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(71) Applicant(s)
Fresenius Medical Care Deutschland GmbH

(72) Inventor(s)
Kopperschmidt, Pascal

(74) Agent / Attorney
Davies Collison Cave, Level 14 255 Elizabeth Street, Sydney, NSW, 2000

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LAND GMBH [DE/DE]; Else-Kröner-Strasse 1, 61352
Bad Homburg v.d.H. (DE).

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(72) Erfinder; und

(75) Erfinder/Anmelder (nur für US): KOPPERSCHMIDT,
Pascal [DE/DE]; Am Süßberg 11, 97456 Dittelbrunn
(DE).

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(74) Anwälte: OPPERMAN, Frank usw.; John-F.-
Kennedy-Strasse 4, 65189 Wiesbaden (DE).

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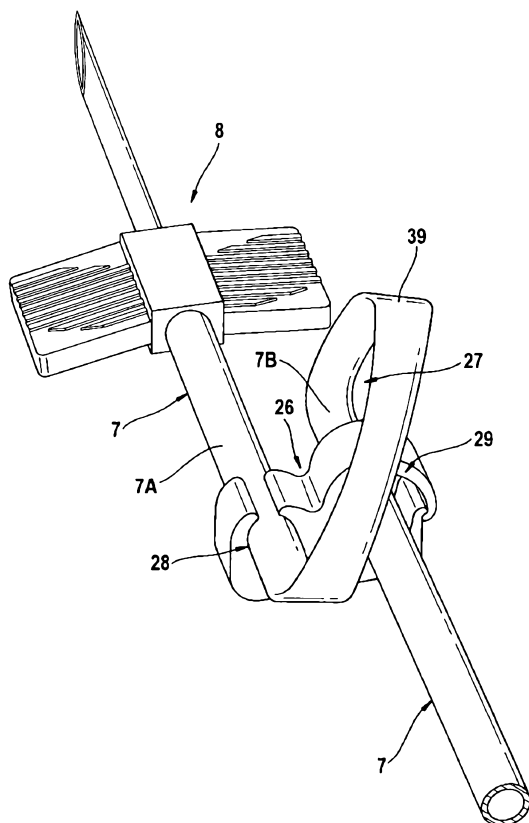
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(54) Title: DEVICE AND METHOD FOR MONITORING ACCESS TO A PATIENT, IN PARTICULAR ACCESS TO VESSELS
DURING EXTRACORPOREAL BLOOD TREATMENT

(54) Bezeichnung: VORRICHTUNG UND VERFAHREN ZUR ÜBERWACHUNG EINES ZUGANGES ZU EINEM PATIEN-
TEN, INSBESONDERE EINES GEFÄßZUGANGES BEI EINER EXTRAKORPORALEN BLUTBEHANDLUNG



(57) Abstract: The invention relates to a device and to a method wherein access to a patient, in particular access to vessels, can be monitored during extracorporeal blood treatment during which a loop (27) is formed in the arterial and/or venous line (6, 7). Inventive means (26) for fixing a section of the line in the form of a loop are provided. When the line is stressed under tension, the loop contracts until the line finally kinks. The modification of the diameter of the line and finally the formation of a kink in the line leads to a rise of pressure in the line, which is monitored by a pressure monitoring device. If the pressure exceeds a predetermined threshold value, the aspirating cannula is in danger of slipping out of the vessel access, has partially or has completely slipped out thus allowing the threshold value to be determined for prealarms or alarms.

(57) Zusammenfassung: Die Erfindung betrifft eine Vorrichtung und ein Verfahren, mit dem der Zugang zu einem Patienten, insbesondere der Gefäßzugang bei einer extrakorporalen Blutbehandlung, überwacht werden kann. Bei der extrakorporalen Blutbehandlung wird in der arteriellen und/oder venösen Schlauchleitung (6, 7) eine Schlaufe (27) gebildet. Hierzu sind erfindungsgemäß Mittel (26) zum Fixieren eines Schlauchsegmentes der Schlauchleitung in Form einer Schlaufe vorgesehen. Bei der Beanspruchung der Schlauchleitung auf Zug zieht sich die Schlaufe so lange zusammen bis die Schlauchleitung letztlich abknickt. Die Änderung des Durchmessers der Schlauchleitung und letztlich die Entstehung eines Knicks in dem Schlauch führt zu einer Erhöhung des Drucks in der Schlauchleitung, der mit einer Drucküberwachungsvorrichtung (22) überwacht wird. Wenn der Druck einen

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Device and method for monitoring access to a patient,
in particular access to vessels during extracorporeal
blood treatment

The invention relates to a device for monitoring an access to a patient for an apparatus with which a fluid is fed to the patient or carried away from the patient via a hose line, in particular for monitoring the vascular access in an extracorporeal blood treatment, wherein a patient's blood is fed via a venous hose line, which has a venous puncture cannula or puncture needle, and is carried away from the patient via an arterial hose line, which has an arterial puncture cannula or puncture needle. Moreover, the invention relates to a blood treatment apparatus with an extracorporeal blood circuit, which has a device for monitoring the arterial and/or venous vascular access. The invention also relates to a method for monitoring a patient access.

In the field of medical technology, a large number of apparatuses are known with which fluids can be fed to a patient or fluids can be carried away from a patient via a hose line. The access to the patient generally takes place with a catheter for introduction into body organs or a cannula or needle for the puncturing of vessels. During the examination or treatment, correct access to the patient must be ensured. It is therefore necessary to monitor the patient access.

A case of application with particularly high demands on reliability of the vascular access is extracorporeal blood treatment, in which blood is carried away from the patient via an arterial hose line which has an arterial puncture cannula, the blood is passed through a dialyser and is fed back again to the patient via a venous blood line, which has a venous puncture cannula. Despite regular monitoring of the patient access by hospital staff, there is in principle the risk of the venous puncture cannula slipping out of the patient's blood vessel unnoticed. Whereas slipping-out of the arterial cannula is associated with the

sucking in of air into the arterial hose line, which leads to a visual and/or optical alarm and to interruption of the treatment on account of air being detected on the machine side, the slipping-out of the venous cannula and the free flow of blood into the surroundings feared as a result cannot be readily detected. If the slipping-out of the venous cannula is not detected immediately, however, the patient can bleed to death.

To solve this problem, a large number of different devices are known in the prior art. Some of these devices rely on safety devices provided as standard in blood treatment machines and trigger an immediate interruption of the extracorporeal blood circuit in the event of an incorrect vascular access. The safety devices provided as standard in treatment machines are generally based on monitoring the pressure in the extracorporeal blood circuit. In practice, however, it has been shown that the slipping-out of the venous puncture cannula in particular cannot be detected with sufficient reliability solely by monitoring the pressure in the extracorporeal blood circuit. Some known safety devices do have adequate sensitivity, but they react very sensitively to changes in the patient's position, and this often leads to false alarms. It is also a drawback that the existing blood treatment apparatuses cannot be readily retrofitted with the known monitoring devices, but rather the retrofitting requires expensive and cost-intensive intervention into the treatment machines.

