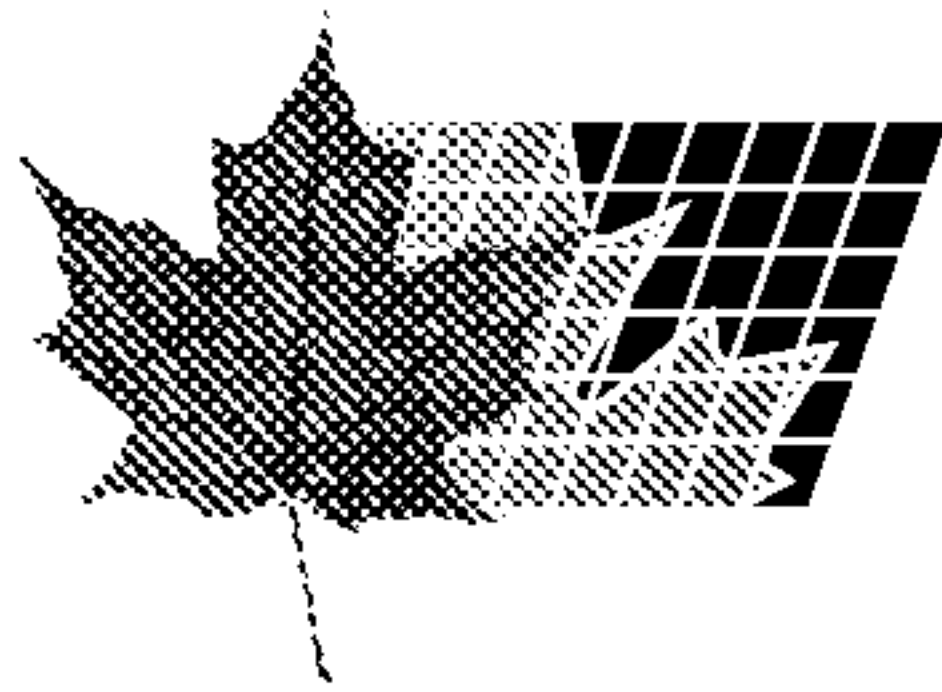
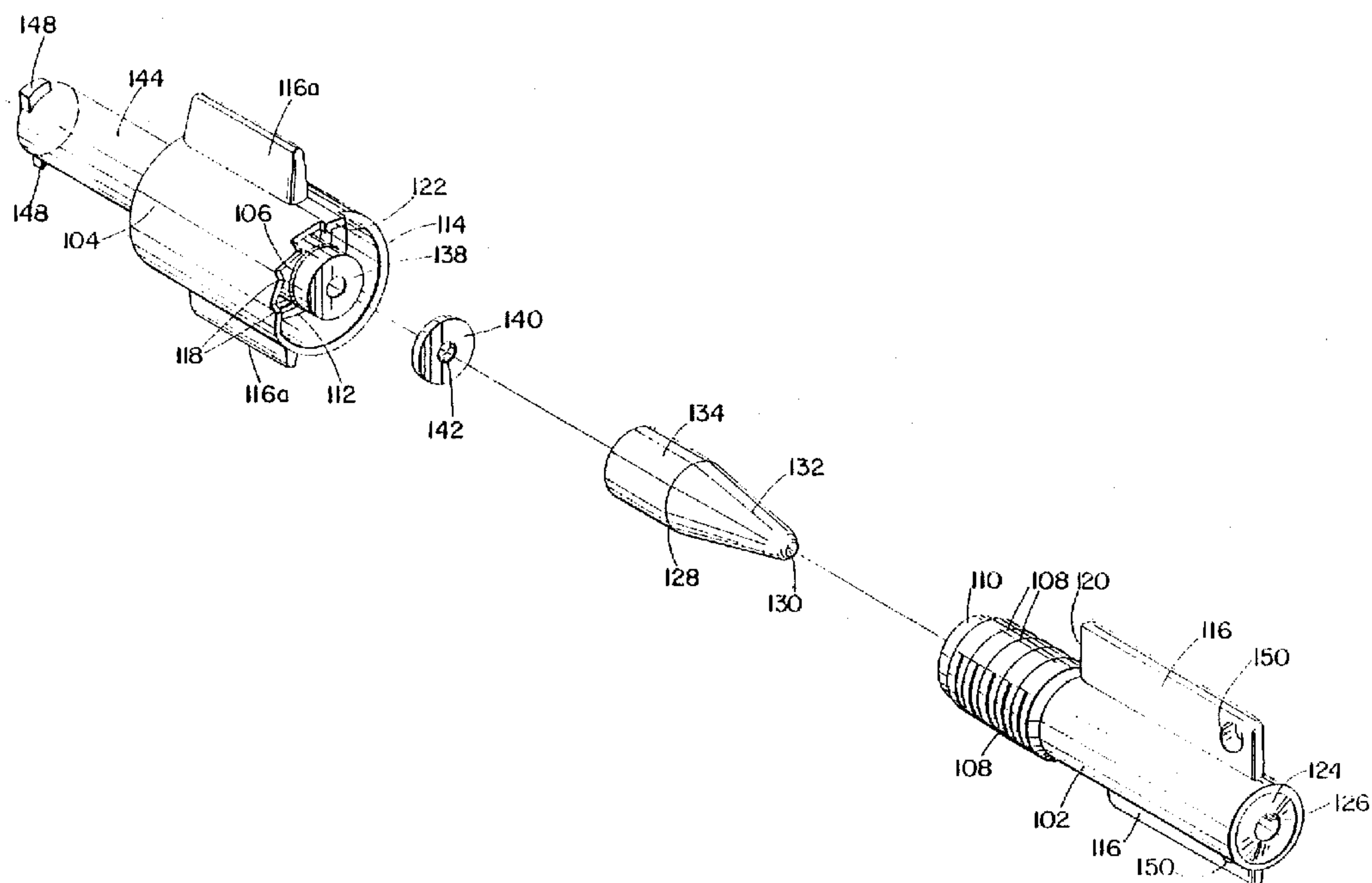




