(19) Europäisches Patentamt
European Patent Office
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(11) **EP 3 216 975 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
13.09.2017 Bulletin 2017/37

(51) Int Cl.:
E21B 33/127 *(2006.01)* ***E21B 43/25*** *(2006.01)*

(21) Application number: **16159369.4**

(22) Date of filing: **09.03.2016**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

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(54) **DOWNHOLE SYSTEM**

(57) The present invention relates to a downhole system for completing a well. The downhole system comprises a downhole well tubular structure having a wall and being configured to be arranged in a borehole of the well and a first annular barrier for being expanded in an annulus between the downhole well tubular structure and a wall of the borehole. The first annular barrier comprises a tubular part for mounting as part of the downhole well tubular structure, the tubular part having a first expansion opening and an outer face; an expandable sleeve surrounding the tubular part and having an inner face facing the tubular part and an outer face facing the wall of the borehole; a first connection part and a second connection part configured to connect a first end and a second end, respectively, of the expandable sleeve with the tubular part; and an annular space between the inner face of the expandable sleeve and the tubular part, the expandable sleeve being expanded by pressurising the annular space to an expansion pressure by pressurising the tubular part opposite the expansion opening. The downhole system further comprises a first aperture in the wall of the downhole well tubular structure. The aperture is at least partly plugged with an acid-soluble material. The present invention further relates to a completion method for completing a downhole system according to the present invention.

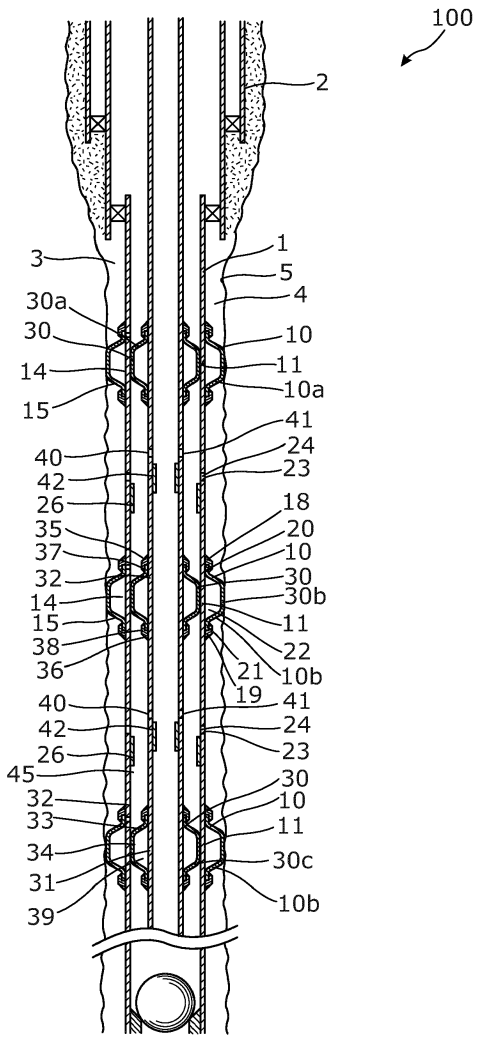

Fig. 4

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Description

Field of the invention

[0001] The present invention relates to a downhole system for completing a well, comprising a downhole well tubular structure having a wall and being configured to be arranged in a borehole of the well; a first annular barrier for being expanded in an annulus between the downhole well tubular structure and a wall of the borehole; and a first aperture in the wall of the downhole well tubular structure. Furthermore, the invention relates to a completion method for completing a downhole system.

Background art

[0002] Hydrocarbon-containing wells may be completed in very different manners and with very different designs, and the design used depends on the geological structure and composition of the formation in which the well is formed. In sub-salt fields that experience high losses during drilling and completion, it is very important that the well tubular structure is closed off until the annular barriers are expanded so that a zone experiencing a high pressure loss can be closed off after opening for production from that zone.

[0003] Also, when using expandable annular barriers where the well tubular structure is pressurised to expand several annular barriers in one run, the well tubular structure needs to be sealed off so that the well tubular structure can be pressurised to a certain pressure. Subsequently, the well tubular structure needs to be opened to let hydrocarbon-containing fluid from the formation into the well tubular structure. For this reason, well tubular structures are often opened for production by perforating the well tubular structure by means of perforation guns after the expansion of the annular barriers. However, such detonation entails a risk of the well tubular structure leaking in unintended areas, and sliding sleeves are therefore often preferred. However, operating such sliding sleeves takes time and cannot be done remotely as demanded by oil companies nowadays.

Summary of the invention

[0004] It is an object of the present invention to wholly or partly overcome the above disadvantages and drawbacks of the prior art. More specifically, it is an object to provide an improved downhole system having annular barriers configured to be expanded by pressurising the well tubular structure, in which system opening for production may done remotely and easily.

[0005] The above objects, together with numerous other objects, advantages and features, which will become evident from the below description, are accomplished by a solution in accordance with the present invention by a downhole system for completing a well, comprising:

- a downhole well tubular structure having a wall and being configured to be arranged in a borehole of the well,
- a first annular barrier for being expanded in an annulus between the downhole well tubular structure and a wall of the borehole, the first annular barrier comprising:
  - a tubular part for mounting as part of the downhole well tubular structure, the tubular part having a first expansion opening and an outer face,
  - an expandable sleeve surrounding the tubular part and having an inner face facing the tubular part and an outer face facing the wall of the borehole,
  - a first connection part and a second connection part configured to connect a first end and a second end, respectively, of the expandable sleeve with the tubular part, and
  - an annular space between the inner face of the expandable sleeve and the tubular part, the expandable sleeve being expanded by pressurising the annular space to an expansion pressure by pressurising the tubular part opposite the expansion opening, and
- a first aperture in the wall of the downhole well tubular structure,

wherein the aperture is at least partly plugged with an acid-soluble material.

[0006] In an embodiment, the material may comprise aluminium.

[0007] Furthermore, the aperture plugged with the material may be configured to withstand a first pressure being higher than the expansion pressure.

[0008] The downhole system may further comprise a second annular barrier, and the aperture may be arranged between the first annular barrier and the second annular barrier.