DE 44 32 348 C2 describes a safety device for a hose line conveying blood, wound discharge or infusion, said safety device reacting to a relative change in position of the hose line. The known safety device has a magnet, which is fixed to the hose line, and a reed contact which is fixed to the patient. If the hose line is tugged, the distance between the magnet and the reed contact changes so that an alarm is triggered.

There is known from DE 199 53 068 A1 a mechanical safety device, which can be fixed for example to the blood line of a dialysis machine. The known safety device has elastically pretensioned clamping jaws, which can be held in the opened position by a locking bar fixed to the patient's body, whereby the blood line is placed between the clamping jaws. A change in position of the blood line leads to the locking bar being torn away, so that the clamping jaws pinch off the hose. This leads to a pressure increase in the

hose, which is detected by the devices for monitoring the pressure in the extracorporeal circuit, said devices being provided as standard in the known dialysis apparatuses. A drawback is that the fixing of the mechanical safety device on the one hand to the blood hose and on the other hand to the patient is complicated. Since the clamping jaws pinch off the hose line abruptly, it is not possible solely to trigger an alarm before the interruption of the blood treatment. On account of the occurring creep processes, the use of inexpensive plastics as a material for factory assembly on the blood line is also problematic. The clamping jaws should not in principle be under permanent pretensioning, but this is only the case when the clamping jaws are closed. Since the hose is pinched off when the clamping jaws are closed, the clamping jaws must however be under pretensioning. If the device is produced from inexpensive plastics, however, this could lead in the course of time, as a result of creep processes even at room temperature, to a permanent reduction in the pretensioning of the clamping jaws and thus to unfitness of the device for use.

The problem underlying the invention is to provide a device which permits reliable monitoring of a patient access, said device being easy to handle, inexpensive to produce and capable of being retrofitted at any time.

A further problem of the invention is to provide a method with which a patient access can be monitored in a straightforward manner at any time with a high degree of reliability. Moreover, a problem of the invention is to make available an extracorporeal blood treatment apparatus with a monitoring device for a patient access.

The present invention seeks to address a solution to these problems.

The device according to the invention and the method according to the invention for the monitoring of a patient access are based on the fact that a loop is formed in the fluid-conveying hose line. It is assumed that slipping-out of the puncture cannula or the catheter can be traced back to the action of tractive forces on the hose line. If the hose line is

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placed under a tractive load, the loop automatically tightens. This leads to an increased pressure loss in the hose line which can easily be detected.

The known blood treatment apparatuses already have a device for monitoring the pressure in the extracorporeal blood circuit. If the pressure exceeds preset limits, the blood treatment apparatuses can emit an alarm and/or interrupt the blood treatment. The mechanical devices required for this are present in the known blood treatment apparatuses. It is therefore only necessary to match the preset limiting values for the pressure in the extracorporeal blood circuit to the hose line used.

It is advantageous that not only can a defective patient access easily be detected, but that the formation of a loop can, as it were, weaken the transfer of tractive forces to the catheter or the cannula. If the hose is placed under tractive load, the loop first tightens, so that the tractive forces are not immediately transferred to the catheter or the cannula. Only when the loop has tightened to such an extent that the hose kinks are tractive forces transferred to the catheter or the cannula. By then, however, the protective mechanism has already started. Even a small kink is sufficient to permit an increase in the pressure loss in the hose line to be reliably detected. Moreover, it is advantageous that the dynamic pressure builds up more quickly with an increasing flow rate of the fluid. This is especially the case when the hose line is made from a flexible material that easily gives away.

If the hose length is dimensioned suitably generously and the patient is given a certain freedom of movement, only a few false alarms arise, because no tractive forces or only small tractive forces can occur on the blood hose with normal movements. In addition, it is possible for the device for supplying and carrying away the fluid not to be switched off immediately in the event of a malfunction, but merely for an alarm to be triggered. If an alarm is triggered, the hospital staff can remove the kink by returning the hose line into the loop shape without the treatment having to be interrupted.

The device according to the invention for the monitoring of a vascular access, with which an apparatus for supplying and carrying away fluids to or from a patient can at any time be retrofitted, has means for fixing a hose segment of the hose line in the form of a loop. The

invention provides for two alternative embodiments which differ from one another in that, with one embodiment, the means for fixing a hose segment of the hose line can be fitted on an existing hose line, whilst with the other embodiment the means for fixing a hose segment of the hose line are designed as a one-piece part of the catheter (puncture wing). If the patient access takes place with a catheter, the fixing means can also be a one-piece part of the catheter.

In the first alternative embodiment, the fixing means for the hose segment have a first fixing element for the detachable fixing of a first hose segment and a second fixing element for the detectable fixing of a second hose segment, whereby the first and second fixing elements are connected to one another. The two fixing elements can be designed differently. With the first fixing element, the fixing means are fixed to a hose segment of the hose line. A loop is then formed manually in the hose line, whereby the hose segment at the end of the loop is fixed with the second fixing element. The effect of this is to prevent the hose line from returning into the original shape. If the hose line is fed loosely at least in one of the two fixing elements, the loop can first tighten in the presence of a tractive load until such time as the hose line finally kinks.

In a preferred embodiment, the first fixing element has a clamp, with which the hose segment can preferably be fixed in a clamped fashion. The diameter of the opening of the clamp is preferably slightly smaller than the diameter of the hose line, so that the hose line can easily be fixed in a clamped fashion, but without the hose being pressed together. In a further preferred embodiment, the second fixing element has an eyelet, through which the hose segment can be passed. Since the hose segment is fed loosely in the eyelet, the loop of the hose line is able to tighten under tractive load.

A further particularly preferred embodiment makes provision such that the hose line is not passed through the eyelet, but can be placed into the eyelet from the side. For this purpose, the hose is slightly pinched together when it is placed into the eyelet.

To advantage, slipping-out of the hose line from the eyelet is prevented by the fact that the eyelet can be closed with a snap lock.

It has proved to be advantageous for the loop to be formed directly behind the puncture cannula or the catheter, since the hose line is generally subjected at this point to lesser demands in the form of changes in the patient's position.

The alternative embodiment, wherein the means for the fixing of a hose segment of the hose line are a one-piece part of the catheter (puncture wing), has a fixing element for the detachable fixing of a hose segment of a hose line, which either is connected or can be connected to the puncture cannula. The loop can be formed simply by the fact that the hose segment behind the puncture cannula is formed into a loop and the hose segment lying behind the loop is fixed with the fixing elements. The fixing element is preferably designed in such a way that the hose segment can be fixed detachably. It is however also possible in principle for the loop not to be formed manually behind the puncture cannula, but rather for the hose line to form a loop permanently at the catheter (puncture wing).

The fixing elements for the hose segment are preferably an eyelet, through which the hose segments can be passed, so that the loop can pull tight in the presence of tractive loading. The eyelet is preferably capable of being splayed apart so that the hose line can be inserted. It can be designed for example as a clip or suchlike for the hose line.

Various examples of embodiment of the invention are explained in greater detail below by reference to the drawings.

