

a valve assembly disposed within the chamber of the catheter hub, the valve assembly comprising:

25 a first valve member closing the distal end of the extension tube and openable under the action of a pressurised fluid within the extension tube; and

30 a second valve member preventing the flow of fluid through the chamber to or from the proximal end of the catheter hub, the second valve member being a two-way valve and openable to permit the flow of fluid through the chamber in the catheter hub in both a proximal and a distal direction.

2. The catheter assembly according to claim 1, wherein a distal hub portion of the catheter hub is generally flattened.

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3. The catheter assembly according to claim 2, wherein the extension tube opens into the distal hub portion of the catheter hub.

10 4. The catheter assembly according to any preceding claim, wherein the needle comprises an opening in the shaft of the needle in the distal end portion of the needle.

15 5. The catheter assembly according to claim 4, wherein the opening is disposed within the catheter in the ready position.

6. The catheter assembly according to any preceding claim, wherein the first valve member is a one-way valve between the extension tube and the internal chamber of the catheter hub.

20 7. The catheter assembly according to any of claims 1 to 5, wherein the first valve member is a two-way valve between the extension tube and the internal chamber of the catheter hub.

25 8. The catheter assembly according to claim 7, wherein the first valve member comprises one or more slits therein aligned with the opening of the extension tube.

9. The catheter assembly according to any preceding claim, wherein the first valve member comprises a resilient valve body.

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10. The catheter assembly according to claim 9, wherein the valve body is a tubular body.

11. The catheter assembly according to claim 10, wherein the tubular body is disposed within the internal chamber of the catheter hub in contact with the inner surface of the wall of the catheter hub.

12. The catheter assembly according to any preceding claim, wherein the second valve member comprises a resilient valve disc extending laterally across the internal chamber of the catheter hub.

13. The catheter assembly according to claim 12, wherein the disc is provided with one or more slits therein.

14. The catheter assembly according to any preceding claim, wherein the second valve member forms a seal around the shaft of the needle in the ready position.

15. The catheter assembly according to claim 14, wherein the seal allows gas to vent through the second valve member but prevents blood from passing through the second valve member.

16. The catheter assembly according to any preceding claim, further comprising a valve opener disposed within the chamber in the catheter hub proximally of the valve assembly.

17. The catheter assembly according to claim 16, wherein the valve opener has a passage therethrough or therearound for the passage of fluid.

18. The catheter assembly according to any preceding claim, further comprising a needle guard assembly.

19. The catheter assembly according to claim 18, wherein the needle guard assembly is disposed wholly or partly within the internal chamber of the catheter hub.

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20. The catheter assembly according to claim 19, wherein the needle guard assembly is releasably engaged with the catheter hub, such that the needle has a protected position in which the needle tip is blocked by the needle guard assembly as the needle guard assembly is released from the catheter hub.

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21. The catheter assembly according to claim 18, wherein the needle guard assembly is disposed outside the catheter hub.

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22. The catheter assembly according to any of claims 18 to 21, wherein the needle guard assembly is releasably engaged with the catheter hub in the ready position.

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23. The catheter assembly according to claim 22, in which movement of the needle to a protected position releases the needle guard assembly from engagement with the catheter hub.

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24. The catheter assembly according to any of claims 18 to 23, wherein the needle guard assembly comprises a needle guard housing.

25. The catheter assembly according to any of claims 18 to 24, further comprising means for limiting movement of the needle in the proximal direction relative to the needle guard assembly.

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26. The catheter assembly according to claim 25, wherein the limiting means comprises a bulge in the distal end portion of the needle shaft.

27. The catheter assembly according to claim 26, wherein the bulge is non-circular.

5 28. The catheter assembly according to either of claims 26 or 27, wherein the needle guard assembly comprises a proximal wall having an opening therein, the needle shaft extending through the opening in the proximal wall, the bulge having a radial dimension that is greater than that of the opening in the proximal wall.

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29. The catheter assembly according to any of claims 26 to 28, wherein the bulge lies within the catheter in the ready position.