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(54) **ADAPTATEURS DE CATHETER**
(54) **NOVEL ADAPTERS FOR CATHETERS**



(57) Novel unitary adapter for placing a catheter in fluid communication with a source of liquid medication, comprising: a catheter connector for releasably securing the proximal end of a catheter extending from a patient's body for receiving said medication; a connector releasably engaging said liquid medication source, said connectors being attached to one another and movable between an open position for inserting said catheter end and a closed position for securing said catheter end within said connector; and locking means for retaining said connectors in said closed position, whereby to prevent accidental opening and the resulting falling out of said catheter end from said adapter. Preferably, said source is a syringe and said catheter is one for continuous spinal or continuous epidural anesthesia procedures.

P. F. 1676

PATENTS

ABSTRACT OF THE INVENTION

Novel unitary adapter for placing a catheter in fluid communication with a source of liquid medication, comprising:

a catheter connector for releasably securing the proximal end of a catheter extending from a patient's body for receiving said medication;

a connector releasably engaging said liquid medication source, said connectors being attached to one another and movable between an open position for inserting said catheter end and a closed position for securing said catheter end within said connector; and

locking means for retaining said connectors in said closed position, whereby to prevent accidental opening and the resulting falling out of said catheter end from said adapter.

Preferably, said source is a syringe and said catheter is one for continuous spinal or continuous epidural anesthesia procedures.

TITLE: NOVEL ADAPTER FOR CATHETERSBACKGROUND OF THE INVENTION

Continuous spinal anesthesia procedures and continuous epidural anesthesia procedures are of course well known in the art. In either case, the distal end of the catheter is first introduced in to the patient's body with the proximal or trailing end outside the body to receive the anesthetic.

To do so, an adapter is employed connecting the proximal end of the catheter at one end of the adapter to a source of liquid anesthetic, e.g. a syringe, at the other. The adapter has a channel communicating with the catheter end so that when the liquid anesthetic is introduced into the channel, it passes through the catheter into either the subarachnoid space, if the spinal anesthesia procedure is used or into the epidural space, as would be the case with the epidural anesthesia procedure.

