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CA 2667409 C 2015/02/17

(11)(21) 2 667 409

(12) BREVET CANADIEN
CANADIAN PATENT

(13) C

(86) Date de dépôt PCT/PCT Filing Date: 2007/10/23
(87) Date publication PCT/PCT Publication Date: 2008/05/02
(45) Date de délivrance/Issue Date: 2015/02/17
(85) Entrée phase nationale/National Entry: 2009/04/23
(86) N° demande PCT/PCT Application No.: EP 2007/009156
(87) N° publication PCT/PCT Publication No.: 2008/049568
(30) Priorité/Priority: 2006/10/25 (DE10 2006 050 212.4)

(51) Cl.Int./Int.Cl. *A61M 39/10* (2006.01)

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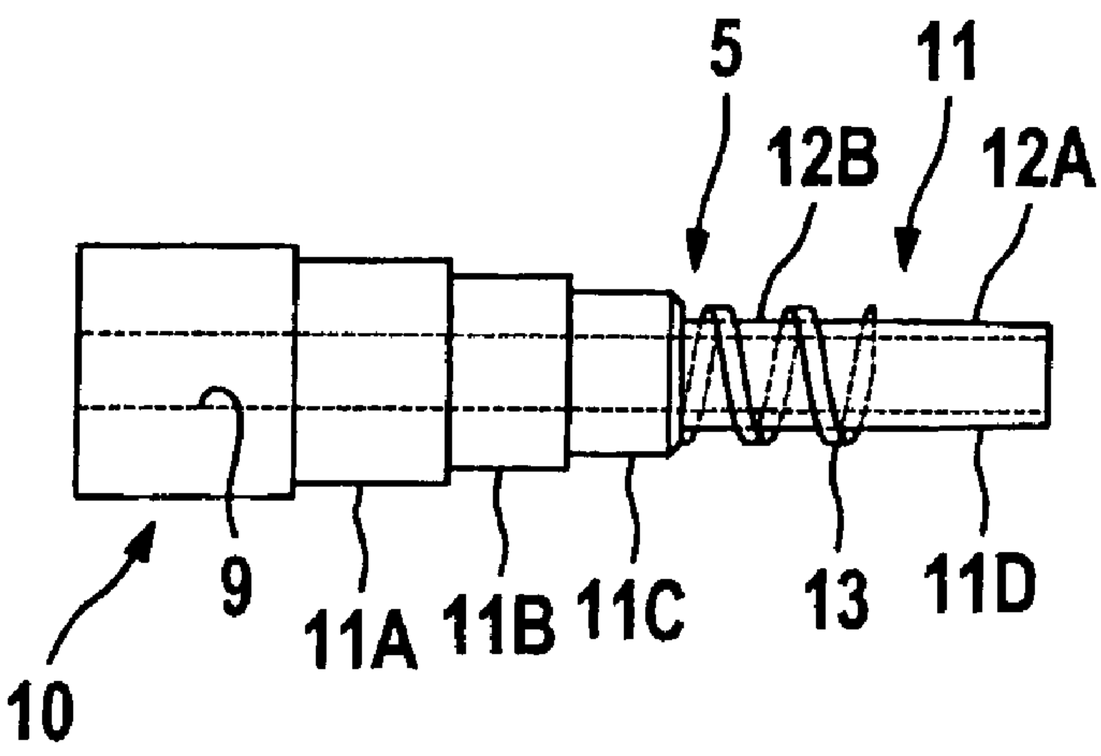
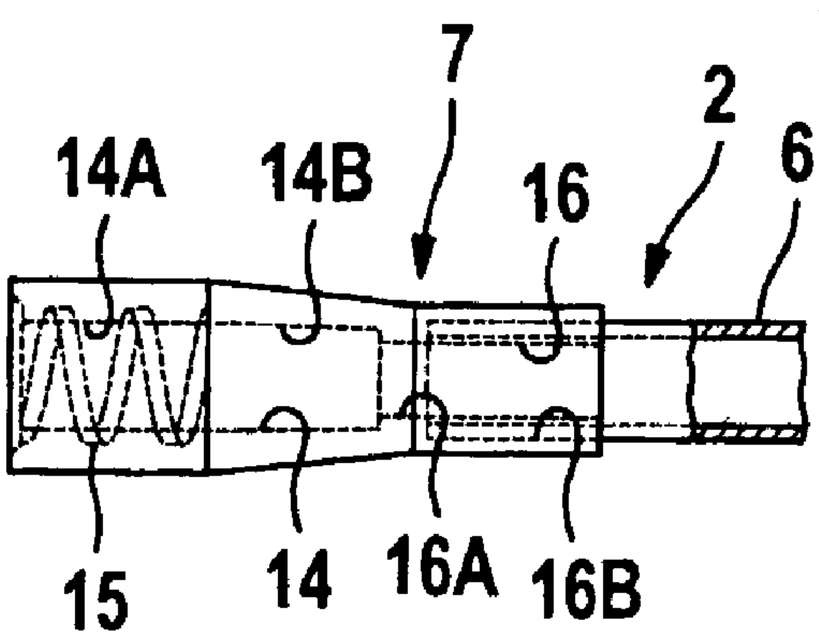
(54) Titre : PIECE DE RACCORDEMENT POUR UN SYSTEME DE TRANSFERT ENTERAL
(54) Title: CONNECTION PIECE FOR AN ENTERAL TRANSFER SYSTEM





(57) Abrégé/Abstract:
The invention relates to a connection piece for an enteral transfer system, to an enteral transfer system, and to an arrangement of a transfer system and an enteral feed probe. The connection piece comprises a distal attachment piece for attaching a connection piece of a probe tube of an enteral feed probe, and a proximal attachment piece for attaching the connection tube of a transfer system. The distal attachment piece of the connection piece is conical or is designed in stepped fashion with several portions of different diameter. The distal attachment piece can be releasably connected to the funnel-shaped connection pieces of different diameter of probe tubes. The distal attachment piece of the connection piece has a locking element, so that a releasable form-fit connection is made to a connection piece of a probe tube that has a locking element complementing the locking element of the distal attachment piece.

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Abstract

The invention relates to a connection piece for an enteral transfer system, to an enteral transfer system, and to an arrangement of a transfer system and an enteral feed probe. The connection piece comprises a distal attachment piece for attaching a connection piece of a probe tube of an enteral feed probe, and a proximal attachment piece for attaching the connection tube of a transfer system. The distal attachment piece of the connection piece is conical or is designed in stepped fashion with several portions of different diameter. The distal attachment piece can be releasably connected to the funnel-shaped connection pieces of different diameter of probe tubes. The distal attachment piece of the connection piece has a locking element, so that a releasable form-fit connection is made to a connection piece of a probe tube that has a locking element complementing the locking element of the distal attachment piece.

PCT/EP2007/009156 **WO 2008/049568**

Connection piece for an enteral transfer system

The invention relates to a connecting piece for an enteral transfer system, which connecting piece has a distal connecting portion for connection to a connecting piece belonging to the flexible tube of an enteral feeding probe, and a proximal connecting portion for connection to a flexible connecting tube of a transfer system. As well as this, the invention also relates to a transfer system for enteral feeding having a connecting piece of this kind. What is more, the invention also relates to an arrangement which comprises a transfer system of this kind and also an enteral feeding probe which has a flexible probe tube having a connecting piece for connection to the transfer system.

In enteral feeding, a liquid nutrient solution is administered to the patient with an enteral feeding probe. The enteral nutrient solution is made available in a container which is connected to the enteral feeding probe via what is referred to as a transfer system. The enteral transfer system has a flexible probe tube having a proximal and a distal connecting piece. The distal connecting piece is connected to the feeding probe and the proximal connecting piece is connected to the container holding the nutrient solution, thus allowing the nutrient solution to flow out of the container and via the connecting tube of the transfer system into the feeding probe.

The container of nutrient solution is generally changed several times a day whereas in the case of the transfer system a change is recommended every 24 hours. The feeding probe can be used for as long as several months.

What have been used in the prior art to connect the connecting tube of the transfer system to the flexible tube of the feeding probe are the known luer lock connectors, thus enabling the transfer system and feeding probe to be connected together without there being any risk of the flexible tube of the feeding probe unintentionally coming loose from the flexible connecting tube of the transfer system during the administration of the nutrient solu-

tion. It is however a disadvantage that in enteral administration the known luer lock connections may pose a risk to the patient inasmuch as the luer lock connections used in enteral administration may be confused with those which are used particularly in intravenous administration and in ventilation techniques. If for example an enteral nutrient solution should inadvertently be administered via an intravenously inserted luer lock connection, there is a considerable risk to the patient.

A gain in safety is achieved in the prior art by giving the enteral transfer system a female distal luer lock connecting piece, whereas the enteral feeding probe has a male luer lock connecting piece. Intravenous probes however have a female luer lock connecting piece, and because of this the possibility of an enteral transfer system being connected directly to the intravenous probe can be ruled out. However, because of the large number of luer lock adapters available which are offered by the various manufacturers, the possibility of mix-ups cannot be entirely ruled out.

