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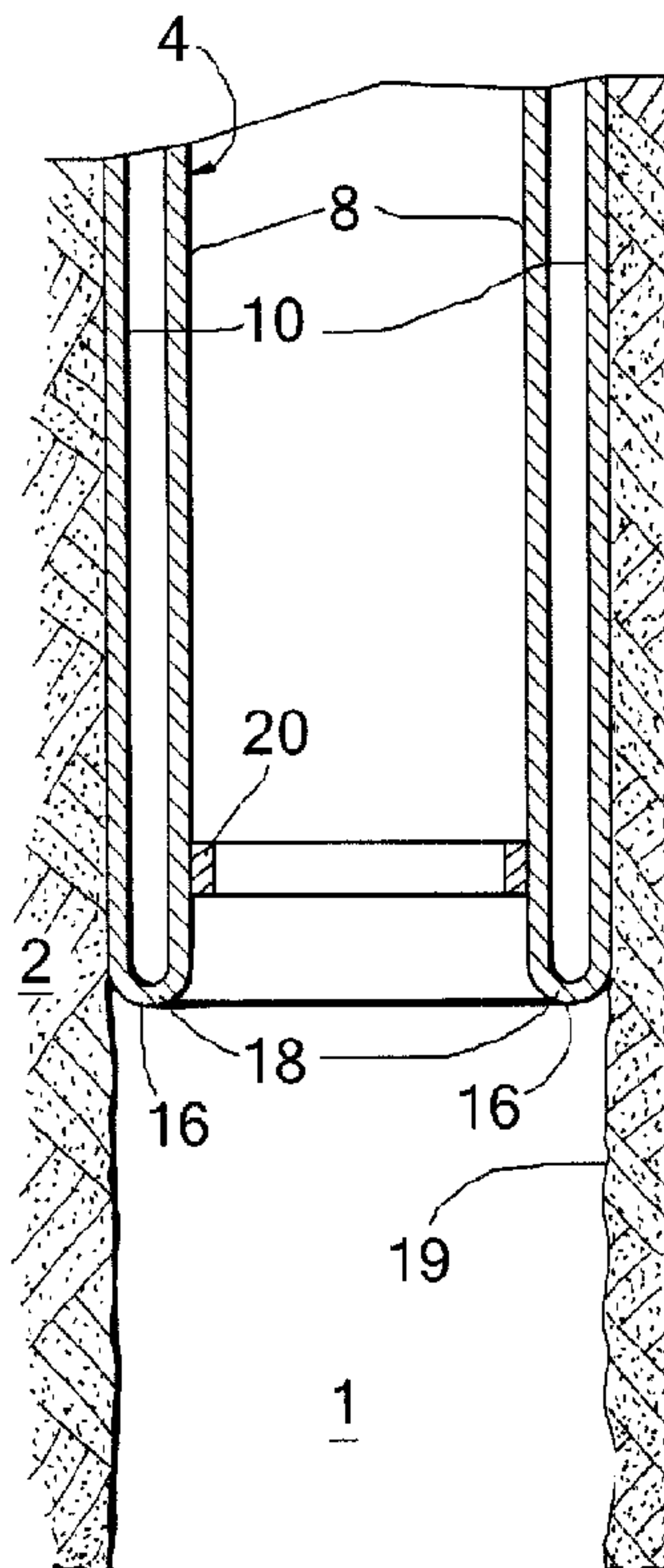
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(54) Titre : PROCEDE D'EXPANSION RADIALE D'UN ELEMENT TUBULAIRE

(54) Title: METHOD OF RADIALLY EXPANDING A TUBULAR ELEMENT



(57) Abrégé/Abstract:

A method is provided of radially expanding a tubular element extending into a wellbore formed in an earth formation, the method comprising inducing the wall of the tubular element to bend radially outward and in axially reverse direction so as to form an expanded tubular section extending around a remaining tubular section of the tubular element, wherein said bending occurs in a bending zone of the tubular element, and increasing the length of the expanded tubular section by inducing the bending zone to move in axial direction relative to the remaining tubular section. One of the tubular element and the wellbore wall is provided with at least one seal member arranged to induce sealing of the expanded tubular section relative to the wellbore wall.