As an illustration of prior adapters for this purpose, mention may be made of those described and claimed in U.S.P. 4,187,848 issued to Glenn N. Taylor. As disclosed therein, the adapter comprises two separate members, one being designated as the body member, the other being termed a compression member. The body member has an elongated bore and an opening at its distal end for receiving the proximal end of the catheter extending from the patient's body. An elongated elastic plug having a channel extending therethrough is seated

in uncompressed condition within the bore of the body member, the channel being aligned with the opening of the body member so that the catheter end inserted in the opening can be positioned within the plug channel. The compression member has a port at its proximal end where the tip of a syringe may be releasably engaged for injecting liquid anesthetic. A passageway for fluid extends between the two ends of the compression member so that when the proximal end of the body member and the distal end of the compression member are secured together, the liquid anesthetic injected from the syringe may be pumped into the catheter. To connect the two members, the proximal end of the body member is provided with external threads and the distal end of the compression member with internal threads mating with the body member threads. When the threads are tightened to secure the two members, the plug is compressed to retain the catheter end positioned therein.

While a catheter adapter of this general description is in theory entirely satisfactory for connecting the catheter to the syringe, the prior art two-piece adapters currently in use, as exemplified by the teachings of the aforementioned patent, do nevertheless suffer from certain inherent disadvantages.

A primary disadvantage is that there is no locking engagement to maintain the two components together, as intended. Consequently, there is a danger for unscrewing or back-off, resulting in loss of compressive force on the plug and, consequently, in separation of the catheter from the adapter.

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Another problem which occurs from time-to-time is the human error in attempting to screw the two components together. It sometimes happens that one of the components is dropped. This human error necessitates the time and expense of opening a
5 whole new sterile tray to replace the dropped component.

It is accordingly the task of this invention to provide an improved adapter which will obviate the aforementioned problems.

SUMMARY OF THE INVENTION

10 In accordance with the present invention, this task is solved in a simple and elegant manner by providing a unitary adapter having one component for releasably engaging the syringe or other source of liquid medication, a second component for securing the catheter end, the two components
15 being attached together with the distal end of the first component in superposition with the proximal end of the second component so as to prevent accidental dropping of either component, the respective components further being movable between an open position for inserting the catheter in the
20 adapter and a closed position for retaining the catheter in place, and means for locking the adapter in the closed position to prevent drop-off.

More specifically, the invention provides, an adapter for connecting a catheter to second duct means comprising a first
25 connector (102) having a duct passing therethrough and affording gripping means (128) for the catheter and a second connector (104) having a duct passing therethrough to which the second duct means may be connected, means being provided for moving the said connectors between open and closed positions,
30 the said means being threads (108) on one end (110) of the said first connectors adapted to mate with threads (112) on an end

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(114) of the said second connector, whereby the said connectors can be screwed together to provide the said second or closed position and unscrewed to the said first or open position, characterised in that retaining means (106,107) are provided to
5 hold the first and second connectors together whilst permitting their movement relative to each other from a first or open position in which the catheter may be inserted and removed to a second or closed position in which the gripping means engages the catheter to secure it against removal, in which second
10 position the duct in the second connector communicates with the catheter, the said retaining means consisting of snap rings (106,107) located at juxtaposed ends of the said connectors so as to engage each other when the connectors are assembled to form the unitary adapter, and in that locking means
15 (116,118,120) are provided for securing the said connectors in the said closed position, the said locking means comprising ratchet-type teeth (118) at the distal end of a said second connector (104) and a locking wing (116) on the external surface of said first connector (102), the proximal edge of the
20 said locking wing being adapted to engage one of the said teeth when the said connectors are screwed together to the said closed or second position, the said locking wing thereby interfering with a course of the said ratchet-type teeth, and thereby preventing accidental unscrewing of the said connectors
25 towards the said open or first position.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a fragmentary, exploded elevational view of a two-piece catheter adapter illustrative of the current state of the art;

Fig 2. is a perspective view illustrating the novel adapter of this invention;

Fig. 3 is an exploded elevational view of the novel catheter of Fig. 2; and

Fig. 4 is a fragmentary top view illustrating the locking mechanism for securing the adapter in the closed position, as shown in Fig. 2.