As well as the transfer systems and feeding probes which have luer lock connections, what are also known are feeding probes which have a funnel-shaped connecting piece. Various manufacturers offer feeding probes having connecting funnels of different diameters in this case. For a connection to be able to be made to the connecting funnels of the known feeding probes, there are known in the prior art adapters of a stepped form which are generally releasably connected to the connecting tube of the transfer system by means of a luer lock connection.

The known stepped adapters have the advantage that a connection is possible to connecting funnels of different diameters. The stepped adapter is plugged into the connecting funnel of the feeding probe and when this is done that section of the stepped adapter whose diameter corresponds to the diameter of the connecting funnel comes into contact with the connecting funnel. The two parts are fixed in this case by the frictional force between the circumferential surfaces of the stepped adapter and the connecting funnel.

Whereas the stepped adapter is generally made of a harder material, the connecting funnel is, as a rule, composed of a softer material to improve the transmission of force. It is a disadvantage that the retaining force between the stepped adapter and the connecting funnel may not be high enough. Particularly when nutrient solutions containing fat or grease are

being used there is a risk of the connection unintentionally coming loose. Ageing effects which affect the properties of the material of the connecting funnel and its geometry may also result in a reduced retaining force.

Screwed connections, which are also used in the field of enteral feeding, are known from WO 2005/055919 A1. It is a disadvantage that the known screwed connections are not capable of general use but are confined to the particular feeding probe or transfer system which has appropriate connections.

A connecting piece of stepped form which has a plurality of sections of different diameters onto which an elastic flexible tube can be slid is known for example from US A 4,693,707. It is true that a sealed connection to flexible tubes of different diameters can be made with this known stepped adapter, but it is a disadvantage that there is a risk of the flexible tube coming loose from the connecting piece if a tractive stress is applied.

A stepped adapter for use in the field of enteral feeding is known from WO 02/051494 A1. In this case too the risk exists of the flexible tube of the feeding probe unintentionally coming loose.

US A 4,692,150 describes an arrangement which comprises a flexible probe tube having a connecting funnel and a flexible connecting tube having a stepped adapter. To secure the stepped adapter in the connecting funnel, this printed publication proposes the use of a securing band which is slid over the junction after the two parts have been plugged together, thus causing the two parts to be held together. The securing band is similarly intended to act as a protection against bacteria. It is however a disadvantage that the use of an additional securing band which has to be slid over the junction after the parts have been plugged together makes handling more difficult.

Some embodiments of the invention may provide a connecting piece for an enteral transfer system which is capable of being used generally, which is easy to handle, and which makes a secure but releasable connection possible between a transfer system and feeding probe. Some embodiments of the invention may provide a transfer system for enteral feeding which is capable of being used generally, which is easy to handle, and which can be con-

nected to a feeding probe without the risk of the connection unintentionally coming loose. As well as this, some embodiments of the invention may provide an arrangement, comprising a transfer system and a feeding probe, which is capable of being used generally and which is easy to handle, the feeding probe and transfer system being able to be connected together securely.

According to one embodiment of the invention, there is provided a connector for an enteral transfer system, which comprises a distal coupling portion for connecting a tube part of an enteral feeding tube, and a proximal coupling portion for connecting a connecting tube of a transfer system, wherein the distal coupling portion is designed as stepped, with a plurality of sections of different diameters, so that a detachable connection can be produced with conical connectors of different diameters in the tube parts of different feeding tubes, wherein a foremost section of the distal coupling portion having the smallest diameter has a distal connecting cone designed as an outer cone, to the proximal end of which connecting cone a section embodied as a locking element is joined, wherein the locking element of the distal coupling portion is embodied as a threaded connecting element or as a bayonet connecting element, so that the distal coupling portion is designed such that a detachable interlocking connection can be produced with a connector of a tube part of an enteral feeding tube, which connector has a locking element that is complementary to the locking element of the distal coupling portion, and so that a detachable connection can be produced with the conical connectors of different diameters in the tube parts of different feeding tubes.

According to another embodiment of the invention, there is provided a transfer system for enteral feeding having a connector as described herein.

According to still another embodiment of the invention, there is provided an assembly comprising a transfer system as described herein and an enteral feeding tube, which has a tube part with a connector for connecting the transfer system, wherein the connector of the tube part has a further locking element that is complementary to the locking element of the connector of the transfer system.

References herein to the invention are to be understood as references to one or more embodiments of the invention.

The connecting piece according to the invention for an enteral transfer system has a distal connecting portion for connection to a connecting piece belonging to the flexible tube of an enteral feeding probe, and a proximal connecting portion for connection to the flexible connecting tube of a transfer system.

The distal connecting portion of the connecting piece has either a conical section or a stepped section. In this case the stepped section of the distal connecting portion may itself have, in turn, shoulders of different diameters which are conical and/or cylindrical. What is crucial is that the conical or stepped section of the distal connecting piece narrows. The distal connecting portion can therefore be releasbly connected to the funnel-shaped connecting pieces of different diameters of the flexible tubes of known feeding probes. This being the case, the connecting piece according to the invention is capable of being used generally.

The distal connecting portion of the connecting piece according to the invention has a locking element which is so designed that a positively engaged releasable connection can be made to a connecting piece of a flexible tube of an enteral feeding probe when this latter connecting piece has a locking element which is complementary to the locking element of the distal connecting portion. The locking element may be of different designs. What may be considered as locking elements are, basically, all positively engaging releasable connections such for example as screwed and plug-in connections and in particular over-fitting caps, screwed joints, bayonet connections or the like.

Hence on the one hand the making of a positively engaged releasable connection to a connecting piece of a flexible tube of an enteral feeding probe, which connecting piece has a locking element complementary to the locking element of the distal connecting portion, is possible by virtue of the special design of the distal connecting portion, and on the other hand the connecting piece according to the invention can be connected in a known manner to the funnel-shaped connecting pieces, of different diameters, of known feeding probes.

It is of advantage that, because of the incompatibility of the connecting pieces, the connecting piece according to the invention rules out the possibility of mix-ups with luer lock connections which are not used for enteral accesses.

In cases where the connecting piece according to the invention is used to connect up a feeding probe which has a complementary locking element, the said connecting piece makes a connection by positive and frictional engagement which is easily released and which is secured against coming loose unintentionally.

The general use which can be made of the connecting piece according to the invention leads to a reduction in costs in the provision of different feeding probes and in transfer systems. Also, there are fewer problems involved in the changeover from the known feeding probes having connecting funnels to feeding probes which have a complementary locking element, because it will still be possible for conventional feeding probes to be connected on, at least for a certain transitional period.

The connecting piece according to the invention combines the advantages of the known luer lock connectors with the advantages of the known connections which do not engage positively but only by friction between funnel-shaped connecting portions and stepped adapters or even conical adapters, but without having to accept their disadvantages.

In a preferred embodiment of the connecting piece according to the invention, the front section of the distal connecting portion, which section is of the smallest diameter, takes the form of a locking element. In this embodiment, the sealing of the connecting pieces of the feeding probe and transfer system takes place particularly at the end-face of the distal connecting portion, which bears against the end-face of the connecting piece with a seal. Basically however it is also possible for the locking element to be provided in the rear or centre

region of the distal connecting portion, which connecting portion is either conical, or stepped in a plurality of sections.

In an alternative and particularly preferred embodiment, the front section of the distal connecting piece takes the form of a connecting cone and the section of the distal connecting portion which follows on from the connecting cone takes the form of a locking element. In this case, the sealing takes place by virtue of the fact that the connecting cone of the connecting portion engages in a bore which is of a corresponding conicity in the connecting piece of the feeding probe.

In both cases, a sealed but easily releasable connection is made between the flexible tube and the flexible connecting tube of the feeding probe and transfer system respectively.

A particular embodiment makes provision for the locking element of the distal connecting portion to take the form of a screwed connecting element, and preferably that of a cylindrical or conical connecting element having an outside thread. It is however also possible for the screwed connecting element to have an inside thread. A cylindrical section may for example be provided with a rib which extends round in a helix or with a helical groove. The section may also be conical, in which case the height of the rib or the depth of the groove is of a size, over the length of the section, such that the distance between, respectively, the outer face of the rib and the floor of the groove and the axis of the cylindrical or conical section remains the same over this length. The connecting piece of the flexible tube of the probe is then of whichever form is complementary.

A further embodiment makes provision for the locking element of the distal connecting portion to take the form of a bayonet-type connecting element. The bayonet-type connecting element is preferably a cylindrical connecting element whose circumferential surface has a groove, the groove preferably having an axially extending section from which a section which extends around part of the circumference of the circumferential surface follows on. It is however also possible for the cylindrical connecting element to be the bayonet-type connecting element complementary to the above configuration which has a projection which engages in a groove.

Basically, provision may be made for any of the connecting techniques which are known to the person skilled in the art as bayonet connections. The bayonet-type connecting element may, basically, be provided in the rear, centre or front region of the distal connecting portion. The connecting piece of the flexible probe tube is then formed in turn in whichever way is complementary.