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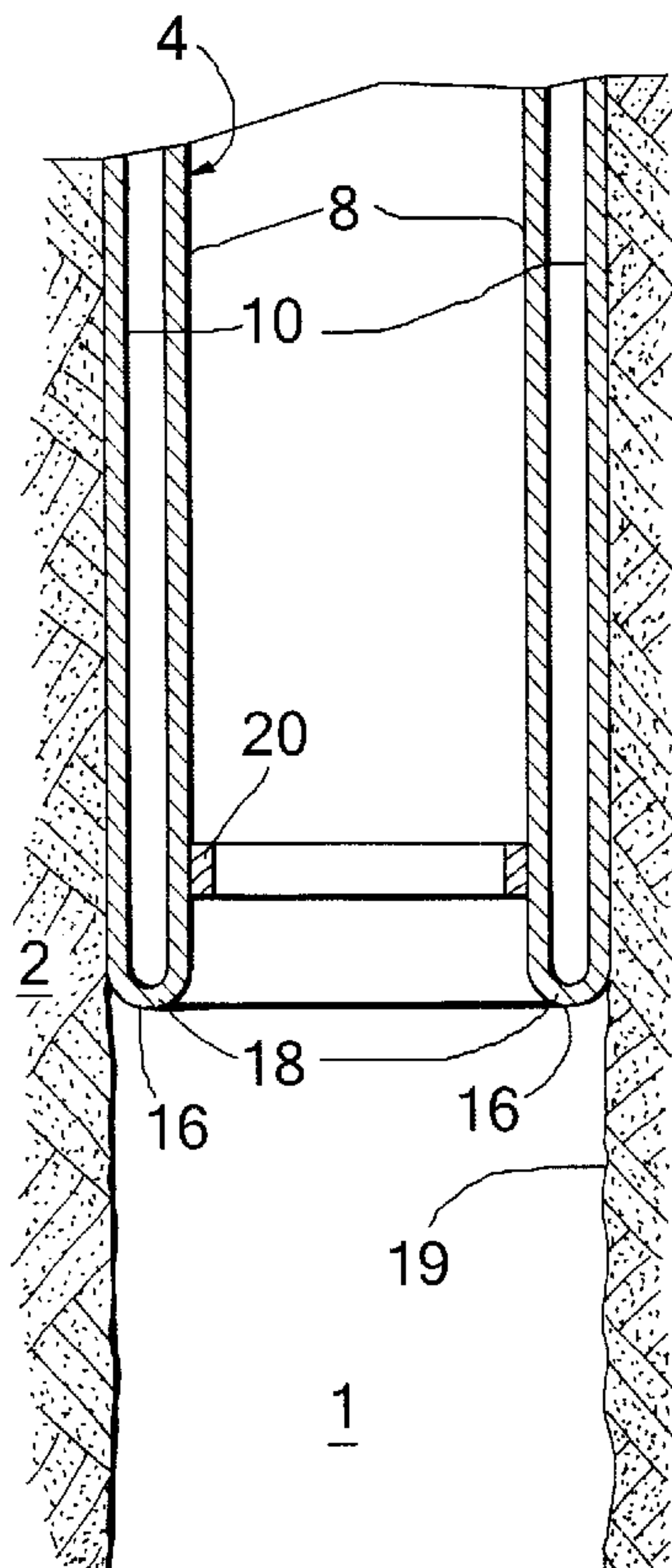
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(54) Title: METHOD OF RADIALY EXPANDING A TUBULAR ELEMENT

Fig. 1



(57) Abstract: A method is provided of radially expanding a tubular element extending into a wellbore formed in an earth formation, the method comprising inducing the wall of the tubular element to bend radially outward and in axially reverse direction so as to form an expanded tubular section extending around a remaining tubular section of the tubular element, wherein said bending occurs in a bending zone of the tubular element, and increasing the length of the expanded tubular section by inducing the bending zone to move in axial direction relative to the remaining tubular section. One of the tubular element and the wellbore wall is provided with at least one seal member arranged to induce sealing of the expanded tubular section relative to the wellbore wall.

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METHOD OF RADIALY EXPANDING A TUBULAR ELEMENT

The present invention relates to a method of radially expanding a tubular element in a wellbore.

The technology of radially expanding tubular elements in wellbores is increasingly applied in the industry of oil and gas production from subterranean formations.

Wellbores are generally provided with one or more casings or liners to provide stability to the wellbore wall, and/or to provide zonal isolation between different earth formation layers. The terms "casing" and "liner" refer to tubular elements for supporting and stabilising the wellbore wall, whereby it is generally understood that a casing extends from surface into the wellbore and that a liner extends from a downhole location further into the wellbore. However, in the present context, the terms "casing" and "liner" are used interchangeably and without such intended distinction.

In conventional wellbore construction, several casings are set at different depth intervals, and in a nested arrangement, whereby each subsequent casing is lowered through the previous casing and therefore has a smaller diameter than the previous casing. As a result, the cross-sectional wellbore size that is available for oil and gas production, decreases with depth. To alleviate this drawback, it has become general practice to radially expand one or more tubular elements at the desired depth in the wellbore, for example to form an expanded casing, expanded liner, or a clad against an existing casing or liner. Also, it has been proposed to radially expand each subsequent casing to substantially the same diameter as the previous casing to form a

monobore wellbore. It is thus achieved that the available diameter of the wellbore remains substantially constant along (a portion of) its depth as opposed to the conventional nested arrangement.

