CLAIMS:

1. An intravenous catheter apparatus comprising:

a catheter hub (12) arranged at a proximal end of a catheter tube (10), the catheter hub (12) having an inner surface (14) defining a chamber (16);

a needle (20) defining an axial direction and having a needle tip (24), the needle (20) extending through the chamber (16) and the catheter tube (10) when in a ready position;

a needle guard (32) slidably arranged on the needle (20) and at least partially received in the chamber (16) when the needle (20) is in the ready position, the needle guard (32) including a base portion (34) and first and second arms (36, 38) extending from the base portion (34), wherein the first arm (36) is deflected radially outwards by the needle (20) against a restoring force when the needle (20) is in the ready position whereby the needle guard (32) is brought into retaining contact with the catheter hub (12); and

wherein the catheter apparatus includes a valve which separates a distal space arranged in distal direction from the valve from a proximal space arranged on proximal direction from the valve,

characterized that the valve opens based on a pressure differential between the pressure prevailing in the distal space and the pressure prevailing in the proximal space.

2. The intravenous catheter apparatus of claim 1, wherein the valve comprises: a housing having an first opening and a second opening; and an elastomeric member positioned in the housing, the elastomeric member comprising a continuous peripheral wall projecting from a surface; and a slit extending through the surface, a continuous portion of the peripheral wall creating a continuous sealable contact with the housing and partitioning the housing into an upper section and a lower section, the elastomeric member configured such that upon creating a pressure differential between the upper section and the lower section of the housing causes either:

(i) the peripheral wall to deflect from the housing permitting fluid flow around the elastomeric member; or

(ii) the slit to open permitting fluid flow through the elastomeric member.

3. The intravenous catheter apparatus of claim 2, wherein, further comprising a support

member positioned in the housing and surrounded by the peripheral wall, the support configured to provide fluid communication between the first opening and the second opening.

4. The intravenous catheter apparatus of claim 2 or 3, wherein the support member is received by or integral with the housing.

5. The intravenous catheter apparatus of any one of claims 2 to 4, wherein the support member comprises a plurality of spaced apart columns arranged about the second opening, the distal ends of the plurality of columns surrounded by the peripheral wall.

6. The intravenous catheter apparatus of any one of claims 2 to 5, wherein the support member comprises an annular wall arranged around the second opening, the annular wall having at least one fluid flow passage providing fluid communication between the lower section and the second opening.

7. The intravenous catheter apparatus of any one of claims 2 to 7, wherein the second opening comprises a conduit that extends into the housing and is surrounded the peripheral wall.

8. The intravenous catheter apparatus of claim 7, wherein a portion of the conduit extending into the housing is of a larger internal diameter than the conduit extending external to the housing.

9. The intravenous catheter apparatus of any one of claims 2 to 8, wherein a portion of housing is tapered and a distal portion of the peripheral wall tapers in sealable contact therewith.

10. The intravenous catheter apparatus of any one of claims 2 to 9, wherein the upper portion of the housing comprises an interior wall, the interior wall comprising at least one recessed channel therein and extending substantially along the longitudinal axis of the housing, wherein deflection of the peripheral wall from the housing substantially corresponds to the placement of the at least one recessed channel.

11. The intravenous catheter apparatus of any one of claims 2 to 10, wherein the surface

comprises a top surface and a bottom surface separated from the top surface by a first thickness; and the peripheral wall has a second thickness, and the peripheral wall projects from the bottom surface, wherein optionally the second thickness is less than the first thickness.

12. The intravenous catheter apparatus of any one of claims 2 to 11, wherein the elastomeric member further comprises a continuous lateral protrusion along the peripheral edge of the surface, and the housing is configured with a corresponding recess to receive the continuous lateral protrusion and to provide a radial stress to the surface of the elastomeric member.

13. The intravenous catheter apparatus of any one of claims 2 to 12, wherein the elastomeric member further comprises one or more vertical protrusions on the top surface, the housing being configured to provide a normal stress to the one or more vertical protrusions.

14. The intravenous catheter apparatus of any one of claims 2 to 13, wherein the elastomeric member is concave, convex, or concave and convex on opposing sides of the thickness.

15. The intravenous catheter apparatus of any one of claims 2 to 14, wherein the top surface of the elastomeric member has one or more fluid channels terminating at the peripheral edge.

16. The intravenous catheter apparatus of any one of claims 2 to 15, wherein the elastomeric member is annular, oval, cylindrical, hemispherical, cup-shaped or conical frustum-shaped.

17. The intravenous catheter apparatus of any one of claims 2 to 16, wherein the slit opens at a threshold pressure greater than a threshold pressure required to deflect the peripheral wall from the housing.

18. The intravenous catheter apparatus of any one of claims 2 to 17, wherein the slit, in combination with the first opening and the second opening, is configured to receive the needle through the housing.