In an alternative and particularly preferred embodiment, the locking element of the distal connecting portion does not take the form of a screwed connecting element on the stepped or conical section of the distal connecting portion but that of a screwed cap having an inside thread, which screwed cap encloses the conical section of the distal connecting portion for at least part of its length, but may also enclose a stepped section for at least part of its length if the distal connecting portion has a stepped section rather than a conical one. The screwed cap may be an integral part of the distal connecting portion or may be rotatable about the axis of the distal connecting portion.

Rather than a screwed cap, what may also be provided is a cap which is inserted onto the connecting piece of the flexible probe tube as a good fit. It may for example be fixed in place on the connecting piece of the flexible probe tube by a clamping or latching action.

The cap may also take the form of a bayonet-type connection, in which case either the projection of the bayonet-type connection which engages in the groove, or its groove, may be provided in the distal connecting portion.

It goes without saying that in the different embodiments of the distal connecting piece the connecting piece of the flexible probe hose is, in turn, of a complementary form. The connecting piece of the flexible probe hose may for example take the form of a connecting funnel, in which case an outside thread for a screwed connection, or whatever is the complementary mating part of a bayonet-type connection, may be provided on the outside of the funnel.

The proximal connecting portion of the connecting piece according to the invention may take the form of a connecting portion for making a releasable connection to a complementary connecting portion of the transfer system, and in particular the form of a luer lock connecting portion. It is possible in this way for the connecting piece according to the in-

vention to be handled and used in the same way as the known stepped adapters which are connected to the luer lock connecting portions of known transfer systems. Preferably however the connecting piece according to the invention is connected directly to the flexible tube of the feeding probe, such for example as by being adhesive-bonded and/or welded.

The transfer system according to the invention comprises the connecting piece according to the invention and an enteral transfer system, in which case the connecting piece according to the invention may take the form of an adapter for the luer lock connecting portion of the enteral transfer system or may be connected solidly to the flexible connecting hose of the enteral transfer system.

The arrangement according to the invention comprises the transfer system according to the invention and an enteral feeding probe which can be connected to the connecting piece of the transfer system according to the invention.

Various embodiments of the invention will be explained in detail below by reference to the drawings. In the drawings:

Fig. 1 shows an arrangement comprising a transfer system and an enteral feeding probe,

Figs. 2a
and 2b are enlarged views of the connecting pieces of the transfer system and feeding probe shown in Fig. 1, before and after the making of a connection between the transfer system and the feeding probe,

Figs. 3a
and 3b are enlarged views of the connecting piece of the transfer system shown in Fig. 1 and a funnel-shaped connecting piece of a known feeding probe, before and after the making of a connection between the transfer system and the feeding probe,

Figs. 4a
and 4b show the connecting piece of the transfer system shown in Fig. 1 and a funnel-shaped connecting piece of another known feeding probe, the latter connecting

piece being of a smaller diameter than the connecting piece of the feeding probe shown in Figs. 3a and 3b,

Figs. 5a
and 5b show an alternative embodiment of the connecting pieces of the transfer system and the feeding probe,

Fig. 6 shows a further alternative embodiment of the connecting piece of the transfer system,

Fig. 7 shows a further alternative embodiment of the connecting piece of the transfer system,

Figs. 8a
and 8b are enlarged views of the connecting piece of the feeding probe shown in Fig. 1 and of an adapter for the connecting piece, before and after the making of a connection between the connecting piece and adapter,

Fig. 9 shows a further embodiment of the connecting piece according to the invention together with the connecting piece of the flexible probe tube,

Fig. 10 shows an embodiment of an alternative form of the connecting piece according to the invention together with the connecting piece of the flexible probe tube.

Fig. 1 is a simplified view showing an arrangement comprising a transfer system 1 for enteral feeding and an enteral feeding probe 2, the two of which are connected together to allow an enteral nutrient solution to be administered to the patient from a nutrient solution container (not shown).

Because enteral transfer systems and feeding probes are known per se to the person skilled in the art, the description will be confined in essence to the parts which are relevant to the invention.

The transfer system 1 has a flexible connecting tube 3 which has a proximal connecting piece 4 at its proximal end and a distal connecting piece 5 at its distal end. The proximal connecting piece 4 is used to connect the transfer system 1 to a nutrient solution container (not shown) whereas the distal connecting piece 5 is used to connect on the feeding probe 2.

The feeding probe 2 has a flexible tube 6 which has a proximal connecting piece 7 at its proximal end and an end-piece 8 which leads into the patient at its distal end. The proximal connecting piece 7 of the feeding probe 2 is connected to the distal connecting piece 5 of the transfer system 1.

In what follows, various embodiments of the connecting pieces of the transfer system 1 and feeding probe 2 will be described in detail.

Figs. 2a and 2b are enlarged views of a first embodiment of the proximal connecting piece 5 of the transfer system 1 and of the distal connecting piece 7 of the feeding probe 2. Fig. 2a shows the connecting pieces before they are screwed together and Fig. 2b shows them after.

The connecting piece 5 is a tubular part made of plastics material which is produced by the injection moulding process. The passage 9 which is formed in the connecting piece is shown in broken lines. The connecting piece 5 has a proximal connecting portion 10 which in Figs. 2a and 2b is the left-hand sub-division of the connecting piece. The distal end of the flexible connecting tube 3 of the transfer system 1 is solidly connected to the proximal connecting portion 10. For this purpose, the end of the flexible tube may for example be inserted in a bore in the proximal connecting portion 10 and may be adhesive-bonded and/or welded to the connecting portion.

To allow the feeding probe 2 to be connected on, the connecting piece of the transfer system 1 has a distal connecting portion 11 which in Figs. 2a and 2b is the right-hand sub-division of the connecting piece. The distal connecting portion 11 is a stepped sub-division having a plurality, totalling four in the present embodiment, of sections 11A, 11B, 11C, 11D of different diameters, with the diameters decreasing in the direction of the front end. The front section 11D is approximately twice as long as the rear sections 11A, 11B, 11C.

The front section 11D comprises a front, conical, sub-division 12A and a rear, cylindrical, sub-division 12B which is provided with an outside thread 13. The conical sub-division forms a connecting cone which can be slid into a bore of corresponding conicity in the connecting piece 7 of the feeding probe 2, whereas the cylindrical sub-division 12B having the outside thread 13 forms a locking element, thus enabling a positively engaged connection to be made to a complementary locking element belonging to the connecting piece 7 of the feeding probe 2. The connecting piece 7 of the feeding probe 2 is likewise a tubular part made of plastics material which is produced by the injection moulding process. The connecting piece 7 has a bore 14 which is shown in broken lines and which has a cylindrical front section 14A and a slightly conical rear section 14B. The cylindrical section 14A of the bore 14 in the connecting piece 7 has an inside thread 15 which is shown in broken lines and which corresponds to the outside thread 13 on the connecting piece 5, and the cylindrical section 14A is of a diameter which corresponds to the outside diameter of the cylindrical sub-division 12B of the connecting piece 5. The conical section 14B of the bore 14 is of a conicity which corresponds to the conicity of the conical sub-division 12A of the connecting piece 5.

Following on from the bore 14 in the connecting piece 7 is a bore 16 which has a sub-division 16A of smaller diameter and a sub-division 16B of larger diameter. Seated in the sub-division 16B is the flexible tube 6 of the feeding probe 2, which is preferably adhesive-bonded and/or welded to the connecting piece 7.

To make a connection between the transfer system 1 and the feeding probe 2, their respective connecting pieces 5 and 7 are plugged together and screwed to one another. When this is done, the circumferential surface of the conical sub-division 12A seals against the circumferential surface of the conical section 14B, while the screwed connection stops the connecting pieces from being able to come loose unintentionally. It is also advantageous that the frictional and positively engaged connection is resistant to ageing because any fatigue or wear of the material can only have an effect in the long term.

Both a frictional and a positively engaged connection can be made with the connecting pieces 5 and 7. If the diameter of the front section 11D of the connecting piece 5 is selected to be so large that the connecting piece is not compatible with the female Luer con-

nectors of catheters which are not intended for enteral feeding, then any mix-ups can be ruled out.

It is of advantage that the connecting piece 5 of the transfer system 1 can be connected not only to the connecting piece 7, which fits, of the feeding probe 2, which connecting piece 7 was described by reference to Figs. 2a and 2b, but similarly can also be connected to funnel-shaped connecting pieces of different diameters of known feeding probes.

Figs. 3a and 3b show the connection of the connecting piece 5 of the transfer system to a funnel-shaped connecting piece 17 of a known feeding probe 2'. The funnel-shaped connecting piece 17 has a funnel-shaped bore 18 which is shown in broken lines. The connecting pieces 5 and 17 are plugged together until the connecting piece 5 is firmly seated in the funnel-shaped bore 18 in the connecting piece 17. When this is done, the circumferential surface of at least one of the sections 11A, 11B, 11C, 11D seal against the circumferential surface of the funnel-shaped bore 18. However, compared with the screwed connection, this connection does have the disadvantage that it is possible for the connecting pieces to come loose unintentionally if the connection is stressed in traction.