DETAILED DESCRIPTION OF THE INVENTION

As mentioned, adapters for continuous spinal or epidural catheters currently in use are of a two-piece construction.

Fig. 1, which need not be described in great detail for purposes of understanding the nature and objects of this invention, is illustrative of the adapters presently in use for the administration of spinal anesthesia.

As shown therein, the adapter consists of two separate body members which, for ease of reference, will be designated as catheter connector 10 and syringe connector 12. Both connectors have a longitudinally extending passageway for pumping the anesthetic from the syringe into the catheter. Catheter connector 10 has an opening 14 at its distal end 16. A compressible plug 18 of elastomeric material having a longitudinally extending channel 20 is seated within a correspondingly shaped bore within connector 10 in a relatively uncompressed condition with channel 20 aligned with opening 14 to receive the proximal end of a catheter (not shown) extending from the body of a patient.

Syringe connector 12 has a tapered port 22 at its proximal end 24 to receive the tip of a syringe (not shown). The proximal end 24 has luer lock flanges 25 and a female luer slip 26 adapted to receive the luer tip of the syringe so that the syringe may be releasably locked to connector 12.

Connector 10 has external threads 28 adjacent its proximal end which mate with internal threads 30 adjacent the distal end of syringe connector 12.

When the respective connectors are screwed together, e.g. by rotating wings 32 on catheter connector 10, a compression collar 34 having an opening 36 compresses plug 18 to decrease the external dimensions (gap) of channel 20 to secure the catheter end in the adapter.

In use, the distal end of the catheter is first positioned in the patient in per se known manner. The proximal end of the catheter is inserted in the catheter connector and the two connectors are then screwed tightly together to "lock" the catheter in the adapter. The anesthesia procedure may then commence by engaging the syringe in the syringe connector and injecting the liquid anesthetic.

A Major disadvantage in adapters of this general description is the tendency for back-off wherein the threads loosen or unscrew to release the compressive force sufficiently for the catheter to be displaced from the adapter. [Since the compression applied should never be so great as to materially narrow the gap of the catheter, substantial drop in compressive force is not required for loss of the catheter connection to occur.]

Another problem is the human factor involved in screwing the two separate connectors together. The parts are relatively small and extremely light. It is very easy to drop one or the other during the manual manipulative step of joining them together. If this should occur, the rigid operating room requirements for aseptic instruments demands that the dropped connector be discarded. This in turn requires the time and expense of opening a new sterile spinal tray to obtain a replacement.

The present invention is directed to a novel adapter which obviates these problems.

Stated simply, in accordance with this invention, the adapter is of a one-piece or unitary construction wherein the catheter connector and syringe connector are movably pre-connected with respect to each other from an open position to insert the catheter end and a closed position to secure the catheter in place. Anti-back-off means are provided to retain the connectors in the closed position, thereby locking the catheter end in the adapter until released by disengaging the anti-back-off means.

In the preferred embodiment, means are also provided for preventing overtightening of the connectors, which overtightening will cause excessive compressive force to be exerted on the catheter, causing unwanted lowering of its gap through which the anesthetic must traverse as well as possible damage to the catheter.

Figs. 2 and 3 illustrate the novel adapter of this invention.

As shown, adapter 100 has a catheter connector housing 102 (similar to that shown in Fig. 1) and a syringe connector housing 104 which are secured in juxtaposition as a unitary device by means of an external snap ring 106 which engages an internal snap ring (not shown) at the proximal end 110 of catheter connector 102 to prevent separation of the respective housings.

Catheter connector 102 has a series of external threads 108 adjacent its proximal end 110 which mate with internal threads 112 at the distal end 114 of the syringe connector housing 104. By tightening or loosening the connection, e.g. by gripping one of wings 116 or 116a and rotating the other, the connectors are movable longitudinally with respect to each other from a closed position wherein all the threads are engaged (to secure the catheter) to an open position (for insertion or removal of the catheter, as the case may be). When in the open or unthreaded position, the connectors are retained together by snap ring 106, as previously mentioned.