5 EP 1438483 B1 discloses a method of radially expanding a tubular element in a wellbore whereby the tubular element, in unexpanded state, is initially attached to a drill string during drilling of a new wellbore section. Thereafter the tubular element is
10 radially expanded and released from the drill string.

 To expand such wellbore tubular element, generally a conical expander is used with a largest outer diameter substantially equal to the required tubular diameter after expansion. The expander is pumped, pushed or pulled
15 through the tubular element. Such method can lead to high friction forces that need to be overcome, between the expander and the inner surface of the tubular element. Also, there is a risk that the expander becomes stuck in the tubular element.

20 EP 0044706 A2 discloses a method of radially expanding a flexible tube of woven material or cloth by eversion thereof in a wellbore, to separate drilling fluid pumped into the wellbore from slurry cuttings flowing towards the surface.

25 Although in some applications the known expansion techniques have indicated promising results, there is a need for an improved method of radially expanding a tubular element.

 In accordance with the invention there is provided a
30 method of radially expanding a tubular element extending into a wellbore formed in an earth formation, the method comprising

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- inducing a wall of the tubular element to bend radially outward and in axially reverse direction so as to form an expanded tubular section extending around a remaining tubular section of the tubular element, wherein
5 said bending occurs in a bending zone of the tubular element;

- increasing the length of the expanded tubular section by inducing the bending zone to move in axial direction relative to the remaining tubular section;
10 wherein one of the tubular element and the wellbore wall is provided with at least one seal member arranged to induce sealing of the expanded tubular section relative to the wellbore wall.

Thus, the tubular element is effectively turned
15 inside out during the bending process. The bending zone of a respective layer defines the location where the bending process takes place. By inducing the bending zone to move in axial direction along the tubular element it is achieved that the tubular element is progressively
20 expanded without the need for an expander that is pushed, pulled or pumped through the tubular element.

Furthermore, by virtue of the expanded tubular section being sealed relative to the wellbore wall, undesired outflow of wellbore fluid from the wellbore, or
25 undesired inflow of formation fluid into the wellbore past the expanded tubular section, is prevented.

Suitably, each seal member is provided at the tubular element, wherein the seal member is positioned at one of the outer surface and the inner surface of the expanded
30 tubular section.

The seal member can be fixedly connected to the expanded tubular section by suitable connecting means, or

it can be integrally formed with the expanded tubular section.

It is preferred that the wall of the tubular element includes a material that is plastically deformed in the bending zone, so that the expanded tubular section retains an expanded shape as a result of said plastic deformation. In this manner it is achieved that the expanded tubular section remains in expanded form due to plastic deformation, i.e. permanent deformation, of the wall. Thus, there is no need for an external force or pressure to maintain the expanded form. If, for example, the expanded tubular section has been expanded against the wellbore wall as a result of said bending of the wall, no external radial force or pressure needs to be exerted to the expanded tubular section to keep it against the wellbore wall. Suitably the wall of the tubular element is made of a metal such as steel or any other ductile metal capable of being plastically deformed by eversion of the tubular element. The expanded tubular section then has adequate collapse resistance, for example in the order of 100-150 bars.

If the tubular element extends vertically in the wellbore, the weight of the remaining tubular section can be utilised to contribute to the force needed to induce downward movement of the bending zone.

Suitably the bending zone is induced to move in axial direction relative to the remaining tubular section by inducing the remaining tubular section to move in axial direction relative to the expanded tubular section. For example, the expanded tubular section is held stationary while the remaining tubular section is moved in axial direction through the expanded tubular section to induce said bending of the wall.

In order to induce said movement of the remaining tubular section, preferably the remaining tubular section is subjected to an axially compressive force acting to induce said movement. The axially compressive force preferably at least partly results from the weight of the remaining tubular section. If necessary the weight can be supplemented by an external, downward, force applied to the remaining tubular section to induce said movement. As the length, and hence the weight, of the remaining tubular section increases, an upward force may need to be applied to the remaining tubular section to prevent uncontrolled bending or buckling in the bending zone.

If the bending zone is located at a lower end of the tubular element, whereby the remaining tubular section is axially shortened at a lower end thereof due to said movement of the bending zone, it is preferred that the remaining tubular section is axially extended at an upper end thereof in correspondence with said axial shortening at the lower end thereof. The remaining tubular section gradually shortens at its lower end due to continued reverse bending of the wall. Therefore, by extending the remaining tubular section at its upper end to compensate for shortening at its lower end, the process of reverse bending the wall can be continued until a desired length of the expanded tubular section is reached. The remaining tubular section can be extended at its upper end, for example, by connecting a tubular portion to the upper end in any suitable manner such as by welding. Alternatively, the remaining tubular section can be provided as a coiled tubing which is unreeled from a reel and subsequently inserted into the wellbore.