Figs. 4a and 4b make it clear that it is possible for the connecting piece 5 of the transfer system 1 also to be to a funnel-shaped connecting piece 17' of a known feeding probe 2" which differs in size from the connecting piece 17 of the feeding probe which is shown in Figs. 3A and 3b. The probe 2" has a smaller connecting piece 17' than the probe 2'. The known paediatric probes for example have a connecting piece 17' of this kind. In the connection which is shown in Figs. 4A and 4b, the conical sub-division 12A of the connecting piece 5 seats in the funnel-shaped bore 18' in the connecting piece 17'.

Figs. 5a and 5b show a further embodiment of the connecting piece 5' of the transfer system 1 which differs from the embodiment which was described by reference to Figs. 2a and 2b only in that the front section 11D of the connecting piece does not have the conical sub-division 12A but only the cylindrical sub-division 12B having the outside thread 13. The connecting pieces 5 and 5' are otherwise identical. Parts which correspond to one another have therefore been identified by the same reference numerals. The connecting piece 5' of the transfer system 1 is connected to the connecting piece 7' of the feeding probe, which connecting piece 7' is shown in Fig. 5b. The connecting piece 7' differs from the

connecting piece 7 shown in Figs. 2a and 2b in that the bore 14' has only the sub-division 14A' having the inside thread 15 but not the conical sub-division. Basically however it is also possible for the connecting piece 5' to be screwed to the connecting piece 7 shown in Figs. 2a and 2b.

In the embodiment shown in Fig. 5a and Fig. 5b, the seal is made by pressing the end-faces of the connecting piece 7' on the flexible probe tube 6 and of the connecting piece 5' of the transfer system 1 together when the connecting pieces are screwed together. Basically, it is however also possible for a seal to be made by means of the thread.

Fig. 6 shows a further embodiment of the connecting piece 5" of the transfer system 1 which differs from the embodiment shown in Figs. 2a and 2b in that the cylindrical sub-division 12B' is in the form of a bayonet-type connecting element which has, instead of the outside thread 13, a groove 13' in the circumferential surface of the cylindrical sub-division, which groove 13' has an axially extending section 13A from which a section 13B which extends part-way round the circumference of the circumferential surface follows on. The connecting piece 5" can be connected by friction and positive engagement to a connecting piece of a feeding probe which, instead of having an inside thread, has, on the inside face of the bore, a projection which engages in the groove 13'. For connecting purposes, the connecting pieces of the transfer system and the feeding probe are first slid together and then turned relative to one another.

Fig. 7 shows a further embodiment of the connecting piece 5"' of the transfer system 1 which differs from the embodiment shown in Fig. 5a only in that the proximal connecting portion 10 for the distal end of the flexible connecting tube 3 of the transfer system 1 does not take the form of a connecting portion to which the flexible connecting tube is solidly connected, being welded or adhesive-bonded for example, but takes the form of a luer lock connecting portion 10' to which the complementary luer lock connecting portion on the distal end of the flexible connecting tube of the transfer system can be connected. Complementary luer lock connecting portions of this kind, which are referred to as male and female luer lock connecting portions, are generally known per se to the person skilled in the art.

In the event that use should be made of a feeding probe which has the connecting piece 7 which is shown in Figs. 2a and 2b and that the connecting piece according to the invention should not be available for the transfer system, a transfer system having a conventional connecting piece can be connected to the connecting piece 7 of the feeding probe if the adapter 19 which is shown in Figs. 8a and 8b is used. The adapter 19 has a funnel-shaped portion 19A which corresponds to the adapter of known feeding probes, and has a cylindrical portion 19B which corresponds to the front sub-division 11D which has the cylindrical section 12B having the outside thread 13 and the conical section 12A (Figs. 2a and 2b). If the adapter 19 is screwed to the connecting piece 7, the feeding probe can be connected to known transfer systems having the conventional connecting pieces.

Fig. 9 is a view partly in section showing a further embodiment of the connecting piece according to the invention of the transfer system, together with the connecting piece of the flexible probe tube. As in the embodiment shown in Fig. 7, the connecting piece 5"" of the transfer system has a luer lock connecting portion 10' for connecting on the distal end of the flexible connecting tube of the transfer system. The embodiment shown in Fig. 9 differs from the embodiment shown in Fig. 7 in that the section of smallest diameter, which takes the form of a locking element 11, has not only a cylindrical connecting element 12B having an outside thread 13 but also a distal connecting cone 12A which follows on from the connecting element.

The connecting piece 7" on the flexible probe tube has a first connecting funnel 20 from which a second connecting funnel 21 branches off. The first connecting funnel 20 is used to connect on the connecting piece 5"" of the transfer system, whereas the second connecting funnel 21 is used to connect on a further connecting portion although this is not shown in Fig. 9. Closing-off caps 22 which are integrally formed on the connecting piece by means of bridges 24, 25 are provided to allow the connecting funnels to be closed off. Fig. 9 shows that the stepped section of the connecting piece 5"" of the transfer system is firmly seated in the first connecting funnel 20 of the connecting piece 7" of the flexible probe tube with a seal.

Fig. 10 is a view in section of an embodiment of an alternative form of the connecting piece 27 according to the invention together with the connecting piece 7"' of the flexible probe tube, which connecting piece 7"' once again has the two connecting funnels 20, 21. The

connecting piece 7"' corresponds to the connecting piece 7" shown in Fig. 9 except that the first connecting funnel 20 shown in Fig. 10 has an outside thread 28. The embodiment shown in Fig. 10 also differs from the embodiment shown in Fig. 9 in respect of the connecting piece 27 to which the flexible tubing line of the transfer system is connected.

The connecting piece 27 has, as a proximal connecting portion for the flexible tubing line of the transfer system, a luer lock connecting portion 10' which is known per se to the person skilled in the art. Following on from the luer lock connecting portion 10' there is the distal connecting portion 11' which is connected to the first connecting funnel 20.

In the present embodiment, the distal connecting portion 11' does not have a stepped section but a conical section 29 which merges into a connecting cone 30 which is of smaller diameter than the conical section. The conical section 29 of the distal connecting portion seats in the upper section of larger inside diameter of the first connecting funnel 20, whereas the conical connecting cone 30 seats in the lower section of smaller inside diameter of the connecting funnel 20. As a result the two parts are sealed against one another.

To secure the connecting piece 27 to the connecting funnel 20, the distal connecting portion 11' has, in this embodiment too, a locking element, which in this case takes the form of a screwed cap 31 having an inside thread 32, which screwed cap 31 encloses the conical section 29 of the connecting piece 27 for part of its length. The screwed cap 31 can be screwed to the connecting funnel 20, and the two parts are thus releasably connected to one another.

CLAIMS:

1. A connector for an enteral transfer system, which comprises a distal coupling portion for connecting a tube part of an enteral feeding tube, and a proximal coupling portion for connecting a connecting tube of a transfer system, wherein the distal coupling portion is designed as stepped, with a plurality of sections of different diameters, so that a detachable connection can be produced with conical connectors of different diameters in the tube parts of different feeding tubes,

wherein a foremost section of the distal coupling portion having the smallest diameter has a distal connecting cone designed as an outer cone, to the proximal end of which connecting cone a section embodied as a locking element is joined, wherein the locking element of the distal coupling portion is embodied as a threaded connecting element or as a bayonet connecting element,

so that the distal coupling portion is designed such that a detachable interlocking connection can be produced with a connector of a tube part of an enteral feeding tube, which connector has a locking element that is complementary to the locking element of the distal coupling portion, and

so that a detachable connection can be produced with the conical connectors of different diameters in the tube parts of different feeding tubes.

2. The connector for an enteral transfer system according to claim 1, wherein the locking element of the distal coupling portion is designed as a threaded connecting element.

3. The connector for an enteral transfer system according to claim 2, wherein the threaded connecting element is a cylindrical connecting element with external threading.

4. The connector for an enteral transfer system according to claim 1, wherein the locking element of the distal coupling portion is embodied as a bayonet connecting element.

5. The connector for an enteral transfer system according to claim 4, wherein the bayonet connecting element is a cylindrical connecting element, the outer surface of which has a groove with an axially extending section, to which a section that extends over part of the circumference of the outer surface is joined.

6. The connector for an enteral transfer system according to any of claims 1 to 5, wherein the proximal coupling portion is designed as a coupling piece for producing a detachable connection with a complementary coupling piece of the transfer system.

7. The connector for an enteral transfer system according to claim 6, wherein the proximal coupling portion is a luer lock coupling portion.

8. A transfer system for enteral feeding having a connector according to any of claims 1 to 7.

9. The transfer system for enteral feeding according to claim 8, the connecting tube of the transfer system having a distal and a proximal end, wherein the proximal coupling portion of the connector is securely connected to the distal end of the connecting tube.

10. An assembly comprising a transfer system according to claim 8 or 9 and an enteral feeding tube, which has a tube part with a connector for connecting the transfer system, wherein the connector of the tube part has a further locking element that is complementary to the locking element of the connector of the transfer system.

11. The assembly according to claim 10, wherein the connector of the tube part and the connector of the transfer system are designed as a threaded connection that forms a seal.

