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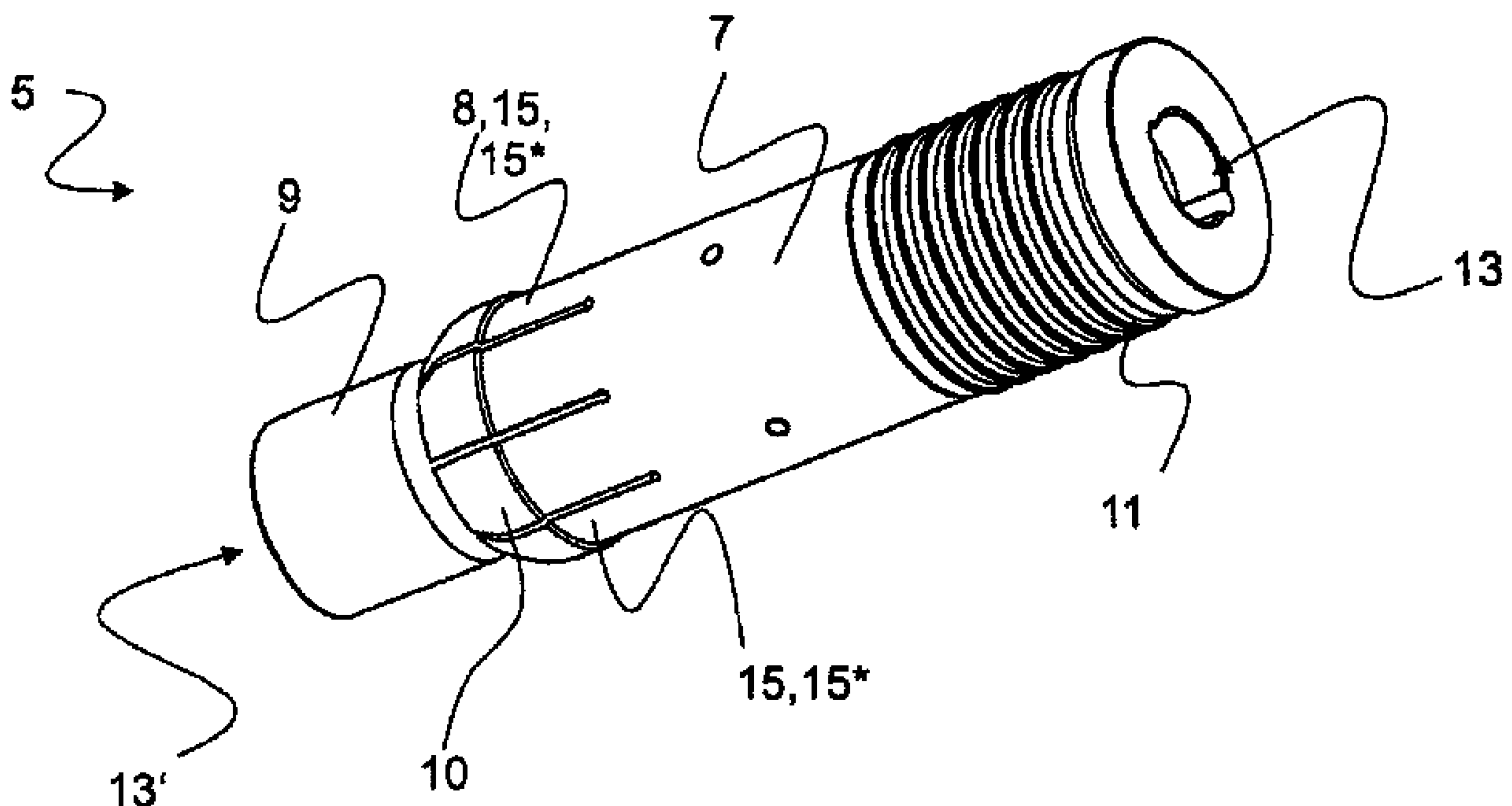
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(54) **Titre : SYSTEME D'EXTRACTION DE MILIEUX LIQUIDES A PARTIR D'UN FORAGE AINSI QUE PROCEDE D'INSTALLATION D'UN ENSEMBLE DE POMPAGE REALISE SOUS LA FORME D'UNE POMPE A VIS EXCENTREE DANS UN FORAGE**
(54) **Title: SYSTEM FOR PUMPING LIQUID MEDIA FROM A BORE AND METHOD FOR INSTALLING A PUMP UNIT DESIGNED AS A PROGRESSIVE CAVITY PUMP IN A BORE**



(57) **Abrégé/Abstract:**

The invention relates to a system for pumping liquid media from a bore. The system comprises a riser pipe, which extends at least approximately in a longitudinal direction of the bore, and a pump unit, which is accommodated in the riser pipe and which has a stator and a rotor. The system also comprises a drive train connected to the rotor for eccentrically moving the rotor. The system also comprises an adapter unit, which is connected to the stator and which holds the stator substantially stationary in the riser pipe by means of clamping contact with the riser pipe. The invention further relates to a method for installing a pump unit designed as a progressive cavity pump in a bore.

ABSTRACT

The invention relates to a system for pumping liquid media from a bore. The system comprises a riser pipe, which extends at least approximately in a longitudinal direction of the bore, and a pump unit, which is accommodated in the riser pipe and which has a stator and a rotor. The system also comprises a drive train connected to the rotor for eccentrically moving the rotor. The system also comprises an adapter unit, which is connected to the stator and which holds the stator substantially stationary in the riser pipe by means of clamping contact with the riser pipe. The invention further relates to a method for installing a pump unit designed as a progressive cavity pump in a bore.

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System for pumping liquid media from a bore and method for
installing a pump unit designed as a progressive cavity
pump in a bore

The invention relates to a system with an adapter unit for pumping liquid media from a bore. The invention also relates to a method for installing a pump unit designed as a progressive cavity pump in a bore.

Prior art

In the case of existing bores, such as can be connected to reciprocating pumps for pumping liquids, removal of the entire pump unit together with all the components takes place when the pump is replaced by another kind of pump. Such a replacement is always time-consuming and associated with high costs.

In particular, the switch from reciprocating pumps to progressive cavity pumps is generally technically complex. This is the case, because a producer-specific mounting has to be used for the anchoring of usable progressive cavity pumps according to the present state of the art. The installation of these producer-specific mountings, however, requires the removal of the entire riser pipe together with the mounting located thereon and the replacement of the different mounting devices.

The problem of the invention, therefore, is to make available a system and a method with which the replacement of a pump connected to a bore by a progressive cavity pump can take place without the original piping of the riser pipe having to be replaced. The system and the method should be designed simple and capable of being implemented without a large cost outlay.

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Summary

Certain exemplary embodiments can provide a system or pumping liquid media from a bore, comprising: a riser pipe, which extends at least approximately in a longitudinal direction of the bore, a pump unit accommodated in the riser pipe with a stator, a rotor and a drive train connected to the rotor for eccentrically moving the rotor, and an adapter unit, which is connected to the stator and which holds the stator substantially stationary in the riser pipe by means of a clamping contact with the riser pipe, wherein the system the adapter unit comprises a partial region with an increased cross-sectional diameter (D_{15}) and at least one spring element, which is brought into clamping contact with the riser pipe and/or with a locating sleeve disposed in the riser pipe.

Certain exemplary embodiments can provide a method for installing a pump unit designed as a progressive cavity pump in a bore, comprising the following steps: uninstalling a pump device in an operative connection with the bore and removal of the pump device from the bore, a riser pipe remaining in the bore, fastening of an adapter unit or parts of an adapter unit to the free end of a pump unit designed as a progressive cavity pump, introduction of the pump unit with the adapter unit disposed thereon into the riser pipe, wherein the adapter unit is brought into contact in a clamping manner with a locating sleeve of the riser pipe, so that the pump unit is held substantially stationary in the riser pipe by the adapter unit.

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Description

The invention relates to a system for pumping liquid media from a bore. The system comprises a riser pipe, which extends at least approximately in a longitudinal direction of the bore. The riser pipe is accommodated at least in sections in the bore. As provided by the defined problem, the riser pipe is already installed in the bore when the pump unit is installed, which will be described in greater detail below. The riser pipe comprises a plurality of pipe sections, which are connected to one another free from interruption by connecting sleeves.

Furthermore, a pump unit accommodated in the riser pipe is present. The pump unit comprises a stator with a rotor and a drive train for eccentrically moving the rotor, said drive train being connected to the rotor. The pump unit is thus constituted as a progressive cavity pump, by means of which liquid medium can be pumped in the direction of the bore opening by means of delivery chambers resulting from a rotary motion of the rotor.

In order to ensure stable anchoring of the progressive cavity pump, the system can comprise an anti-rotation device. The anti-rotation device can be connected fixedly to the riser pipe, or can be clamped in the riser pipe. The anti-rotation device is preferably disposed vertically beneath the pump unit.

