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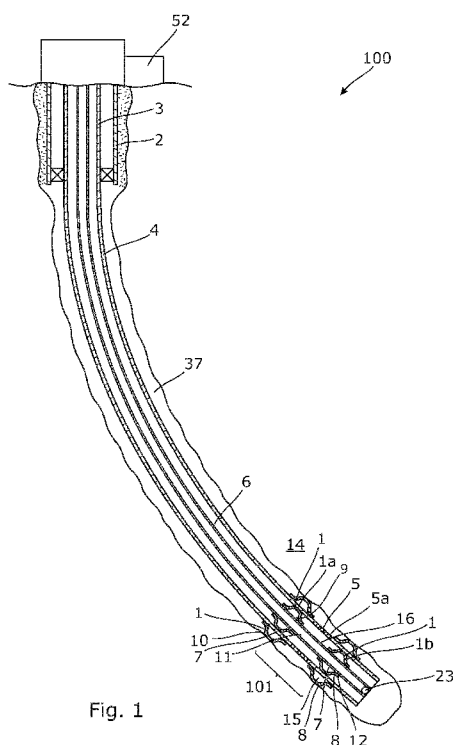


Fig. 1

(57) Abstract: A redressing method for arranging an inner production casing within an existing production casing in order to re-establish production of hydrocarbon-containing fluid in a well, comprises providing the inner production casing to having a substantially constant inner diameter, the inner production casing comprising spaced first and second annular barriers. Each annular barrier has a tubular metal part and an expandable metal sleeve surrounding the tubular metal part. Each barrier has an inner face facing the tubular metal part and an outer face facing an inner wall of the existing production casing. The inner production casing has an outer unexpanded diameter which is smaller than the first inner diameter of the existing production casing. The existing production casing is redressed by introducing the inner production casing into the existing production casing, arranging the first annular barrier on one side of the first inflow section and the second annular barrier on the other side of the inflow section, thereby isolating an inflow of fluid from the first inflow section, encapsulating the first inflow section of the existing production casing by expanding the expandable metal sleeves of the first annular barrier and the second annular barrier, thereby isolating the first inflow section.



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REDRESSING METHOD AND REDRESSED COMPLETION SYSTEM

Field of the invention

5 The present invention relates to a redressing method for arranging an inner production casing within an existing production casing in order to re-establish production of hydrocarbon-containing fluid in a malfunctioning well. Furthermore, the present invention relates to a redressed completion system for re-establishing production of hydrocarbon-containing fluid in a malfunctioning well.

10 Background art

In existing wells, screens may be abraded to such an extent that the well produces too much sand, gravel, etc. Then, that part of the well is closed or the well is fully abandoned. In recent years with low oil prices, companies have
15 focused on optimising existing wells rather than drilling new ones. This means that when existing wells are no longer producing sufficiently, new perforations are made and further stimulation operations are run. However, often this only increases the oil production by a few percentages, and there is therefore a need for a new solution for optimising production in existing, poorly producing wells.

20

Summary of the invention

It is an aspect of the present invention to wholly or partly overcome the above disadvantages and drawbacks of the prior art. More specifically, it is an aspect to
25 provide an improved completion system in which abandonment of at least part of the well having worn out or abraded screens or abandonment of poorly-producing wells is avoided.

The above aspects, together with numerous other aspects, advantages and
30 features, which will become evident from the below description, are accomplished by a solution in accordance with the present invention by a redressing method for arranging an inner production casing within an existing production casing in order to re-establish production of hydrocarbon-containing fluid in a malfunctioning well having a top part, the existing production casing having a first inner diameter
35 and being arranged in a borehole, the redressing method comprising:

- determining a first inflow section of the existing production casing opposite a first production zone, the first production zone being isolated from a second zone,
- providing the inner production casing, the inner production casing having a inner diameter which is substantially the same along an extension of the inner
- 5 production casing, the inner production casing comprising a first annular barrier and a second annular barrier having a distance between them, each annular barrier comprising:
 - a tubular metal part for mounting as part of the inner production casing,
 - an expandable metal sleeve surrounding the tubular metal part and
 - 10 having an inner face facing the tubular metal part and an outer face facing an inner wall of the existing production casing, each end of the expandable metal sleeve being connected with the tubular metal part, and
 - an annular space between the inner face of the expandable metal sleeve and the tubular metal part,
- 15 the inner production casing having an outer unexpanded diameter which is smaller than the first inner diameter of the existing production casing,
- redressing the existing production casing by introducing the inner production casing into the existing production casing,
- arranging the first annular barrier on one side of the first inflow section and the
- 20 second annular barrier on the other side of the inflow section, thereby isolating an inflow of fluid from the first inflow section,
- encapsulating the first inflow section of the existing production casing by expanding the expandable metal sleeves of the first annular barrier and the second annular barrier, thereby isolating the first inflow section,
- 25 - anchoring the inner production casing in the top part of the well,
- providing a first inner inflow section in the inner production casing opposite the first inflow section of the existing production casing or opposite the second zone, and
- initiating production of hydrocarbon-containing fluid through the inner
- 30 production casing from the first production zone or the second zone.

The redressing method as described above may comprise reducing a hydrostatic pressure of the well by redressing the existing production casing by means of the inner production casing.

In an embodiment, the initiating production of hydrocarbon-containing fluid through the inner production casing from the second zone may include perforating the inner production casing opposite the second zone.

- 5 By isolating the first production zone and perforating the inner production casing opposite the second zone, a new production zone is created while isolating the first production zone. This is especially useful when the first production zone is depleted and is thus no longer producing, but fluid may still be produced from another zone. By providing perforations after the annular barriers of the inner
10 production casing have been expanded, the annular barriers can be expanded by pressurising the inner production casing from one end.

- Furthermore, the redressing method may further comprise perforating the second zone before introducing the inner production casing into the existing production
15 casing.

In addition, the redressing method may further comprise detecting a depleted production zone.

- 20 Also, the redressing method may further comprise fracturing or stimulating the first production zone or the second zone from within the inner production casing.

- Further, the redressing method as described above may comprise determining a second inflow section of the existing production casing opposite a second
25 production zone, wherein the providing an inner production casing may further comprise providing a third annular barrier, and arranging the second annular barrier on one side of the second inflow section and the third annular barrier on the other side of the second inflow section of the existing production casing.

- 30 Also, the redressing method as described above may comprise determining a third inflow section of the existing production casing opposite a third production zone, wherein the providing an inner production casing may further comprise providing a fourth annular barrier, and arranging the third annular barrier on one side of the third inflow section and the fourth annular barrier on the other side of
35 the third inflow section of the existing production casing.

Moreover, the inner production casing may extend to the top of the well.

Furthermore, the inner production casing may overlap most of the existing production casing.

5 The anchoring the inner production casing in the top part of the well may comprise providing the inner production casing with an anchoring annular barrier.

The redressing method according to the present invention may comprise arranging a screen opposite the first inner inflow section of the inner production casing.
10

Additionally, the expandable metal sleeves may be expanded by introducing pressurised fluid into the annular space via the inner production casing.

Further, the redressing method as described above may comprise closing the
15 inner production casing before the expanding the expandable metal sleeves of the annular barriers.

The determining may be performed by means of a detecting unit in a downhole tool or in the inner production casing.
20

Also, the determining may be performed by consulting a completion diagram of the existing production casing.

The present invention also relates to a redressed completion system for re-
25 establishing production of hydrocarbon-containing fluid in a malfunctioning well having a top part, comprising:

- an existing production casing arranged in the well and having a first inflow section opposite a first production zone,
- an inner production casing comprising a first annular barrier and a second
30 annular barrier having a distance between them, each annular barrier comprising:
 - a tubular metal part for mounting as part of the inner production casing, and
 - an expandable metal sleeve surrounding the tubular metal part and
35 having an inner face facing the tubular metal part and an outer face facing an inner wall of the existing production casing, each end of the expandable metal sleeve being connected with the tubular metal part, and

- an annular space between the inner face of the expandable metal sleeve and the tubular metal part,

wherein the inner production casing comprises a first inner inflow section arranged between the first annular barrier and the second annular barrier, the inner production casing extending inside the existing production casing, and wherein the first annular barrier is expanded on one side of the first inflow section and the second annular barrier is expanded on the other side of the first inflow section of the existing production casing, thereby isolating the first inflow section and leading the hydrocarbon-containing fluid from the first production zone into the inner production casing through the inflow sections.

The inner production casing may have an unexpanded outer diameter which is smaller than a first inner diameter of the existing production casing, thereby reducing the hydrostatic pressure of the well.

Also, the inner production casing may be anchored to the top part of the well.

Moreover, the inner production casing may extend to a top of the well.

Furthermore, the inner production casing may have an inner diameter which is substantially equal along the entire extension of the inner production casing.

Additionally, the existing production casing may have a second inflow section opposite a second production zone, and the inner production casing comprises a third annular barrier and a second inner inflow section arranged between the second annular barrier and the third annular barrier, the second annular barrier being expanded on one side of the second inflow section and the third annular barrier being expanded on the other side of the second inflow section of the existing production casing, thereby isolating the second inflow section.

Further, the existing production casing may have a third inflow section opposite a third production zone, and the inner production casing may comprise a fourth annular barrier and a third inner inflow section arranged between the third annular barrier and the fourth annular barrier, the third annular barrier being expanded on one side of the third inflow section, and the fourth annular barrier being expanded on the other side of the third inflow section of the existing production casing, thereby isolating the third inflow section.

The redressed completion system as described above may further comprise a detection tool configured to determine the inflow sections of the existing production casing.

- 5 Also, a screen may be arranged opposite the inflow sections of the existing production casing and/or the inner inflow sections of the inner production casing.

Furthermore, the inner production casing may have an inner diameter which is substantially equal along the entire extension of the inner production casing.

10

Moreover, the screen may be fluidly connected to the inflow sections.

The inflow section may comprise an inflow control device.

- 15 Further, a pump may be arranged at the top of the well.

Additionally, the system may comprise an expansion tool.

Also, the tubular metal part may comprise an expansion opening.

20

The annular space may comprise at least one thermally decomposable compound adapted to generate gas or super-critical fluid upon decomposition.

This compound may be thermally decomposable below a temperature of 400°C.

25

The compound may comprise nitrogen, or comprise nitrogen in the form of ammonium, nitrite, azide or nitrate.

- 30 The compound may be selected from a group consisting of: ammonium dichromate, ammonium nitrate, ammonium nitrite, barium azide, sodium nitrate, or a combination thereof.