As a result of forming the expanded tubular section around the remaining tubular section, an annular space is

formed between the unexpanded and expanded tubular sections. To increase the collapse resistance of the expanded tubular section, a pressurized fluid can be inserted into the annular space. The fluid pressure can result solely from the weight of the fluid column in the annular space, or in addition also from an external pressure applied to the fluid column.

The expansion process is suitably initiated by bending the wall of the tubular element at a lower end portion thereof by any suitable means.

Advantageously the wellbore is being drilled with a drill string extending through the unexpanded tubular section. In such application the unexpanded tubular section and the drill string preferably are lowered simultaneously through the wellbore during drilling with the drill string.

Optionally the bending zone can be heated to promote bending of the tubular wall.

To reduce any buckling tendency of the unexpanded tubular section during the expansion process, the remaining tubular section advantageously is kept centralised within the expanded section.

The invention will be described hereinafter in more detail and by way of example, with reference to the accompanying drawings in which:

Fig. 1 schematically shows a first embodiment of a wellbore system during an initial stage of eversion of a liner;

Fig. 2 schematically shows the first embodiment during a subsequent stage of eversion of the liner;

Fig. 3 schematically shows detail A of Fig. 2;

Fig. 4 schematically shows a second embodiment of a wellbore system during an initial stage of eversion of a liner;

5 Fig. 5 schematically shows the second embodiment during a subsequent stage of eversion of the liner;

Fig. 6 schematically shows a third embodiment of a wellbore system during an initial stage of eversion of a liner;

10 Fig. 7 schematically shows the third embodiment during a subsequent stage of eversion of the liner;

Fig. 8 schematically shows detail B of Fig. 7; and

Fig. 9 schematically shows the first embodiment, modified in that a drill string extending through the wellbore liner.

15 In the Figures and the description like reference numerals relate to like components.

Referring to Figs. 1-3 there is shown, in longitudinal section, the first embodiment comprising a wellbore 1 extending into an earth formation 2, and a
20 tubular element in the form of liner 4 extending downwardly into the wellbore 1. The liner 4 has been partially radially expanded by eversion of the wall of the liner whereby a radially expanded tubular section 10 of the liner 4 has been formed, which has an outer
25 diameter substantially equal to the wellbore diameter. A remaining tubular section 8 of the liner 4 extends concentrically within the expanded tubular section 10.

The wall of the liner 4 is, due to eversion at its lower end, bent radially outward and in axially reverse
30 (i.e. upward) direction so as to form a U-shaped lower section 16 of the liner interconnecting the remaining liner section 8 and the expanded liner section 10. The U-

shaped lower section 16 of the liner 4 defines a bending zone 18 of the liner.

The expanded liner section 10 is axially fixed to the wellbore wall 19 by virtue of frictional forces between the expanded liner section 10 and the wellbore wall 19 resulting from the expansion process. Alternatively, or additionally, the expanded liner section 10 can be anchored to the wellbore wall by any suitable anchoring means (not shown).

The liner 4 is provided with a plurality of annular seal members 20 axially spaced along the liner 4. For ease of reference, only one seal member 20 is shown. At the remaining liner section 8, each seal member 20 is positioned at the inner surface of the remaining liner section 8 (Fig. 1). After eversion of the liner, the seal members 20 become positioned at the outer surface of the expanded liner section 10 (Fig. 2). Further, each seal member 20 is pressed against the wellbore wall 19 so as to form a seal between the expanded liner section 10 and the wellbore wall 19.

The seal members 20 can be made of any suitable material adapted to withstand compression against the wellbore wall 19, such as, for example, steel, rubber, composite material etc.

Furthermore, the seal members 20 can be fixedly connected to the liner 4 by suitable connecting means, or the seal members 20 can be integrally formed with the liner 4.

Referring further to Figs. 4 and 5 there is shown, in longitudinal section, the second embodiment, which is substantially similar to the first embodiment. However, instead of annular seal members being connected to the liner, in the second embodiment annular seal members 25

are connected to the wellbore wall 19. The seal members 25 can be fixedly connected to the wellbore wall 19 by suitable means, or the seal members 25 can be integrally formed with the wellbore wall. In the latter case, the seal members 25 can be formed, for example, as annular ridges extending radially inward from the wellbore wall 19.