In the figures:

Fig. 1 shows the essential components of a haemodialysis apparatus together with the device according to the invention for the monitoring of the patient access in a very simplified diagrammatic representation,

Fig. 2 shows a first example of an embodiment of the device according to the invention in a perspective view,

Fig. 3 shows the device from fig. 2 together with a puncture cannula and a hose line, whereby the hose line has not been subjected to tractive load,

Fig. 4 shows the device from fig. 2, whereby the hose line has been subjected to tractive load,

Fig. 5 shows a second example of embodiment of the device according to the invention in a perspective view,

Fig. 6 shows a further example of embodiment of the device according to the invention in a perspective view,

Fig. 7 shows the device from fig. 6 together with a hose line in a perspective view, and

Fig. 8 shows a further view of the device from fig. 6 in a perspective view.

Fig. 1 shows the essential components of a haemodialysis apparatus, which has a device for monitoring a venous vascular access. The haemodialysis apparatus has a dialyser 1, which is divided by a semipermeable membrane 2 into a blood chamber 3 and a dialysing fluid chamber 4. Connected to one of the patient's arteries by means of an arterial puncture cannula 5 is an arterial hose line 6, which leads to the inlet of blood chamber 3 of the dialyser. Departing from the outlet of blood chamber 3 of dialyser 1 is a venous hose line 7, which is connected by means of a venous puncture cannula 8 to one of the patient's veins. Arterial hose line 6 is inserted into an occluding blood pump 9, which conveys the blood in extracorporeal blood circuit I.

Dialysing fluid circuit II of the haemodialysis apparatus includes a dialysing fluid source 10, to which a dialysing fluid supply line 11 is connected, which leads to the inlet of dialysing fluid chamber 4 of the dialyser. Departing from the outlet of dialysing fluid chamber 4 of dialyser 1 is a dialysing fluid discharge line 12, which leads to a drain 13. A dialysing fluid pump 14 is incorporated into dialysing fluid discharge line 12.

The control of the dialysis apparatus is assumed by a central control unit 15, which controls blood and dialysing fluid pumps 9, 14 via control lines 16, 17. Central control unit 15 is connected via a data line 18 to an alarm unit 19, which in the event of a malfunction emits an optical and/or acoustic alarm.

Located on venous hose line 7 downstream of blood chamber 3 of dialyser 1 is an electromagnetically actuatable hose clamp 20, which is closed via a further control line 21 by central control unit 15 if the venous puncture cannula (needle) slips out of the vascular access. Furthermore, control unit 15 stops blood pump 9 after the slipping-out of the cannula.

In order to monitor the pressure in the arterial hose line, the dialysis apparatus has a monitoring device 22, which is connected via a data line 23 to a pressure sensor 24 which measures the pressure in venous hose line 7. Pressure monitoring device 22 communicates with central control unit 15 via a further data line 25.

The device for monitoring the venous vascular access has means 26, described in detail below, for fixing a hose segment of venous hose line 7 in the form of a loop 27. The loop is formed upstream of venous puncture cannula 8 preferably on a segment of the hose line in which the hose line still lies next to the patient's body, for example on his lower arm.

During the dialysis treatment, venous hose line 7 is not subjected to tractive load. Pressure monitoring device 22 measures a pressure P in the venous hose line that lies within preset limits. The typical venous pressures lie at approx. 100 to 200 mmHg. It will be assumed that pressure measuring device 22 measures a venous pressure of 150 mmHg. With such pressure conditions, a limiting-value window with a width of 100 mmHg is defined, whereby the lower limiting value for the pressure lies at 100 mmHg and the upper limiting value at 200 mmHg. If the measured pressure lies above or below the preset limits of 100 and 200 mmHg, central control unit 15 triggers an optical and/or acoustic alarm.

If tugging occurs on venous hose line 7 upstream of loop 27, there is the risk of puncture cannula 8 slipping out of the patient's vein. If this remains unnoticed, the patient's life is

at risk. The pressure drop in the venous hose line due to loss of internal pressure in the patient access of about 15 to 25 mmHg may not however lead to the lower limiting value for the venous pressure of 100 mmHg being fallen below, so that the slipping-out of the venous puncture cannula is not detected without the monitoring device according to the invention.

However, since the hose line forms a loop above the puncture cannula, the slipping-out of the puncture cannula leads to the triggering of an alarm and/or the interruption of the blood treatment. If tugging occurs on venous hose line 7, loop 27 is first tightened, so that the tractive force can first be "buffered". Further tractive loading, however, leads to a situation where loop 27 is tightened until such time as the hose finally kinks. Since the blood dams up at the kinking point, the venous pressure in the hose line upstream of the kinking point increases. The dynamic pressure depends on the remaining open cross-section of the kinked hose segment at the kinking point and on the blood flow. Pressure measuring device 22 measures the dynamic pressure before the kinking point by means of pressure sensor 24 arranged upstream of loop 27. Within a short time, approx. 1 to 2 seconds, the pressure rises from 150 mmHg on account of the narrowing at the kinking point, as a result of which the upper limiting value of 200 mmHg for the venous pressure is exceeded. Consequently, central control unit 15 triggers an alarm and interrupts the blood treatment by closing venous hose clamp 20 and stopping blood pump 9.

Various limiting values of differing level can be defined for the monitoring, so that it can be deduced whether the puncture cannula risks slipping out of the vascular access or has partially or completely slipped out. Various preliminary alarms or alarms can be triggered when the individual limiting values are exceeded.

Since, when the loop is tightened, a significant change in pressure occurs only relatively late, i.e. only when the kink formation occurs, it must be ensured that the hose line does actually kink. It is advantageous to assist this by a constructional or structural anisotropy of the hose line, whereby the shape and/or the constitution of the material of the hose at the kinking point is changed so as to diverge from the shape and/or constitution of the material outside the kinking point. Thus, for example, a predetermined kinking point can be

created by the fact that the hose wall is designed thinner or for example diverges from the round cross-sectional shape. Thus, the round hose line can have, for example, an elliptical cross-section at the kinking point.

A first example of embodiment of the means by which a loop can be formed in a straightforward manner in the hose line is described in the following. These fixing means can be fitted at any time to the existing hose line of a conventional dialysis machine, which generally already has a pressure monitoring device that reacts when preset limiting values are exceeded and/or fallen below.

Fig. 2 shows fixing means 26 in perspective view without a venous hose line, whilst figures 3 and 4 show fixing means 26 together with the venous hose line, whereby the hose line in fig. 3 has not been subjected to tractive load and the hose line in fig. 4 has been subjected to tractive load.

Fixing means 26 have two fixing elements 28, 29 for venous hose line 7. The two fixing elements 28, 29 are arranged in such a way that the hose segments of the hose line held by the latter run parallel to one another. With first fixing element 28, fixing means 26 are fitted on a hose segment 7A of venous hose line 7 that lies upstream of venous puncture cannula 8, preferably directly before the puncture cannula. First fixing element 28 is a plastic injection-moulded part, which is formed in the manner of a clamp 30 into which hose segment 7A can be inserted. Clamp 30 has a central opening 31, the diameter whereof is slightly smaller than the diameter of hose segment 7A, so that the hose segment can be held in a clamped fashion by the clamp. Clamp 30 surrounds hose segment 7A as far as an upper gap 33 through which the hose segment is pushed, as a result of which the clamp can easily be splayed apart. In order to fix the fixing means to the hose line, however, two parallel legs can be provided instead of a clamp, the spacing of which legs is slightly smaller than the diameter of the hose line, so that the hose line can be fixed easily in a clamped fashion between the legs.