Also, the compound may decompose at temperatures above 100°C, preferably above 180°C.

35

Moreover, the inner production casing may comprise an anchoring annular barrier.

Furthermore, the inner production casing may comprise closing means for closing the inner production casing before expansion.

5 In addition, the existing production casing may comprise annular barriers for isolating a production zone.

Brief description of the drawings

10 The invention and its many advantages will be described in more detail below with reference to the accompanying schematic drawings, which for the purpose of illustration show some non-limiting examples and in which

15 Fig. 1 shows a cross-sectional view of a redressed completion system according to the invention,

Fig. 2 shows a cross-sectional view of a redressed completion system having a detection tool submerged in the well,

20 Fig. 3 shows a cross-sectional view of an inner production casing being submerged into the well in its unexpanded condition,

Fig. 4 shows a cross-sectional view of the inner production casing in an expanded condition of the annular barriers,

25 Fig. 5 shows a cross-sectional view of the inner production casing being anchored to the top part of the well,

30 Fig. 6 shows a cross-sectional view of a redressed completion system having perforations,

Fig. 7 shows a cross-sectional view of a redressed completion system having a two-part existing production casing,

35 Fig. 8 shows a cross-sectional view of another redressed completion system,

Fig. 9 shows a cross-sectional view of another redressed completion system having screens,

Fig. 10 shows a cross-sectional view of yet another redressed completion system having a sliding sleeve,

Fig. 11 shows a cross-sectional view of an existing production casing being
5 perforated opposite the second zone,

Fig. 12 shows a cross-sectional view of another redressed completion system where the new production zone is established in the second zone, and

10 Fig. 13 shows a cross-sectional view of another redressed completion system where the new production zone has been established in the second zone by perforating the inner production casing.

All the figures are highly schematic and not necessarily to scale, and they show
15 only those parts which are necessary in order to elucidate the invention, other parts being omitted or merely suggested.

Detailed description of the invention

20 Fig. 1 shows a redressed completion system 100 for re-establishing production of hydrocarbon-containing fluid in a malfunctioning well 2. The redressed completion system 100 comprises an existing production casing 4 arranged in a borehole in the well 2. The existing production casing 4 has a first inflow section 5, 5a opposite a first production zone 101 of a reservoir or formation 14. The
25 redressed completion system 100 further comprises an inner production casing 6 having a first annular barrier 1, 1a and a second annular barrier 1, 1b having a distance between them. Each annular barrier comprises a tubular metal part 7 for mounting as part of the inner production casing 6, and an expandable metal sleeve 8 surrounding the tubular metal part 7. The expandable metal sleeve 8
30 has an inner face 9 facing the tubular metal part 7 and an outer face 10 facing an inner wall 11 of the existing production casing 4. Each end 12 of the expandable metal sleeve 8 is connected with the tubular metal part 7, thereby defining an annular space 15 between the inner face 9 of the expandable metal sleeve 8 and the tubular metal part 7. The inner production casing 6 further comprises a first
35 inner inflow section 16 arranged between the first and second annular barriers 1, 1a, 1b, the inner production casing 6 extending inside the existing production casing 4. A first annular barrier 1, 1a is expanded on one side of the first inflow

section 5, 5a of the existing production casing 4, and a second annular barrier 1, 1b is expanded on the other side of the first inflow section 5 of the existing production casing 4, isolating the first inflow section 5, 5a and thereby leading the hydrocarbon-containing fluid from the first production zone 101 into the inner
5 production casing 6 through the first inflow section 5, 5a and the first inner inflow section 16.

The inner production casing 6 has an unexpanded outer diameter D_{uo} (shown in Fig. 3) which is smaller than a first inner diameter D_1 (shown in Fig. 3) of the
10 existing production casing 4, and when the annular barriers 1, 1a, 1b are expanded, the inner diameter of the producing production casing is substantially reduced, thereby also reducing the hydrostatic pressure of the well 2 since the hydrocarbon-containing fluid from the reservoir 14 only has to displace a substantially smaller fluid column than in the existing production casing. When
15 hydrocarbon-containing fluid has been produced from a production zone for some time, the pressure in the reservoir 14 may drop or the screen through which the fluid enters may be worn out, and an excess amount of sand is produced along with the fluid. Then it is beneficial to insert an inner production casing 6 to reduce the inner diameter or to insert a new screen, so that the sand can no
20 longer enter the producing production casing. In this way, the lifetime of the well 2 is prolonged by redressing the redressed completion system 100 in an easy manner by encapsulating the inflow section of the existing production casing 4, so that the production fluid is led from the production zone 101 into the existing production casing 4 through the inflow section 5 and further into the inner
25 production casing 6 through the first inner inflow section 16.

The completion system 100 is redressed by first determining the first inflow section 5, 5a of the existing production casing 4 opposite the first production zone 101, e.g. by a submerging a detection tool 50 into the existing production
30 casing 4, as shown in Fig. 2. The inner production casing 6 having an inner diameter D_i (shown in Fig. 10) which is substantially the same along the entire extension of the inner production casing is then provided, so that the hydrocarbon-containing fluid is able to flow in an uninterrupted manner along the inner production casing 6. Then the existing production casing 4 is redressed by
35 introducing the inner production casing 6 into the existing production casing, as shown in Fig. 3, which is possible due to the inner production casing having an outer unexpanded diameter which is smaller than the first inner diameter of the

existing production casing. The first annular barrier 1, 1a is arranged on one side of the first inner inflow section 16 and on one side of the first inflow section 5, and the second annular barrier 1, 1b is arranged on the other side of the inner inflow section 16 and the other side of the first inflow section 5. Thus, the first inflow section 5, 5a of the existing production casing 4 is encapsulated by expanding the expandable metal sleeves 8 of the first and second annular barriers 1, 1a, 1b, thereby isolating the first inflow section 5, 5a, as shown in Fig. 4. The annular barriers 1, 1a, 1b may be expanded by pressurised fluid within the inner production casing 6 entering an expansion opening 22. Subsequently, the inner production casing 6 is anchored in the top part 3 of the well 2, e.g. by expanding an anchoring annular barrier 1_{an} providing the first inner inflow section 16 in the inner production casing 6 opposite the first inflow section 5 of the existing production casing 4, as shown in Fig. 5. Then production of hydrocarbon-containing fluid through the inner production casing is initiated. The well 2 may be self-producing when the completion is redressed or the first inner inflow section of the inner production casing 6 may be activated, e.g. by opening a sliding sleeve so that the sliding sleeve 24 (shown in Fig. 10) no longer blocks the inflow of fluid into the inner production casing 6.

The annular barriers 1, 1a, 1b may be expanded by pressurised fluid inside the inner production casing 6. The inner production casing 6 may be pressurised by an expansion tool 53 (shown in Fig. 9) isolating a zone opposite the expansion opening 22 (shown in Fig. 4), or the inner production casing 6 may be pressurised from the top by a pump 52, as shown in Fig. 1. The inner production casing 6 is closed by a closing means 23, e.g. by dropping a closing means 23 in the form of a ball down the inner production casing 6 to close the end of the inner production casing 6, as shown in Figs. 1 and 4, and then, the entire inner production casing 6 is pressurised, expanding all annular barriers 1 substantially simultaneously.

The existing production casing 4 may have annular barriers 1 for isolating the first production zone 101, as shown in Figs. 1-5. As shown in Fig. 6, the existing production casing 4 may also be a cemented casing in that cement 55 is pumped into the annulus surrounding the existing production casing 4, and the production is thus established by perforating the existing production casing 4, the cement and the formation creating perforations 56. In Fig. 6, the inner production casing 6 extending all the way up to the top of the well is not suspended/hung off inside

the existing production casing 4, but is anchored in the well head, the "christmas tree" or the blowout preventer.

When determining the first inflow section, other inflow sections of the existing
5 production casing 4 may simultaneously be determined or detected, such as
determining a second inflow section 5b (shown in Fig. 7) of the existing
production casing opposite a second production zone 102, e.g. by means of a
detection unit 58 in the inner production casing 6 or the detection tool 50 (shown
10 in Fig. 2). In the event that the existing production casing 4 comprises a second
inflow section 5b, the inner production casing 6 further comprises a third annular
barrier 1c and the second annular barrier 1b on one side of the second inflow
section 16b and the third annular barrier 1c on the other side of the second
inflow section 16b of the existing production casing, as shown in Fig. 7. The
redressed completion system 100 of Fig. 7 comprises an existing production
15 casing 4 having several inflow sections, and similarly, the inner production casing
6 has at least the same number plus at least one annular barrier 1 as inflow
sections of the existing production casing 4. The annular barriers 1, 1a, 1b, 1c,
1d, 1e are arranged in such a way that they two-by-two encapsulate one of the
production zones 101, 102, 103, 104. The fourth production zone 104 is arranged
20 closer to the top of the well than the third production zone 103 and the second
production zone 102. As can be seen in Fig. 7, the existing production casing 4 is
shorter in length than the inner production casing 6, and the inner production
casing overlaps most of the existing production casing. The inner production
casing 6 thus extends further up the well towards the top of the well than the
25 existing production casing 4, and the anchoring of the inner production casing 6
is performed in an upper casing 25 of the existing production casing 4. The
redressing of the redressed completion system 100 thus eliminates the gap 26
between the upper casing 25 and the lower existing production casing 4, and
there is therefore no longer a risk of any intervention tools getting stuck in the
30 gap 26.

Thus, the inner production casing 6 of Fig. 7 has a first annular barrier 1, 1a, a
second annular barrier 1, 1b, a third annular barrier 1, 1c, a fourth annular
barrier 1, 1d, and a fifth annular barrier 1, 1e. The first annular barrier 1, 1a and
35 the second annular barrier 1, 1b isolate a first production zone 101, the second
annular barrier 1, 1b and third annular barrier 1, 1c isolate a second production
zone 102, the third annular barrier 1, 1c and fourth annular barrier 1, 1d isolate

a third production zone 103, and the fourth annular barrier 1, 1d and fifth annular barrier 1, 1e isolate a fourth production zone 104.