15 30. The catheter assembly according to any of claims 18 to 29, wherein the needle guard comprises at least one arm moveable from the ready position into a blocking position, in which the sharpened needle tip is blocked.

31. The catheter assembly according to claim 30, wherein the at least one arm comprises a distal end portion for blocking the sharpened needle tip.

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32. The catheter assembly according to claim 30, wherein the needle guard comprises a first arm and a second arm.

25 33. The catheter assembly according to claim 32, wherein both the first and the second arms comprises a distal end portion.

34. The catheter assembly according to either of claims 32 or 33, wherein the first arm and the second arm intersect.

30 35. The catheter assembly according to any of claims 32 to 34, wherein the first and second arms are of different lengths.

36. The catheter assembly according to claim 35, wherein the longer of the first and second arms is provided with an endmost portion curved inward at the free edge.

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37. The catheter assembly according to any of claims 30 to 36, wherein needle guard assembly comprises a proximal wall.

38. The catheter assembly according to claim 37, wherein the or each arm extends distally from the proximal wall.

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39. A needle guard assembly for a catheter assembly, the needle guard assembly comprising:

15 a housing for receiving a needle extending therethrough and having a distal end and a proximal end, the housing being connectable at its distal end to the proximal end of a catheter hub;

a needle guard disposed within the housing, the needle guard comprising:

20 a needle trap moveable between a ready position, in which the needle trap is held to one side of the shaft of the needle extending through the housing; and a protected position, in which the needle trap blocks the sharpened needle tip of the needle within the housing;

25 a resilient arm biasing the needle trap into the protected position, the resilient arm bearing against the inner wall of the housing to urge the needle trap into the protected position;

a coupling arm, in the ready position the coupling arm coupling the housing to the proximal end of the catheter hub, movement of the needle trap from the ready position to the protected position causing the coupling arm to release the housing from the catheter hub.

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40. The needle guard assembly according to claim 39, wherein the needle guard housing has a portion for extending into the proximal end of a catheter hub in the ready position.

5 41. The needle guard assembly according to either of claims 39 or 40, wherein the needle trap is pivotally attached at a first end to the resilient arm.

10 42. The needle guard assembly according to any of claims 39 to 41, wherein the needle trap and the resilient arm are folded together to one side of the needle shaft in the ready position.

15 43. The needle guard assembly according to any of claims 39 to 42, wherein the needle trap comprises one or more lateral members extending in a proximal direction from each side of the needle trap.

44. The needle guard assembly according to any of claims 39 to 43, wherein the needle trap comprises a retaining member preventing movement of the needle trap from the protected position to the ready position.

20 45. The needle guard assembly according to any of claims 39 to 44, wherein the coupling arm engages with an exterior portion of the proximal end of the catheter hub.

25 46. The needle guard assembly according to any of claims 39 to 45, wherein the coupling arm is connected to a second end of the needle trap.

47. The needle guard assembly according to any of claims 39 to 46, wherein the coupling arm comprises an opening therein, the needle extending through the opening in the ready position.

48. The needle guard assembly according to any of claims 39 to 47,
wherein the needle guard housing comprises a proximal wall having an
opening therein, the needle shaft extending through the opening in the
proximal wall, the opening for engaging with a bulge in the needle shaft
5 having a radial dimension that is greater than that of the opening in the
proximal wall.

49. The needle guard assembly according to claim 48, wherein the region
of the proximal wall adjacent the opening is reinforced.

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50. The catheter assembly according to claim 1, further comprising a
needle guard assembly according to any of claims 39 to 49.

