

ADAPTER CAP ATTACHMENT

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to an adapter and cap assembly and a method for assembling a cap to an adapter for an infusion device or the like, and more specifically, to a method of attachment and the structures for an attachment between the cap for an inlet on an adapter housing and the housing.

2. Background Description

U.S. Pat. No. 3,416,567 has an adapter of the type described herein except the cap and its living hinge assembly appear to be a part of the body of the adapter. That is to say that they appear to be molded as a single part and of the same polymer as the body of the adapter. There is no specific showing or description of the specific attachment between the living hinge of the cap and the adapter body. The body also includes a sleeve therein to close off the inlet passage so that flow into the main passage of the adapter is restricted such that outflow cannot occur.

U.S. Pat. No. 3,802,433 is an adapter wherein a catheter of thermoplastic material is mounted inside the adapter and held therein by a sleeve shaped insert. This particular patent is specifically directed to the connection between the catheter and the adapter in order to secure them together and maintain a fluid tight connection. The adapter has a cap shown in FIG. 1 attached to the socket but no specific teaching appears in the patent describing the attachment.

U.S. Pat. No. 4,063,555 shows another adapter for a catheter wherein an inlet includes a check valve in order to assure that flow into the adapter cannot be reversed. No specific cap or construction of a cap are disclosed in this patent.

U.S. Pat. No. 4,231,367 shows still another adapter wherein the cap assembly is held to the body by means of a living hinge and what would appear to be a flexible ring which surrounds the body of the inlet. There is no specific description of how this is applied and the understanding of it is primarily by means of examining FIG. 1 therein.

U.S. Design Pat. No. 256,617 shows another approach to retaining the cap wherein the living hinge and cap assembly appear to have been molded as part of the adapter body. There is no specific teaching of any other form of attachment. The need to provide a securely assembled cap and adapter which allows the cap to be of a relatively flexible material and the adapter of a material less flexible than the cap is missing in the prior references.

SUMMARY OF THE INVENTION

In the preferred form of the invention an adapter and cap assembly include a housing with a input and an output. The housing has a passage aligned along an axis thereof which passage passes from the input to the output. A generally cylindrical inlet extends from the housing in a first direction normal to the axis and the inlet intersects with the housing permitting fluid communication between the inlet and the axial passage. A mouth in the inlet is shaped for connecting in fluid tight manner with an infusion device and the mouth has lips extending radially therefrom.

Another part of the preferred assembly is a cap having a generally cylindrical side wall with an inner sur-

face configured to conjugate with and close the inlet when placed thereover and to open the mouth when the cap is removed therefrom. An undercut in the inner side wall of the cap conjugates and releasably locks to the lips. A protrusion extends from the side wall one way and a living hinge terminating in a knob extends the other way. The protrusion may be used to remove the cap from the inlet when the undercut thereon is engaged with the lips.

A pair of opposed locking fingers most preferably extends from the housing and defines a groove therebetween. The locking fingers are shaped for receiving and securing therebetween the knob in the groove as the knob may have a camming nose with opposed tapers which cooperate with a ramp on each of the pair of locking fingers to spread the fingers as the knob is inserted therebetween and to ease the seating of the knob in the groove. The knob might include a distal end with a furrow located transverse thereto and the groove has preferably a peak transversely centered therein so that the central position of the knob in the groove is maintained upon engagement. The knob is most preferably transversely thicker than the living hinge and the knob extends normal thereto with a shoulder thereabout. Each ramp has an opposed central recess for cooperating as the camming nose is forced thereover and between so that the conjugating motion of the knob and the pair of locking fingers spreads the locking fingers apart until the peak and furrow are fully together. On each locking finger a land may be positioned normal to the inward taper of the ramp of each and is located above the groove for engagement with the shoulder on the knob.

The preferred invention may also be a method of assembly for an adapter and an inlet cap with the step of holding the living hinge on the housing in position relative to the inlet for allowing the cap to be placed on or removed from the inlet. An additional step in the assembly of locating on the knob a camming nose with opposed tapers which nose cooperates with a ramp on each of the pair of locking fingers may be included. The preferred method of assembly may also have the step of spreading the fingers by inserting the camming nose between the ramps to move the locking fingers apart when seating the knob in the groove as the knob is pressed toward the housing in the direction normal to the axis. To exactly position the knob in the groove the final step of centering the knob in the groove with a furrow located transversely across a distal end of the knob and with a peak centered in and transversely across the groove will follow conjugating a shoulder formed at the transversely thicker portion of the knob where it joins the living hinge with a land on each locking finger, each land is positioned normal to the inward taper of the ramp of each and located above the groove.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the preferred embodiment of an adapter and cap assembly showing the cap placed over the inlet to close the mouth thereof.

FIG. 2 is a side sectional view of the preferred embodiment of an adapter and cap assembly of FIG. 1 with the addition of the needle guard and the needle hub as well as the proximal fittings for the adapter and hub.

FIG. 3 is an enlarged cross sectional view, taken along line 3—3 of FIG. 1, of the adapter of the present