Formed on first fixing element 28 is a second fixing element 29, which holds another hose segment 7B of venous hose line 7 when the hose line forms a loop 27. Second fixing

element 29 is designed as an eyelet, which can be opened or closed. Eyelet 29 is a plastic injection-moulded part with a lower arc-shaped part 35 and an upper arc-shaped part 36. Lower and upper arc-shaped parts 35, 36 each have a locking hook 37, 38, which engage with one another in a snap-in fashion when lower and upper parts 35, 36 are pressed together.

Upper arc-shaped part 36 is bent upwards for the insertion of hose segment 7B, so that the hose segment can be inserted into the gap between upper and lower parts 35, 36 into eyelet 29. The eyelet is then closed by pressing together the upper and lower parts, so that hose segment 7B is secured captively in the eyelet. The hose segment lies loosely in the eyelet, so that the loop can tighten when tugging occurs on the hose line. If tugging occurs on hose line 7, the loop tightens until the hose line kinks. The kinking point is provided with reference number 39 in fig. 4.

Fig. 5 shows in perspective view a further example of embodiment of fixing means 40, which have two eyelets 53, 54 connected together, one of which accommodates first hose segment 7A and the other second hose segment 7B. The two eyelets cannot be closed, but hold the respective hose segment fast in a slightly clamped fashion. Whereas end pieces 55 of the one eyelet 53 point inwards, end pieces 56 of other eyelet 54 point outwards. The end pieces of both eyelets, however, can also point inwards or outwards respectively. The end pieces pointing outwards have the advantage that the eyelet can be more easily splayed apart and the hose line inserted more easily.

Figures 6 to 8 show perspective views from different directions of further alternative embodiments of fixing means 41. This embodiment differs from the examples of embodiment described by reference to figures 2 to 5 by the fact that the fixing means are designed as a puncture wing 41. The puncture wing according to the invention differs from a conventional rotary wing cannula by the fact that the puncture wing has a fixing element 42 for the detachable fixing of a hose segment 7B of a hose line 7 connected or connectable to the cannula. Puncture wing 41 has a cannula needle 57 with a ground-section opening 43 and a hose connection piece 44, to which hose line 7 is firmly connected, for example glued or welded. For the connection of the hose line, hose

connection piece 44 and the end of the hose line can however also be provided with suitable connectors. Fig. 6 does not show the puncture cannula which is inserted into the hose connection piece.

Hose connection piece 44 has a cylindrical body 45 for receiving the hose end piece, on which a wing 46, 47 is formed on both sides. Fixing element 42 is connected to cylindrical body 45 of hose connection piece 44. Fixing element 42 is an eyelet which can be splayed apart and into which hose segment 7B of hose line 7 can be pushed from the side after the formation of loop 27. The eyelet comprises two arc-shaped plastic pieces 48, 49, which are formed at the side on the hose connection piece and each end in a leg 50, 51 bent off at an angle. After formation of loop 27, hose line 7 is inserted through gap 52 between the two legs 50, 51 from the side into the eyelet, in which the line is secured against slipping out. The hose line is again passed loosely in the eyelet, so that the loop can tighten and kink under tractive loading.

The reference in this specification to any prior publication (or information derived from it), or to any matter which is known, is not, and should not be taken as, an acknowledgement or admission or any form of suggestion that prior publication (or information derived from it) or known matter forms part of the common general knowledge in the field of endeavour to which this specification relates.

Throughout this specification and the claims which follow, unless the context requires otherwise, the word "comprise", and variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated integer or step or group of integers or steps but not the exclusion of any other integer or step or group of integers or steps.

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Patent Claims

1. A device for monitoring an access to a patient for an apparatus with which a fluid is fed to the patient or carried away from the patient via a hose line, whereby the pressure in the hose line is monitored, in particular for the monitoring of the vascular access in an extracorporeal blood treatment, in which a patient's blood is fed to the patient via a venous hose line which has a venous puncture cannula, and is carried away from the patient via an arterial hose line which has an arterial puncture cannula,
the device for the monitoring of the patient access including a device for monitoring the pressure in the hose line which is configured such that it is concluded that there is an incorrect patient access when there is a change in pressure,
characterised in that
the device for the monitoring of the patient access has means for the fixing of a hose segment of the hose line in the form of a loop , so that the loop can tighten when the hose line is subjected to tractive loading, and
the device for monitoring the pressure in the hose line is configured such that it is concluded that there is an incorrect patient access if there is a change in the pressure within preset limits on account of a tractive loading of the hose line.
2. The device according to claim 1, characterised in that the means for the fixing of a hose segment of the hose line in the form of a loop has a first fixing element for the detachable fixing of a first hose segment of the hose line and a second fixing element for the detachable fixing of a second hose segment of the hose line, whereby the first and second fixing elements are connected together.
3. The device according to claim 2, characterised in that the first fixing element for the fixing of the first hose segment has a clamp into which the hose segment can be inserted.
4. The device according to claim 3, characterised in that the clamp has a gap for the

insertion of the hose segment.

5. The device according to any one of claims 2 to 4, characterised in that the second fixing element for the detachable fixing of the second hose segment is an eyelet through which the hose segment can be passed.
6. The device according to claim 5, characterised in that the eyelet can be opened for the insertion of the hose line.
7. The device according to claim 6, characterised in that the eyelet can be closed with a snap lock.
8. The device according to claim 1, characterised in that the means for the fixing of a hose segment of the hose line is designed as a catheter, to which a hose line is or can be connected.
9. The device according to claim 8, characterised in that the catheter has a fixing element for the detachable fixing of a hose segment of a hose line connected or connectable to the catheter.
10. The device according to claim 9, characterised in that the catheter has a hose connection piece, whereby the fixing element is a one-piece part of the hose connection piece.
11. The device according to claim 9 or 10, characterised in that the fixing element is designed as an eyelet, through which the hose segment of the hose line can be passed.
12. The device according to claim 11, characterised in that the eyelet can be splayed apart for the insertion of the hose segment of the hose line.
13. The device according to any one of claims 1 to 12 with a hose line for supplying a fluid to a patient or carrying a fluid away from a patient, characterised in that the hose line is designed with a predetermined kinking point.