Referring to Figs. 6-8 there is shown, in longitudinal section, the third embodiment, which is substantially similar to the first embodiment. However in the third embodiment, annular seal members 30 are provided at the outer surface of the remaining liner section 8, rather than at the inner surface thereof. Like in the first embodiment, the seal members 30 can be connected to the liner 4 by any suitable connecting means, or the seal members 30 can be integrally formed with the liner 4. As shown in Fig. 7, the seal members 30 become located at the inner surface of the expanded liner section 10 after the eversion process whereby, at the position of each seal member 30, the wall of the expanded liner section 8 extends further radially outward than at adjacent locations where no seal member is positioned (Fig. 8).

Referring further to Fig. 9, there is shown, in longitudinal section, the first embodiment, modified in that a drill string 40 extends from surface through the unexpanded liner section 8 to the bottom of the wellbore 1. The drill string 40 has a bottom hole assembly including a downhole motor 42 and a drill bit 44 driven by the downhole motor 42. The drill bit 44 comprises a pilot bit 46 with gauge diameter slightly smaller than the internal diameter of the remaining liner section 8, and a reamer section 48 with gauge diameter

adapted to drill the wellbore 1 to its nominal diameter. The reamer section 48 is radially retractable to an outer diameter allowing it to pass through unexpanded liner section 8, so that the drill string 40 can be retrieved through the unexpanded liner section 8 to surface.

During normal operation of the first embodiment (Figs. 1-3), a lower end portion of the liner 4 is initially everted, that is, the lower portion is bent radially outward and in axially reverse direction. The U-shaped lower section 16 and the expanded liner section 10 are thereby initiated. Subsequently, the short length of expanded liner section 10 that has been formed is anchored to the wellbore wall by any suitable anchoring means. Depending on the geometry and/or material properties of the liner 4, the expanded liner section 10 alternatively can become anchored to the wellbore wall automatically due to friction between the expanded liner section 10 and the wellbore wall 19.

A downward force F of sufficient magnitude is then applied to the unexpanded liner section 8 in order to move the unexpanded liner section 8 gradually downward. As a result, the unexpanded liner section 8 is progressively everted thereby progressively transforming the unexpanded liner section 8 into the expanded liner section 10. During the eversion process, the bending zone 18 moves in downward direction at approximately half the speed of movement of the unexpanded liner section 8.

During the eversion process, the seal members 20 move from the inside of the remaining liner section 8 to the outside of the expanded liner section 10. Since the outer surface of the expanded liner section 10 is of a diameter substantially equal to the wellbore diameter, and because the seal members 20 extend radially outward from said

outer surface, the seal members become compressed between the expanded liner section 10 and the wellbore wall 19. The seal members are thereby subjected to a radially inward reaction force from the wellbore wall 19, which induces a slight elastic deformation of the wall of the expanded liner section 10. Due to this elastic deformation, the seal members 20 remain pressed against the wellbore wall 19 so that the expanded liner section 10 is permanently sealed against the wellbore wall 19.

In this manner it is achieved that fluid from the wellbore, or fluid from the surrounding earth formation, cannot leak between the expanded liner section 10 and the wellbore wall 19.

If desired, the diameter and/or wall thickness of the liner 4 can be selected such that portions of the expanded liner section 10 inbetween adjacent seal members 20 become pressed against the wellbore wall 19 as a result of the expansion process so as to seal against the wellbore wall and/or to stabilize the wellbore wall. In such case, the seal members 20 provide additional sealing capacity.

Since the length, and hence the weight, of the unexpanded section 8 gradually increases, the magnitude of downward force F can be decreased gradually in correspondence with the increased weight of section 8.

Normal operation of the second embodiment is substantially similar to normal operation of the first embodiment, however differing in that the seal members 25 are connected to, or integrally formed with, the wellbore wall 19 prior to eversion of liner 4. As the bending zone 18 steadily moves downward during eversion of the liner 4, the seal members 25 successively become

compressed between the expanded liner section 10 and the wellbore wall 19 (Fig. 5).

Normal operation of the third embodiment (Figs. 6-8) is substantially similar to normal of the first embodiment. As mentioned hereinbefore, the seal members 30 become located at the inner surface of the expanded liner section 10 after the eversion process. The bending resistance of the wall of the liner 4 is higher at locations where the seal members 30 are connected to the liner, than at adjacent locations where no seal members are located. Therefore, at the location of each seal member 30, the wall of the liner 4 bends at a larger bending radius during the eversion process than at adjacent locations where no seal member is positioned.

In view thereof, at the location of each seal member 30, a portion 32 of the wall of the expanded liner section 8 extends further radially outward than at the adjacent locations (Fig. 8).

Each wall portion 32 thereby become pressed against the wellbore wall 19 and is subjected to a radially inward reaction force from the wellbore wall 19, which induces a slight elastic deformation of the wall portion 32. This elastic deformation causes the wall portions 32 to remain pressed against the wellbore wall 19 so that the expanded liner section 10 is permanently sealed against the wellbore wall 19.