[0009] Furthermore, the downhole system may further comprise a sliding sleeve arranged opposite the aperture and having a first initial position uncovering the aperture.

[0010] In addition, the downhole system may further comprise:

- an inner well tubular structure arranged inside the downhole well tubular structure, the inner well tubular structure comprising a wall,
- a first and a second inner annular barrier, each inner annular barrier comprising:
  - a tubular part for mounting as part of the inner well tubular structure, the tubular part having an inner expansion opening,
  - an expandable sleeve surrounding the tubular part and having an inner face facing the tubular part and an outer face facing the wall of the

downhole well tubular structure,

- a first connection part and a second connection part configured to connect a first end and a second end, respectively, of the expandable sleeve with the tubular part, and
- an annular space between the inner face of the expandable sleeve and the tubular part, the expandable sleeve being expanded by pressurising the annular space to an inner expansion pressure by pressurising the tubular part opposite the inner expansion opening, and

- a second aperture in the wall of the inner well tubular structure.

[0011] In an embodiment, a burst disc may be arranged in the second aperture and be configured to burst at a burst pressure higher than the inner expansion pressure.

[0012] Moreover, the inner well tubular structure may comprise a sliding sleeve arranged opposite the second aperture.

[0013] Also, the downhole well tubular structure may comprise other annular barriers.

[0014] In addition, the inner well tubular structure may comprise other inner annular barriers.

[0015] Furthermore, the downhole well tubular structure may comprise other first apertures arranged between two annular barriers.

[0016] Additionally, the inner well tubular structure may comprise other second apertures arranged between two inner annular barriers.

[0017] The downhole system may further comprise a tool configured to close and/or open the sliding sleeves.

[0018] In an embodiment, the tool may be arranged at the bottom of the well or be inserted when needed.

[0019] Furthermore, the downhole system may further comprise a dart tool having projecting elements for engaging a groove in the sliding sleeve and an inflatable element.

[0020] The present invention furthermore relates to a completion method for completing a downhole system according to any of the preceding claims, comprising the steps of:

- inserting the downhole well tubular structure into the borehole,
- pressurising the downhole well tubular structure to expand the annular barriers, and
- acidising the acid-soluble material to clear the first aperture.

[0021] In an embodiment, the completion method may, before the step of acidising the acid-soluble material, further comprise the step of inserting an inner well tubular structure.

[0022] Furthermore, the completion method may, before the step of acidising the acid-soluble material and after the step of inserting the inner well tubular structure, further comprise the step of pressurising the inner well tubular structure to the inner expansion pressure to expand inner annular barriers connected with the inner well tubular structure.

[0023] In addition, the completion method may, before the step of acidising the acid-soluble material and after the step of pressurising the inner well tubular structure to the inner expansion pressure, further comprise the step pressurising the inner well tubular structure to the burst pressure to burst a burst disc.

[0024] Finally, the completion method may, after the step of pressurising the inner well tubular structure to the burst pressure to burst the burst disc, let acid through a second aperture into a second annulus between the inner well tubular structure, the downhole well tubular structure and the inner annular barriers to acidise the acid-soluble material.

Brief description of the drawings

[0025] 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 embodiments and in which

Fig. 1 shows a partially cross-sectional view of downhole system having a downhole well tubular structure connected with unexpanded annular barriers,

Fig. 2 shows a partially cross-sectional view of the downhole system of Fig. 1 where the annular barriers are in the expanded position,

Fig. 3 shows a partially cross-sectional view of another downhole system having an inner well tubular structure arranged within the downhole well tubular structure, before the inner annular barriers connected with the inner well tubular structure are expanded,

Fig. 4 shows a partially cross-sectional view of the downhole system of Fig. 1 where the inner annular barriers are in the expanded position,

Fig. 5 shows a partially cross-sectional view of another downhole system having a tool inserted for operating sliding sleeves covering/uncovering the second apertures in the inner well tubular structure, and

Fig. 6 shows a partially cross-sectional view of yet another downhole system having a dart tool for sequentially operating the sliding sleeves.

[0026] All the figures are highly schematic and not necessarily to scale, and they show only those parts which are necessary in order to elucidate the invention, other parts being omitted or merely suggested.

Detailed description of the invention

[0027] Fig. 1 shows a downhole system 100 for completing a well 2, comprising a downhole well tubular structure 1 having a wall 1a and being configured to be arranged in a borehole 3 of the well. The downhole system 100 comprises a first annular barrier 10, 10a configured to be expanded in an annulus 4 between the downhole well tubular structure 1 and a wall 5 of the borehole 3, as shown in Fig. 2. The first annular barrier 10, 10a comprises a tubular part 11 configured to be mounted as part of the downhole well tubular structure 1. The tubular part 11 has a first expansion opening 12 and an outer face 14. The first annular barrier 10, 10a further comprises an expandable sleeve 15 surrounding the tubular part 11 and having an inner face 16 facing the outer face 14 of the tubular part, and further having an outer face 17 facing the wall of the borehole 3. A first connection part 18 is configured to connect a first end 20 of the expandable sleeve 15 with the tubular part 11, and a second connection part 19 is configured to connect a second end 21 of the expandable sleeve with the tubular part. An annular space 22 is defined between the inner face of the expandable sleeve 15 and the outer face 14 of the tubular part 11. The first annular barrier 10, 10a is set and thus expanded by the expandable sleeve 15 being expanded by pressurising the annular space 22 to an expansion pressure by pressurising the tubular part 11 opposite the first expansion opening. The wall of the downhole well tubular structure 1 has a first aperture 23 which is at least partly plugged with an acid-soluble material 24 so that the aperture is configured to withstand a first pressure being higher than the expansion pressure. The material 24 mainly comprises aluminium so that acid can dissolve the material and clear the aperture 23.

[0028] When having well tubular structures with annular barriers which are expanded by pressurising the well tubular structure and letting the pressurised fluid in through the expansion opening and into the annular space, the apertures for the subsequent production of hydrocarbon-containing fluid need to be sealed off to be able to pressurise the well tubular structure. After the pressurisation and the expansion, the production apertures need to be opened by sliding sleeves arranged opposite the apertures. However, this has to be done in a separate run and with the risk of not being able to slide the sleeve and thus not being able to open for production in one or more production zones. For this and other reasons, well tubular structures are often opened for production by perforating the well tubular structure by means of perforation guns after the expansion of the annular barriers. However, such detonation entails a risk of the well tubular structure leaking in unintended areas, and sliding sleeves are therefore preferred. After sliding the sliding sleeves and thereby uncovering the apertures, the well tubular structure is pressurised with acid to acidise the formation and increase the production contact area and thus increase formation contact.