14. The device according to claim 13, characterised in that the wall of the hose line has a smaller thickness in the region of the predetermined kinking point.
15. The device according to claim 13, characterised in that the hose line has a round cross-section with the exception of the region of the predetermined kinking point, whereby the hose line has a non-round cross-section in the region of the predetermined kinking point.
16. A method for monitoring an access to a patient for supplying or carrying away a fluid to or from the patient via a hose line, whereby the pressure in the hose line is monitored, characterised in that a loop is formed in the hose line and that it is concluded that there is an incorrect patient access when there is a change in the pressure within preset limits on account of a tractive loading of the hose line.
17. A blood treatment apparatus with an extracorporeal blood circuit, which has an arterial hose line with an arterial puncture cannula and a venous hose line with a venous puncture cannula, and with a device for monitoring the pressure in the arterial and/or venous hose line, characterised in that the blood treatment apparatus has a device according to any one of claims 1 to 15, whereby the device for monitoring the pressure in an arterial or venous hose line is designed in such a way that it is concluded that the venous and/or arterial puncture cannula has slipped out if there is a change in the pressure within preset limits on account of a tractive loading of the arterial and/or venous hose line.
18. A device for monitoring an access to a patient for an apparatus with which a fluid is fed to the patient and carried away from the patient via a hose line, substantially as herein described with reference to the accompanying drawings.
19. A method for monitoring an access to a patient for supporting or carrying away a fluid to or from the patient via a hose line, substantially as herein described.
20. A blood treatment apparatus with an extracorporeal blood circuit substantially as herein described with reference to the accompanying drawings.