In Fig. 8, the existing production casing 4 comprises a worn out screen 20a where the openings 33 in the screen have become too large due to the sand abrading the material surrounding the openings 33 and the openings 34 in the casing 4, as shown in Fig. 9. Therefore, a screen 20 of the inner production casing 6 is arranged opposite the first inflow section 5a of the existing production casing. The screen 20 is fluidly connected to the inflow sections 5, 16. Thus, the completion is redressed by a not worn sleeve and the production can continue. As shown in Fig. 9, the first and second annular barriers 1, 1a, 1b are arranged offset in relation to the annular barriers 1 of the existing production casing 4; however still encapsulating the inflow section 5 of the existing production casing 4.

15

The second inflow section 5b of Fig. 8 is closed, so in Fig. 8, the inner production casing 6 does not overlap the entire existing production casing 4 also covering the second inflow section 5b.

20 In another embodiment, the redressed completion system 100 is redressed to decrease the hydrostatic pressure, and no screens are used and the inner production casing 6 has annular barriers 1 encapsulating merely the production zone arranged closest to the top of the well, and the inner production casing 6 does not overlap the remaining production zones closer to the bottom 57 (shown in Fig. 8) of the well. Thus, the inner production casing 6 may, in some embodiments, be longer than the existing production casing 4, and in other embodiments, shorter than the existing production casing 4.

30 The inflow section 5, 16 may comprise an inflow control device 38, as shown in Fig. 8.

As shown in Fig. 11, before redressing the existing production casing by introducing the inner production casing into the existing production casing, the existing production casing is perforated in a second zone 102 adjacent to the first production zone 101. Arranging the first annular barrier on one side of the first inflow section and the second annular barrier on the other side of the inflow section is thus done to isolate an inflow of fluid from the first inflow section 5

from the first production zone 101 and initiate production from the second zone 102 becoming the new production zone. This way of redressing the completion is especially useful when the first production zone is depleted and is thus no longer producing, or at least not producing sufficiently.

5

In Fig. 12, the first inflow section 5 of the existing production casing is encapsulated by expanding the expandable metal sleeves of the first annular barrier and the second annular barrier, thereby isolating the first inflow section, and the inner production casing is anchored in the top part of the well. When
10 arranging the inner production casing inside the existing production casing, the first inner inflow section 16 of the inner production casing is arranged opposite the second zone to the effect that hydrocarbon-containing fluid from the second zone flows in through the new perforations in the existing production casing and further in through the first inner inflow section 16 of the inner production casing.
15 The first inner inflow section 16 is opened after the annular barriers have been set, e.g. by an intervention tool, so that the inner production casing can be pressurised to expand the annular barriers or the annular barriers can be expanded by pressurising a zone opposite the annular barriers. In the latter case, the first inner inflow section 16 of the inner production casing can be open when
20 the annular barriers are expanded, and thus does not have to be opened afterwards.

In Fig. 13, the inner production casing is perforated after the annular barriers have been expanded to initiate production. Depending on the condition of the
25 existing production casing, the step of perforating both the existing production casing and the inner production casing may be performed in one operation. By isolating the first production zone and perforating the inner production casing opposite the second zone, a new production zone is established while the first production zone is being isolated. In order to fracture or otherwise stimulate the
30 formation in the second zone 102, a plug may be set by a tool further down the inner production casing below the first inner inflow section 16 or further down the inner production casing below the perforations 31B in the wall of the inner production casing, and then, the pressurised fluid can enter the first inner inflow section 16, 16a or the perforations of the inner production casing and flow further
35 through perforations 31 in the existing production casing and into the second zone 102.

Instead of pressurising the entire inner production casing 6 or a zone opposite an expansion opening of the annular barrier 1, the annular barrier 1 may not have an expansion opening and the annular space may comprise at least one thermally decomposable compound adapted to generate gas or super-critical fluid upon
5 decomposition. This compound may be thermally decomposable below a temperature of 400°C and may comprise nitrogen, or comprise nitrogen in the form of ammonium, nitrite, azide or nitrate. The compound may be selected from a group consisting of: ammonium dichromate, ammonium nitrate, ammonium nitrite, barium azide, sodium nitrate, or a combination thereof. The compound
10 may decompose at temperatures above 100°C, preferably above 180°C.

By fluid, hydrocarbon-containing fluid or well fluid is meant any kind of fluid that may be present in oil or gas wells downhole, such as natural gas, oil, oil mud, crude oil, water, etc. By gas is meant any kind of gas composition present in a
15 well, completion, or open hole, and by oil is meant any kind of oil composition, such as crude oil, an oil-containing fluid, etc. Gas, oil, and water fluids may thus all comprise other elements or substances than gas, oil, and/or water, respectively.

20 By a casing or production casing is meant any kind of pipe, tubing, tubular, liner, string etc. used downhole in relation to oil or natural gas production.

In the event that the tool is not submergible all the way into the casing, a downhole tractor can be used to push the tool all the way into position in the
25 well. The downhole tractor may have projectable arms having wheels, wherein the wheels contact the inner surface of the casing for propelling the tractor and the tool forward in the casing. A downhole tractor is any kind of driving tool capable of pushing or pulling tools in a well downhole, such as a Well Tractor®.

30 Although the invention has been described in the above in connection with preferred embodiments of the invention, it will be evident for a person skilled in the art that several modifications are conceivable without departing from the invention as defined by the following claims.

Claims

1. A redressing method for arranging an inner production casing (6) within an existing production casing (4) in order to re-establish production of hydrocarbon-containing fluid in a malfunctioning or underperforming well (2) having a top part (3), the existing production casing having a first inner diameter (D_1) and being arranged in a borehole (37), the redressing method comprising:
- determining a first inflow section (5, 5a) of the existing production casing opposite a first production zone (101), the first production zone being isolated from a second zone,
 - providing the inner production casing, the inner production casing having an inner diameter (D_i) which is substantially the same along an extension of the inner production casing, the inner production casing comprising a first annular barrier (1, 1a) and a second annular barrier (1, 1b) having a distance between them, each annular barrier comprising:
 - a tubular metal part (7) for mounting as part of the inner production casing,
 - an expandable metal sleeve (8) surrounding the tubular metal part and having an inner face (9) facing the tubular metal part and an outer face (10) facing an inner wall (11) of the existing production casing, each end (12) of the expandable metal sleeve being connected with the tubular metal part, and
 - an annular space (15) between the inner face of the expandable metal sleeve and the tubular metal part,
 - the inner production casing having an outer unexpanded diameter (D_{uo}) which is smaller than the first inner diameter of the existing production casing,
 - redressing the existing production casing by introducing the inner production casing into the existing production casing,
 - arranging the first annular barrier on one side of the first inflow section and the second annular barrier on the other side of the inflow section, thereby isolating an inflow of fluid from the first inflow section,
 - encapsulating the first inflow section of the existing production casing by expanding the expandable metal sleeves of the first annular barrier and the second annular barrier, thereby isolating the first inflow section,
 - anchoring the inner production casing in the top part of the well,

- providing a first inner inflow section (16) in the inner production casing opposite the first inflow section of the existing production casing or opposite the second zone, and
 - initiating production of hydrocarbon-containing fluid through the inner production casing from the first production zone or the second zone.
2. A redressing method according to claim 1, further comprising determining if the existing production casing is damaged.
3. A redressing method according to claim 1 or 2, further comprising stopping the production of hydrocarbon-containing fluid.
4. A redressing method according to claim 3, further comprising pressuring at least part of the casing to expand the annular barriers.
5. A redressing method according to any of claims 1-4, further comprising reducing a hydrostatic pressure of the well by redressing the existing production casing by means of the inner production casing.
6. A redressing method according to any of claims 1-5, wherein the initiating production of hydrocarbon-containing fluid through the inner production casing from the second zone includes perforating the inner production casing opposite the second zone.
7. A redressing method according to claim 6, further comprising perforating the second zone before introducing the inner production casing into the existing production casing.
8. A redressing method according to any of claims 1-7, further comprising:
- determining a second inflow section (5b) of the existing production casing opposite a second production zone (102),
wherein the providing an inner production casing further comprises providing a third annular barrier (1c), and
 - arranging the second annular barrier on one side of the second inflow section and the third annular barrier on the other side of the second inflow section of the existing production casing.