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CLAIMS

1. A catheter assembly comprising:

a catheter hub having a chamber therein, the catheter hub having a distal end and a proximal end, the catheter hub being connectable at its proximal end to a device for the infusion or withdrawal of fluids to or from the chamber within the catheter hub;

a hollow tubular catheter having a proximal end and a distal end, the catheter being connected at its proximal end to the distal end of the catheter hub, the interior of the catheter opening into the chamber within the catheter hub;

a needle having a sharpened needle tip, in a ready position the needle extending through the chamber in the catheter hub and the catheter with the needle tip extending beyond the distal end of the catheter;

a hollow extension tube having a distal end and a proximal end, the extension tube being connected at its distal end to the catheter hub between the proximal and distal ends thereof, the extension tube opening at its distal end into the chamber within the catheter hub, the extension tube connectable at its proximal end to a device for infusing fluid into the chamber within the catheter hub;

a valve assembly disposed within the chamber of the catheter hub, the valve assembly comprising:

a first valve member closing the distal end of the extension tube and openable under the action of a pressurised fluid within the extension tube; and

a second valve member preventing the flow of fluid through the chamber to or from the proximal end of the catheter hub, the second valve member being a two-way valve and openable to permit the flow of fluid through the chamber in the catheter hub in both a proximal and a distal direction.

2. The catheter assembly according to claim 1, wherein the catheter hub is formed as a single piece.

3. The catheter assembly according to claim 1, wherein the catheter hub is formed from a plurality of pieces.
4. The catheter assembly according to any preceding claim, wherein the catheter hub comprises a distal hub portion and a proximal hub portion.
5. The catheter assembly according to claim 4, wherein the distal hub portion is generally flattened.
6. The catheter assembly according to claim 5, wherein the portion of the chamber within the distal hub portion is elliptical in cross-section.
7. The catheter assembly according to either of claims 5 or 6, wherein the distal hub portion comprises a wing member extending laterally from each opposing side of the distal hub portion.
8. The catheter assembly according to any of claims 4 to 7, wherein the extension tube opens into the distal hub portion of the catheter hub.
9. The catheter assembly according to any preceding claim, wherein the needle comprises an opening in the shaft of the needle in the distal end portion of the needle.
10. The catheter assembly according to claim 9, wherein the opening is a slot.
11. The catheter assembly according to either of claims 9 or 10, wherein the opening is disposed within the catheter in the ready position.
12. The catheter assembly according to any preceding claim, wherein the extension tube is provided with a connection hub at its proximal end.

13. The catheter assembly according to any preceding claim, wherein the first valve member is a one-way valve between the extension tube and the internal chamber of the catheter hub.

14. The catheter assembly according to any of claims 1 to 12, wherein the first valve member is a two-way valve between the extension tube and the internal chamber of the catheter hub.

15. The catheter assembly according to claim 14, wherein the first valve member comprises one or more slits therein aligned with the opening of the extension tube.

16. The catheter assembly according to any preceding claim, wherein the first valve member comprises a resilient valve body.

17. The catheter assembly according to claim 16, wherein the valve body is a tubular body.

18. The catheter assembly according to claim 17, wherein the tubular body is disposed within the internal chamber of the catheter hub in contact with the inner surface of the wall of the catheter hub.

19. The catheter assembly according to either of claims 17 or 18, wherein the valve body is circular or elliptical in cross-section.

20. The catheter assembly according to any preceding claim, wherein the second valve member comprises a resilient valve disc extending laterally across the internal chamber of the catheter hub.

21. The catheter assembly according to claim 20, wherein the disc is provided with one or more slits therein.

22. The catheter assembly according to any preceding claim, wherein the valve assembly is retained within the internal chamber of the catheter hub by friction between the valve members and the inner surface of the catheter hub.

23. The catheter assembly according to any preceding claim, wherein the valve assembly engages with one or more recesses or protrusions in the inner surface of the catheter hub.

24. The catheter assembly according to any preceding claim, wherein the second valve member forms a seal around the shaft of the needle in the ready position.

25. The catheter assembly according to claim 24, wherein the seal allows gas to vent through the second valve member but prevents blood from passing through the second valve member.

26. The catheter assembly according to any preceding claim, further comprising a valve opener disposed within the chamber in the catheter hub proximally of the valve assembly.

27. The catheter assembly according to claim 26, wherein the valve opener has a passage therethrough or therearound for the passage of fluid.

28. The catheter assembly according to either of claims 26 or 27, wherein the valve opener comprises a stem and a head portion disposed at the distal end of the stem.