As seen, a portion of distal end 114 of the syringe connector has teeth 118. When screwed together, a locking wing edge 120 interferes with a course of the ratchet-type teeth 118, preventing the connectors from accidentally unscrewing and thereby releasing the catheter from connector 102. In other words, the teeth cooperate with the locking wing edge 120 to prevent back-off and thus lock the respective connectors in the closed position until intentionally disengaged to release the catheter. To prevent overtightening which could cause detrimental excessive

compression to be exerted on the catheter, a full stop detent member 122 is preferably provided.

As was the case with the prior art adapters such as illustrated in Fig. 1, catheter connector 102 is generally cylindrical and has an elongated bore. The distal end 124 has a central opening or port 126 through which the proximal (training) end of a catheter extending from the patient's body may be inserted.

An elongated plug 128 of elastomeric material (e.g. natural rubber, synthetic rubber, or an elastomeric polymer such as one of the KRATON (trademark of Shell Chemical Company) series having a channel 130 is seated within connector 102. Plug 128 has a distal conical section 132 and a proximal cylindrical section 134. The portion of the bore in which the plug is to be received with the end of the cone adjacent opening 126 is of like configuration so that the plug is positioned therein in relatively uncompressed condition with channel 130 aligned with opening 126. Both opening 126 and channel 130 (when the latter is uncompressed) have inner dimensions slightly larger than the outer dimensions of the catheter 136 (Fig. 2) to permit easy insertion through the opening and then into the plug.

When the proximal end of the catheter is so positioned, the wings 116 or 116a are rotated to place the adapter in the closed position with the locking wing edge 120 of the catheter connector abutting detent member 122. In this closed position, teeth 118 lock the two connectors together to prevent loosening or back-off. In this position, compression collar 138 located at the distal end of syringe connector

housing 104 applies compressive force to the proximal end of plug 128, causing it to compress longitudinally to narrow the gap of channel 130, thereby tightly frictionally engaging catheter 130 positioned therein. To prevent damage to the proximal end of the channel 124 in the plug, a slip washer 140 is preferably provided. As seen in Fig. 2, when the plug is compressed, the tip of conical section 132 extrudes through opening 126, thereby providing a liquid-tight strain relief collar for the catheter.

Compression collar 138 has an opening 142 communicating with a fluid passageway within connector 104 and aligned with washer 140 and channel 130, thereby providing a channel for anesthetic injected into the proximal end of syringe connector 104 to be pumped through the adapter and then into the patient via the positioned catheter for administration of the anesthesia procedure.

To accomplish the anesthesia procedure, syringe connector 104 has a female luer slip 144 to receive the tip of the syringe and to frictionally engage the syringe luer when inserted therein. Luer locking wings 148 are provided for engagement to luer locking syringes.

The materials which may be utilized in the manufacture of the adapter of this invention will be readily apparent to those skilled in the art and as such will be a matter of individual choice. Accordingly, they are not critical and per se comprise no part of this invention. In general, with the exception of the elastomeric plug, any of the known plastics which are substantially rigid and of medical grade for use in surgical procedures may be utilized.

In like manner, the method of manufacture will be readily suggested and is accordingly not a part of this invention. Injection molding or any of the other known industrial manufacturing techniques may be employed.

It will be appreciated that the foregoing description is by way of illustration only and that various changes, modifications and additions may be made without departing from the scope of the invention herein contemplated.

For example, while not necessary in the practice of this invention, the wings 116 on connector 102 are shown to have holes 150, the purpose of which is to accommodate a safety pin, suture or other such fastening means to secure the adapter to a sheet, patient's garment or other article, if found desirable or expedient to do so.

While a toothed edge has been shown as the locking mechanism to secure the connectors against back-off, it will be appreciated that other locking means equivalent in function may be provided.

In like manner, any of the per se known means for placing the syringe or other source of fluid medication in engagement with the syringe connector may be employed, e.g. the outwardly directed luer flange described in the aforementioned U.S.P. 4,187,848.