[0029] By having the first aperture at least partly plugged with an acid-soluble material, the step or run of intervening the well in order to slide the sliding sleeves can be avoided since the acid provides access through the aperture to the formation. The aperture may also comprise a burst disc configured to burst at a burst pressure higher than the expansion pressure in order to expand the annular barrier 10.

[0030] As can be seen in Fig. 2, the downhole system 100 further comprises a second annular barrier 10, 10b for isolating a first production zone 101, and the first aperture 23 is arranged between the first and second annular barriers 10, 10a, 10b. The downhole system 100 further comprises a third annular barrier 10, 10c for isolating a second production zone 102 between the second and third annular barriers 10, 10b, 10c. The downhole well tubular structure 1 is closed at the bottom by a ball 46 fitting into a ball seat 47. In this way, the entire well tubular structure 1 can be pressurised from its top to expand the annular barriers 10. The well tubular structure 1 may also be closed, e.g. by a plug or the like.

[0031] The downhole system 100 further comprises a sliding sleeve 26 arranged opposite the first aperture 23 and having a first initial position uncovering the first aperture so that a second run is not necessary to open the first apertures. However, the sliding sleeves 26 can be closed later, e.g. if one of the production zones starts producing water, that zone can be closed by sliding the sliding sleeve arranged opposite that aperture through which the water flows from that zone.

[0032] In Fig. 3, the downhole system 100 further comprises an inner well tubular structure 29 arranged inside the downhole well tubular structure 1. The inner well tubular structure 29 comprises a first inner annular barrier 30, 30a and a second inner annular barrier 30, 30b. Each inner annular barrier 30 comprises a tubular part 31 for mounting as part of the inner well tubular structure 29. The tubular part 31 has an inner expansion opening 32 through which pressurised fluid enters to expand an expandable sleeve 33 surrounding the tubular part and having an inner face 34 facing the tubular part and an outer face facing the wall of the downhole well tubular structure 1. A first connection part 35 is configured to connect a first end 37 of the expandable sleeve 33 with the tubular part 31, and a second connection part 36 is configured to connect a second end 38 of the expandable sleeve with the tubular part. An annular space 39 is formed between the inner face 34 of the expandable sleeve 33 and the tubular part 31. The expandable sleeve 33 of the inner annular barriers 30, 30a, 30b is expanded by pressurising the annular space to an inner expansion pressure by pressurising the tubular part 31 and letting the pressurised fluid in through the inner expansion opening 32. The wall of the inner well tubular structure 29 comprises a second aperture 40 through which acid is let into a second annulus 45 between the inner well tubular structure 29, the downhole well tubular structure 1 and the inner annular barriers 30 to acidise the acid-soluble ma-

terial in the first aperture 23 in the wall of the downhole well tubular structure 1.

[0033] By having an inner well tubular structure 29 arranged in the downhole well tubular structure 1, the completion is double-skinned and the production fluid flows from the first production zone 101 in through the first aperture 23, into the second annulus 45 and further into the inner well tubular structure 29 through the second aperture 40.

[0034] As can be seen in Fig. 3, the inner well tubular structure 29 comprises a key mechanism 49 at its toe at the bottom of the inner well tubular structure 29. The purpose of this is that when the inner well tubular structure 29 is recovered for recompletion or abandonment, the sliding sleeves of the valves of the downhole well tubular structure 1 are closed as the inner well tubular structure is retrieved to surface. The key mechanism 49 slides along the downhole well tubular structure 1 and engages a profile of the sliding sleeves 26 and slides the sliding sleeves into their closed position one by one as the inner well tubular structure 29 is pulled out of the well. This prevents commingling of the zones or significant losses during work-over operations.

[0035] The inner well tubular structure 29 may be an intelligent completion with surface control of the inner valves, e.g. sliding sleeves 26 or other types of valves, for controlling the flow from the multiple zones. By using an acid-dissolvable material in the apertures in the downhole well tubular structure 1, the risk of losing mud out of the apertures when running the inner well tubular structure is decreased, while it is ensured that the zones are open for flow once the inner well tubular structure has landed in its position downhole.

[0036] In order to be able to expand the inner annular barriers 30 as shown in Fig. 4, the second apertures 40 need to be sealed off, e.g. closed by a sliding sleeve 42 covering the second aperture 40. In order to move the sliding sleeves 42 to open the second aperture 40, an additional run is necessary. However, when a burst disc 41 is arranged in the second aperture 40 and configured to burst at a burst pressure higher than the inner expansion pressure, the inner well tubular structure just needs to be pressurised to the burst pressure to open the second apertures. When supplying acid down the inner well tubular structure, the acid fluid can be pressurised to a pressure above the burst pressure and can thus burst the burst disc just before the acid is fed to the second annulus to dissolve the material 24 in the first aperture 23. Thus, the step of acidising entails bursting the burst disc opening the second aperture, acidising the acid-soluble material in the first aperture 23, and acidising the formation to increase formation contact, all in one run without intervening the well.

[0037] Furthermore, when having an inner well tubular structure, it is not easy to operate the sliding sleeves 42 covering/uncovering the first apertures 23 as soon as the inner well tubular structure has been inserted. Therefore, the combination of having a burst disc in the second apertures 40 in the inner well tubular structure and having the acid-soluble material 24 in the downhole well tubular structure 1 makes it possible to make a very operationally safe completion, since the first and second apertures are inserted in the uncovered position, but "plugged" with acid-soluble material or a burst disc, respectively, so that the apertures can be opened in one run after expanding the inner annular barriers 30.

[0038] As shown in Figs. 3 and 4, the downhole well tubular structure 1 may be connected with other annular barriers 10, and the inner well tubular structure may be connected with other inner annular barriers 30. The downhole well tubular structure 1 may comprise other first apertures 23 arranged between two adjacent annular barriers 10, and the inner well tubular structure may comprise other second apertures 40 arranged between two adjacent inner annular barriers 30. The downhole system 100 may in this way have a plurality of production zones other than the first and the second production zones.