Furthermore, an adapter unit is provided, which is connected to the stator and which holds the stator

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substantially stationary in the riser pipe by means of a clamping contact with the riser pipe.

According to a preferred embodiment, the adapter unit, or parts of the adapter unit, comprises at least one partial region with an increased cross-sectional diameter. Disposed in the partial region with the increased cross-sectional diameter is at least one, preferably a plurality of spring elements. The adapter unit is brought into contact with the riser pipe and/or with a so-called locating sleeve integrated into the riser pipe in a clamping manner by means of the partial region with the increased cross-sectional diameter, in particular by means of the spring elements. The locating sleeve is introduced for example before the adapter unit into the riser pipe and integrated into the latter.

According to an embodiment, the spring elements are constituted as elastic and/or spring-loaded tongues, which are connected to the riser pipe in a clamping manner. The adapter unit can preferably comprise a plurality of such elastic tongues, which extend at an identical distance away from the adapter unit or from a part of the adapter unit. The elastic tongues can be produced integral with the adapter unit or with the respective part of the adapter unit in the injection moulding process or another suitable forming process. In the relaxed state, the tongues can be orientated at least approximately parallel to one another.

According to a preferred embodiment, a so-called catch-type connection is constituted between the adapter unit and the riser pipe. In particular, the adapter unit sits fixedly in a press fit by means of a catch-type connection between the spring-loaded tongues and the riser pipe, wherein the outer lateral surfaces of the integrated sealing element are pressed against the inner surface of the standardised locating sleeve of the riser pipe. The stator fixed to the

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adapter unit is thus held substantially stationary in the riser pipe.

The adapter unit preferably provides centring, sealing and guidance for the drive train of the new pump unit. In various embodiments, the adapter unit is constituted as a hollow body, wherein the drive train extends completely through the adapter unit. In particular, embodiments have been tried and tested in which the adapter unit or parts of the adapter unit are constituted as hollow cylinders. During its pumping out of the bore, the liquid medium passes through the adapter unit. The adapter unit is preferably constituted by a metal, a plastic with an integrated sealing element or another suitable material. The integrated sealing element advantageously comprises an elastomer. The adapter unit can expediently lie flush at least in sections against the inner side of a standardised locating sleeve in the riser pipe for the purpose of its clamping and for sealing the delivery chambers.

Once the pump unit and the adapter unit are installed in the riser pipe, it may be that the adapter unit is disposed vertically beneath the pump unit. In further embodiments, it is also conceivable for the adapter unit to be disposed vertically above the pump unit. The arrangement of the adapter unit above or below the newly introduced pump unit is in particular dependent on the diameter of the existing bore and accordingly on the diameter of the piping of the riser pipe.

For the assembly of a new pump unit in the riser pipe, the adapter unit or parts of the adapter unit are for example coupled with a downwardly pointing or upwardly pointing free end of the stator or placed on the free end of the stator. During the installation, the partial region of the adapter unit with the increased cross-sectional diameter and the spring elements is brought into clamping contact

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with the riser pipe and/or with a locating sleeve of the riser pipe. In particular, the spring elements are pressed inwards during the passage of the adapter unit through a narrow point in the riser pipe. After passing the narrow point, the spring elements spring back and clamp the adapter unit securely in the riser pipe.

In order to connect the pump unit in a substantially stationary and clamping manner with the respective riser pipe, provision can be made such that the adapter unit is coupled with a downwardly pointing or an upwardly pointing end of the stator. For this purpose, the adapter unit or parts of the adapter unit can enter at least in sections into the stator or sit on the stator.

According to an embodiment of the invention, provision is made such that the respective free end of the stator on which the adapter unit sits tapers at least in sections in the direction away from the stator. The free end of the stator on which the adapter unit sits can for example be constituted conical and/or with a thread. The adapter unit comprises a correspondingly constituted locating region, in which the free end of the stator can be accommodated in a form-fit and/or friction-locked manner and/or in which the free end of the stator can be securely fixed. For example, the locating region is constituted as an inner thread corresponding to the outer thread of the stator.

In particular, embodiments have been tried and tested in practice wherein the adapter unit or wherein parts of the adapter unit sit on the respective free end of the stator of the progressive cavity pump and wherein the maximum cross-sectional diameter of the adapter unit is constituted enlarged for its clamping connection with the standardised locating sleeve of the riser pipe. According to an embodiment of the invention, the adapter unit or parts of

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the adapter unit can be splayed out over the stator of the progressive cavity pump.

The adapter unit can expediently comprise a perforation extending in a longitudinal direction of the adapter unit, said perforation being aligned with the stator in the pumping direction of the liquid medium. The perforation can lengthen the stator. The liquid medium can be pumped via the perforation of the adapter unit.

In particularly preferred embodiments, the outer lateral surface of the adapter unit is constituted by an elastomer at least in sections and preferably all around the circumference. The elastomer, or the outer lateral surface constituted at least in sections by an elastomer, serves here to increase the adhesive friction between the riser pipe and the adapter unit.

In addition, it may be the case that a seal is constituted by an outer lateral surface of the adapter unit constituted by an elastomer preferably all around the circumference and its contact with the riser pipe. In order to be able to constitute the sealing function and the clamping effect in the optimum manner, provision can also be made such that the outer lateral surface constituted by an elastomer at least in sections and preferably all around the circumference comprises groove-shaped profiling.

According to a further preferred embodiment, the adapter unit is constituted in two parts and comprises a first, female part and a second, so-called male part. As described above, the second part of the adapter unit can sit on the stator in an essentially form-fit manner. In particular, the second part preferably comprises at the free end lying opposite the tapered cross-section a locating region for the free end of the stator. The locating region is

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preferably constituted corresponding to the shape of the free end of the stator.

Furthermore, the cross-section of the second part tapers pointing in the direction of the first part.

The first part preferably comprises the partial region of the adapter unit with the increased cross-sectional diameter and the spring elements; in particular, the first part can comprise a plurality of elastic tongues pointing in the direction of the second part, said tongues together forming the increased cross-sectional diameter at least in sections.

After assembly, the first, female part of the adapter unit is fixedly clamped in the riser pipe; in particular, the first part is brought, by means of the spring elements or tongues, into contact with the riser pipe and/or the locating sleeve in a clamping manner in the region of a locating sleeve or adjacent to a locating sleeve. The second part sits in a form-fit and/or friction-locked manner on the free end of the pump unit, which is connected to the rod string. The second part of the adapter unit is preferably fastened to the free end of the pump unit. The first part and second part of the adapter unit are connected together in a clamping manner during the assembly. The drive shaft can expediently extend through the first part and the second part. For the purpose of clamping and for sealing of the delivery chambers, the first part of the adapter unit preferably lies flush against a standardised locating sleeve of the riser pipe that forms a narrow point.

According to an embodiment of the invention, the first part of the adapter unit comprises so-called tongues or catches. The second part of the adapter unit sitting on the pump unit, in particular the free end region with a tapered

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cross-section, is inserted into an internal space of the first part of the adapter unit limited by the tongues or catches and is fixedly accommodated in a press fit. In addition, the second part can be anchored rotationally fixed with the first part by means of a rotation. Furthermore, the outer lateral surfaces of the tongues or catches of the first part and of the integrated sealing element are pressed against the inner surface of the standardised locating sleeve of the riser pipe and hold the stator substantially stationary in the riser pipe.

According to the embodiment of the invention with an adapter unit constituted in two parts, the first part and the second part of the adapter unit each comprise a perforation, wherein the perforation of the first part and the perforation of the second part are aligned with one another. The two-part adapter unit also provides centring, sealing and an axial guide for the drive train of the new pump unit.

If a pump unit is to be installed in a bore which was not equipped with a reciprocating pump, provision can be made such that, in a first step, the standardised locating sleeve is introduced into the respective riser pipe. In a further and subsequent step, the pump unit can then be introduced into the respective riser pipe.

The installation of a progressive cavity pump, for example, takes place in a bore equipped with a reciprocating pump as follows: The reciprocating pump previously installed in the bore is first removed from the bore, the components for a new pump unit then being able to be installed.

According to an embodiment of the invention with a two-part adapter unit, the installation of the first part of an adapter unit first takes place on or in the existing riser pipe. The first part of the adapter unit is preferably

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installed in the riser pipe in the region of a locating sleeve connecting the pipe sections of the piping. The second part is disposed on and/or fastened to the pump insert of the new pump unit to be used, in particular the progressive cavity pump. The pump unit is then introduced into the riser pipe together with the second part and the rod string of the pump rods. The second part of the adapter unit is anchored in the first part of the adapter unit in the riser pipe. The second part of the adapter unit is anchored rotationally secured in the first part of the adapter unit by rotation of the drive linkage. The weight of the drive train acts from above on the second part of the adapter unit. The upwardly pointing part of the first part is thus expanded and therefore fixedly anchored in the bore. In particular, the tongues of the first part of the adapter unit are splayed and anchored in a clamping manner in the bore or in the riser pipe.