While reference throughout the foregoing specification has been made to anesthetic procedures utilizing a syringe to introduce liquid anesthesia into a spinal or epidural catheter, the primary task of this invention, it is to

be expressly understood that the invention is not restricted to such procedures. It may be utilized in other catheterization procedures where a liquid vehicle is introduced via a catheter, which procedures require the catheter to be in fluid communication with a syringe or other source of a liquid drug or other medication.

Other changes may be readily suggested to those skilled in the art in the light of the foregoing description.

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CLAIMS:

1. An adapter for connecting a catheter to second duct means comprising a first connector (102) having a duct passing therethrough and affording gripping means (128) for the catheter and a second connector (104) having a duct passing therethrough to which the second duct means may be connected, means being provided for moving the said connectors between open and closed positions, the said means being threads (108) on one end (110) of the said first connector adapted to mate with threads (112) on an end (114) of the said second connector, whereby the said connectors can be screwed together to provide the said second or closed position and unscrewed to the said first or open position, characterised in that retaining means (106,107) are provided to hold the first and second connectors together whilst permitting their movement relative to each other from a first or open position in which the catheter may be inserted and removed to a second or closed position in which the gripping means engages the catheter to secure it against removal, in which second position the duct in the second connector communicates with the catheter, the said retaining means consisting of snap rings (106,107) located at juxtaposed ends of the said connectors so as to engage each other when the connectors are assembled to form the unitary adapter, and in that locking means (116,118,120) are provided for securing the said connectors in the said closed position, the said locking means comprising ratchet-type teeth (118) at the distal end of a said second connector (104) and a locking wing (116) on the external surface of said first connector (102), the proximal edge of the said locking wing being adapted to engage one of the said teeth when the said connectors are screwed together to the said closed or second position, the said locking wing thereby interfering with a course of the said ratchet-type teeth, and thereby preventing accidental

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unscrewing of the said connectors towards the said open or first position.

2. An adapter as claimed in claim 1 in which the first connector is a catheter connector (102) having distal and proximal (110) ends, the said distal end having an opening through which the said proximal end of the said catheter may be inserted, the said catheter connector (102) having an internal bore with which the said opening communicates; the gripping means are an elongated elastomeric and compressible plug (128) adapted to be seated within the said bore adjacent the said distal end of the said catheter connector in a relatively uncompressed condition, the said plug having a channel (130) extending therethrough adapted to be aligned with the said opening in the said distal end of the said catheter connector, whereby the said catheter inserted within the said opening can extend within the said channel, the inner dimensions of the said channel when uncompressed and of the said opening being slightly greater than the outer dimensions of the said catheter so as to permit insertion of the said catheter therewithin; the second connector is a source connector (104) for the said second duct means (144) having proximal and distal (114) ends and a passageway for liquid extending longitudinally between the said ends thereof, the said proximal end having means (148) for releasably engaging said second duct means, the said distal end of the said source connector having an opening communicating with the said passageway: the retaining means (106,107) retaining the said connectors (102,104) together with the said proximal end of the said catheter connector in juxtaposition to the said distal end of the said source connector; means (108,112) for moving the said connectors such that the first position permits insertion of the said catheter into and withdrawal of the said catheter from the said first connector and the second position places the said passageway in

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the second connector, in engagement with the said bore in the said first connector; the said channel in the gripping means in engagement with the said catheter when contained therein; and said catheter and said second duct means (144) in liquid
5 communication to define a closed channel for administering the liquid from the second duct means (144) through the said catheter; and compression means for compressing the said plug when the said connectors are in the said closed position, whereby to reduce the size of the inner dimension of said
10 channel and thereby cause the said plug to frictionally engage the said catheter inserted therein and to retain the said catheter in the said adapter.

3. An adapter as claimed in claim 1 or claim 2 including means (122) for preventing overtightening of the said
15 connectors in the said closed position.

4. An adapter as claimed in claim 3 characterised in that the means for preventing overtightening are detent means (122) for limiting how tightly together the said connectors may be screwed.