12. The assembly according to claim 11, wherein the connector of the tube part has a coupling cone with external threading.

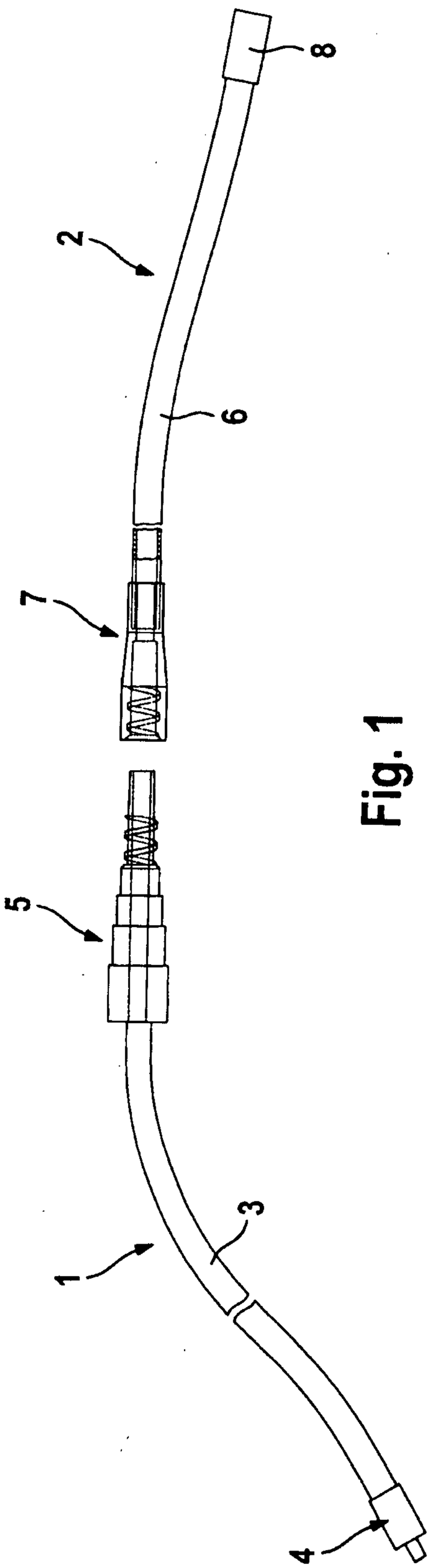


Fig. 1

Fig. 2a

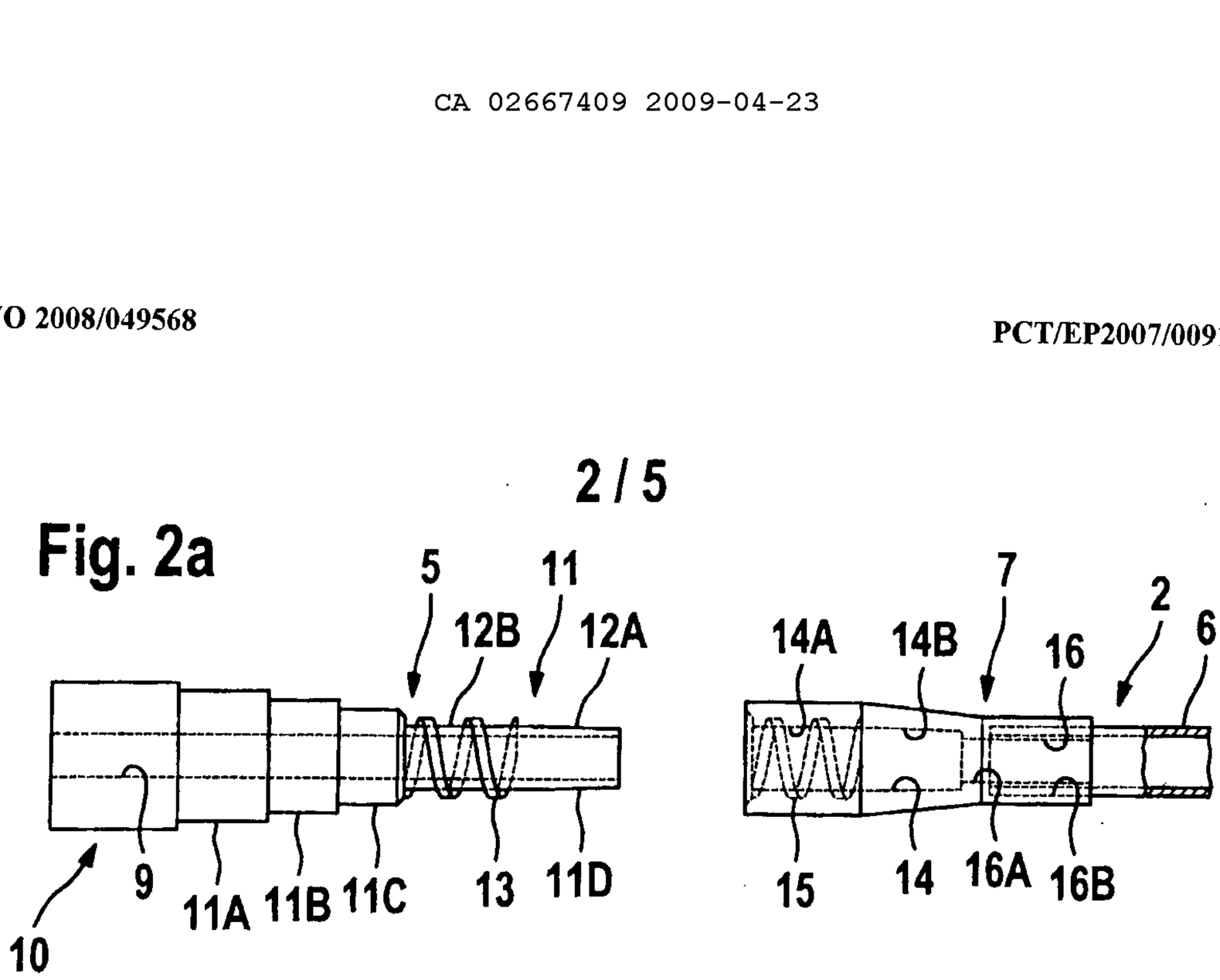


Fig. 2b

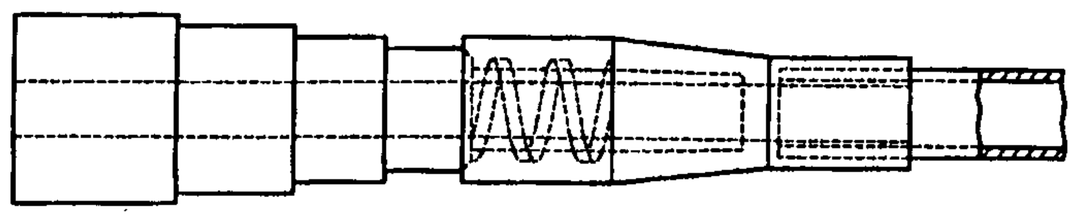