According to a particularly preferred embodiment of the two-part adapter unit, the tapered region of the second part of the adapter unit engages in an internal region of the first part of the adapter unit, said internal region being formed by the tongues. When the adapter unit constituted in two parts or the first part of the adapter unit is passed through a narrow point formed by a locating sleeve of the riser pipe, the tongues enlarging the cross-section of the first part at least in sections spring inwards and then securely disengage after the narrow point has been passed. A securing, clamping connection with the riser pipe is thus produced.

The invention also relates to a method for installing a pump unit designed as a progressive cavity pump in a bore. Within the scope of the method, a pump device in an operative connection with the bore is uninstalled and removed from the bore, a riser pipe remaining in the bore.

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In a subsequent step, an adapter unit, or parts of an adapter unit, is mounted or fastened to the free end of a pump unit designed as a progressive cavity pump. The pump unit is then introduced into the riser pipe by means of a rod string and anchored in the riser pipe by means of the adapter unit. In particular, the pump unit is brought into contact with the riser pipe in a clamping manner by means of the adapter unit, so that the pump unit is held substantially stationary in the riser pipe by the adapter unit. The adapter unit can be disposed on and/or fastened to an upper free end as well as a lower free end of the pump unit.

In preferred embodiments, provision is also made such that the cross-sectional diameter of the adapter unit is enlarged at least in sections after insertion into the riser pipe for the purpose of its clamping contact. The enlargement of the cross-sectional diameter can take place for example by splaying of spring elements of the adapter unit or by springing-back and secure clamping of spring elements of the adapter unit.

According to a preferred embodiment, an adapter unit constituted in two parts, such as has already been described in detail, is used for the installation of the pump unit designed as a progressive cavity pump. The individual assembly steps have also been described in detail.

Description of the figures

Examples of embodiment of the invention and its advantages are explained below in greater detail with the aid of the appended figures. The size ratios of the individual elements with respect to one another in the figures do not always correspond to the actual size ratios, since some forms are represented simplified and other forms are

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represented enlarged in relation to the other elements for the sake of better illustration.

Figure 1 shows a diagrammatic perspective view of an adapter unit, such as can be used for various embodiments of the present invention;

Figure 2 shows a diagrammatic side view of the adapter unit from figure 1;

Figure 3 shows a longitudinal cross-section through the adapter unit from figures 1 and 2;

Figures 4 show diagrammatic views of a pump unit with an adapter unit, such as can be used for various embodiments of the present invention;

Figures 5 show diagrammatic views of a further pump unit with an adapter unit, such as can be used for various embodiments of the present invention;

Figures 6 show diagrammatic views of a further pump unit with an adapter unit, such as can be used for various embodiments of the present invention;

Figures 7 show a diagrammatic view of an embodiment of a system according to the invention for pumping liquid media;

Figures 8 show a diagrammatic view of a further embodiment of a system according to the invention for pumping liquid media.

Identical reference numbers are used for identical or identically acting elements of the invention. Furthermore, for the sake of a clearer view, only reference numbers are represented in the individual figures that are required for

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the description of the respective figure. The represented embodiments only represent examples as to how the device according to the invention can be constituted and do not represent a conclusive limitation.

Figure 1 shows a diagrammatic perspective view of an adapter unit 5, such as can be used for various embodiments of the present invention.

Adapter unit 5 is constituted as a hollow body. It comprises a first part 7 and a second part 9, which each comprise a perforation 13 and 13' respectively, which extend completely through adapter unit 5 aligned with one another in the longitudinal direction of adapter unit 5. A drive train 16 of a pump unit 3, to be described in greater detail below, is accommodated and axially guided in perforations 13 and 13' (see figures 4 to 8).

Adapter unit 5 comprises a first, so-called female part 7 and a second, so-called male part 9. First part 7 comprises spring elements 15 in the form of elastic and/or spring-loaded tongues 15* in an end region 8 facing second part 9. First part 7 has an enlarged cross-sectional diameter D_{15} at least in sections in the region of spring-loaded tongues 15*. Second part 9 comprises an end region 10 facing first part 7. Second part 9 tapers in end region 10 in the direction of first part 7 and has a cross-sectional diameter D_{10} reduced with respect to tongues 15* of the first part. Region 25 (see figure 3) of second part 9 accommodated in first part 7 is constituted in particular peg-shaped. Second part 9 with reduced diameter D_{10} of end region 10 engages in end region 8 of first part 7. Tongues 15* are in a relaxed state here and orientated parallel with one another.

First part 7 also comprises in sections an outer lateral surface 11, which is constituted by an elastomer all around

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the circumference. Outer lateral surface 11 has a groove-shaped profiling and is provided to increase the adhesive friction between adapter unit 5 and respective riser pipe 19. Furthermore, a seal between adapter unit 5 and respective riser pipe 19 is constituted by outer lateral surface 11.

Figure 2 again illustrates, in a diagrammatic side view, the parallel orientation of tongues 15* of first part 7 of adapter unit 5 pushed onto second part 9 in the relaxed state. The groove-shaped profiling of outer lateral surface 11 constituted by an elastomer can also be seen.

Figure 3 shows a longitudinal cross-section through adapter unit 5 from figures 1 and 2. It can clearly be seen in figure 3 that second part 9 is constituted conical at least in sections on its inner lateral surface. The second part is fastened, in particular screwed, to a stator 17 (see figures 4 to 8) of a pump unit 3. Conically constituted second part 9 is matched adaptively to the shape of respective stator 17.

Perforation 13 of first part 7 and perforation 13' of second part 9 can again clearly be seen in the longitudinal cross-section of figure 3. Perforation 13 of first part 7 and perforation 13' of second part 9 are aligned in the longitudinal direction of adapter unit 5 and thereby form a channel, through which the liquid medium can pass through adapter unit 5 during transport out of the bore.

First part 7 and second part 9 comprise bores which, in the position of first part 7 and second part 9 represented in figure 3, are orientated in alignment with one another. First and second part 7, 9 are connected to one another in a friction-locked manner and are also secured with pins 21 passed into the bores.

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Locating region 23 of second part 9 is preferably constituted as a locating thread 24 corresponding to the shape of the free end of a stator 17 (see figures 4 to 8), so that second part 9 can be screwed onto stator 17 in an essentially form-fit manner.

Figures 4 show diagrammatic views of a pump unit 3 with adapter unit 5, such as can be used for various embodiments of the present invention.

A longitudinal cross-section is represented in figure 4A. Figure 4B shows a diagrammatic side view and figure 4C shows a detailed side view of a drive shaft 16 of pump unit 3.

Reference number 27 indicates in the present case an anti-rotation device, to which stator 7 is connected. Anti-rotation device 27 is disposed in the bore vertically beneath pump unit 3 and vertically beneath adapter unit 5.

Pump unit 3 is constituted as a progressive cavity pump and comprises a rotor 18, which is moved in a rotating manner by drive shaft 16 and is guided in a stator 17. Delivery chambers are formed by the eccentric and rotating motion of rotor 18 in stator 17 and liquid medium is moved with the aid of the delivery chambers in the direction of a bore opening. The liquid medium also passes through adapter unit 5 which, as already represented in the example of embodiment of figures 1 to 3, is constituted by a first part 7 and a second part 9.

Second part 9 is screwed onto stator 17 and engages in first part 7. First part 7 is brought into connection with a riser pipe 19 not represented in figures 4.

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Figures 5 show diagrammatic views of a further pump unit 3 with adapter unit 5, such as can be used for various embodiments of the present invention.

In contrast with the embodiment of figure 4, adapter unit 5 in the embodiments from figure 5 is coupled with its tongues 15* (see figures 1 to 3) to anti-rotation device 27. Furthermore, adapter unit 5 is connected to stator 17.

Adapter unit 5 can thus be installed vertically above pump unit 3 in the respective bore (see figures 4) or - as shown in the example of embodiment of figure 5 - vertically beneath pump unit 3 in the respective bore. It is clear to the addressed person skilled in the art that provision can be made in various embodiments such that an adapter unit 5 is present in each case both beneath pump unit 3 and above pump unit 3. As represented in figures 1 to 3, adapter unit 5 comprises in both cases a first part with spring-loaded tongues 15* and a second part 9 with a locating or fastening region 23 for stator 17. Second part 9 sits on stator 17 of pump unit 3 designed as a progressive cavity pump and engages in first part 7.

Similar to the embodiment from figures 4, pump unit 3 is designed as a progressive cavity pump and comprises a stator 17 and an eccentrically rotating rotor 18. Figure 5C illustrates in detail an embodiment for a drive shaft 16, such as can be used for a pump unit 3.

Figures 6 show diagrammatic views of a further pump unit 3 with an adapter unit 5, such as can be used for various embodiments of the present invention. As in the example of embodiment of figures 4, adapter unit 5 is disposed vertically above pump unit 3.