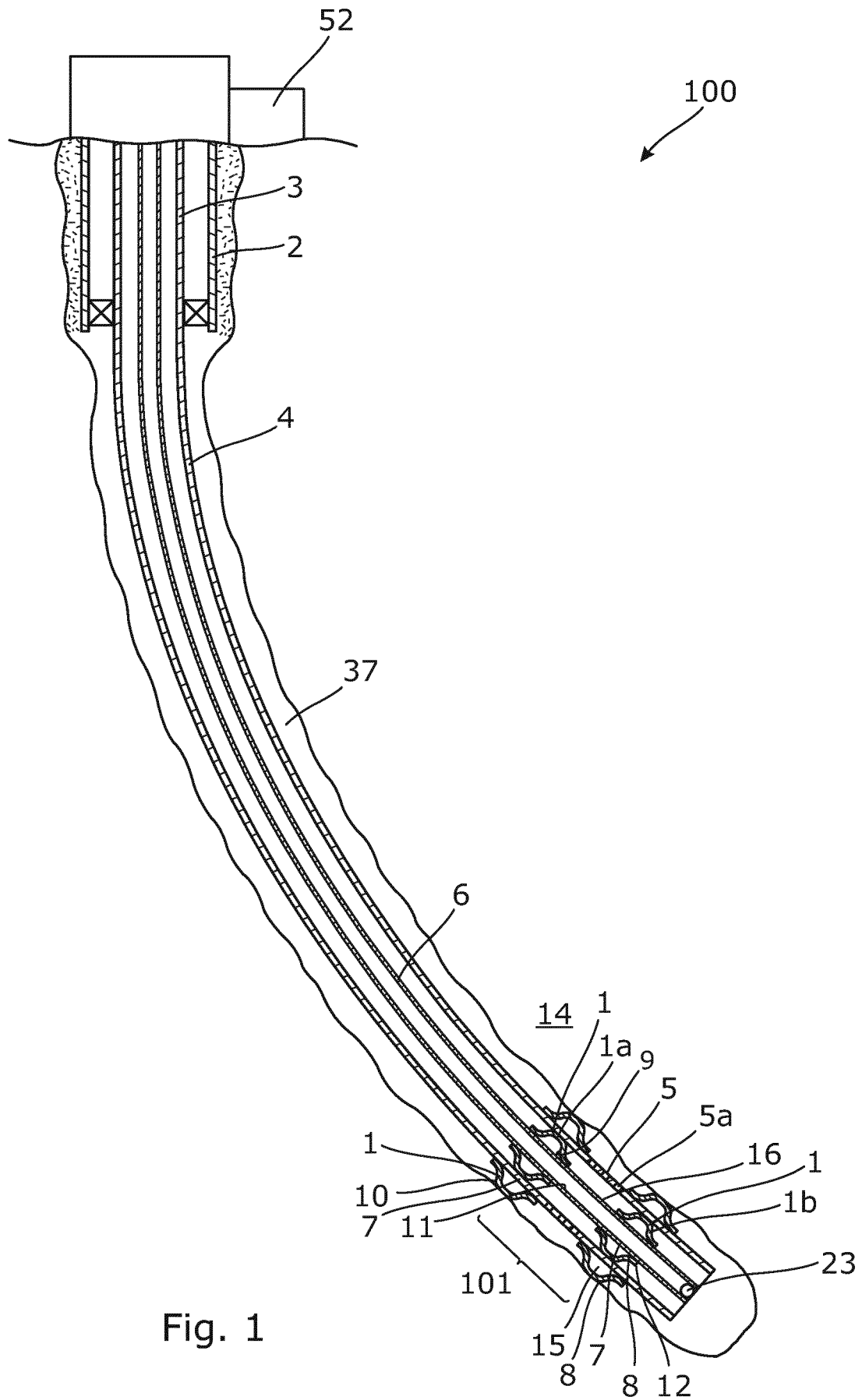
9. A redressing method according to claim 8, comprising:
- determining a third inflow section (5c) of the existing production casing opposite a third production zone (103),
wherein the providing an inner production casing further comprises providing a
- 5 fourth annular barrier (1d), and
- arranging the third annular barrier on one side of the third inflow section and the fourth annular barrier on the other side of the third inflow section of the existing production casing.
- 10 10. A redressing method according to any of claims 1-9, wherein the inner production casing extends to the top of the well.
11. A redressing method according to any of claims 1-10, wherein the inner production casing overlaps most of the existing production casing.
- 15 12. A redressing method according to any of claims 1-11, wherein the anchoring the inner production casing in the top part of the well comprises the step of providing the inner production casing with an anchoring annular barrier (1_{an}).
- 20 13. A redressing method according to any of claims 1-12, wherein the redressing method further comprises the step of detecting a depleted production zone.
- 25 14. A redressing method according to any of claims 1-13, wherein the redressing method further comprises fracturing or stimulating the first production zone or the second zone from within the inner production casing.
- 30 15. A redressed completion system (100) for re-establishing production of hydrocarbon-containing fluid in an existing production casing having a first inflow (5, 5a) section arranged opposite a first production zone (101) in a malfunctioning or underperforming well (2) having a top part (3), the system comprising:
- an inner production casing (6) comprising a first annular barrier (1, 1a) and a
- 35 second annular barrier (1, 1b) having a distance between them, each annular barrier comprising:

- a tubular metal part (7) for mounting as part of the inner production casing, and
 - an expandable metal sleeve (8) surrounding the tubular metal part and having an inner face (9) facing the tubular metal part and an outer face (10) adapted to face an inner wall (11) of the existing production casing, each end of the expandable metal sleeve (12) being connected with the tubular metal part, and
 - an annular space (15) between the inner face of the expandable metal sleeve and the tubular metal part,
- 10 wherein the inner production casing comprises a first inner inflow section (16, 16a) arranged between the first annular barrier and the second annular barrier, the inner production casing being adapted to extend inside the existing production casing, and wherein the first annular barrier is expanded on one side of the first inflow section and the second annular barrier is expanded on the other
- 15 side of the first inflow section of the existing production casing, thereby isolating the first inflow section and allowing the hydrocarbon-containing fluid to flow from the first production zone into the inner production casing through the first inflow section and the first inner inflow section.
- 20 16. A redressed completion system according to claim 15, wherein the inner production casing has an unexpanded outer diameter (D_{uo}) which is dimensioned to be smaller than a first inner diameter (D_1) of the existing production casing, thereby reducing the hydrostatic pressure of the well.
- 25 17. A redressed completion system according to any of claims 15-16, wherein the inner production casing is adapted to be anchored to the top part of the well.
18. A redressed completion system according to any of claims 15-17, wherein the inner production casing is adapted and dimensioned to extend to a top (51)
- 30 of the well.
19. A redressed completion system according to any of claims 15-18, wherein the existing production casing has a second inflow section (5, 5b) opposite a second production zone (102), and the inner production casing comprises a third
- 35 annular barrier (1, 1c) and a second inner inflow section (16, 16b) arranged between the second annular barrier and the third annular barrier, the second annular barrier being expanded on one side of the second inflow section and the

third annular barrier being expandable on the other side of the second inflow section of the existing production casing, thereby isolating the second inflow section.

- 5 20. A redressed completion system according to any of claims 15-19, further comprising a detection tool (50) configured to determine the inflow sections of the existing production casing.

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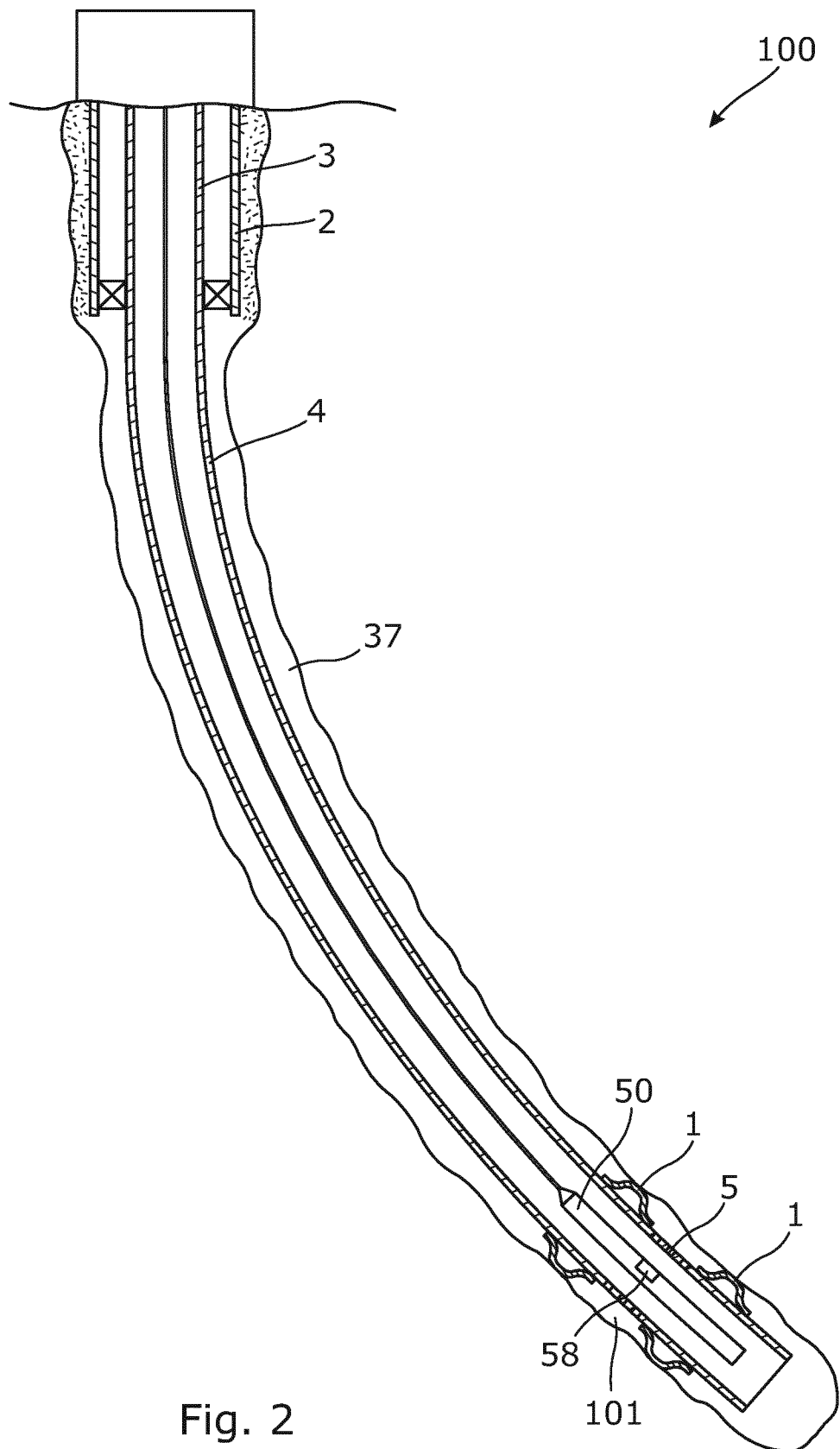