[0039] In Fig. 5, the downhole system 100 further comprises a tool 50 configured to close the sliding sleeves 42 and reopen them when needed. The tool 50 comprises a flexible element (not shown) which is forced radially outwards, but when moving along the inner face 34 of the inner well tubular structure, it is forced to retract, and when being opposite the groove 62 of the sliding sleeve 42, the flexible element is allowed to project radially outwards and engage the groove 62, and as the tool 50 continues to move in one direction, the sliding sleeve 42 is moved to either open or close the aperture 40. The tool 50 may be arranged in the bottom of the well 2 and be engaged by a drill pipe inserted in the inner or downhole well tubular structure when the sliding sleeves 42 need to be closed, e.g. before the inner well tubular structure is retracted for repair or replacement.

[0040] As shown in Fig. 6, the downhole system 100 further comprises a dart tool 60 having projecting elements 61 configured to engage a groove 62 in the sliding sleeve 42 and an inflatable element 63. The dart tool 60 can be used if the inner well tubular structure is inserted with the sliding sleeves 42 in a closed position, covering the second aperture 40, and the production zones need to be opened and fractured sequentially. This is e.g. the case if only one zone is opened and treated with acid, and when that production zone produces water, the zone is closed and another production zone is opened and treated with acid. The dart tool 60 is then inserted into the inner well tubular structure, and when detecting the sliding sleeve 42 to be operated, the projecting elements 61 engage the groove 62 of the sliding sleeve 42 and the inflatable element 63 is inflated. Upon further pressurisation of the fluid above the inflatable element 63, the dart tool 60 is moved downwards and the sliding sleeve 42 is forced open, and the acid is let into the second annulus 45, the acid-soluble material 24 is dissolved and the acid enters the first aperture 23 and the formation. The dart tool 60 may be used to open and treat several zones with acid. When this is done, the sliding sleeves

42 are self-closing.

[0041] The well 2 is completed by inserting the downhole well tubular structure 1 into the borehole 3, by pressurising the downhole well tubular structure to expand the annular barriers 10, and by subsequently acidising the acid-soluble material 24 to clear the first aperture 23 and allowing the acid the enter the first aperture to acidise the formation as well.

[0042] When completing a double-cased completion as shown in Fig. 4, an inner well tubular structure is inserted after the annular barriers 10 connected with the downhole well tubular structure 1 are expanded and before the acid treatment. After the step of inserting the inner well tubular structure, the inner well tubular structure is pressurised to the inner expansion pressure to expand the inner annular barriers 30, 30a, 30b and thus isolate the second annulus 45 between the downhole well tubular structure 1 and the inner well tubular structure into several second annuluses 45. Then, the inner well tubular structure is pressurised to the burst pressure to burst the burst discs 41 and provide access to the second annulus 45. The burst discs 41 may be burst one at a time and thus be rated at different burst pressures so that e.g. the burst disc arranged furthest away from the top of the well is rated to the lowest burst pressure to ensure that it is burst before bursting the next burst disc closer to the top of the well. In this way, it is ensured that all burst discs 41 are burst to prevent that once the first burst disc arranged closest to the top is burst, all fluid is lost in that zone so the other burst discs are not burst.

[0043] A flow control valve may be arranged in one of the apertures in the well tubular structures to control flow in or out of the well tubular structures.

[0044] By 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 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.

[0045] By a casing, well tubular structure, downhole well tubular structure, or inner well tubular structure, production casing is meant any kind of pipe, tubing, tubular, liner, string etc. used downhole in relation to oil or natural gas production.

[0046] 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 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®.

[0047] 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 downhole system (100) for completing a well (2), comprising:

- a downhole well tubular structure (1) having a wall (1a) and being configured to be arranged in a borehole (3) of the well,
- a first annular barrier (10, 10a) for being expanded in an annulus (4) between the downhole well tubular structure and a wall (5) of the borehole, the first annular barrier comprising:
  - a tubular part (11) for mounting as part of the well tubular structure, the tubular part having a first expansion opening (12) and an outer face (14),
  - an expandable sleeve (15) surrounding the tubular part and having an inner face (16) facing the tubular part and an outer face (17) facing the wall of the borehole,
  - a first connection part (18) and a second connection part (19) configured to connect a first end (20) and a second end (21), respectively, of the expandable sleeve with the tubular part, and
  - an annular space (22) between the inner face of the expandable sleeve and the tubular part, the expandable sleeve being expanded by pressurising the annular space to an expansion pressure by pressurising the tubular part opposite the expansion opening, and
- a first aperture (23) in the wall of the downhole well tubular structure,

wherein the aperture is at least partly plugged with an acid-soluble material (24).

2. A downhole system according to claim 1, wherein the material comprises aluminium.

3. A downhole system according to claim 1 or 2, wherein the aperture plugged with the material is configured to withstand a first pressure being higher than the expansion pressure.

4. A downhole system according to any of the preceding claims, further comprising a second annular barrier (10, 10b), the aperture being arranged between the first annular barrier and the second annular bar-

rier.

5. A downhole system according to any of the preceding claims, further comprising a sliding sleeve (26) arranged opposite the aperture and having a first initial position uncovering the aperture.

6. A downhole system according to any of the preceding claims, further comprising:

- an inner well tubular structure (29) arranged inside the downhole well tubular structure, the inner well tubular structure comprising a wall (29a),
- a first (30, 30a) and a second inner annular barrier (30, 30b), each inner annular barrier comprising:
  - a tubular part (31) for mounting as part of the inner well tubular structure, the tubular part having an inner expansion opening (32),
  - an expandable sleeve (33) surrounding the tubular part and having an inner face (34) facing the tubular part and an outer face facing the wall of the downhole well tubular structure,
  - a first connection part (35) and a second connection part (36) configured to connect a first end (37) and a second end (38), respectively, of the expandable sleeve with the tubular part, and
  - an annular space (39) between the inner face of the expandable sleeve and the tubular part, the expandable sleeve being expanded by pressurising the annular space to an inner expansion pressure by pressurising the tubular part opposite the inner expansion opening, and
- a second aperture (40) in the wall of the inner well tubular structure.