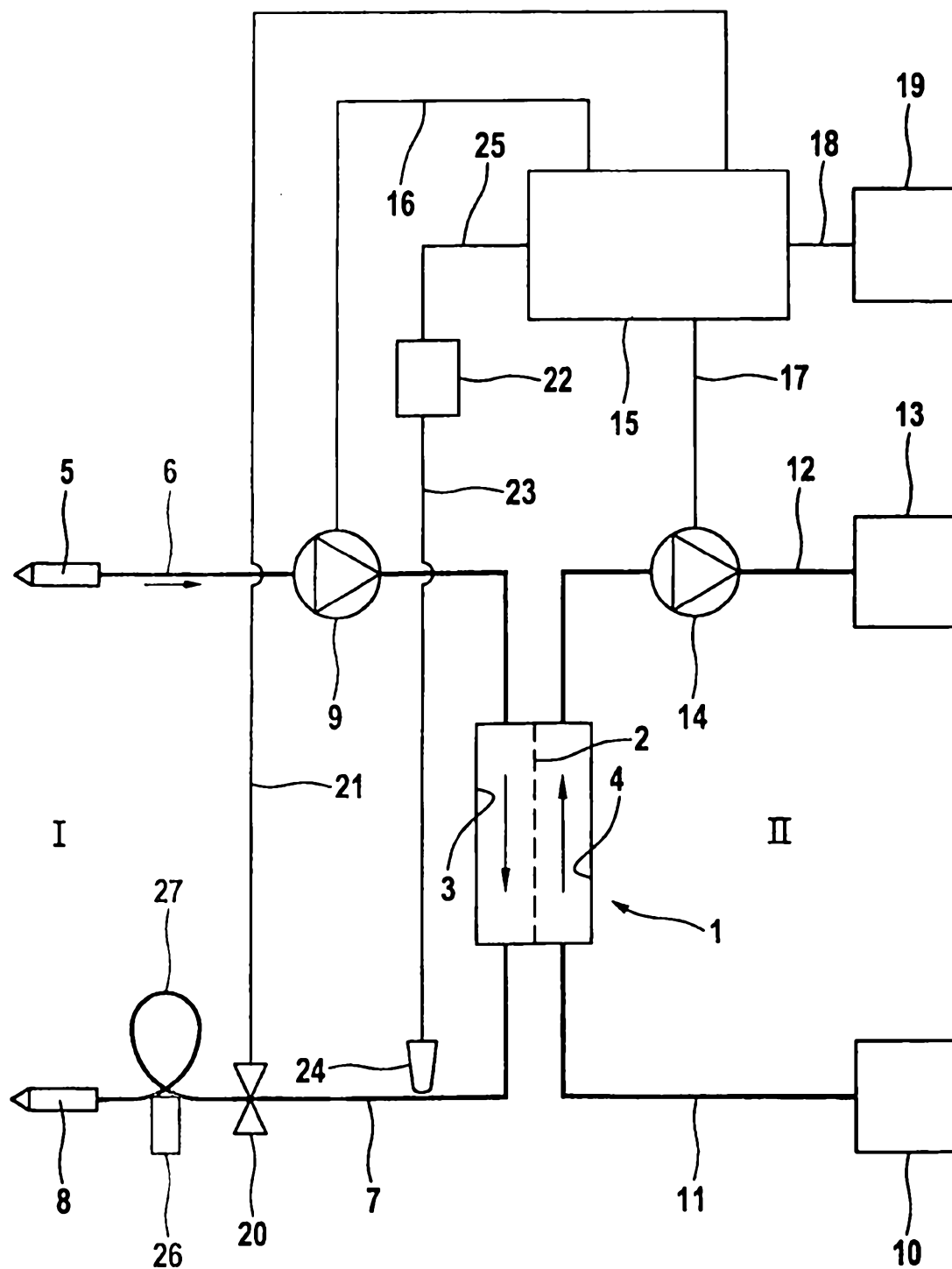


Fig. 1

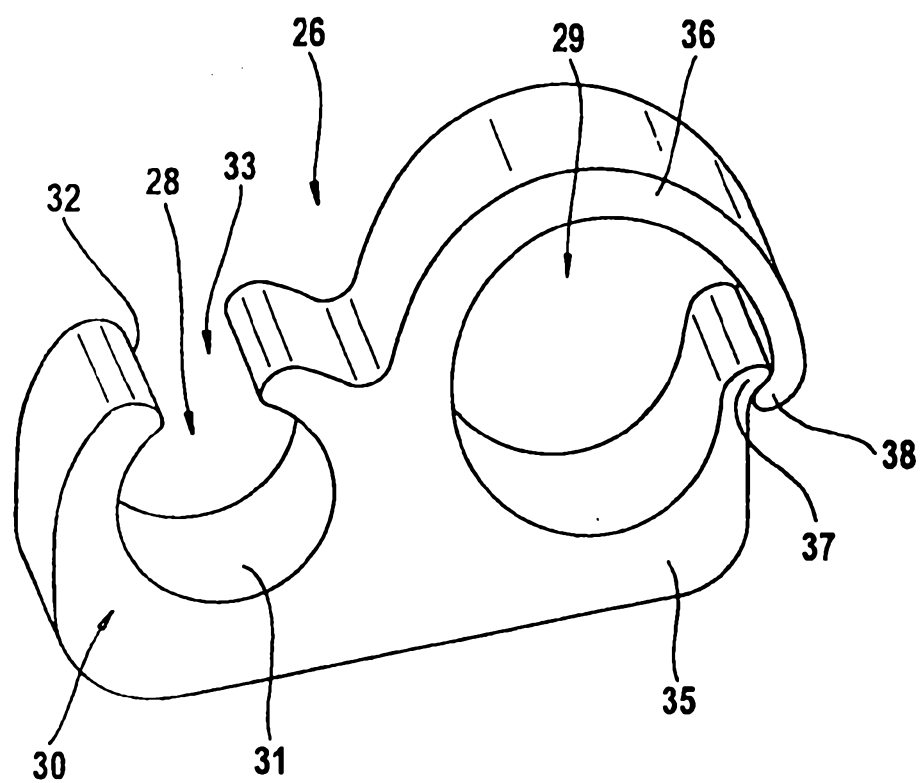


Fig. 2

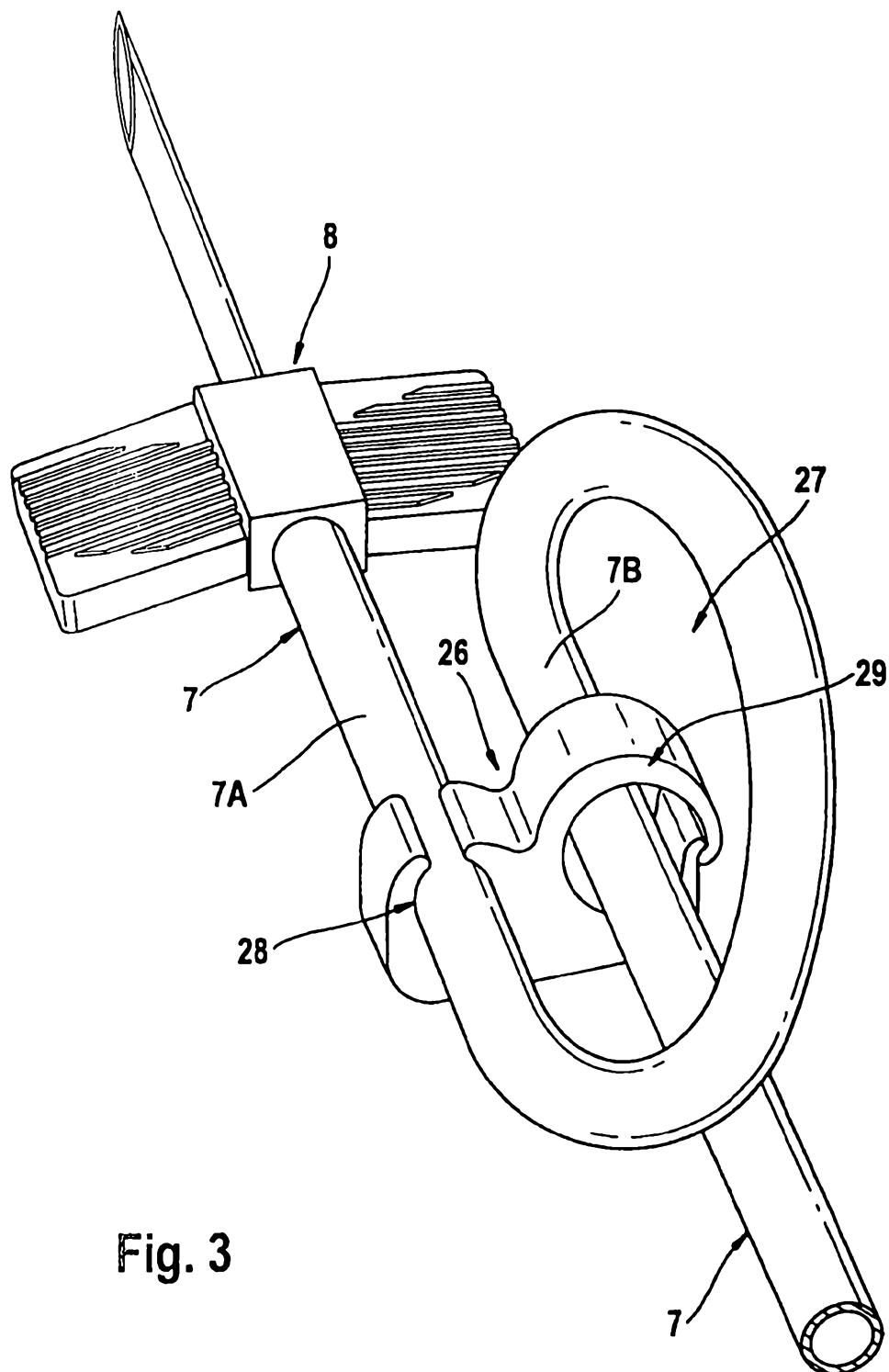


Fig. 3