Anti-rotation device 27 is coupled with stator 17 in the example of embodiment of figures 6. Figure 6C illustrates

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an embodiment of a drive shaft 16 and a rotor 18. Drive shaft 16 and rotor 18 are guided in a rotating manner in stator 17. In this embodiment, an axial guide for drive shaft 16 is provided by adapter unit 5.

Figures 7 show a diagrammatic view of an embodiment of a system 1 according to the invention for pumping liquid media.

Figure 7A and 7B show a riser pipe 19 for conveying the liquid medium out of the respective bore. Figure 7B shows an enlarged detail from figure 7A.

In the embodiment of figures 7, adapter unit 5 with tongues 15* of first part 7 is coupled with an anti-rotation device 27 and disposed vertically beneath pump unit 3. In this embodiment, a second part 9 of adapter unit 5 is not required.

The contact of outer lateral surface 11 of adapter unit 5 constituted by an elastomer with the inner wall of standardised locating sleeve 28 of riser pipe 19 can also clearly be seen in figure 7. A connecting sleeve 29 can also be seen in figure 7B, with which the pipe sections of the piping of a riser pipe 19 are connected to one another. In the example of embodiment according to figure 7B, a locating sleeve 28 is disposed in particular between two connecting sleeves 29. Whereas connecting sleeves 29 are disposed on the outside on riser pipe 19, locating sleeve 28 creates a zonal narrowing of riser pipe 19.

Figures 8 show a diagrammatic view of a further embodiment of a system 1 according to the invention for pumping liquid media. In contrast with the example of embodiment from figures 7, adapter unit 5 is disposed vertically above pump unit 3. Figure 8B shows a detail from figure 8A, figure 8C showing a further detail from figure 8A.

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Having regard to figure 8A, an anti-rotation device 27 is again shown there, which is accommodated in riser pipe 19.

Figure 8C illustrates adapter unit 5, comprising a first part 7 and a second part 9 (see figures 1 to 3). Second part 9 is screwed onto stator 17 and engages in first part 7. First part 7 is brought into contact, with its outer lateral surface 11 constituted by an elastomer, with standardised locating sleeve 28 of riser pipe 19 as described below and thereby forms a seal.

Drive shaft 16 is also shown, which extends along the longitudinal axis of adapter unit 5 through adapter unit 5 or more precisely through first part 7 and second part 9 of adapter unit 5.

As represented in figures 7 and 8, in particular in figures 7B and 8C, tongues 15* of first part 7 of adapter 5, which are constituted at least in sections with an enlarged diameter D_{15} , enable springing of tongues 15* inwards when adapter part 5 is passed through a locating sleeve 28 narrowing riser pipe 19. After leaving the narrow point, tongues 15* are released in a securing manner. As a result of the release of tongues 15*, adapter unit 5 can be brought securely into connection with locating sleeve 28 preassembled in riser pipe 19.

The invention has been described by reference to a preferred embodiment. A person skilled in the art can however imagine that modifications or changes to the invention can be made without thereby departing from the scope of protection of the following claims.

List of reference numbers

1	system
3	pump unit
5	adapter unit
7	first part
8	end region
9	second part
10	end region
11	outer lateral surface
13	perforation
15	spring element
15*	tongues
16	drive shaft
17	stator
18	rotor
19	riser pipe
21	securing pin
23	locating region
24	locating thread
25	peg
27	anti-rotation device
28	locating sleeve (component of the riser pipe)
29	connecting sleeve (component of the riser pipe)
D	cross-sectional diameter

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CLAIMS

1. A system or pumping liquid media from a bore, comprising:

a riser pipe, which extends at least approximately in a longitudinal direction of the bore,

a pump unit accommodated in the riser pipe with a stator, a rotor and a drive train connected to the rotor for eccentrically moving the rotor, and

an adapter unit, which is connected to the stator and which holds the stator substantially stationary in the riser pipe by means of a clamping contact with the riser pipe, wherein the system the adapter unit comprises a partial region with an increased cross-sectional diameter (D_{15}) and at least one spring element, which is brought into clamping contact with the riser pipe and/or with a locating sleeve disposed in the riser pipe.
2. The system according to claim 1, wherein the adapter unit is constituted as a hollow body and the drive train of the pump unit extends completely through the adapter unit.
3. The system according to claim 2, wherein the adapter unit or parts of the adapter unit is/are coupled with a downwardly pointing or an upwardly pointing free end of the stator.

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4. The system according to claim 3, wherein the adapter unit sits on the respective free end of the stator and wherein the partial region with the increased cross-sectional diameter (D_{15}) and the at least one spring element is brought into clamping contact with the riser pipe and/or with the locating sleeve disposed in the riser pipe.
5. The system according to claim 4, wherein the respective free end of the stator on which the adapter unit sits tapers at least in sections in the direction away from the stator.
6. The system according to any one of claims 1 to 5, wherein the adapter unit comprises a perforation extending in a longitudinal direction of the adapter unit, said perforation being aligned with the stator in the pumping direction of the liquid medium.
7. The system according to any one claims 1 to 6, wherein an outer lateral surface of the adapter unit is constituted by an elastomer at least in sections.
8. The system according to claim 7, wherein the outer lateral surface constituted by an elastomer at least in sections comprises groove-shaped profiling.
9. The system according to any one of claims 1 to 8, wherein the adapter unit is constituted in two parts, which second part of the adapter unit sits on the stator and which first part comprises a plurality of spring elements, pointing in the direction of the second part, wherein the second part engages with its free end region

lying opposite the stator in an internal space of the first part formed by the spring elements and is anchored in the latter and wherein the first part is brought into clamping contact by means of the spring elements with the riser pipe or with a locating sleeve of the riser pipe.

10. The system according to claim 9, wherein the second part comprises a locating region for the free end of the stator, wherein the locating region is constituted corresponding to the shape of the free end of the stator.
11. The system according to claim 9 or 10, wherein the first part and the second part each comprise the perforation and the perforation of the first part and the perforation of the second part are aligned with one another.
12. The system according to any one claims 1 to 11, wherein the adapter unit provides an axial guide for the drive train of the pump unit.
13. A method for installing a pump unit designed as a progressive cavity pump in a bore, comprising the following steps:

uninstalling a pump device in an operative connection with the bore and removal of the pump device from the bore, a riser pipe remaining in the bore,

fastening of an adapter unit or parts of an adapter unit to the free end of a pump unit designed as a progressive cavity pump,

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introduction of the pump unit with the adapter unit disposed thereon into the riser pipe, wherein the adapter unit is brought into contact in a clamping manner with a locating sleeve of the riser pipe, so that the pump unit is held substantially stationary in the riser pipe by the adapter unit.

14. The method according to claim 13, wherein the employed adapter unit is constituted in two parts, which second part of the adapter unit sits on a stator and which first part comprises a plurality of spring elements,

wherein the first part of the adapter unit is introduced into the riser pipe;

wherein the second part of the adapter unit is disposed on and fastened to a free end of a stator of a pump unit;

wherein the pump unit with the second part of the adapter unit is introduced into the riser pipe;

wherein the second part of the adapter unit is anchored with the first part of the adapter unit;
and

wherein the first part is brought by means of the spring elements into a clamping contact with the riser pipe or with the locating sleeve of the riser pipe.

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15. The system according to claim 7 or 8, wherein the outer lateral surface of the adapter unit constituted by an elastomer all around the circumference, wherein a seal is constituted by the outer lateral surface of the adapter unit constituted by an elastomer all around the circumference and its contact with the locating sleeve.
16. The system according to claim 9, wherein the plurality of spring elements is a plurality of elastic and/or spring-loaded tongues.