7. A downhole system according to any of the preceding claims, wherein a burst disc (41) is arranged in the second aperture and configured to burst at a burst pressure higher than the inner expansion pressure.

8. A downhole system according to any of the preceding claims, wherein the inner well tubular structure comprises a sliding sleeve (42) arranged opposite the second aperture.

9. A downhole system according to any of the preceding claims, further comprising a tool (50) configured to close and/or open the sliding sleeves.

10. A downhole system according to any of the preceding claims, further comprising a dart tool (60) having projecting elements (61) for engaging a groove (62) in the sliding sleeve and an inflatable element (63).

11. A completion method for completing a downhole system (100) according to any of the preceding claims, comprising the steps of:

- inserting the downhole well tubular structure into the borehole,
- pressurising the downhole well tubular structure to expand the annular barriers, and
- acidising the acid-soluble material to clear the first aperture.

12. A completion method according to claim 11, which before the step of acidising the acid-soluble material further comprises the step of inserting an inner well tubular structure.

13. A completion method according to claim 12, which before the step of acidising the acid-soluble material and after the step of inserting the inner well tubular structure further comprises the step of pressurising the inner well tubular structure to the inner expansion pressure to expand inner annular barriers (30, 30a, 30b) connected with the inner well tubular structure.

14. A completion method according to claim 13, which before the step of acidising the acid-soluble material and after the step of pressurising the inner well tubular structure to the inner expansion pressure further comprises the step pressurising the inner well tubular structure to the burst pressure to burst a burst disc (41).

15. A completion method according to claim 14, which after the step of pressurising the inner well tubular structure to the burst pressure to burst the burst disc lets acid through a second aperture (40) into a second annulus (45) between the inner well tubular structure, the downhole well tubular structure and the inner annular barriers to acidise the acid-soluble material.

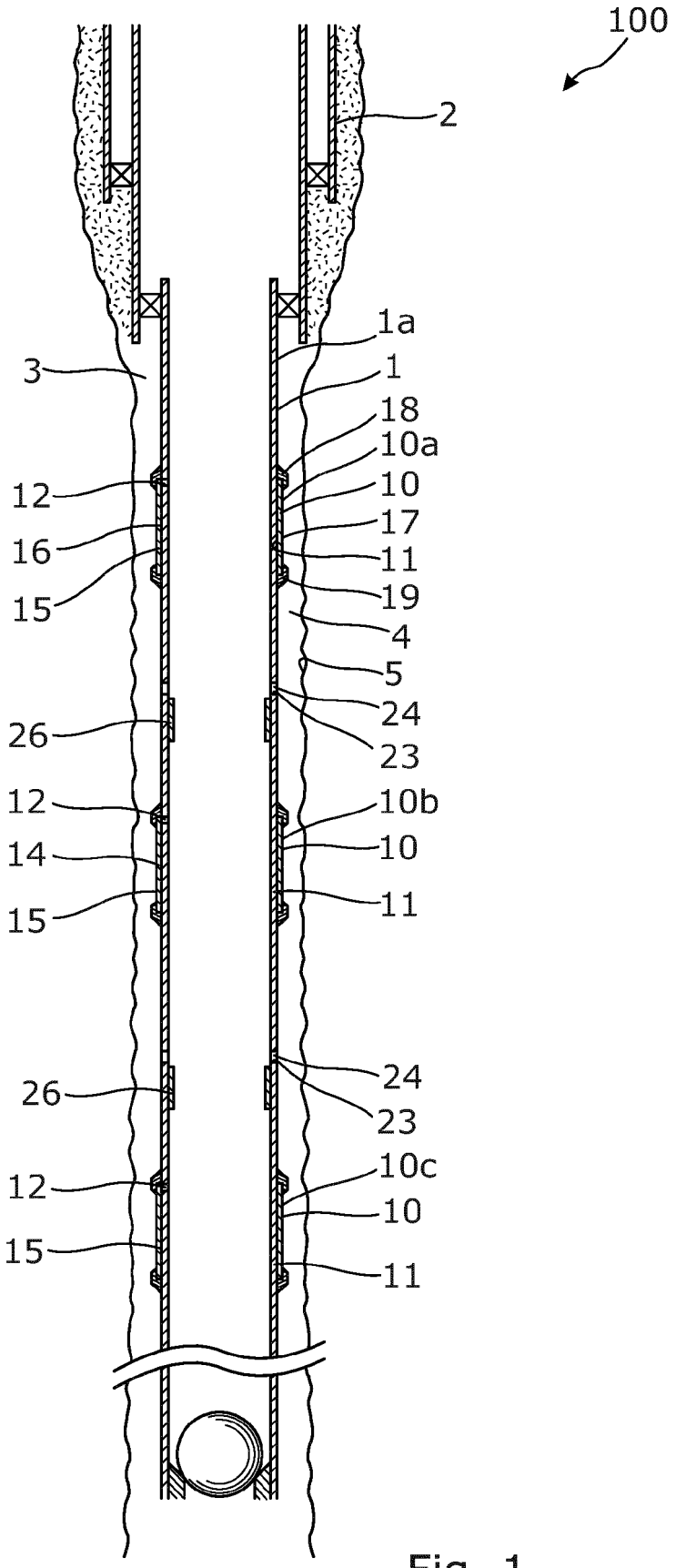
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Fig. 1