20 5. An adapter as claimed in any one of claims 1 to 4 in which one connector has an axial tubular member which fits within a tubular portion of the other connector and the retaining means are located between the juxtaposed surfaces of the said tubular members.

SMART & BIGGAR

OTTAWA, CANADA

PATENT AGENTS

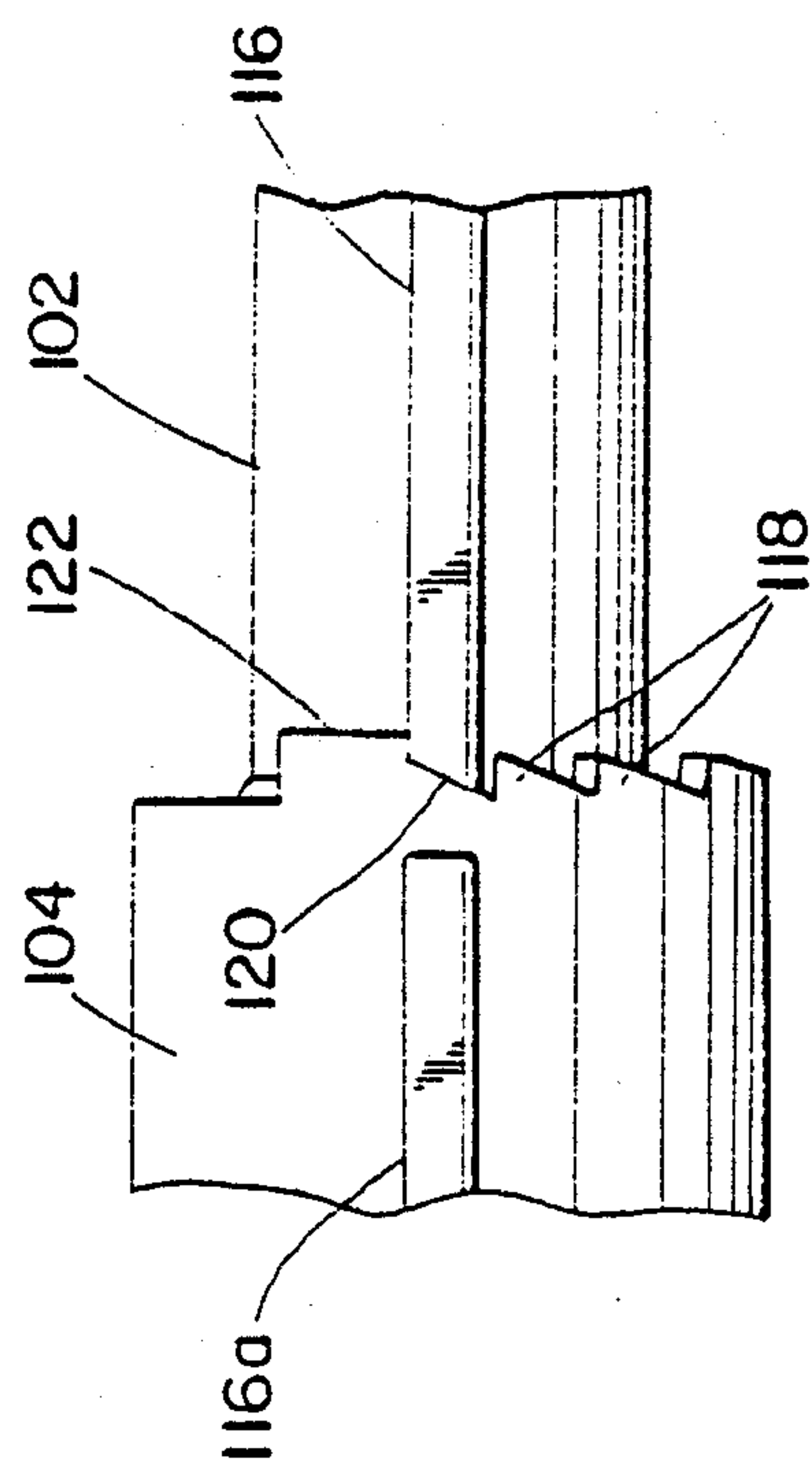


Fig. 4

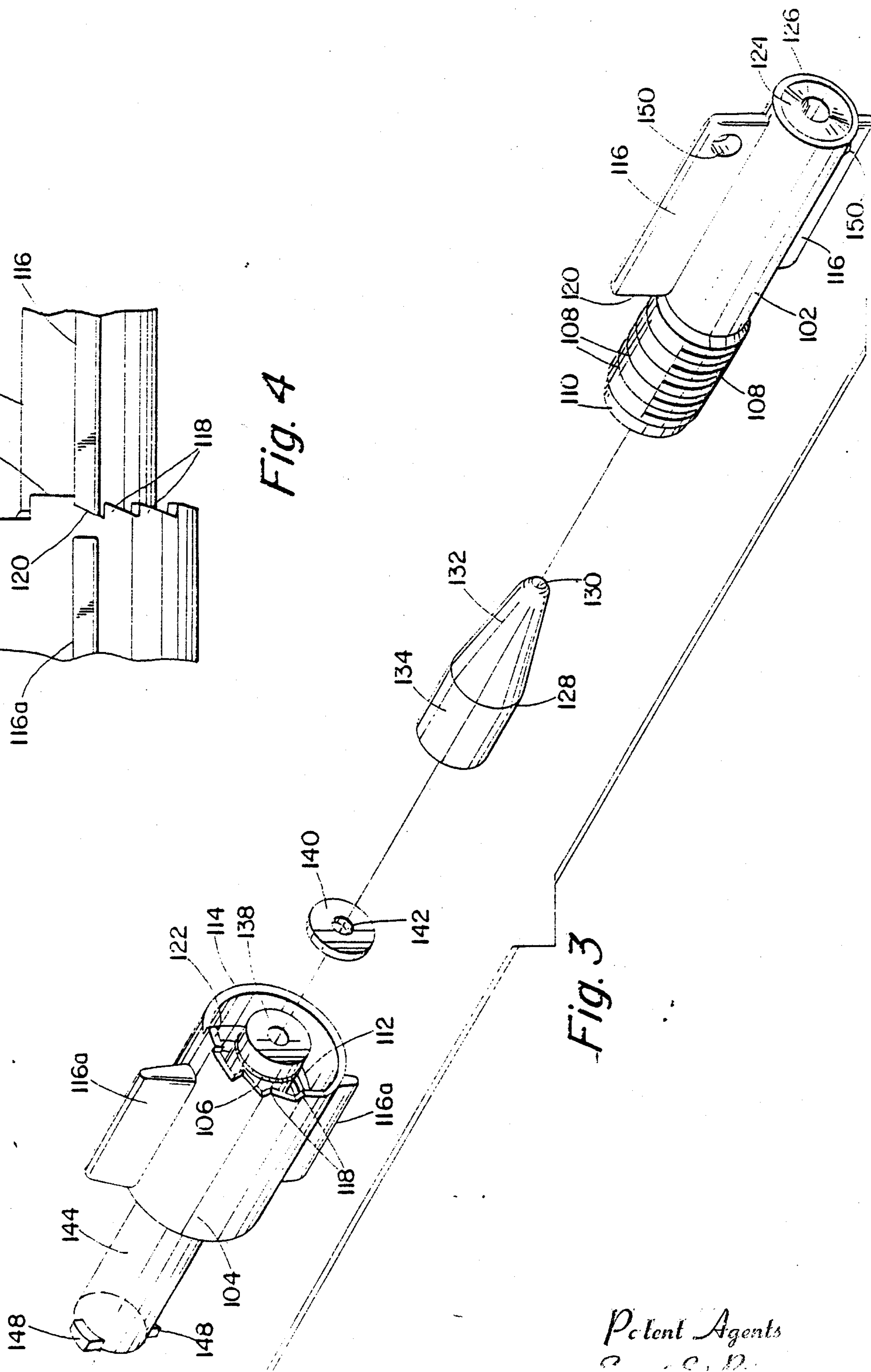


Fig. 3