Fig. 3a

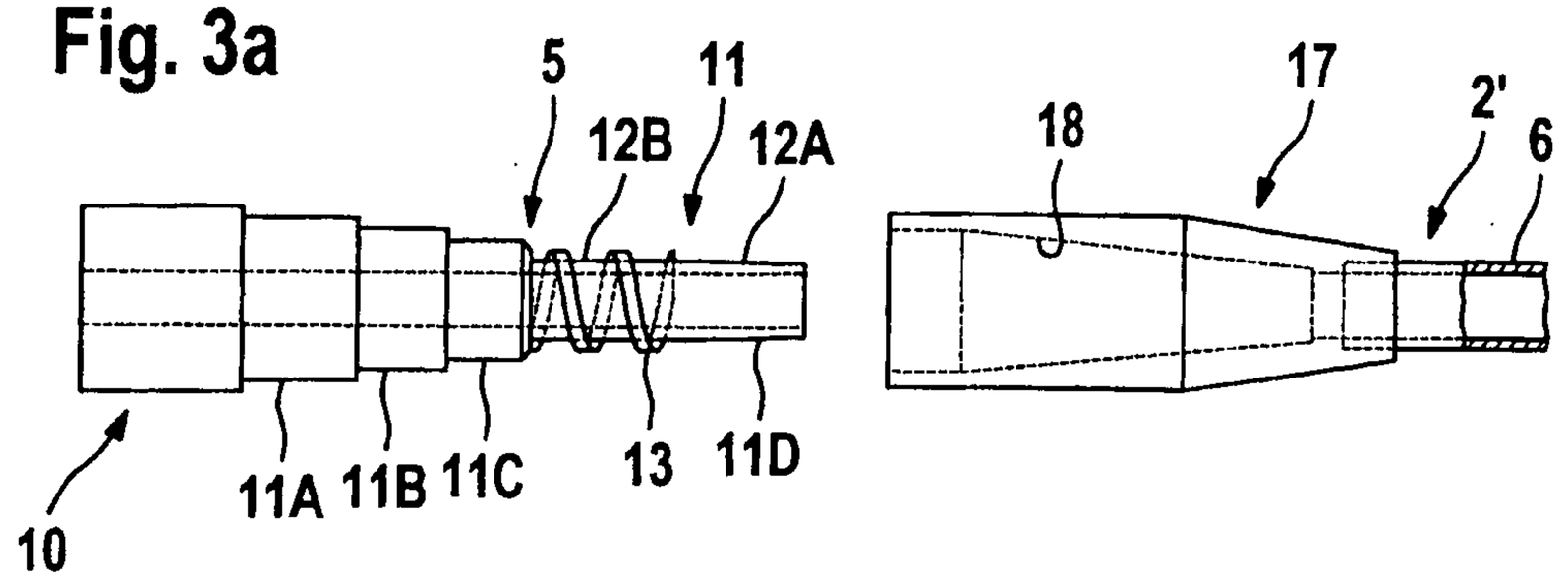


Fig. 3b

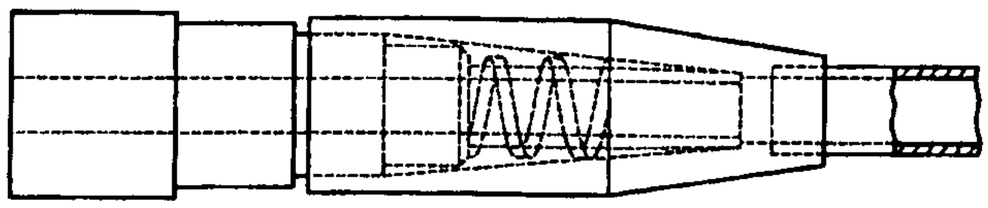


Fig. 4a

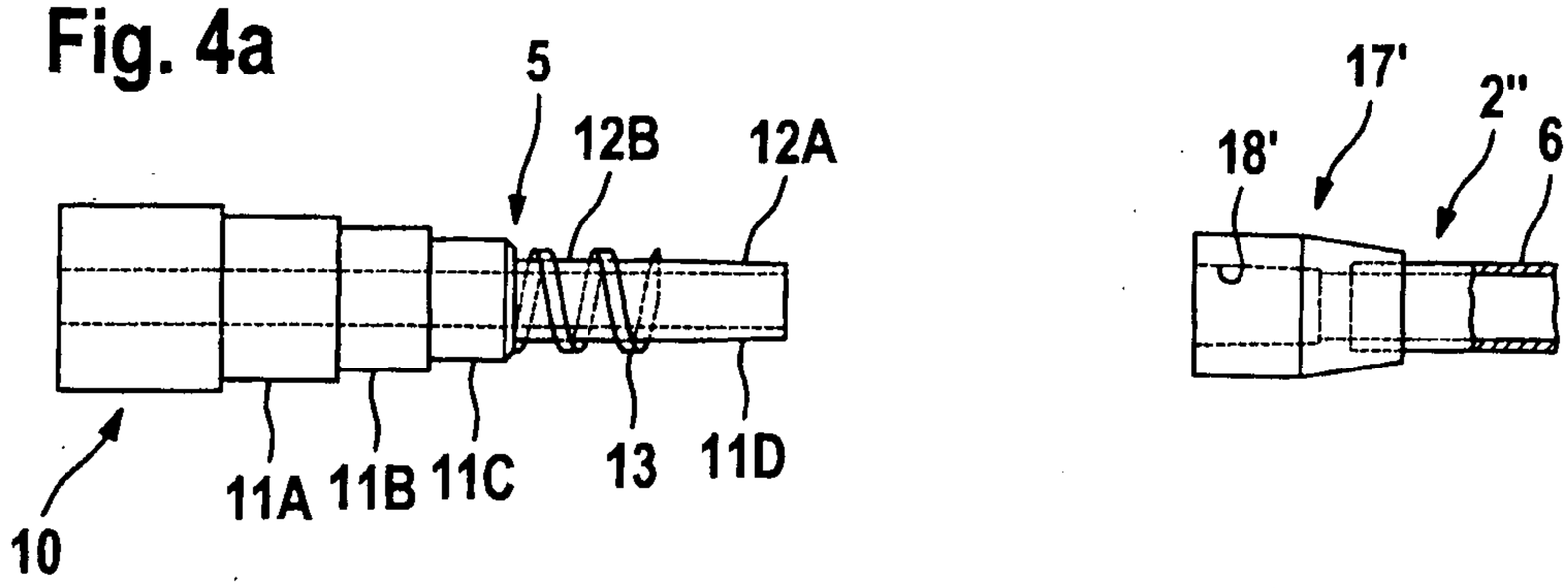


Fig. 4b

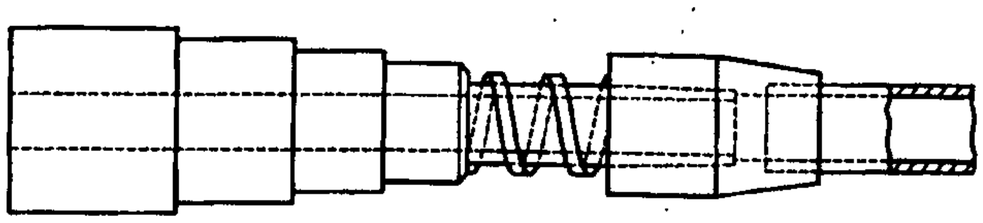


Fig. 5a

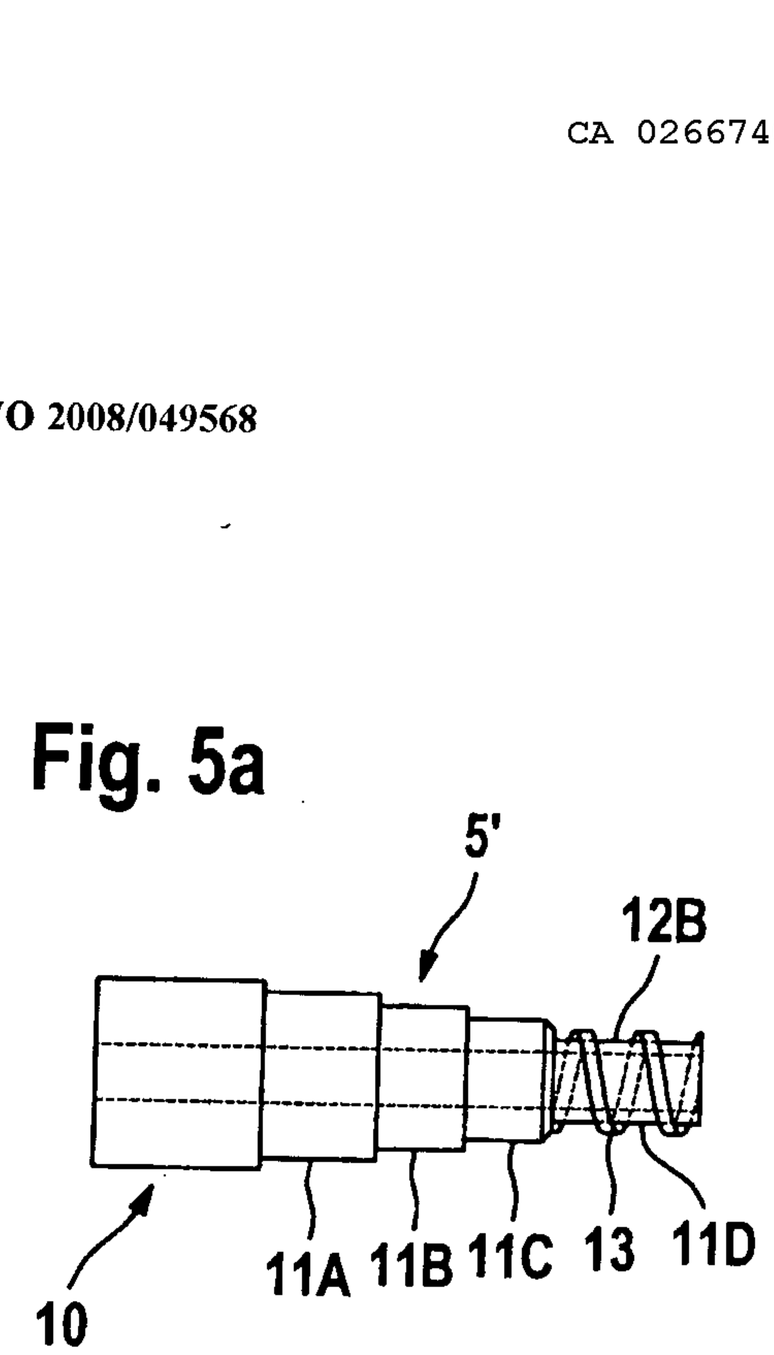