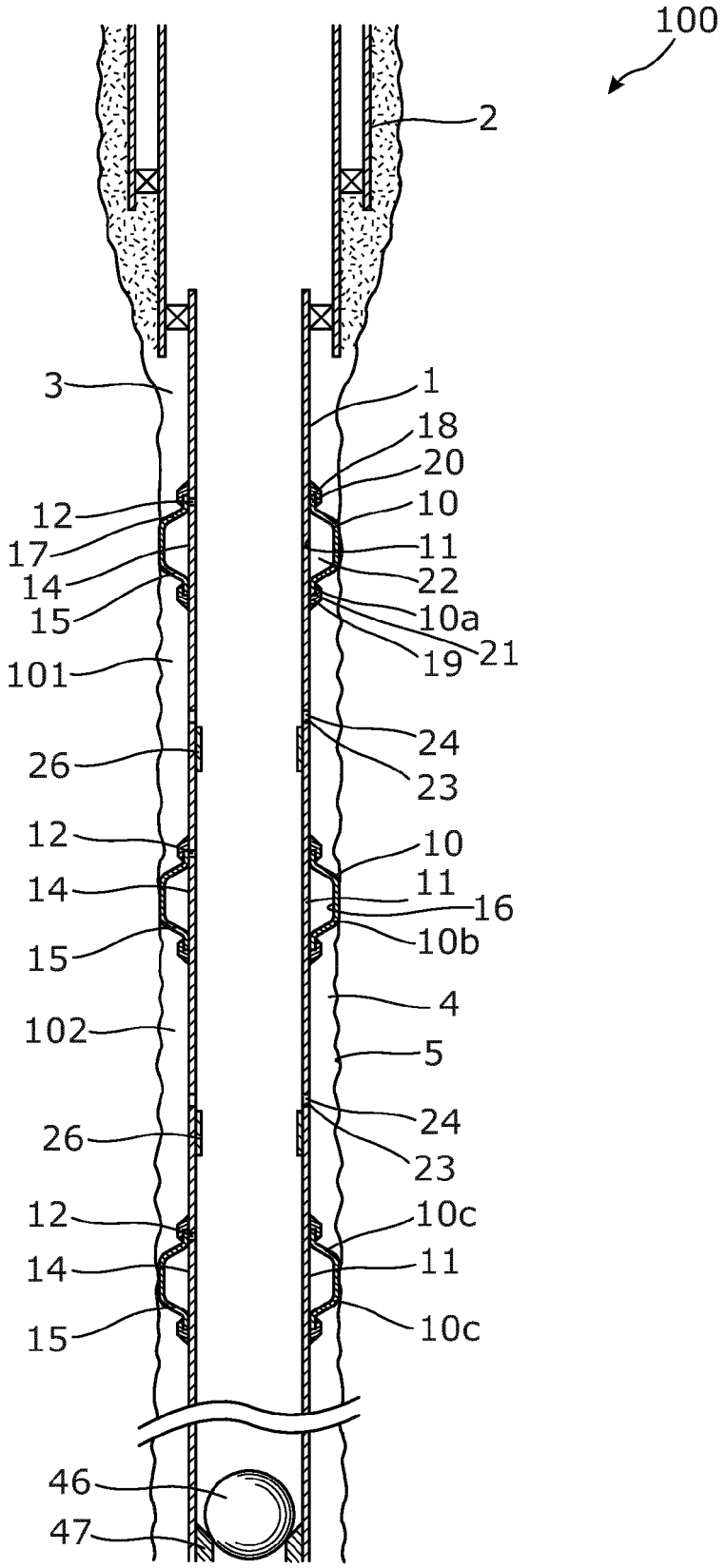
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Fig. 2