In this manner it is achieved that fluid from the wellbore, or fluid from the surrounding earth formation, cannot leak between the expanded liner section 10 and the wellbore wall 19.

If desired, the diameter and/or wall thickness of the liner 4 can be selected such that portions of the expanded liner section 10 inbetween the wall portions 32

also become pressed against the wellbore wall 19 as a result of the expansion process. In such case, the wall portions 32 provide additional sealing capacity.

Normal operation of the modified first embodiment shown in Fig. 9 is substantially similar to normal operation of the first embodiment regarding eversion of the liner 4. In addition, the following features apply to normal operation of the modified first embodiment. The downhole motor 42 is operated to rotate the drill bit 44 so as to deepen the wellbore 1 by further drilling. Thereby, the drill string 40 gradually moves downward into the wellbore 1. The remaining liner section 8 is simultaneously moved downward in a controlled manner, and at substantially the same speed as the drill string 40, whereby it is ensured that the bending zone 18 remains at a short distance above the drill bit 44. Such controlled lowering of the remaining liner section 8 can be achieved by controlling the downward force F referred to hereinbefore.

Initially the downward force F needs to be applied to the unexpanded liner section 8 to induce lowering thereof simultaneously with lowering of the drill string 40. As the length, and hence the weight, of the unexpanded liner section 8 increases, the magnitude of downward force F can be gradually decreased, and eventually may be replaced by an upward force to prevent buckling of the unexpanded liner section 8. Such upward force can be applied to the remaining liner section 8 at surface, or it can be applied to the drill string 40 and transmitted to the remaining liner section 8 by suitable force transmission means (not shown). The weight of the unexpanded liner section 8, in combination with the force

F (if any), also can be used to provide a thrust force to the drill bit 44 during drilling of the wellbore 1.

Simultaneous lowering of the remaining liner section 8 and the drill string 40 also can be achieved by axially
5 restraining the remaining liner section 8 to the drill string 40. For example, the drill string 40 can be provided with a bearing device (not shown) that supports the U-shaped lower section 16 of the liner 4.

As drilling proceeds, pipe sections are added at the
10 top of unexpanded liner section 8 in correspondence with its lowering into the wellbore, as is normal practice for installing casings or liners into wellbores.

When it is required to retrieve the drill string 40 to surface, for example when the drill bit 44 is to be
15 replaced or when drilling of the wellbore 1 is complete, the reamer section 42 brought to its radially retracted mode. Subsequently the drill string 24 is retrieved through the unexpanded liner section 8 to surface.

In practicing the method of the invention, any
20 combination of the first, second and third embodiments may be applied. Thus, seal members may be provided at the inner surface of the remaining liner section, at the outer surface of the remaining liner section, and at the wellbore wall in a single application.

Furthermore, the annular seal members preferably are
25 made of, or include, a swellable elastomer susceptible of swelling upon contact with wellbore fluid and/or formation fluid. It is thereby achieved that sealing of the seal members against the wellbore wall, after
30 swelling of the swellable elastomer, is enhanced. To prevent premature swelling of the swellable elastomer during installation into the wellbore, suitably each annular seal member is provided with a protective coating

that ruptures upon radial expansion of the seal member as it passes through the bending zone, or upon compression of the seal member between the expanded liner section and the wellbore wall. After rupturing of the protective
5 coating, the swellable elastomer becomes exposed to the wellbore fluid or formation fluid and thereby starts swelling. If there is little or no space for the seal member to swell, the seal member becomes more firmly compressed between the wellbore wall and the expanded
10 liner section thereby enhancing its sealing functionality.

With the method described above, it is achieved that the wellbore is progressively lined with the everted liner directly above the drill bit, during the drilling
15 process. As a result, there is only a relatively short open-hole section of the wellbore during the drilling process at all times. The advantages of such short open-hole section will be most pronounced during drilling into a hydrocarbon fluid containing layer of the earth
20 formation. In view thereof, for many applications it will be sufficient if the process of liner eversion during drilling is applied only during drilling into the hydrocarbon fluid reservoir, while other sections of the wellbore are lined or cased in conventional manner.
25 Alternatively, the process of liner eversion during drilling may be commenced at surface or at a selected downhole location, depending on circumstances.

In view of the short open-hole section during drilling, there is a significantly reduced risk that the
30 wellbore fluid pressure gradient exceeds the fracture gradient of the rock formation, or that the wellbore fluid pressure gradient drops below the pore pressure gradient of the rock formation. Therefore, considerably

longer intervals can be drilled at a single nominal diameter than in a conventional drilling practice whereby casings of stepwise decreasing diameter must be set at selected intervals.

5 Also, if the wellbore is drilled through a shale layer, such short open-hole section eliminates possible problems due to heaving of the shale.