Fig. 5b

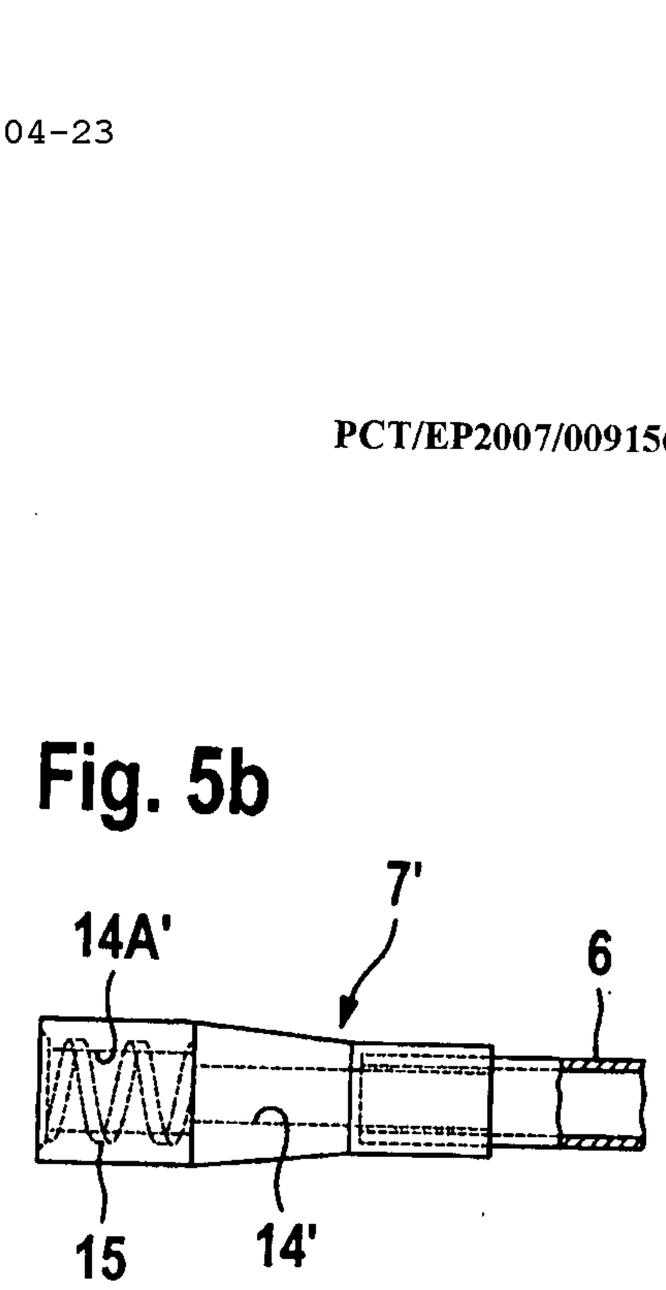


Fig. 6

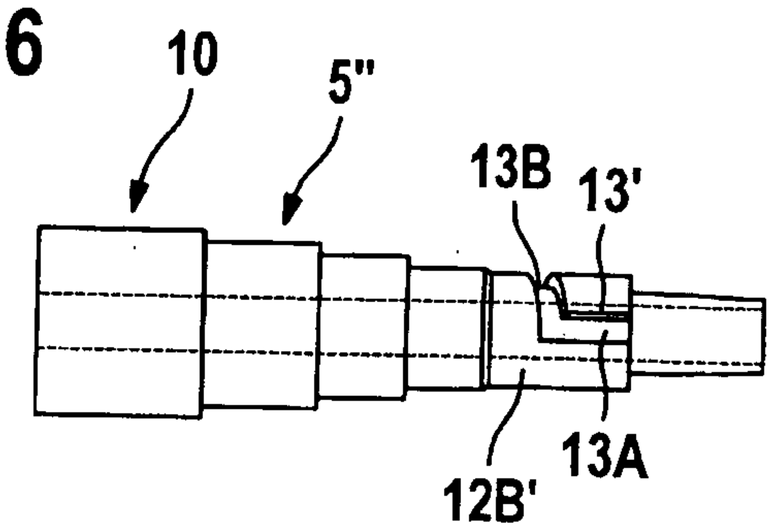


Fig. 7

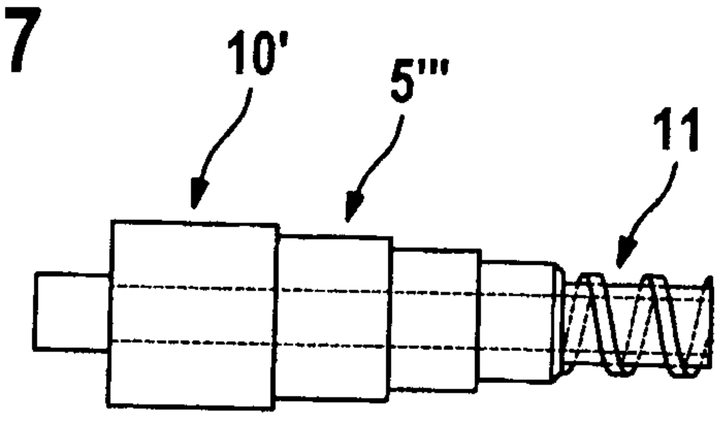


Fig. 8a

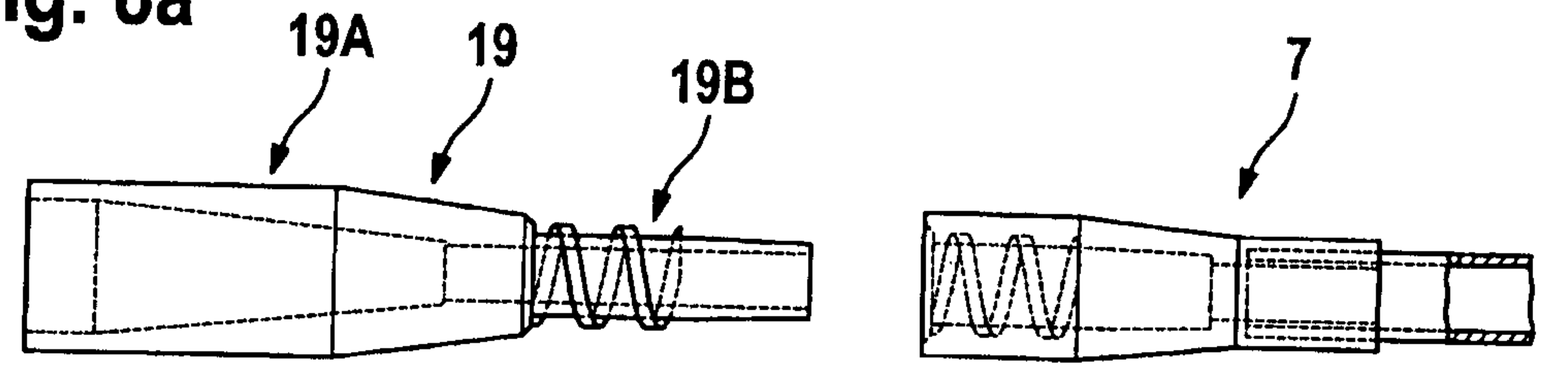
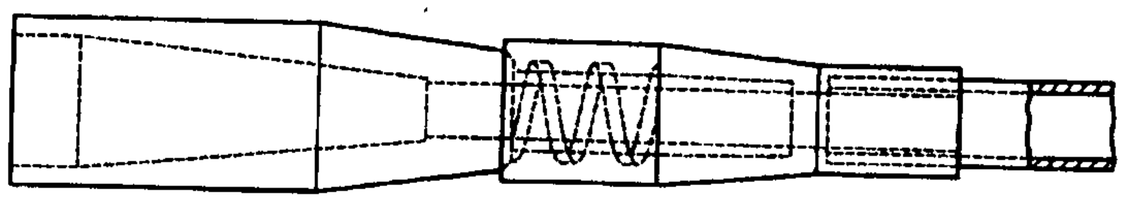