Fig. 2

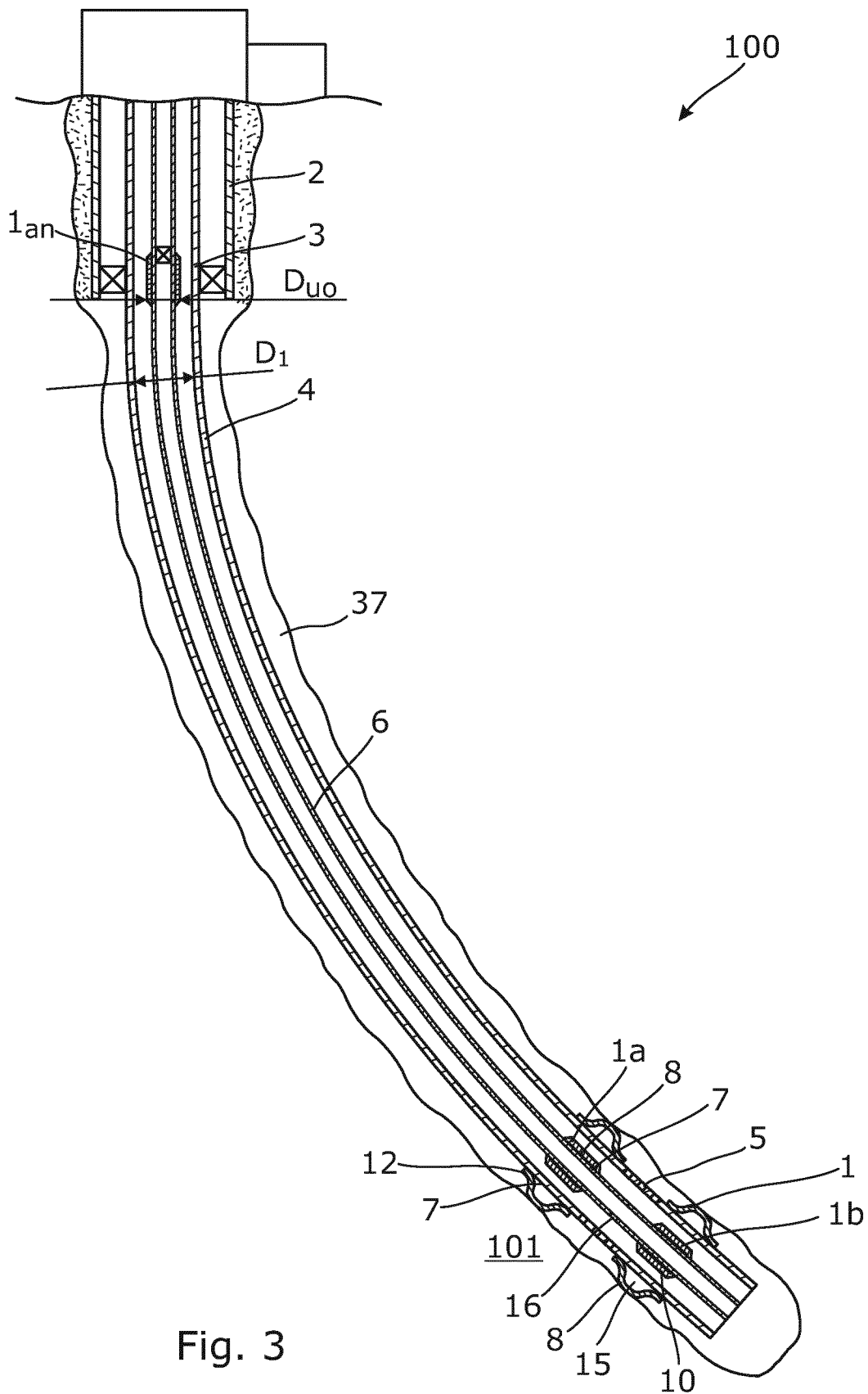
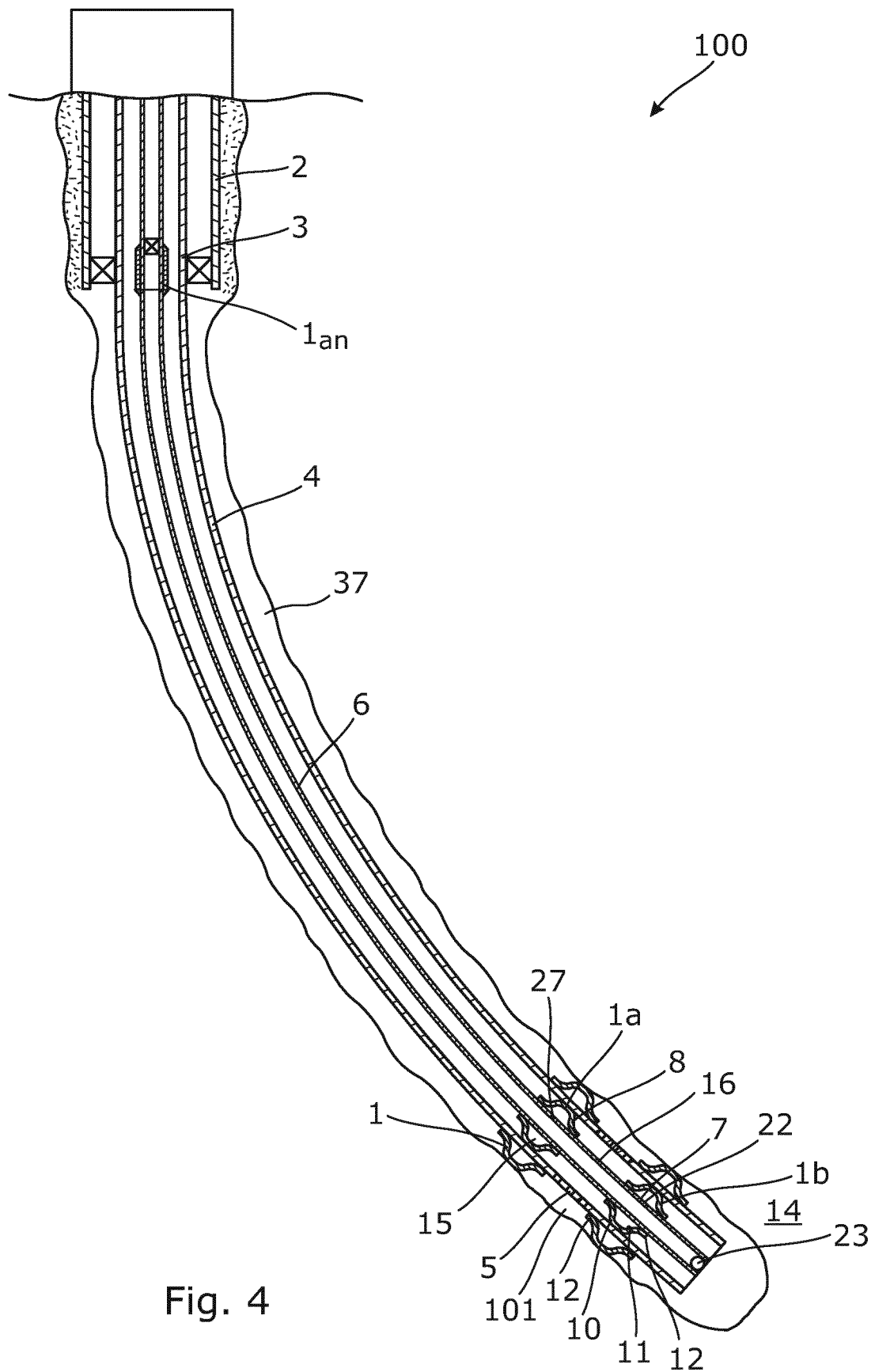