10 After the wellbore 1 has been drilled to the desired depth and the drill string 40 has been removed from the wellbore 1, the length of unexpanded liner section 8 that is still present in the wellbore 1, can be left in the wellbore or it can be cut-off from the expanded liner section 10 and retrieved to surface.

15 In case the length of unexpanded liner section 8 is left in the wellbore 1, there are several options for completing the wellbore. These are, for example, as follows.

20 A) A fluid, for example brine, is pumped into the annular space between the unexpanded and expanded liner sections 8, 10 so as to pressurise the annular space and increase the collapse resistance of the expanded liner section 10. Optionally one or more holes are provided in the U-shaped lower section 16 to allow the pumped fluid to be circulated.

25 B) A heavy fluid is pumped into the annular space so as to support the expanded liner section 10 and increase its collapse resistance.

30 C) cement is pumped into the annular space in order to create, after hardening of the cement, a solid body between the unexpanded liner section 8 and the expanded liner section 10, whereby the cement may expand upon hardening.

D) the unexpanded liner section 8 is radially expanded (i.e. clad) against the expanded liner section 10, for example by pumping, pushing or pulling an expander through the unexpanded liner section 8.

5 In the above examples, expansion of the liner is started at surface or at a downhole location. In case of an offshore wellbore whereby an offshore platform is positioned above the wellbore, at the water surface, it can be advantageous to start the expansion process at the
10 offshore platform. In such process, the bending zone moves from the offshore platform to the seabed and from there further into the wellbore. Thus, the resulting expanded tubular element not only forms a liner in the wellbore, but also a riser extending from the offshore
15 platform to the seabed. The need for a separate riser from is thereby obviated.

 Furthermore, conduits such as electric wires or optical fibres for communication with downhole equipment can be extended in the annular space between the expanded
20 and unexpanded sections. Such conduits can be attached to the outer surface of the tubular element before expansion thereof. Also, the expanded and unexpanded liner sections can be used as electricity conductors to transfer data and/or power downhole.

25 Since any length of unexpanded liner section that is still present in the wellbore after the eversion process is finalised, is subjected to less stringent loading conditions than the expanded liner section, such length of unexpanded liner section may have a smaller wall
30 thickness, or may be of lower quality or steel grade, than the expanded liner section. For example, it may be made of pipe having a relatively low yield strength or relatively low collapse rating.

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Instead of leaving a length of unexpanded liner section in the wellbore after the expansion process, the entire liner can be expanded with the method of the invention so that no unexpanded liner section remains in the wellbore. In such case, an elongate member, for example a pipe string, can be used to exert the necessary downward force F to the unexpanded liner section during the last phase of the expansion process.

In order to reduce friction forces between the unexpanded and expanded tubular sections during the expansion process described in any of the aforementioned examples, suitably a friction reducing layer, such as a TeflonTM layer, is applied between the unexpanded and expanded tubular sections. For example, a friction reducing coating can be applied to the outer surface of the tubular element before expansion. Such layer of friction reducing material furthermore reduces the annular clearance between the unexpanded and expanded sections, thus resulting in a reduced buckling tendency of the unexpanded section. Instead of, or in addition to, such friction reducing layer, centralizing pads and/or rollers can be applied between the unexpanded and expanded sections to reduce the friction forces and the annular clearance there-between.

Instead of expanding the expanded liner section against the wellbore wall (as described above), the expanded liner section can be expanded against the inner surface of another tubular element already present in the wellbore.

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CLAIMS:

1. A method of radially expanding a tubular element extending into a wellbore formed in an earth formation, the method comprising
 - 5 - inducing a wall of the tubular element to bend radially outward and in axially reverse direction so as to form an expanded tubular section extending around a remaining tubular section of the tubular element, wherein said bending occurs in a bending zone of the tubular element;
 - 10 - inducing the bending zone to move in axial direction relative to the remaining tubular section so as to increase the length of the expanded tubular section; wherein one of the tubular element and the wellbore wall is provided with at least one seal member arranged to
15 induce sealing of the expanded tubular section relative to the wellbore wall.
2. The method of claim 1, wherein each seal member comprises a swellable elastomer susceptible of swelling upon contact with a fluid selected from formation fluid
20 and wellbore fluid.
3. The method of claim 1 or 2, wherein each seal member is provided at the tubular element, the seal member being positioned at one of an outer surface and an inner surface of the expanded tubular section.
- 25 4. The method of claim 3, wherein the seal member is fixedly connected to the expanded tubular section.
5. The method of claim 3, wherein the seal member is integrally formed with the expanded tubular section.
6. The method of any one of claims 1-5, wherein the wall
30 of the tubular element includes a material susceptible of

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plastic deformation in the bending zone during the bending process so that the expanded tubular section retains an expanded shape as a result of said plastic deformation.