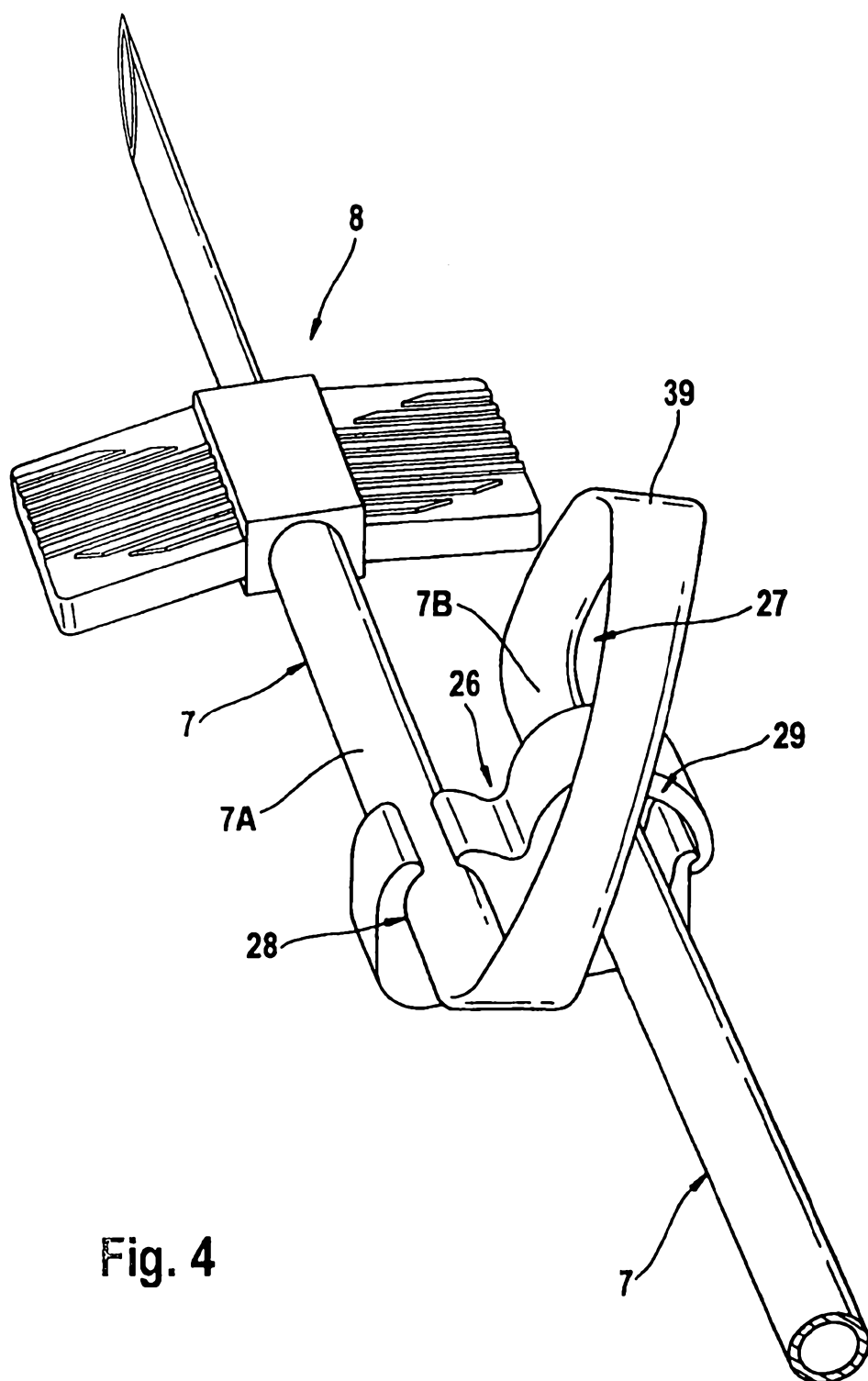


Fig. 4

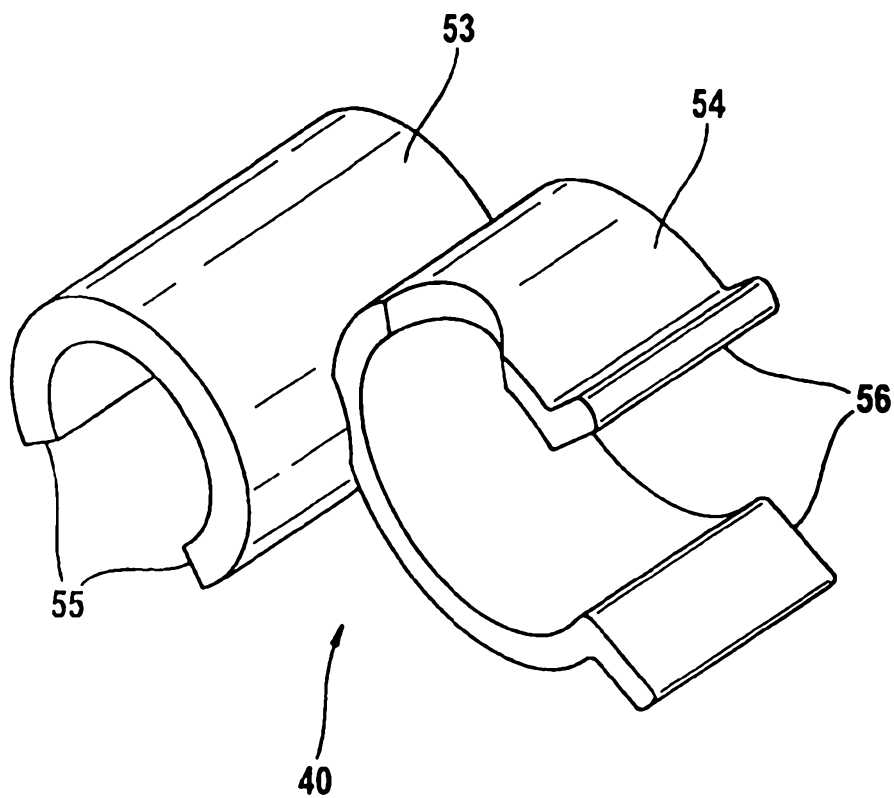


Fig. 5

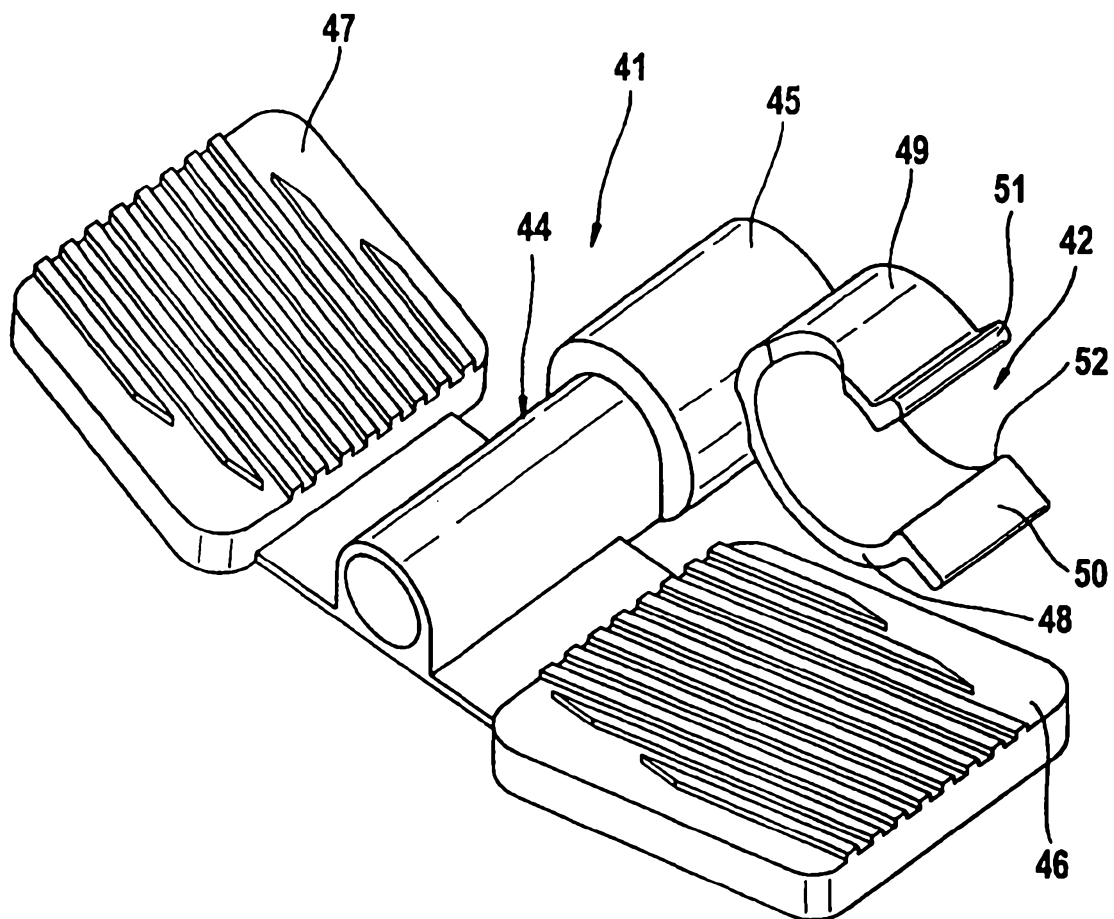
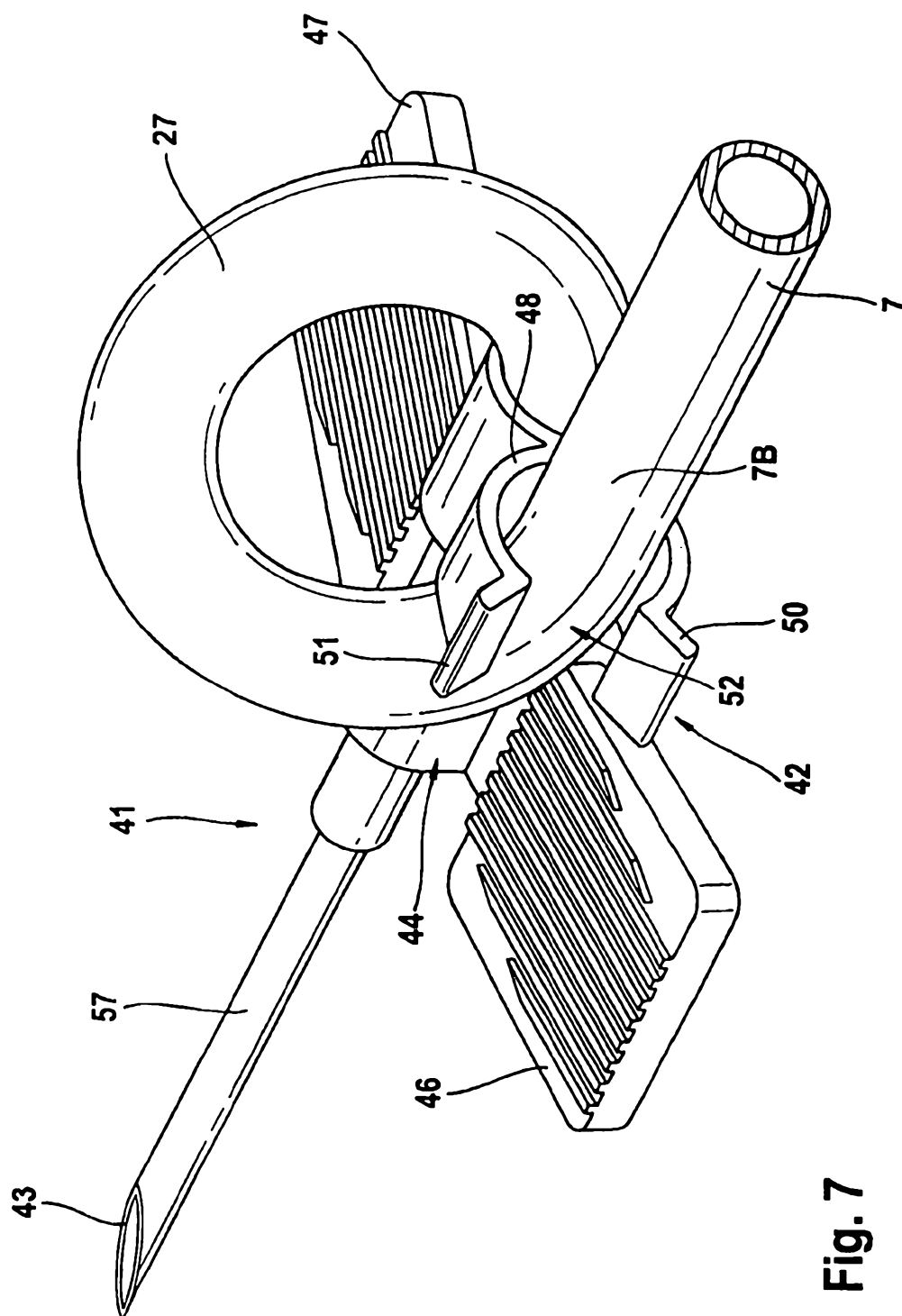