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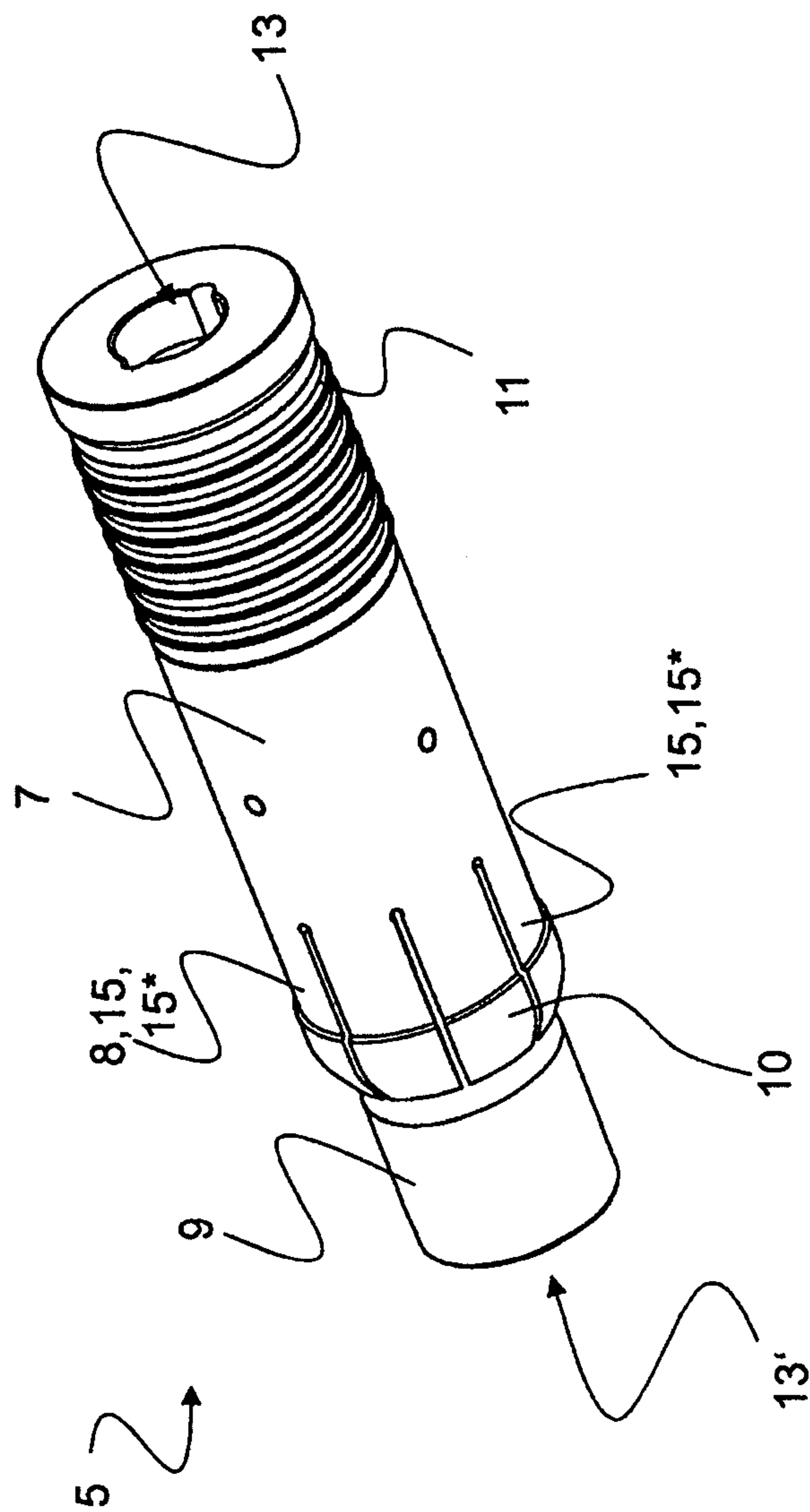


Fig. 1

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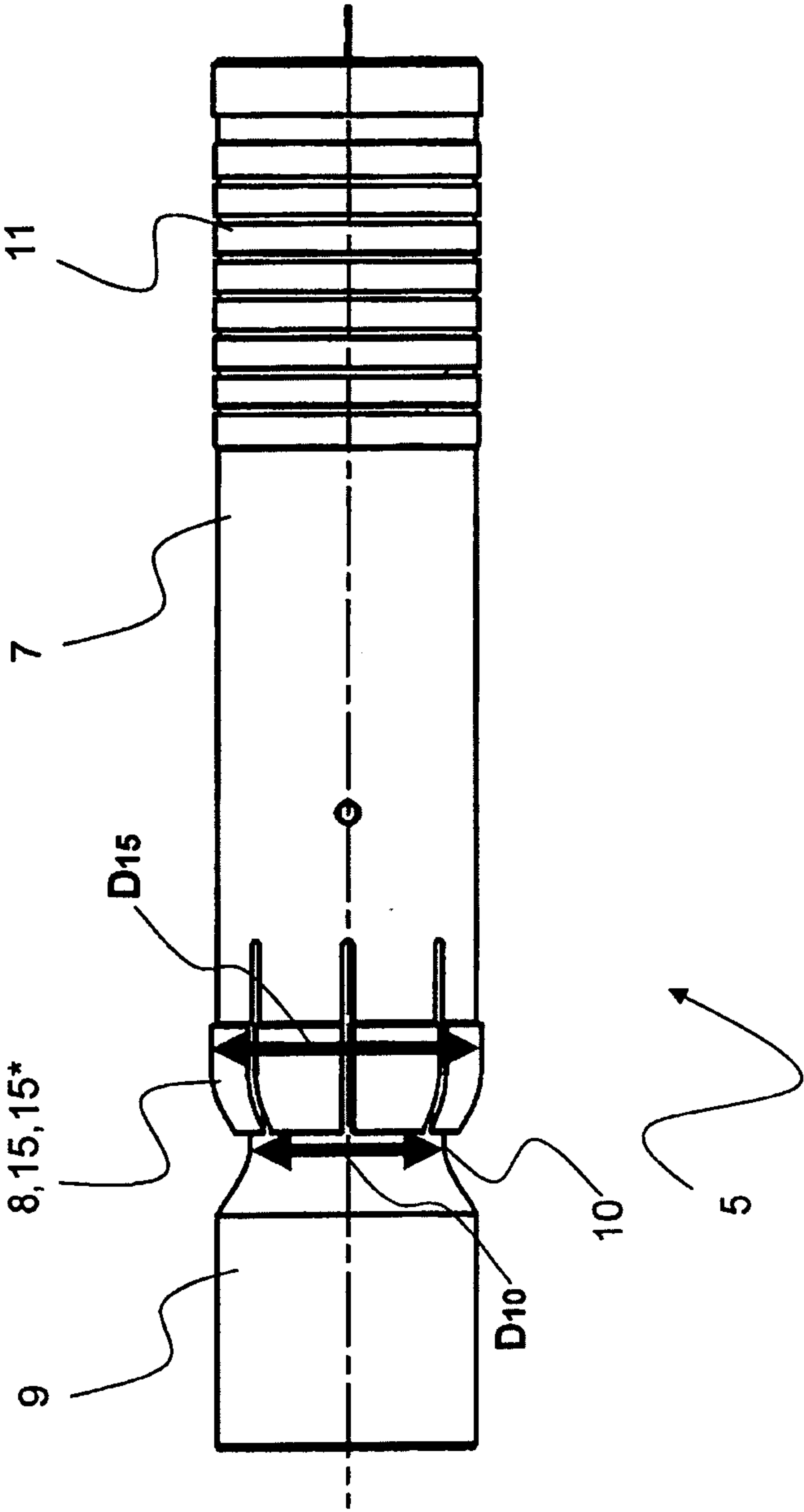
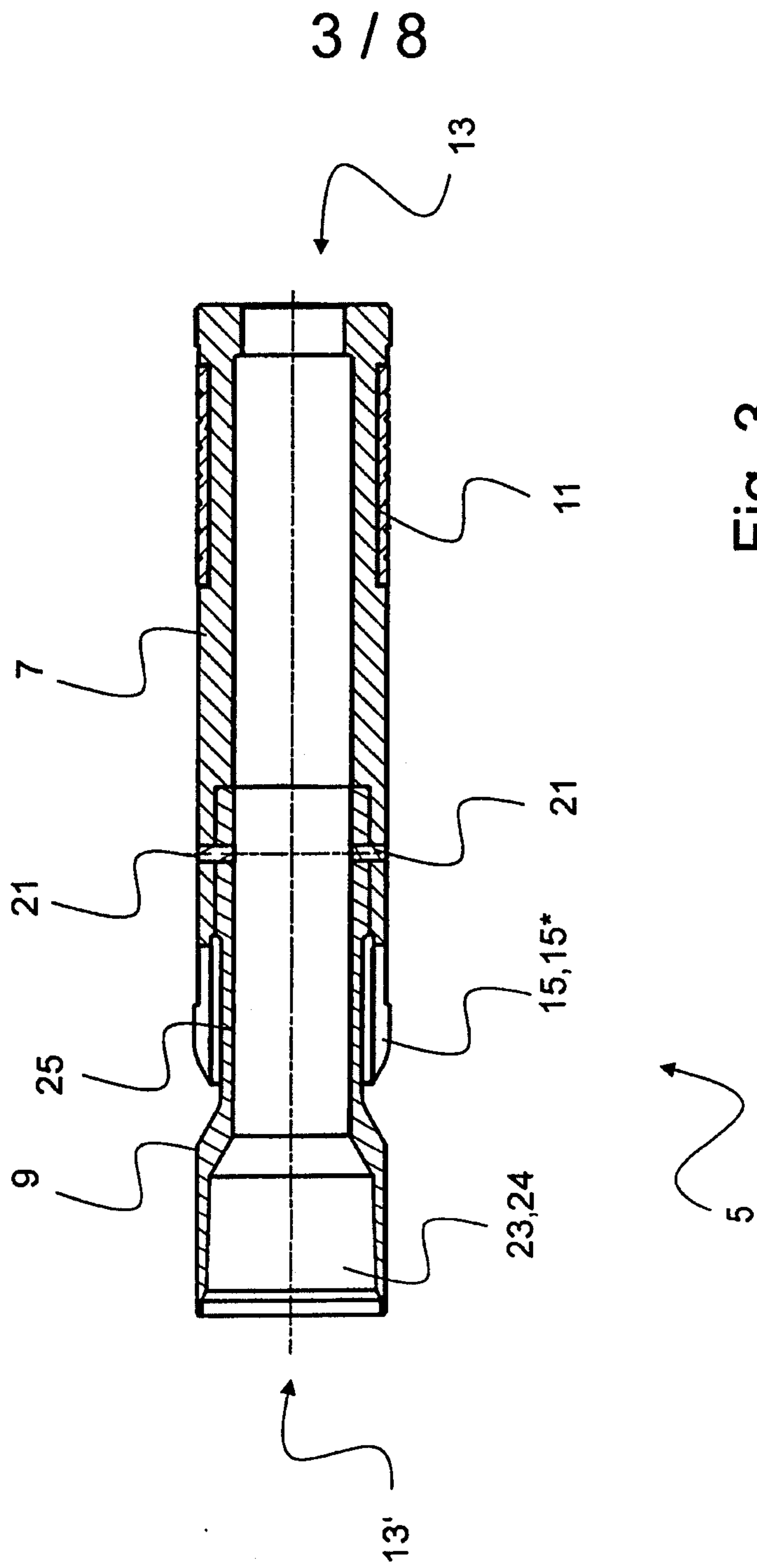