Fig. 3



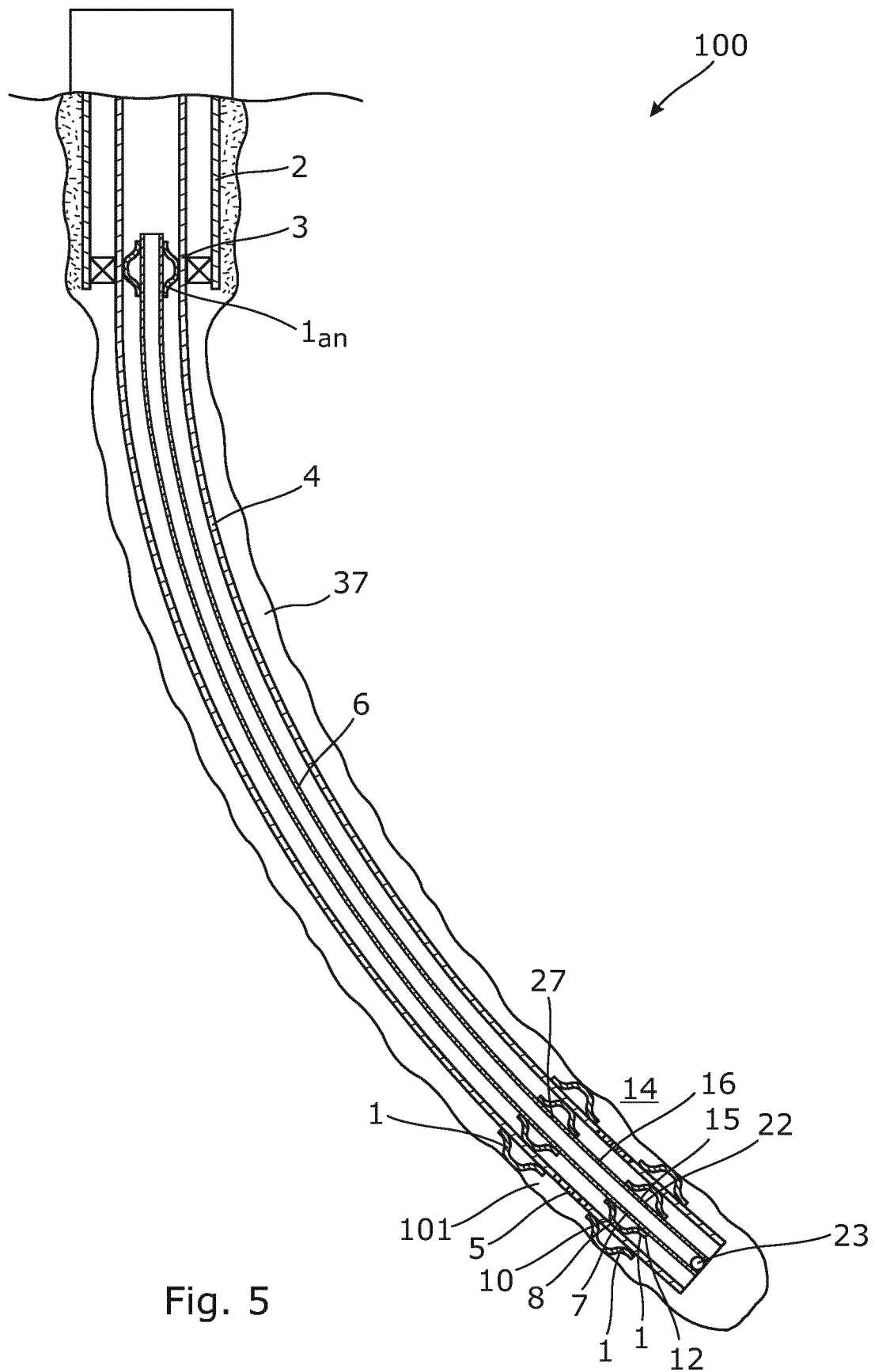


Fig. 5

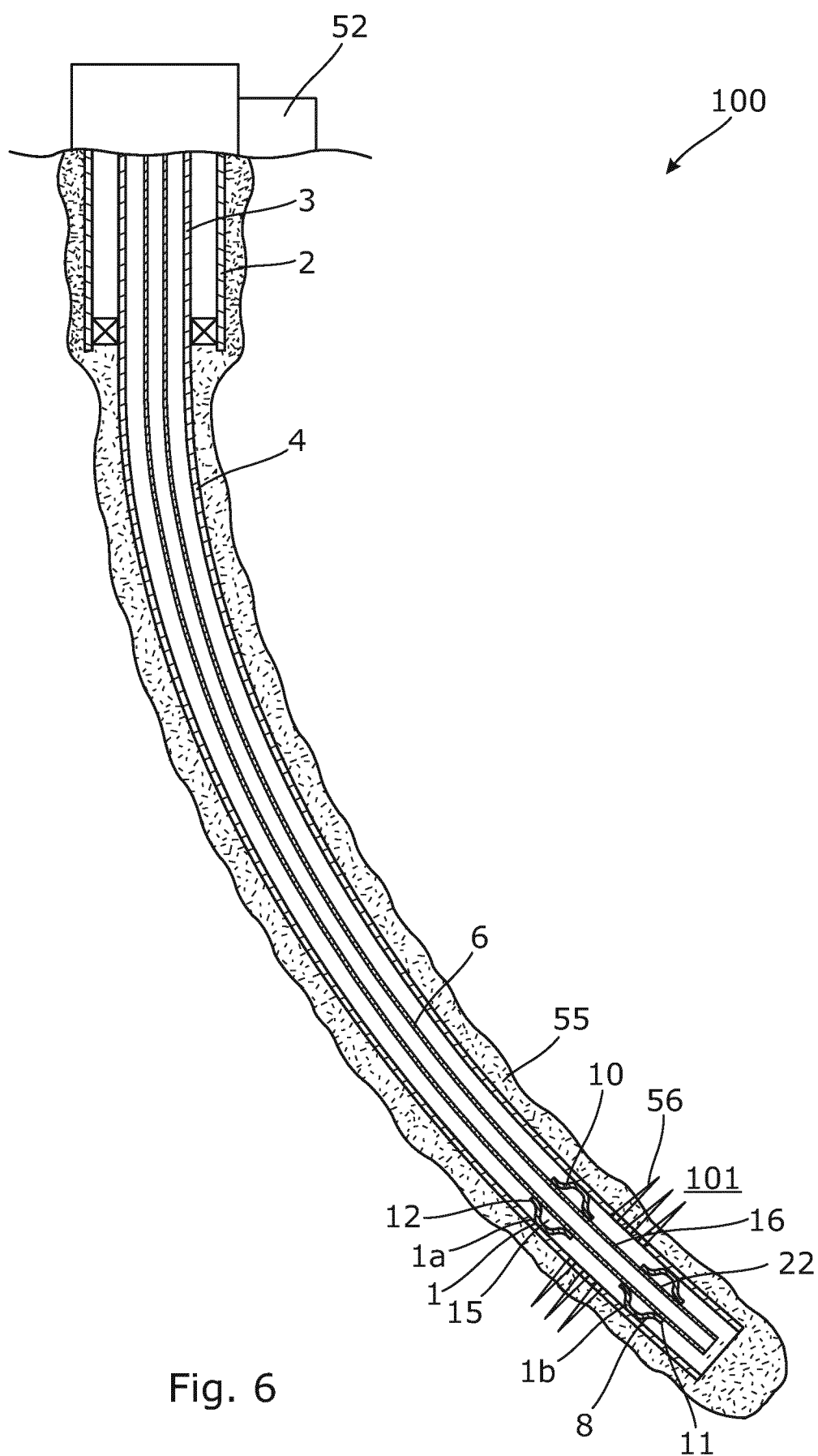
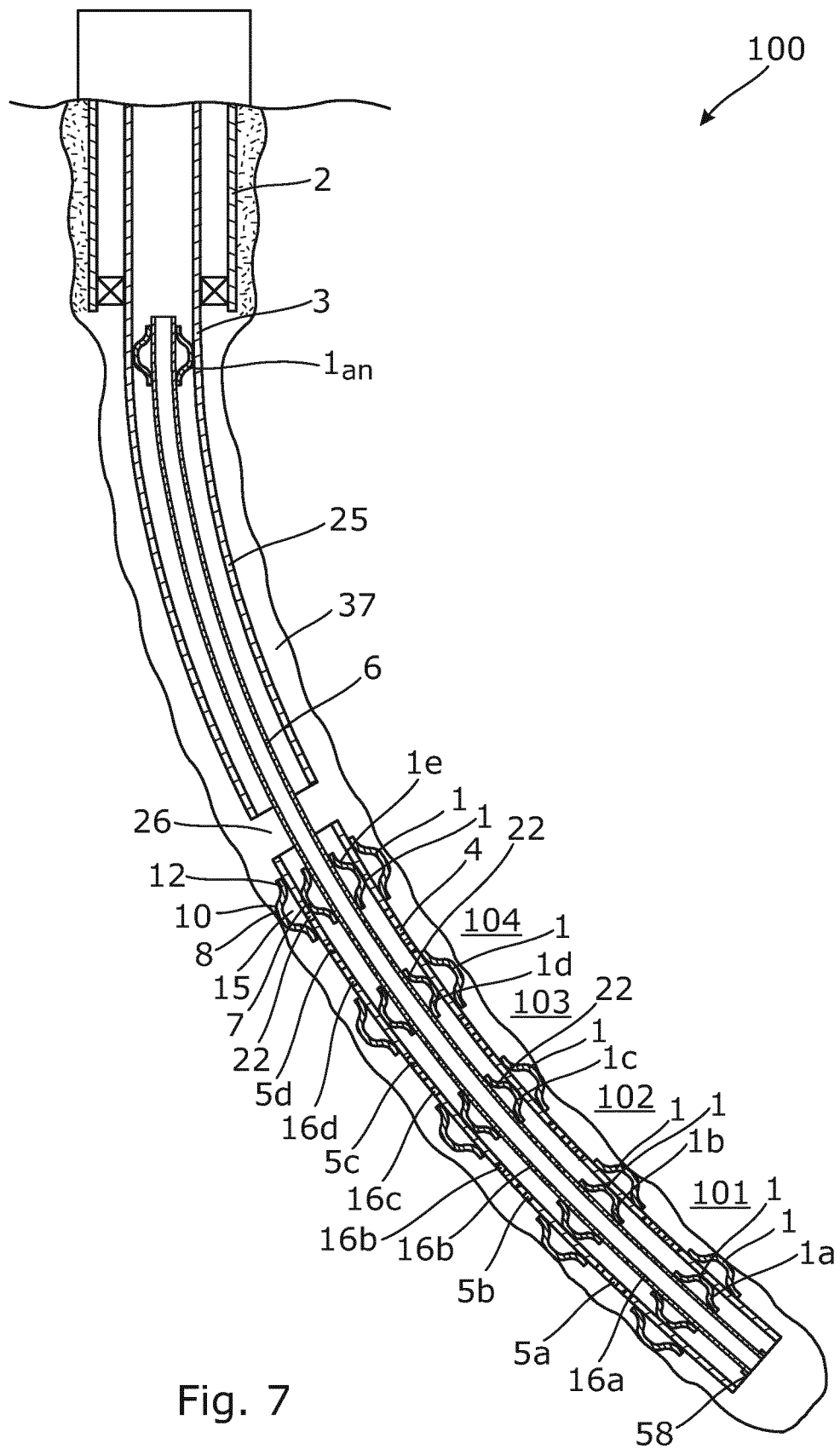


