

and the pair 38 of locking fingers 39 of the preferred adapter 19 extend from the housing 14 somewhere between the luer thread 42 and the inlet 12.

In FIGS. 3 and 4 the details and features of the locking fingers 39 and in FIGS. 5 and 6 the living hinge 25 which terminates in an enlarged knob 43 are shown. The living hinge 25 extends, in the preferred embodiment, in the direction exactly opposite the protrusion 24 permitting the handling of the cap 11 during removal from the inlet 12 as explained. In particular in FIG. 4 there is an enlarged partial top plan view of the locking fingers 39 of the present invention as the pair 38 would appear if viewed along lines 4—4 of FIG. 3. The details of the locking fingers 39 that are useful for centering the knob 43 received therebetween are best illustrated in FIG. 4. The locking fingers 39 are shaped for receiving and securing therebetween the knob 43 in the groove 40 by sliding mating engagement. More particularly but not by way of limitation the knob 43 is an easy press fit into the groove 40 but as will be explained in greater detail in connection with the features on the knob 43 and the locking fingers 39 which cooperate to make removal rather difficult.

FIG. 5 is a top plan view illustrating the cap 11 removed from the housing 14. FIG. 6 is an enlarged cross sectional view as it would appear if examined along lines 6—6 of FIG. 5. The preferred knob 43 shown in FIGS. 5 and 6 has a camming nose 44 with opposed tapers 45 which cooperate with a ramp 46 on each of the pair 38 of locking fingers 39 to spread the fingers 39 apart in a direction generally normal to that of arrow B as the knob 43 is inserted therebetween and to ease the seating of the knob 43 in the groove 40. The knob 43 might include a distal end 47 with a furrow 48 located transverse thereto and the groove 40 has preferably a peak 49 transversely centered therein so that the central position of the knob 43 in the groove 40 is maintained upon engagement. The knob 43 is as mentioned enlarged and most preferably is transversely thicker than its living hinge 25. The knob 43 extends normal to the living hinge 25 with shoulder 50 thereabout and therebetween as a transition between the thinner and more flexible living hinge 25 and the enlarged and less flexible knob 43.

In FIG. 3 each ramp 46 has one of a pair 38 of mirror image opposed central recesses 51 positioned for cooperating as the camming nose 44 is forced and slid therebetween and thereacross so that the conjugating motion of the knob 43 and the pair 38 of locking fingers 39 spreads the locking fingers 39 apart until the peak 49 and furrow 48 are fully together. It should now be understood that the peak 49 and furrow 48 center and hold the knob 43 and groove 40 while the central recesses 51 are as will be fully explained shaped and positioned to engage and hold centered the living hinge 25 most adjacent the shoulder 50 of the knob 43. On each locking finger 39 a land 52 is positioned and forms a plane generally normal to the inward taper of the ramp 46 of each and/or the direction of arrow B. The lands 52 are located above the groove 40 for engagement with the shoulder 50 on the knob 43 such that the locking engagement of the knob 43 in the groove 40 will place the lands 52 abutted against the shoulder 50 forming a one way snap connection which can not be pulled in the direction of arrow B without first prying the locking fingers 39 apart. The complete engagement also secures the knob 43 and hinge 25 from transverse, side to side or off center movement because the locking fingers 39

come together after assembly placing the central recesses 51 about and around the living hinge 25.

The preferred invention also includes a method of assembly for the adapter 19 and the inlet 12 cap 11 by holding the living hinge 25 attached to the housing 14 in position relative to the inlet 12 for allowing the cap 11 to be easily placed on or removed from the inlet 12. An additional step in making the adapter and cap assembly 10 includes locating on the knob 43 the camming nose 44 with opposed tapers 45 which nose 44 cooperates with ramp 46 on each of the pair 38 of locking fingers 39. The preferred method of assembly may also have the step of spreading the fingers apart by inserting the camming nose 44 between the ramps 46 to move the locking fingers 39 during the process of seating the knob 43 in the groove 40 as the knob 43 is pressed toward the housing 14 in the direction of arrow B which is generally normal to the axis.

The penultimate step of the preferred method of assembly of the adapter and cap 11 requires conjugating the shoulder 50 formed at the transversely thicker portion of the knob 43 where it joins the living hinge 25 with lands 52 on each locking finger. As explained each land 52 is positioned generally normal to the inward taper of the ramp 46 of each locking figure and is located above the groove 40. To exactly position the knob 43 in the groove 40 a final step of centering the knob 43 in the groove 40 with the engagement of the furrow 48 located transversely across a distal end 47 of the knob 43 and with the peak 49 centered in and transversely across the groove 40. The knob 43 can also be assembled into the groove 40 by sliding the knob 43 sideways or transversely into the groove 40 so that it is centered therein with peak 49 and furrow 48 engaged.

Those skilled in the art will appreciate that the dimensions, application and details of the construction may be altered or reversed. For example the locking fingers 39 can be on the cap 11 and the knob 43 on the housing 14 without significantly changing the invention of the adapter and cap assembly 10. Similarly, changes in the materials described, the method of assembly and particular configuration of the adapter and cap assembly 10 disclosed may be made without departing from the scope of the invention covered by the claims which follow.

What is claimed is:

1. An adapter and cap assembly comprising:

- a housing with an input and an output, the housing having a passage aligned along an axis thereof and passing through the housing from the input to the output, the housing having an inlet extending from the housing in a first direction and located generally normal to the axis and between the input and output, the inlet having an intersection with the housing for permitting fluid communication with the passage;
- a cap having a side wall with an inner surface configured to conjugate with and closed the inlet when placed thereover, the cap including a living hinge extending from the side wall and terminating in a knob;
- a pair of opposed generally parallel locking fingers extending from the housing to provide a groove therebetween, the locking fingers shaped for receiving and securing therebetween in the groove the knob and thereby hold the living hinge for allowing the cap to be placed on or removed from the inlet;