Fig. 2



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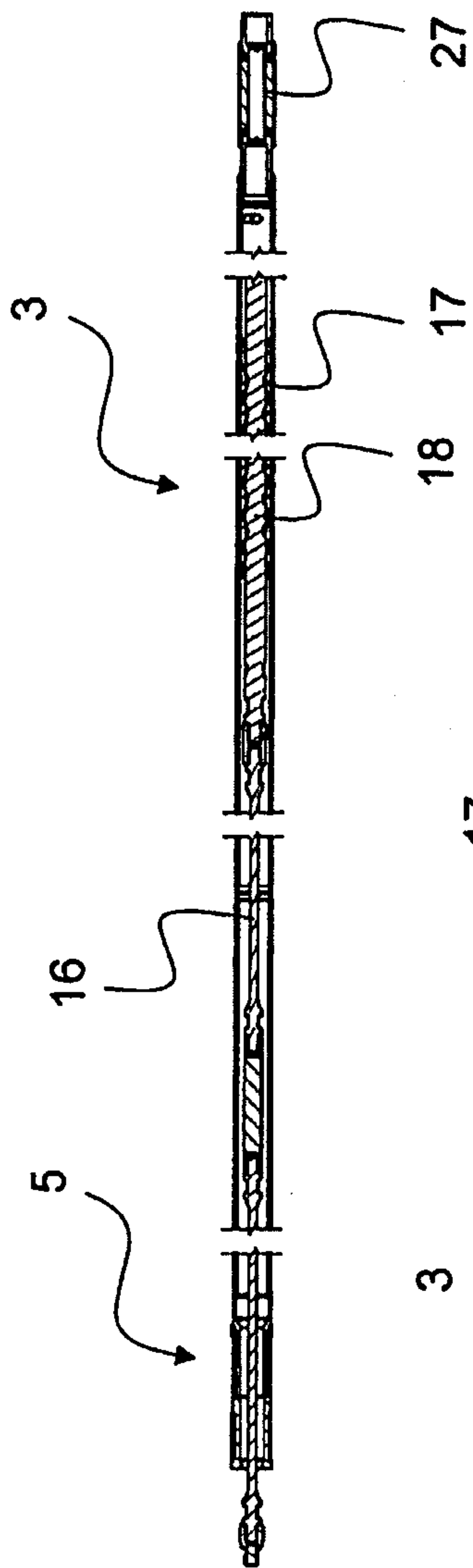