29. The catheter assembly according to claim 28, wherein the stem comprises a tube, the needle extending through the tube in the ready position.

30. The catheter assembly according to claim 28, wherein the stem comprises one or more legs extending proximally from the head portion.

31. The catheter assembly according to any of claims 28 to 30, wherein the head portion has a domed or frusto-conical region for contacting the second valve member.

32. The catheter assembly according to any preceding claim, further comprising a needle guard assembly.

33. The catheter assembly according to claim 32, wherein the needle guard assembly is disposed wholly or partly within the internal chamber of the catheter hub.

34. The catheter assembly according to claim 33, wherein the needle guard assembly is releasably engaged with the catheter hub, such that the needle has a protected position in which the needle tip is blocked by the needle guard assembly as the needle guard assembly is released from the catheter hub.

35. The catheter assembly according to claim 32, wherein the needle guard assembly is disposed outside the catheter hub.

36. The catheter assembly according to claim 35, wherein the needle guard assembly is disposed proximal of the catheter hub.

37. The catheter assembly according to any of claims 32 to 36, wherein the needle guard assembly is releasably engaged with the catheter hub in the ready position.

38. The catheter assembly according to claim 37, in which movement of the needle to a protected position releases the needle guard assembly from engagement with the catheter hub.

39. The catheter assembly according to any of claims 32 to 38, wherein the needle guard assembly comprises a needle guard housing.

40. The catheter assembly according to claim 39, wherein the needle guard housing has a portion extending into the proximal end of the catheter hub in the ready position.

41. The catheter assembly according to any of claims 32 to 40, wherein the needle guard assembly comprises a needle guard.

42. The catheter assembly according to claim 41, wherein the needle guard comprises a needle trap moveable between a ready position, in which the needle trap is held to one side of the needle shaft, and a protected position, in which the needle trap extends across the needle tip.

43. The catheter assembly according to claim 42, wherein the needle guard further comprises a resilient arm biasing the needle trap into the protected position.

44. The catheter assembly according to claim 43, wherein the needle trap is pivotally attached at a first end to the resilient arm.

45. The catheter assembly according to claim 44, wherein the needle trap and the resilient arm are folded together to one side of the needle shaft in the ready position.

46. The catheter assembly according to any of claims 42 to 45, wherein the needle trap comprises one or more lateral members extending in a proximal direction from each side of the needle trap.

47. The catheter assembly according to any of claims 42 to 46, wherein the needle trap comprises a retaining member preventing movement of the needle trap from the protected position to the ready position.

48. The catheter assembly according to any of claims 42 to 47, wherein the needle guard comprises a coupling arm moveable by the needle trap.

49. The catheter assembly according to claim 48, wherein the coupling arm engages with the catheter hub in the ready position.

50. The catheter assembly according to claim 49, wherein the coupling arm engages with the outside of the catheter hub in the ready position.

51. The catheter assembly according to any of claims 48 to 50, wherein the coupling arm is connected to a second end of the needle trap.

52. The catheter assembly according to claim 51, wherein the arm is pivotally connected to the needle trap.

53. The catheter assembly according to any of claims 48 to 52, wherein the coupling arm comprises an opening therein, the needle extending through the opening in the ready position.

54. The catheter assembly according to any of claims 32 to 53, further comprising means for limiting movement of the needle in the proximal direction relative to the needle guard assembly.

55. The catheter assembly according to claim 54, wherein the limiting means comprises a bulge in the distal end portion of the needle shaft.

56. The catheter assembly according to claim 55, wherein the bulge is non-circular.

57. The catheter assembly according to either of claims 55 or 56, wherein the needle guard assembly comprises a proximal wall having an opening therein, the needle shaft extending through the opening in the proximal wall, the bulge having a radial dimension that is greater than that of the opening in the proximal wall.

58. The catheter assembly according to claim 57, wherein the region of the proximal wall adjacent the opening is reinforced.

59. The catheter assembly according to any of claims 55 to 58, wherein the bulge lies within the catheter in the ready position.