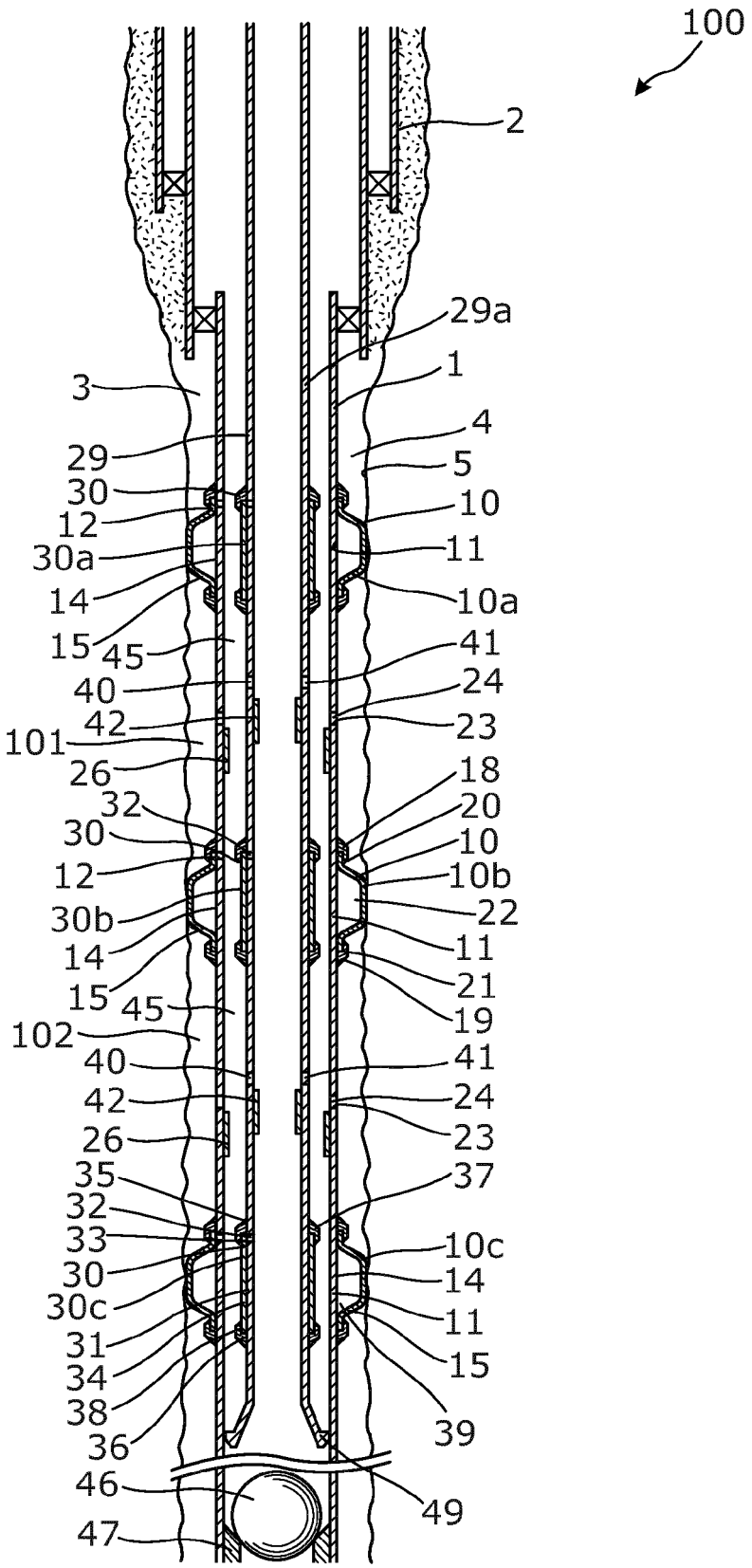
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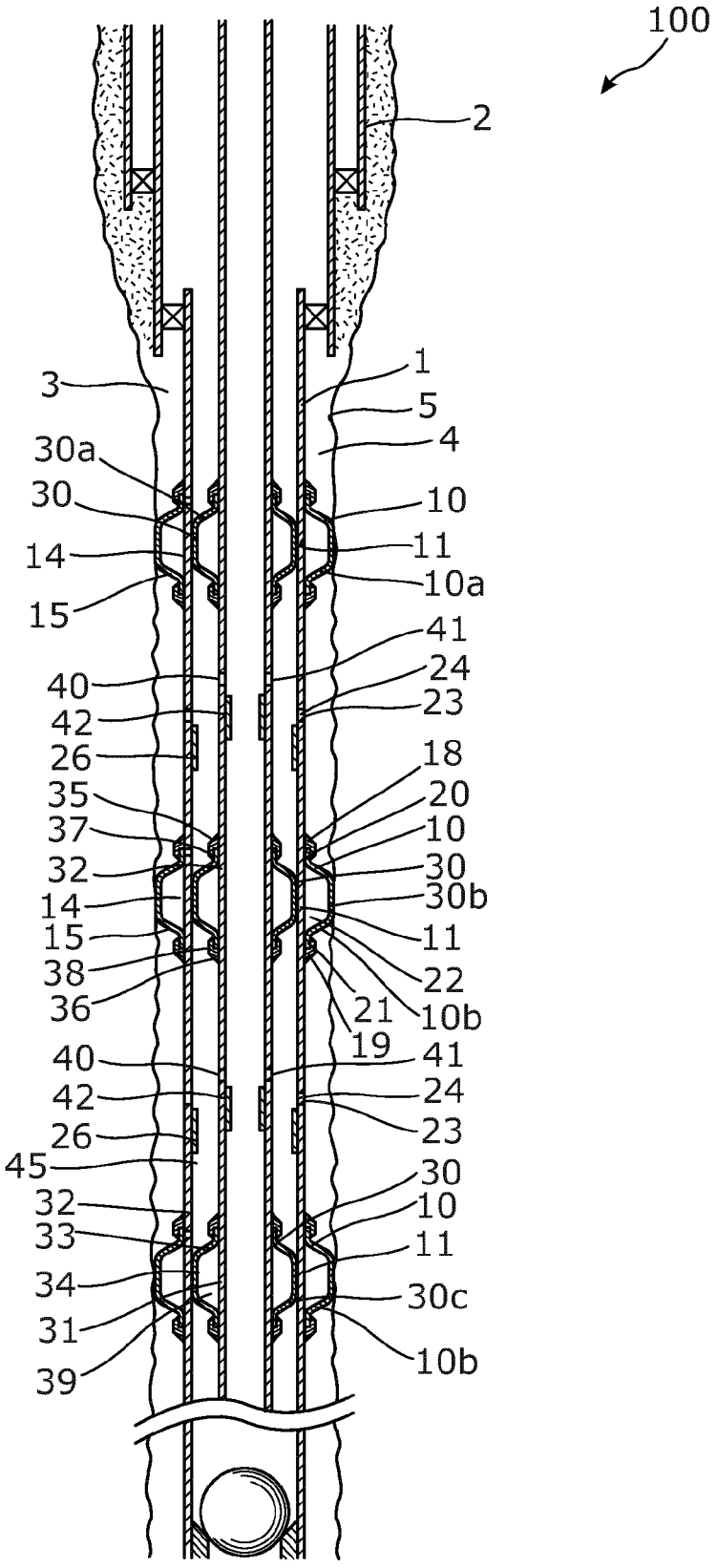
Fig. 3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30
10
14
11
10a
15
41
40
24
23
42
26
18
35
20
37
10
32
30
14
30b
15
11
38
22
36
21
10b
19
40
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26
23
45
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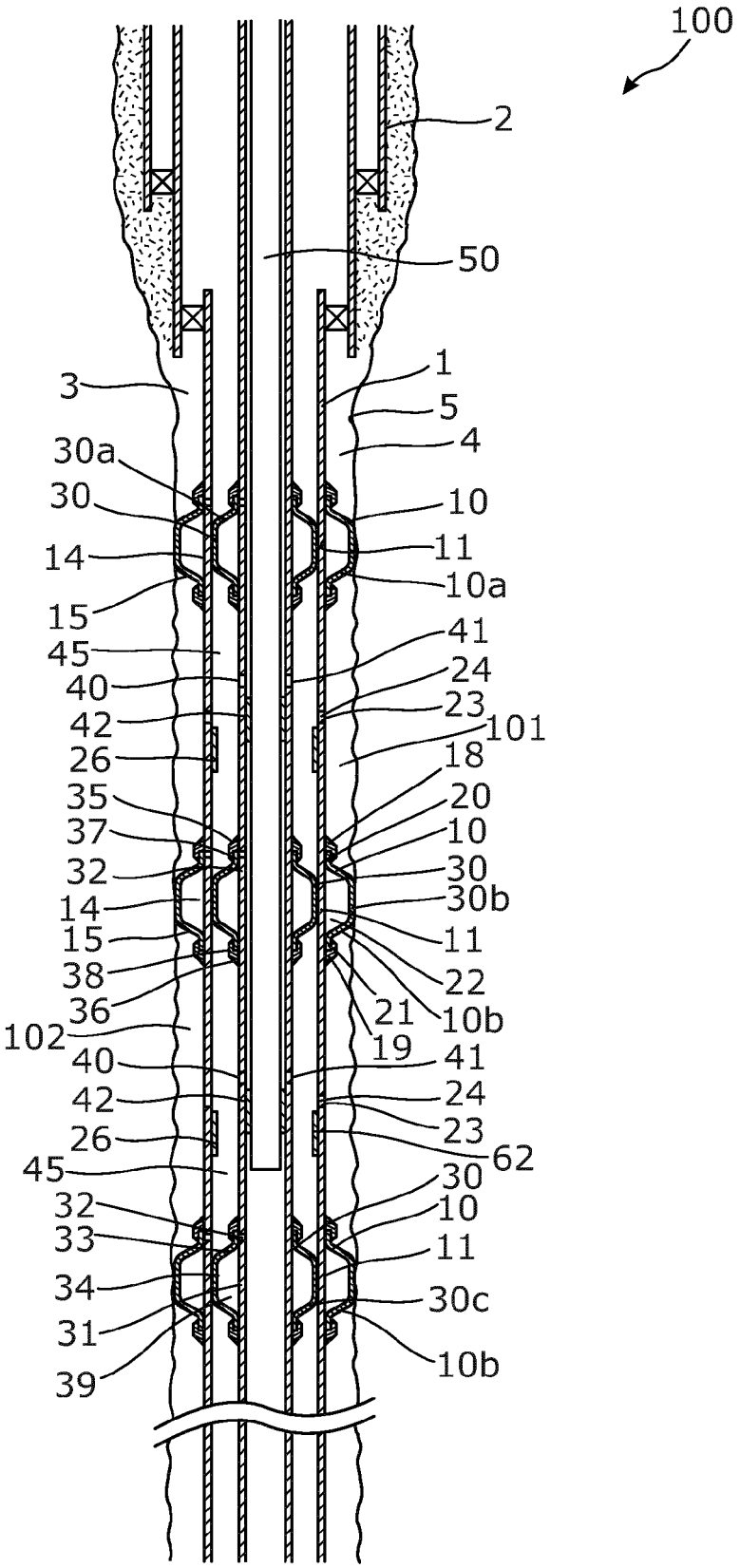
32
10
33
11
34
30c
31
10b
39