Fig. 6



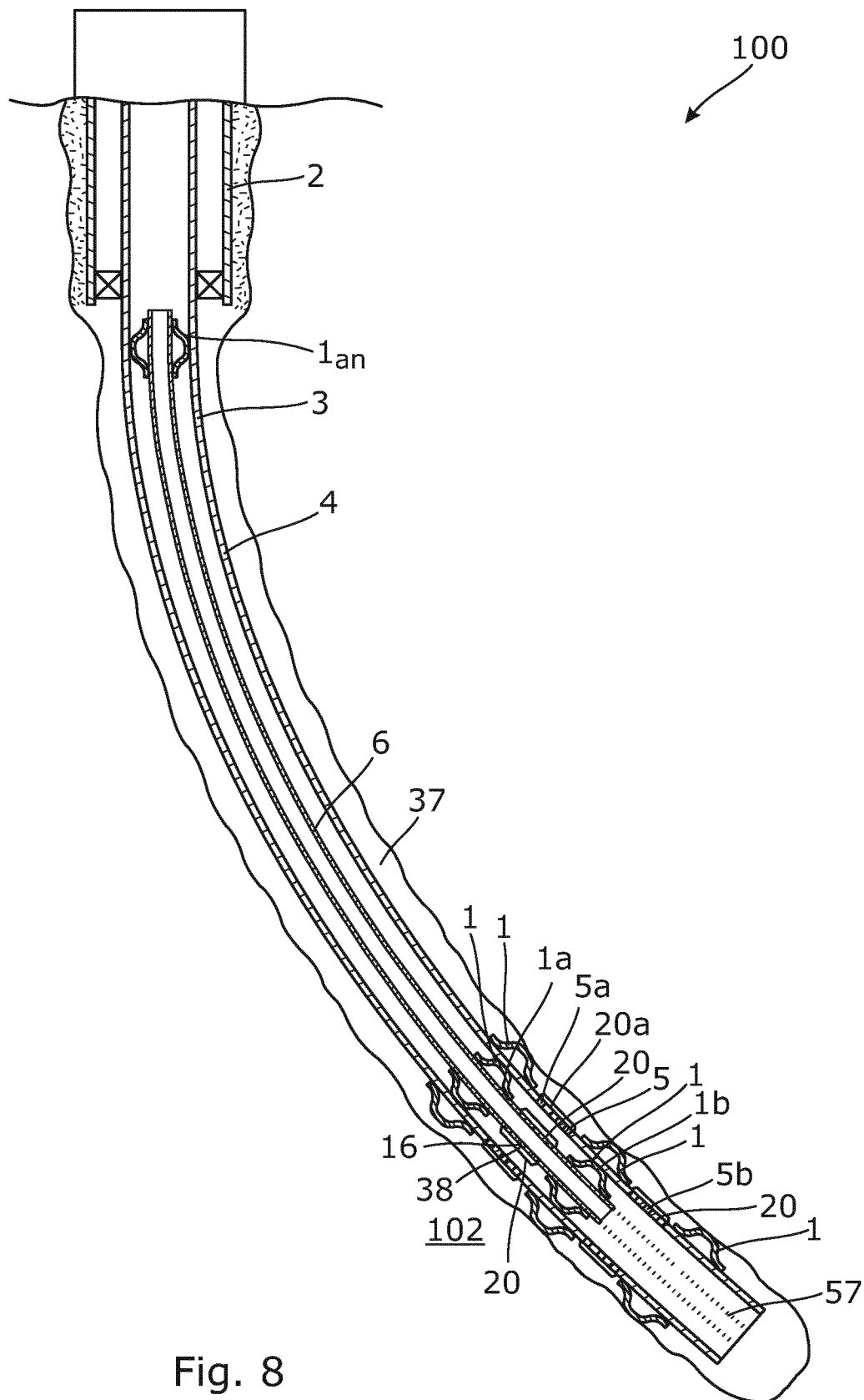
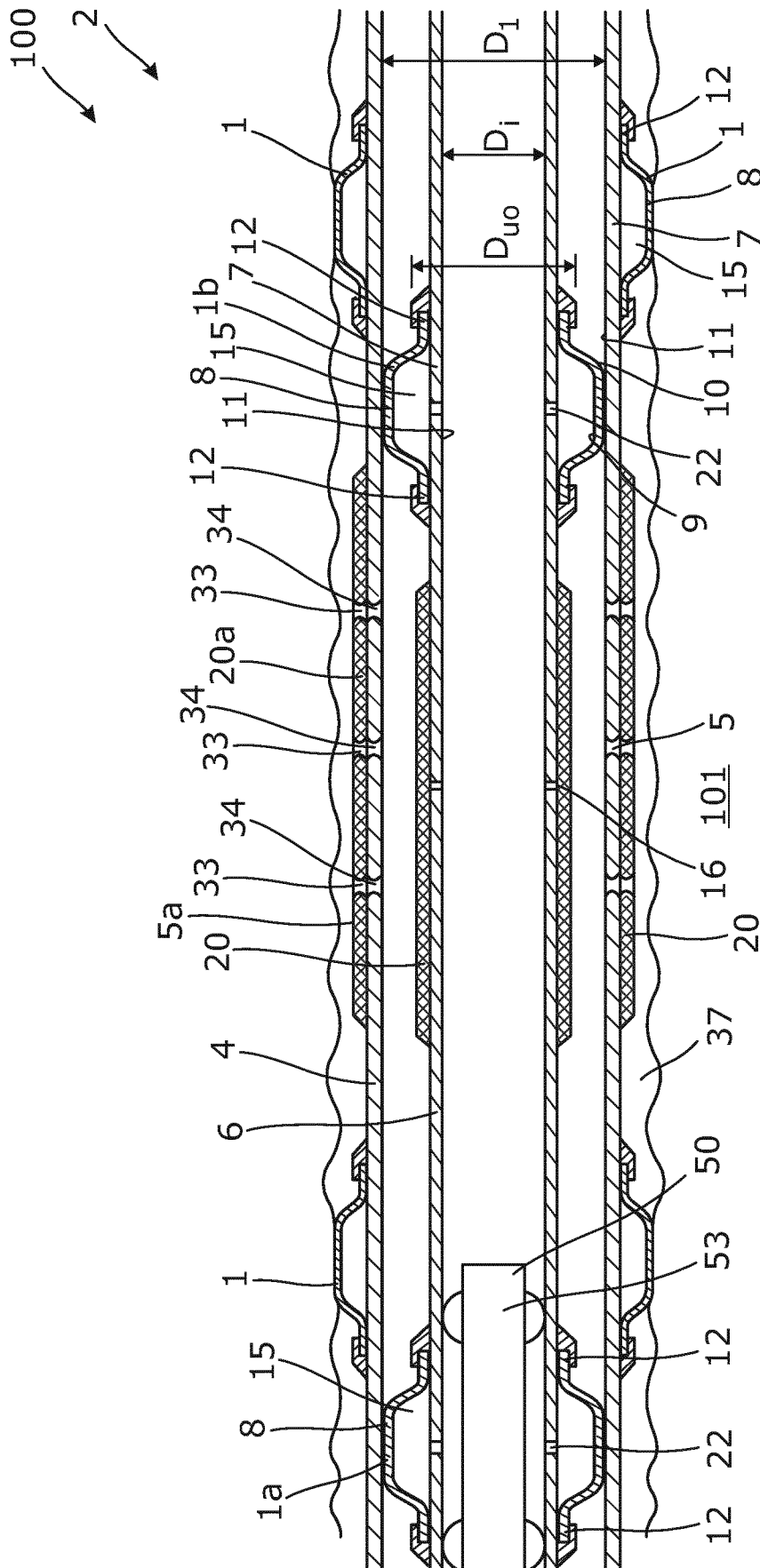


Fig. 8



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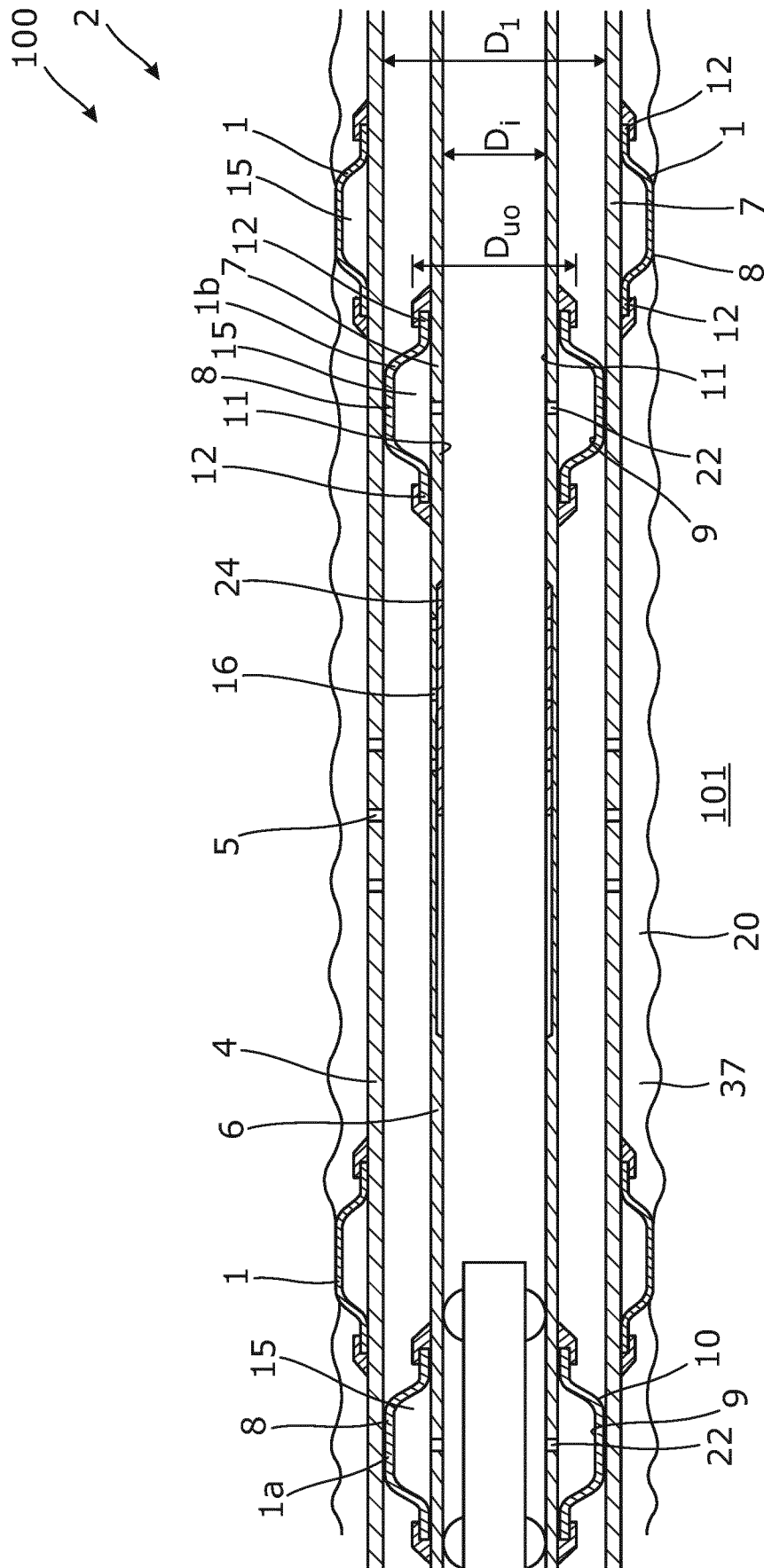