Fig. 4A

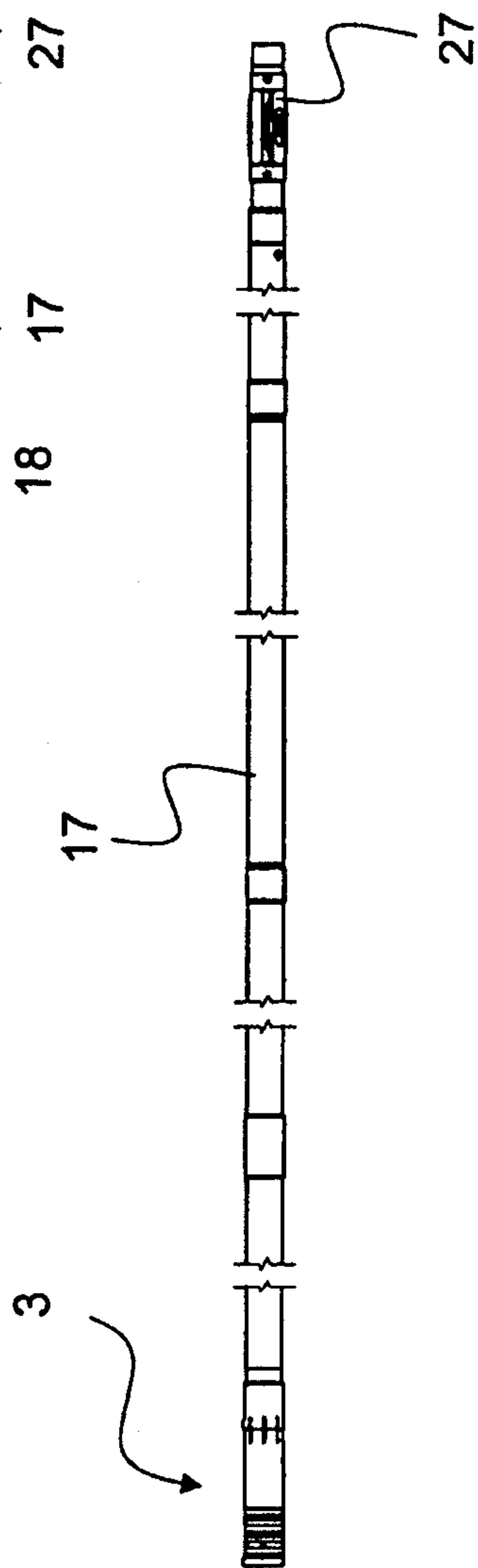


Fig. 4B

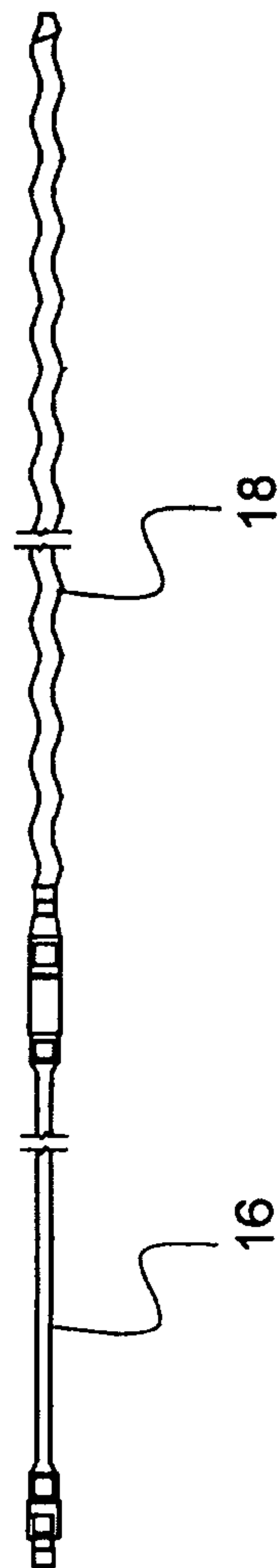


Fig. 4C

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Fig. 5A

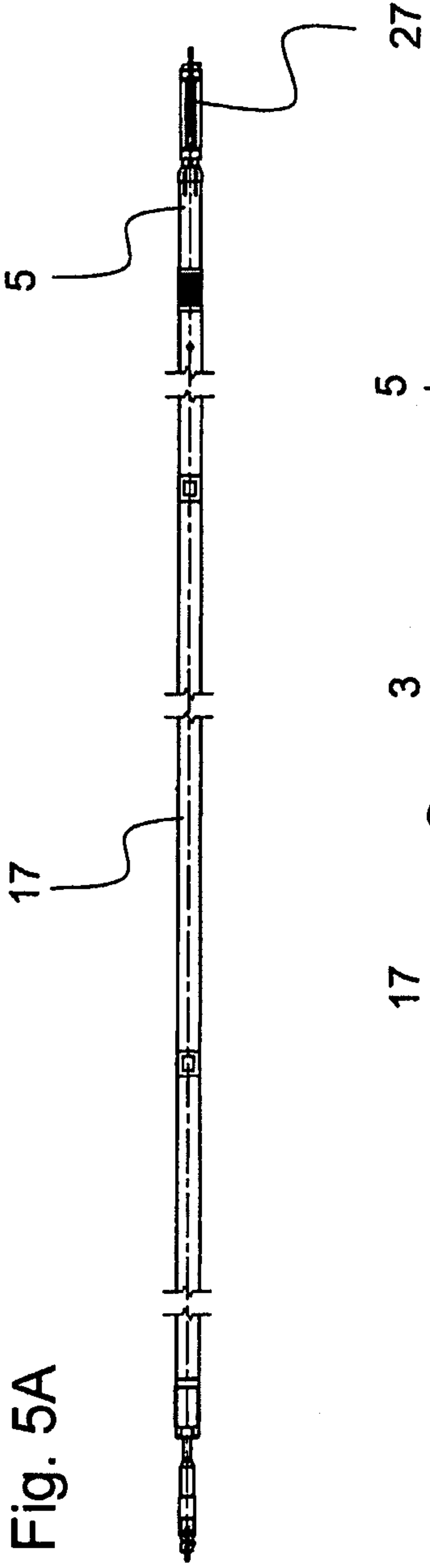


Fig. 5B

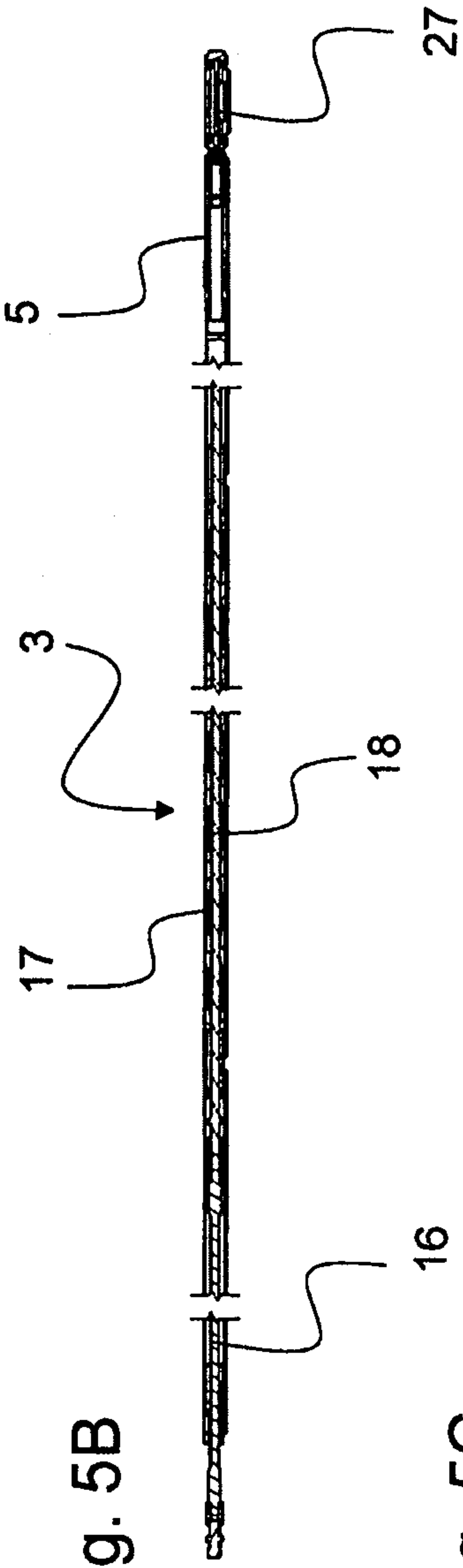
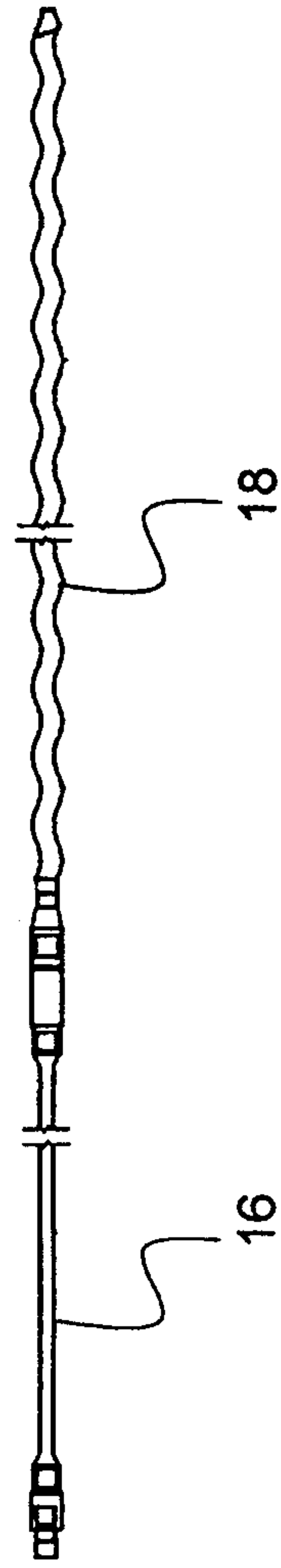
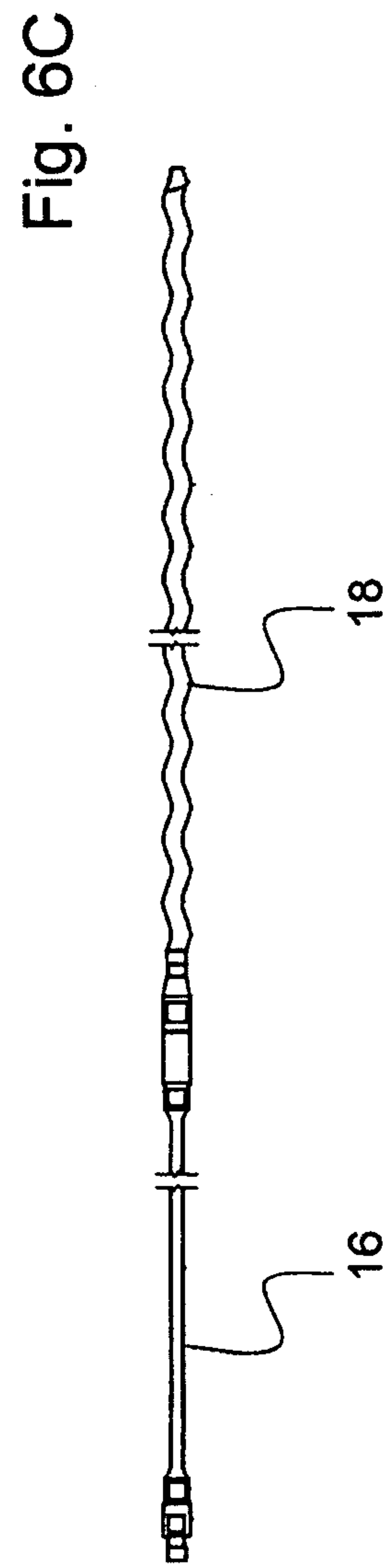
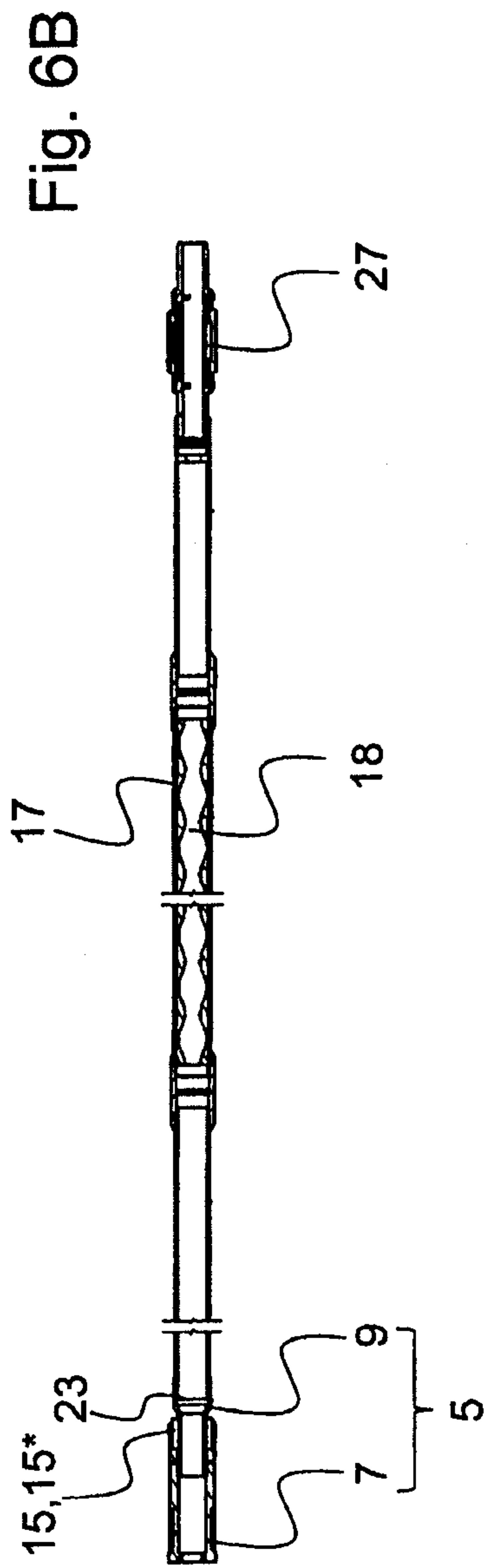
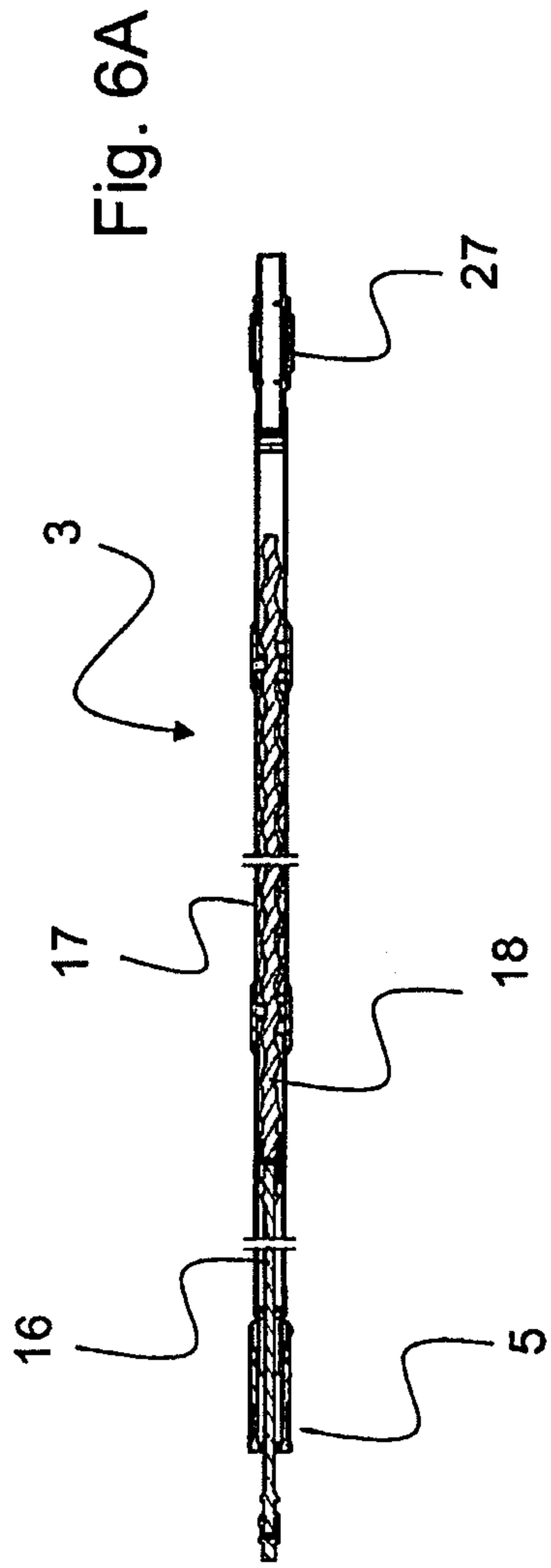