Fig. 4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40
23
42
101
26
18
35
20
37
10
32
30
14
30b
15
11
38
22
36
21
10b
102
19
40
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26
23
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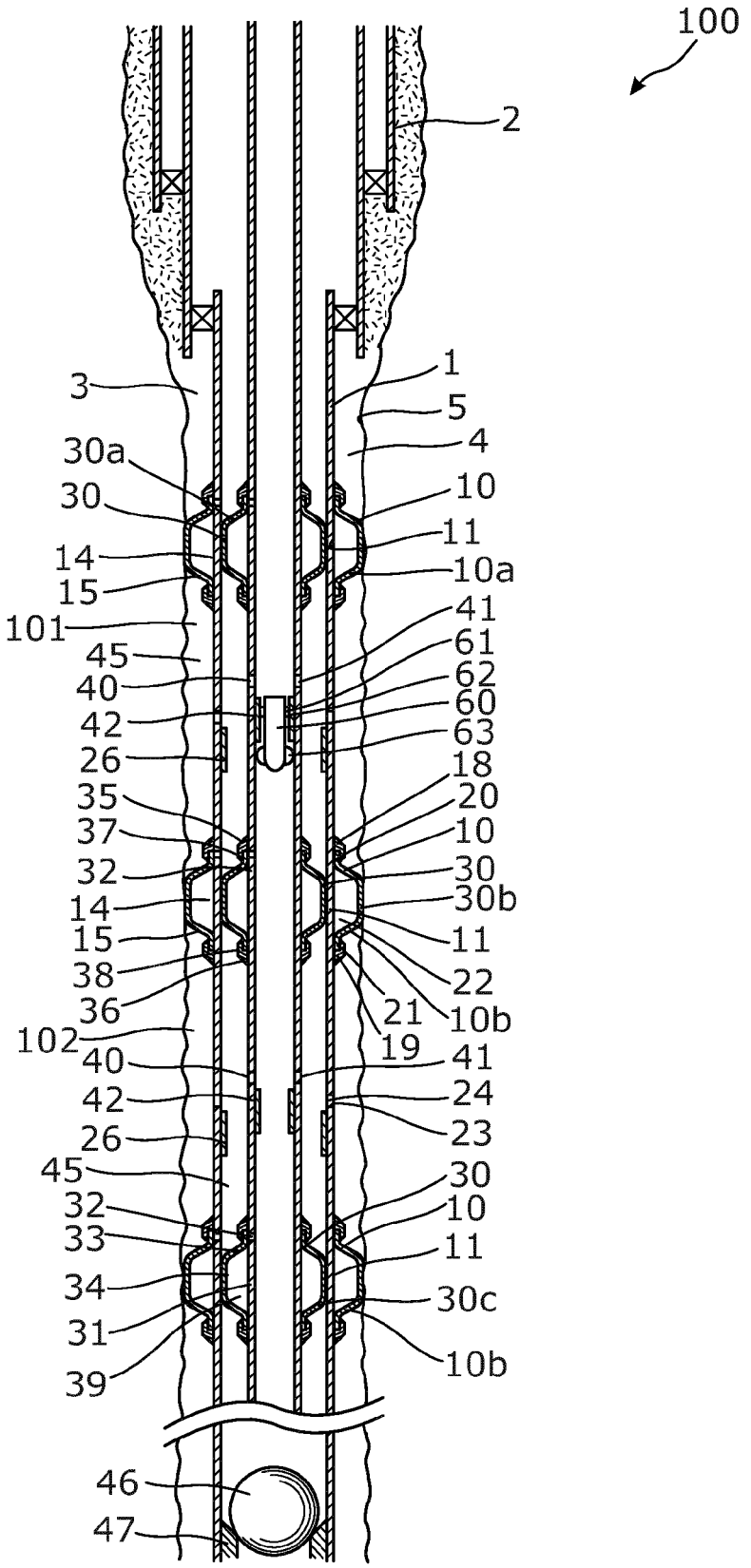
45
30
32
10
33
11
34
30c
31
10b
39

Fig. 5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10a
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26
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37
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32
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14
30b
15
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10b
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30c
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10b
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Fig. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 16 15 9369

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	14 September 2016	Wehland, Florian

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