Fig. 6



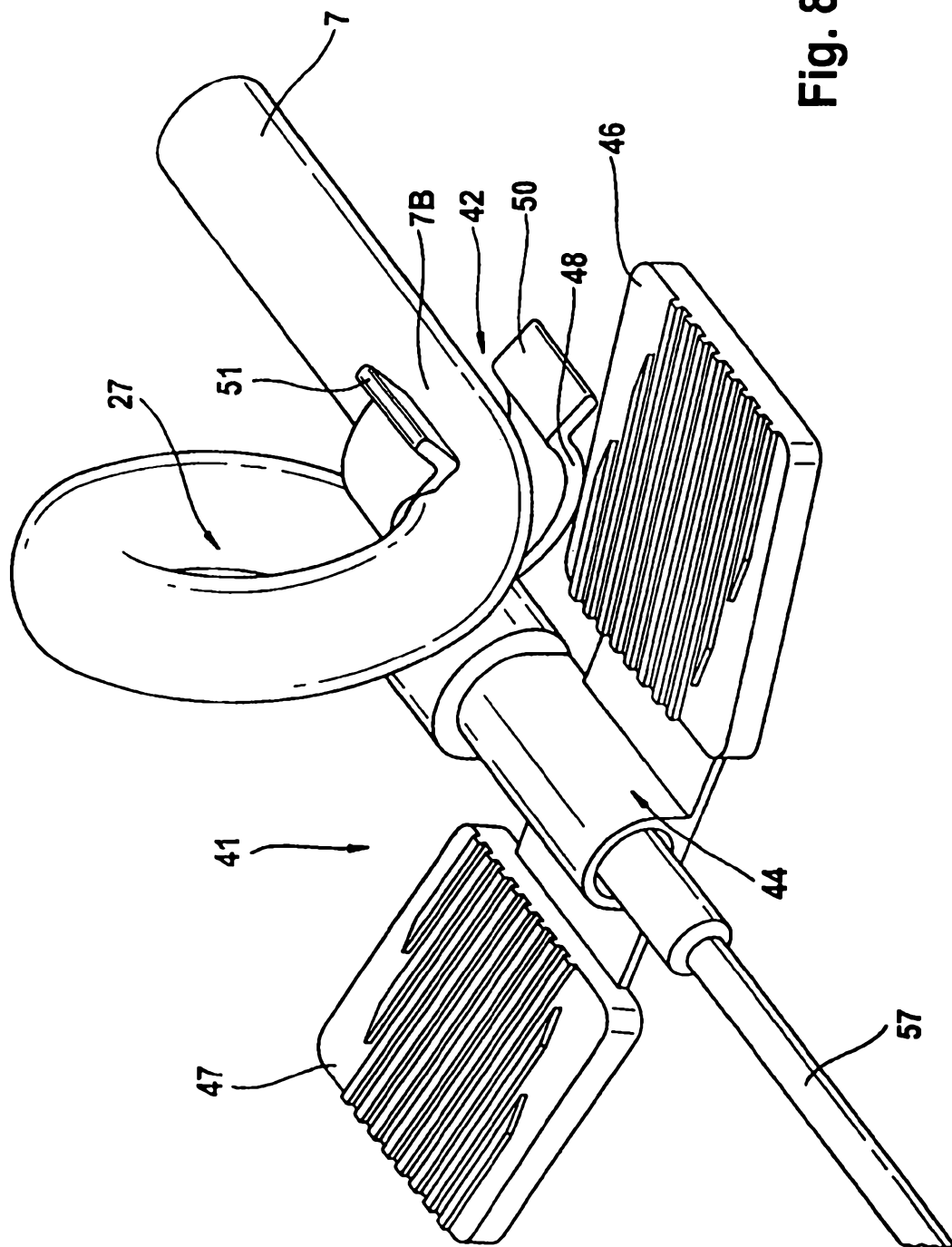


Fig. 8