CLAIMS

What is claimed is:

1. A needle assembly comprising:

a needle hub having a distal end;

a needle attached to the distal end of the needle hub;

a catheter hub having a wall structure defining an interior cavity;

a catheter tube extending distally of the catheter hub, the needle projecting through the catheter tube;

a valve located in the interior cavity of the catheter hub, said valve comprising a cylindrical walled structure and a disc formed with the cylindrical walled structure, said cylindrical walled structure comprising an exterior wall surface and an interior wall surface defining an interior space, said disc comprising a plurality of slits formed through a thickness of the disc and defining a plurality of flaps, said cylindrical walled structure defining an open proximal end;

a plurality of flexible ribs connected to the interior wall surface of the cylindrical walled structure and to the disc; and

an actuator disposed inside the interior cavity of the catheter hub and having a distal end sized and shaped to deflect the plurality of flaps of the disc radially and axially when the actuator is pushed by a male tip inserted into the interior cavity of the catheter hub.

2. The needle assembly of claim 1, wherein the plurality of flexible ribs each has a first configuration in which the flexible rib has a generally linear shape and a second configuration where the flexible rib is compressed and has a curved or undulating shape.

3. The needle assembly of claim 1, further comprising a plurality of raised sections connected to at least two of the plurality of flaps, said plurality of raised sections extending radially from the interior wall surface of the cylindrical walled structure towards a center of the disc.

4. The needle assembly of claim 1, wherein the actuator comprises at least two fins or at least two plunger sections.

5. The needle assembly of claim 2, wherein the plurality of flexible ribs are connected to a plurality of raised sections.

6. The needle assembly of claim 1, wherein the valve is secured between two catheter hub elements.

7. The needle assembly of claim 1, wherein the valve moves from a first position where the valve is open and the actuator is at least partially in an opening defined by the slits to a second position wherein the valve is closed, without application of any external force.

8. The needle assembly of claim 1, further comprising a plurality of raised sections connected to at least two of the plurality of flaps and to at least two of the plurality of flexible ribs.

9. The needle assembly of claim 1, further comprising a needle guard for covering a needle tip of the needle located proximally of the valve.

10. A method for manufacturing a needle assembly comprising:

forming a needle hub with a needle having a needle tip;

forming a catheter hub having a wall structure defining an interior cavity and a catheter tube extending distally of the catheter hub, and locating the needle within the catheter tube;

placing a valve in the interior cavity of the catheter hub, said valve comprising a cylindrical walled structure and a disc formed with the cylindrical walled structure, said cylindrical walled structure comprising an exterior wall surface and an interior wall surface defining an interior space, said disc comprising a plurality of slits formed through a thickness of the disc and defining a plurality of flaps, said cylindrical walled structure defining an open end located opposite the disc and said disc comprising a distal wall surface and a proximal wall surface;

forming a plurality of flexible ribs connected to the interior wall surface of the cylindrical walled structure and to the disc; and

positioning an actuator inside the interior cavity of the catheter hub, said actuator comprising a distal end sized and shaped to project through the plurality of slits of the disc.

11. The method of claim 10, wherein the plurality of flexible ribs each has a first configuration in which the flexible rib has a generally linear shape and a second configuration where the flexible rib is compressed and has a curved or undulating shape.

12. The method of claim 11, wherein the plurality of flexible ribs are connected to a plurality of raised sections.

13. The method of claim 12, wherein the plurality of slits and the plurality of flexible ribs are evenly spaced around a circumference of the disc.

14. The method of claim 13, further comprising at least one raised section on the distal wall surface of the disc.

15. The method of claim 13, further comprising a needle guard positioned proximally of the valve.

16. A needle assembly comprising:

a catheter hub having a wall structure defining an interior cavity;

a catheter tube extending distally of the catheter hub;

a needle hub having a distal end;

a needle attached to the distal end of the needle hub, said needle projecting through the catheter tube;

a valve located in the interior cavity of the catheter hub, said valve comprising a cylindrical walled structure and a disc formed with the cylindrical walled structure, said cylindrical walled structure comprising an exterior wall surface, an interior wall surface defining an interior space, and an open end located opposite the disc, said disc comprising a plurality of slits formed through a thickness of the disc and defining a plurality of flaps;

a plurality of flexible ribs connected to the interior wall surface of the cylindrical walled structure;

a plurality of raised sections extending outwardly from a wall surface of the disc having at least one of the slits located between two raised sections or cutting through one of the raised sections; and

an actuator disposed inside the interior cavity of the catheter hub and having a distal end sized and shaped to deflect the flaps of the disc when the actuator is pushed by a male tip inserted into the interior cavity of the catheter hub.

17. The needle assembly of claim 16, wherein the wall surface of the disc has a proximally facing wall surface and a distally facing wall surface and wherein the plurality of raised sections are formed on the proximally facing wall surface of the disc.

18. The needle assembly of claim 16, wherein the wall surface of the disc has a proximally facing wall surface and a distally facing wall surface and wherein the plurality of raised sections are formed on the distally facing wall surface of the disc and spaced from the plurality of flexible ribs.

19. The needle assembly of claim 16, wherein the plurality of flexible ribs are connected to the plurality of raised sections.

20. The needle assembly of claim 16, wherein the actuator comprises at least two fins or at least two plunger sections.

21. The needle assembly of claim 16, wherein the distal end of the actuator is located in the open end of the cylindrical walled structure to deflect the plurality of flaps.

22. The needle assembly of claim 16, wherein the distal end of the actuator contacts the disc on a side of the valve away from the cylindrical walled structure.

23. The needle assembly of claim 17, wherein the plurality of slits and the plurality of flexible ribs are evenly spaced around a circumference of the valve.

24. The needle assembly of claim 16, further comprising a needle guard for covering a needle tip of the needle located proximally of the valve.