Fig. 10

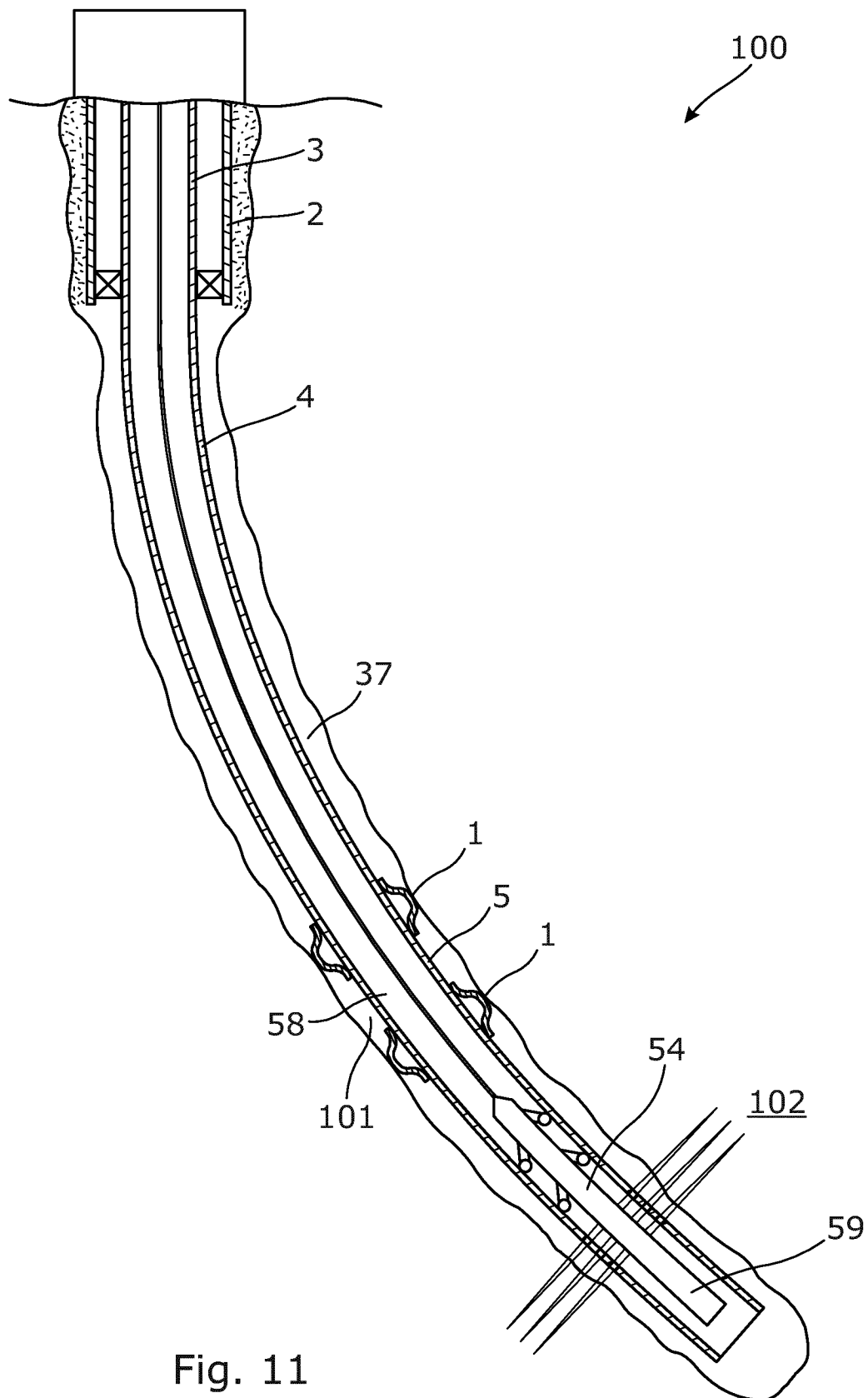
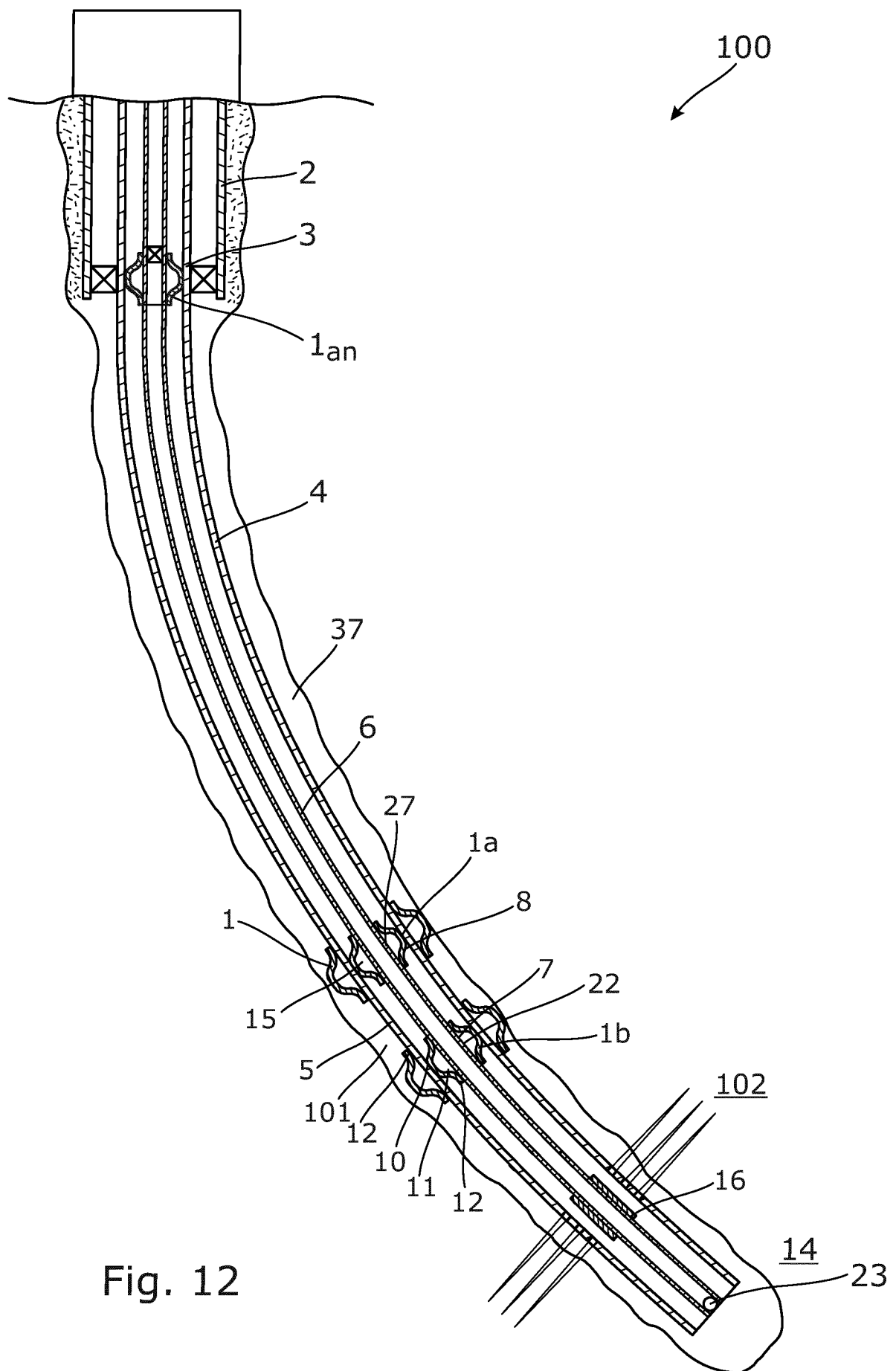
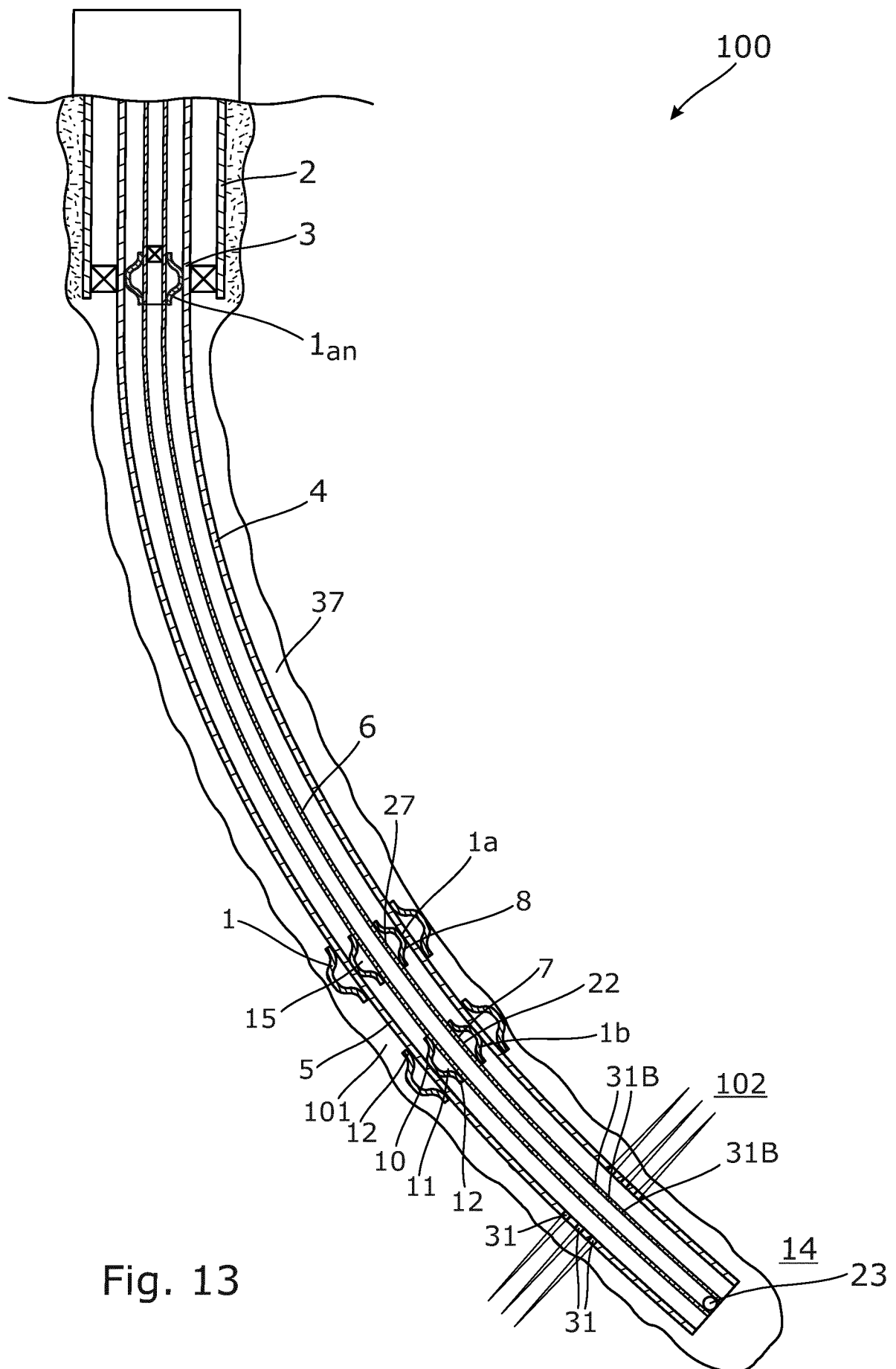


Fig. 11

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2016/063704

A. CLASSIFICATION OF SUBJECT MATTER

INV. E21B29/10 E21B33/124 E21B43/10 E21B43/14
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
E21B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2004/149435 A1 (HENDERSON WILLIAM D [US]) 5 August 2004 (2004-08-05) paragraphs [0032], [0034], [0047], [0049]; figures 1,2 -----	1-20
Y	US 2014/318770 A1 (HALLUNDBÄK JÖRGEN [DK] ET AL) 30 October 2014 (2014-10-30) paragraph [0080]; figures 1,3 -----	1-20
A	US 2008/115934 A1 (PETTINATO MIGUEL H [AR] ET AL) 22 May 2008 (2008-05-22) paragraphs [0032], [0035]; figure 1 -----	1-20
A	US 2004/163811 A1 (MCKEE L MICHAEL [US] ET AL) 26 August 2004 (2004-08-26) the whole document -----	1-20



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

8 August 2016

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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