19. The intravenous catheter apparatus of any one of claims 2 to 18, wherein the support is configured to receive and/or guide the needle through the housing.

20. The intravenous catheter apparatus of any one of claims 2 to 19, wherein the support in combination with the slit is configured to receive and/or guide the needle through the housing.

21. The intravenous catheter apparatus of any one of claims 2 to 20,
wherein the housing of the valve is formed as a separate component or wherein the housing is part of the catheter hub.

22. The intravenous catheter apparatus of any one of the preceding claims, wherein the catheter hub is formed by at least two components, comprising a distal catheter hub portion holding the catheter tube, and a proximal catheter hub portion, wherein the at least two components are mounted to one another.

23. The intravenous catheter apparatus of claim 22, wherein one of the distal catheter hub portion and the proximal catheter hub portion includes a female connecting section and wherein the other of the distal catheter hub portion and the proximal catheter hub portion includes a male connecting section fitting into the female connecting section.

24. The intravenous catheter apparatus of claim 23, wherein the male connecting section and/or the female connecting section are formed with a thread or a snap-fit arrangement fitting into one another.

25. The intravenous catheter apparatus of any of claims 22 to 24, wherein the proximal catheter hub portion includes a first proximal catheter hub wall forming said chamber.

26. The intravenous catheter apparatus of any of claim 22 or 25 and one of claims 2 to 21, wherein the elastomeric member is arranged in an internal space formed by the distal catheter hub portion or by the proximal catheter hub portion or by the distal and the proximal catheter hub portion.

27. The intravenous catheter apparatus of claim 26, wherein the support member is formed as a separate element or integrally formed either with the distal catheter hub portion or the proximal catheter hub portion.

28. The intravenous catheter apparatus of any one of the preceding claims, wherein the second arm (38) can be deflected radially inwards when the needle tip (24) is received between the arms (36, 38).

29. The intravenous catheter apparatus of any one of the preceding claims, wherein the first and second arms (36, 38) are made of a resilient material.

30. The intravenous catheter apparatus of any one of the preceding claims, wherein the first and second arms (36, 38) are made of a plastic material.

31. The intravenous catheter apparatus of any one of the preceding claims, wherein the first and second arms (36, 38) are integrally formed with the base portion (34).

32. The intravenous catheter apparatus of any one of the preceding claims, wherein the restoring force is created by at least one of an elastic property of the first arm (36) and an additional tension element at least partly surrounding the arms (36, 38).

33. The intravenous catheter apparatus of any one of the preceding claims, wherein the first arm (36) is longer than the second arm (38).

34. The intravenous catheter apparatus of any one of the preceding claims, wherein the first arm (36) has a distal end section (50) having an undercut (51) for catching the needle tip (24).

35. The intravenous catheter apparatus according to claim 30, wherein the distal end section (50) is angled towards the second arm (38) and overlaps the second arm (38).

36. The intravenous catheter apparatus of any one of the preceding claims, further comprising retaining means for retaining the needle guard (32) in the chamber (16) as long as the first arm (36) is in its deflected state, the retaining means including a first disc-like retaining protrusion (58) provided on the first arm (36) and a retaining depression (18) formed in the inner surface (14) and adapted to receive the retaining protrusion (58).

37. The intravenous catheter apparatus of claim 36,
wherein the retaining protrusion (58) has generally parallel proximal and distal faces (60, 62) and/or a convex, in particular part-cylindrical, peripheral surface (64).

38. The intravenous catheter apparatus of any one of claims 36 or 37,
wherein a second disk-like retaining protrusion (66) is arranged on the second arm (38) and adapted to engage with the retaining depression (18).

39. The intravenous catheter apparatus of any one of claims 36 to 38, wherein the needle guard (32) comprises a tension element at least partly surrounding the arms (36, 38) in a region proximal of the first retaining protrusion (58) or applying a linear biasing force biasing the arms (36, 38) together.

40. The intravenous catheter according to one of the preceding claims, wherein the needle includes an opening closed the needle tip, wherein the distance between the needle tip and the opening is arranged such that the opening is covered by the catheter hub when the needle is in the ready position.

41. The intravenous catheter according to claim 40, wherein the opening is formed by a longitudinal slit extending with its longitudinal direction in parallel with or transverse to a longitudinal axis of the needle.

42. The intravenous catheter according to one of the preceding claims, wherein the needle includes a needle feature close to its needle tip changing the cross-sectional shape of the needle.

43. The intravenous catheter according to claim 42, wherein the needle guard includes an opening with a predetermined diameter interacting with the needle feature such that it prevents the retraction of the needle out of the needle guard when the needle is in the retracted position.

44. The intravenous catheter according to claim 43, wherein the opening of the needle guard interacting with the needle feature is integrally formed in the needle guard or formed by an a metal or plastic washer.

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