Fig. 8b



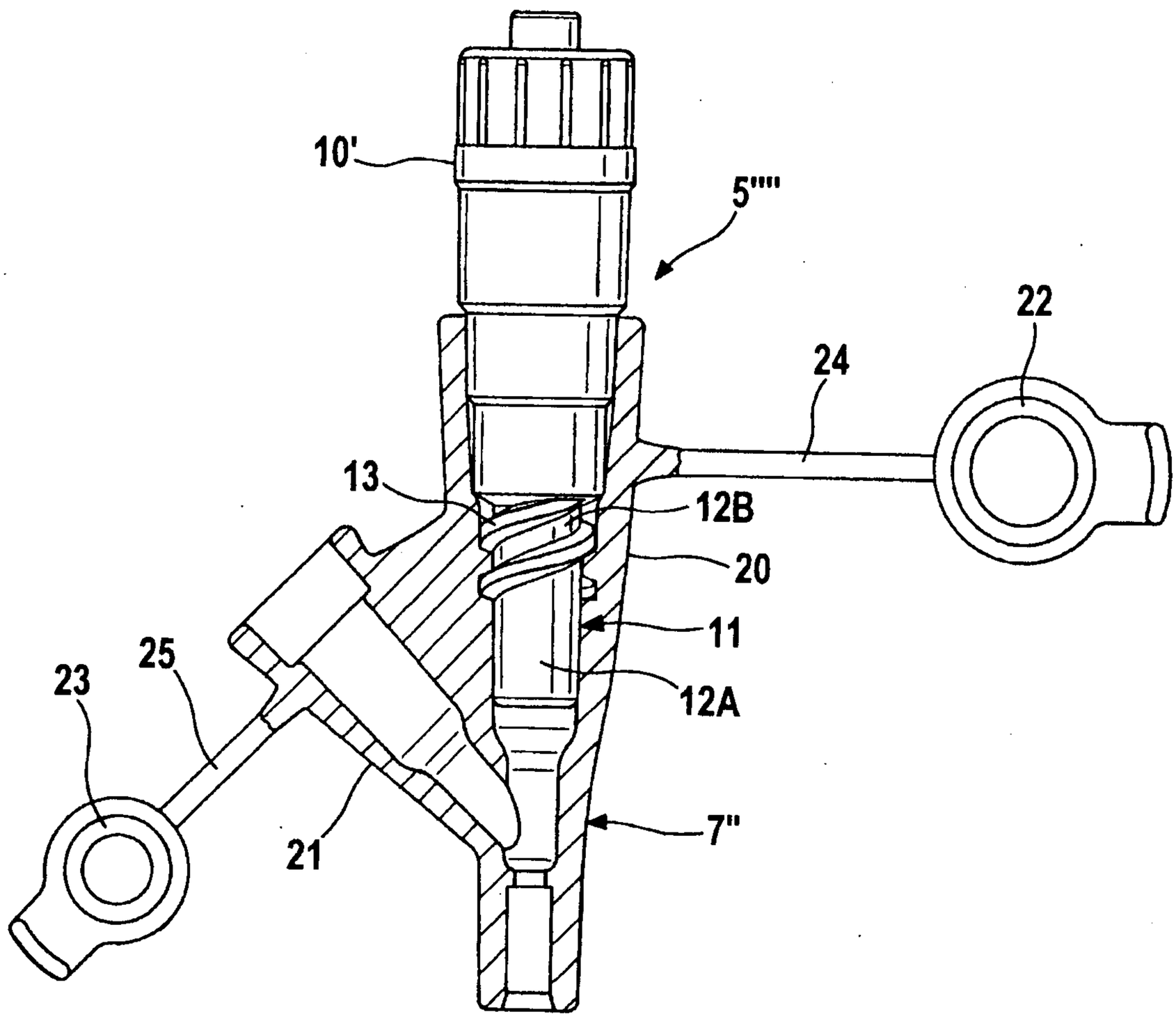


Fig. 9

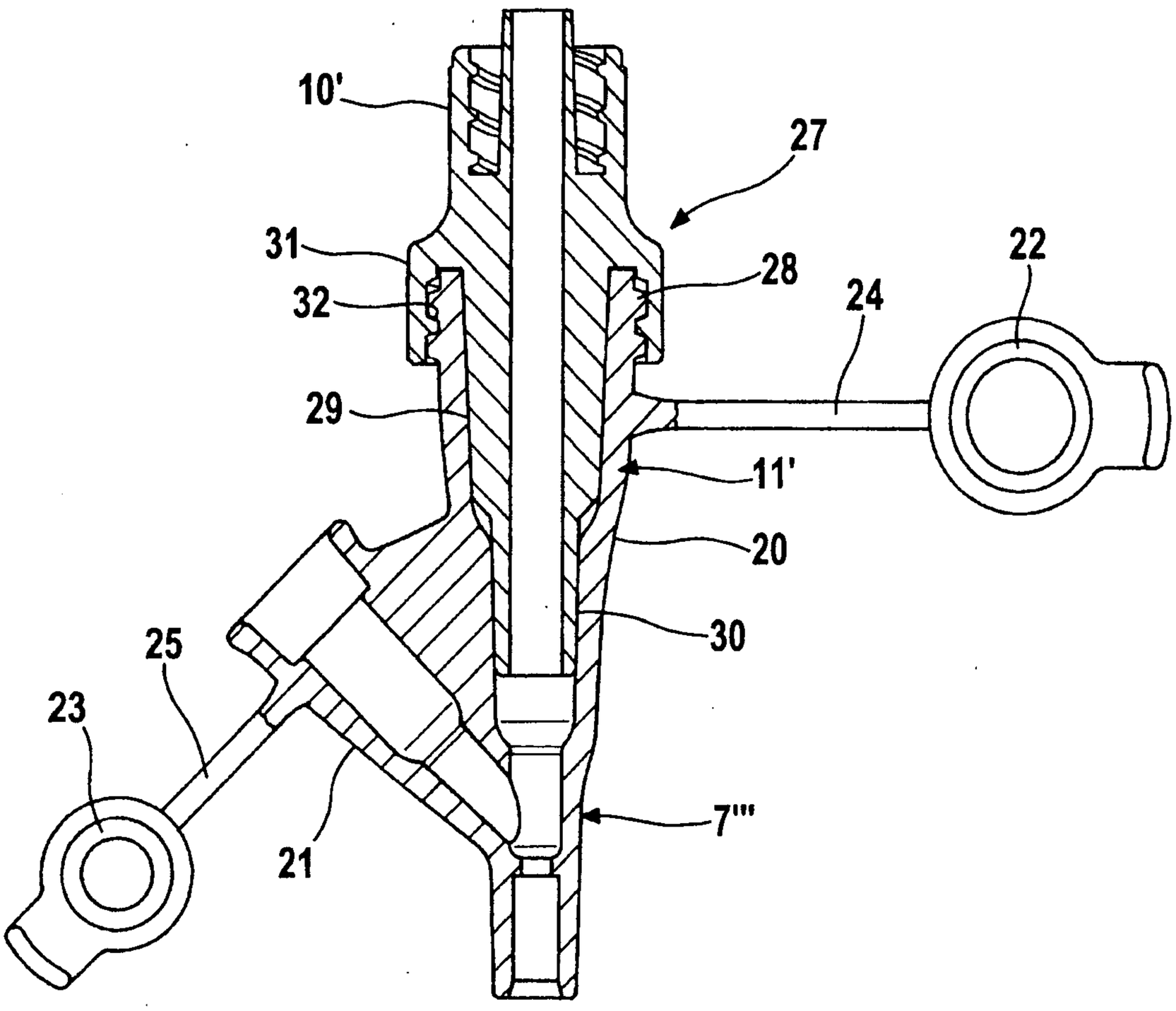
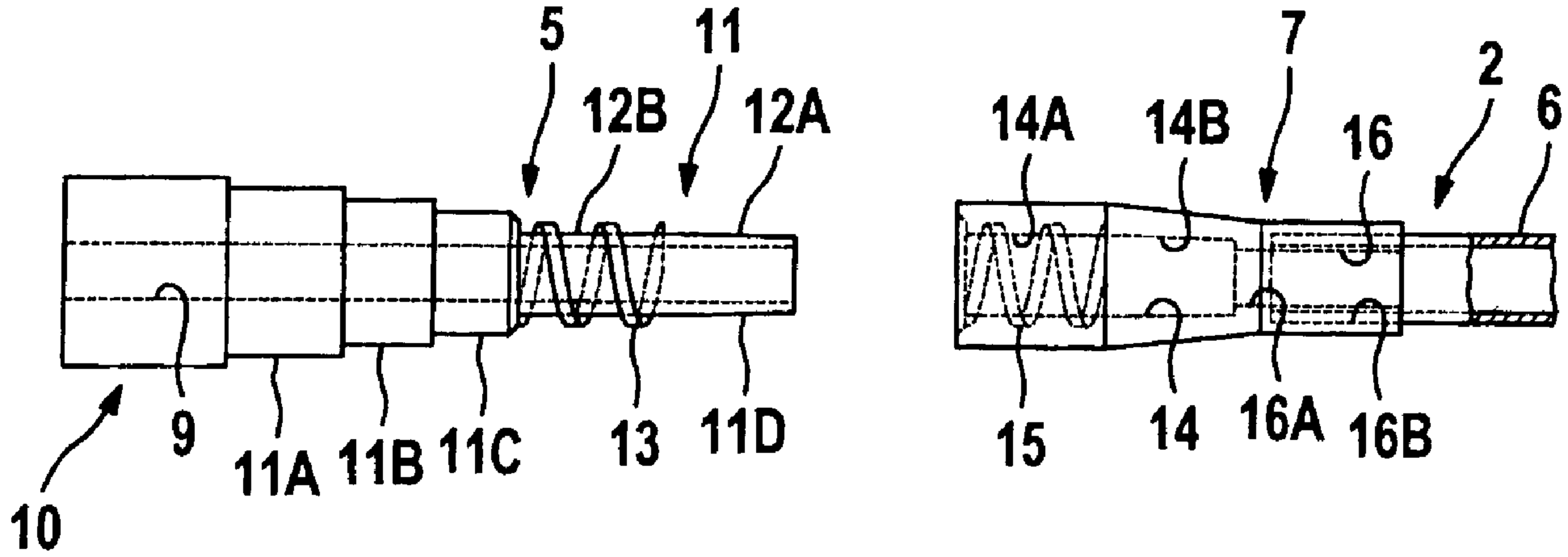


Fig. 10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