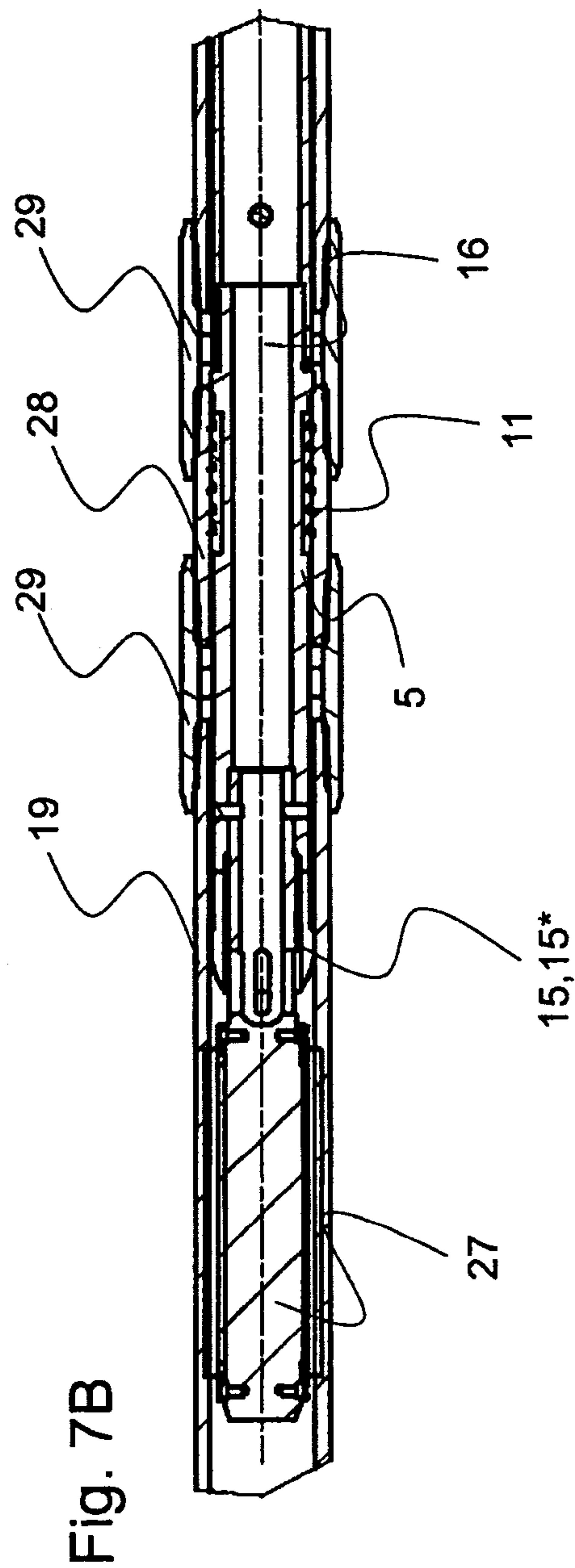
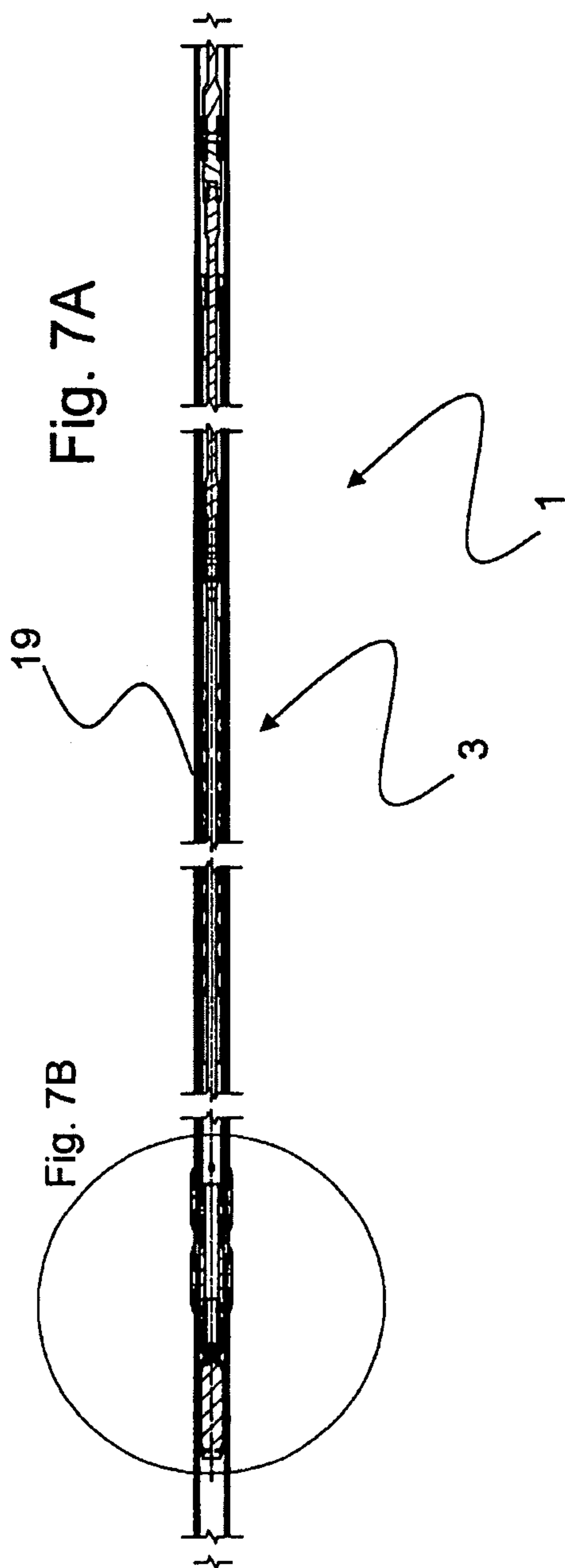
Fig. 5C



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