5 7. The method of any one of claims 1-6, wherein the bending zone is induced to move in axial direction relative to the remaining tubular section by inducing the remaining tubular section to move in axial direction relative to the expanded tubular section.

10 8. The method of claim 7, wherein the remaining tubular section is subjected to an axially compressive force acting to induce said movement of the remaining tubular section.

15 9. The method of claim 8, wherein said axially compressive force is at least partly due to the weight of the remaining tubular section.

10. The method of claim 8 or 9, wherein said axially compressive force is at least partly due to an external force applied to the remaining tubular section.

20 11. The method of any one of claims 1-10, wherein the remaining tubular section is axially shortened at a lower end thereof due to said movement of the bending zone, and wherein the method further comprises axially extending the remaining tubular section at an upper end thereof in
25 correspondence with said axial shortening at the lower end thereof.

12. The method of any one of claims 1-11, wherein a drill string extends through the remaining tubular section for further drilling of the wellbore.

30 13. The method of claim 12, wherein the remaining tubular section and the drill string are simultaneously lowered through the wellbore during drilling with the drill string.

Fig.1

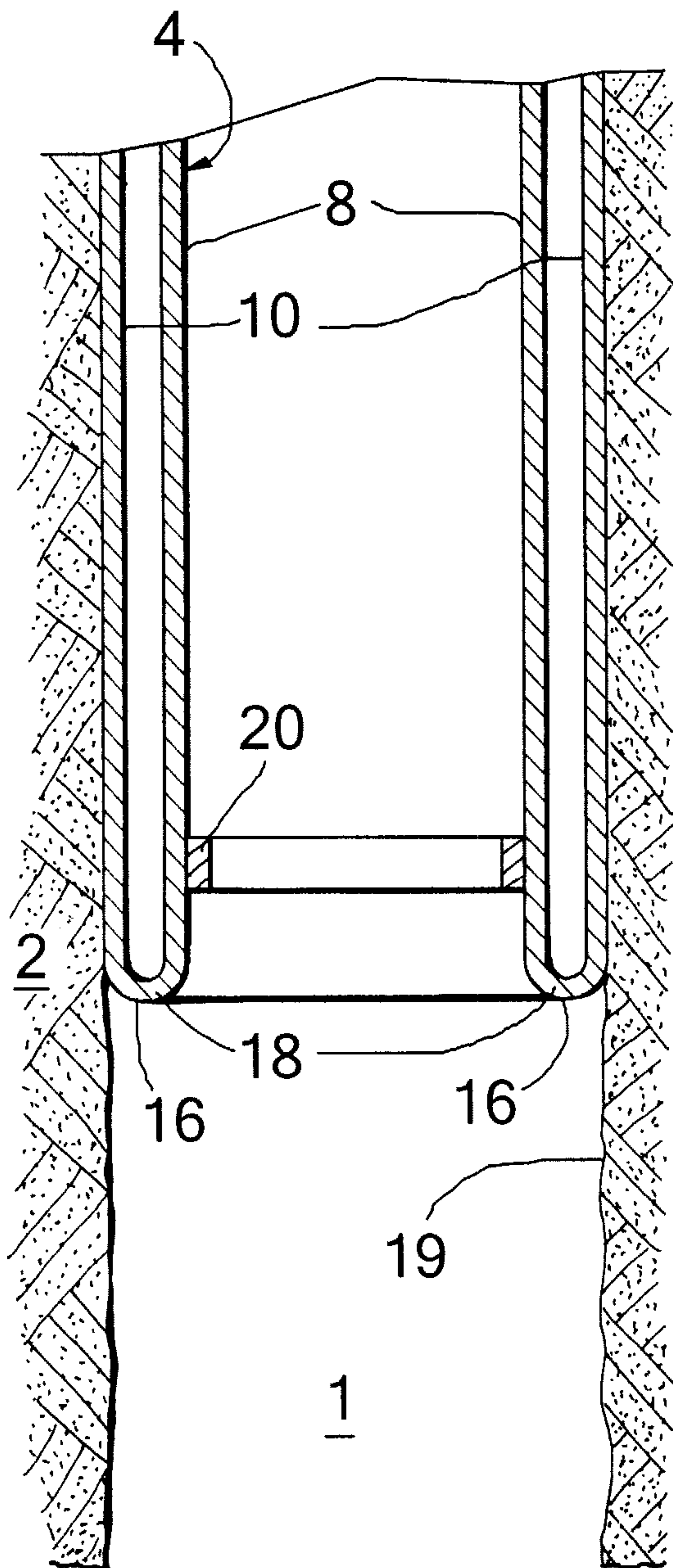
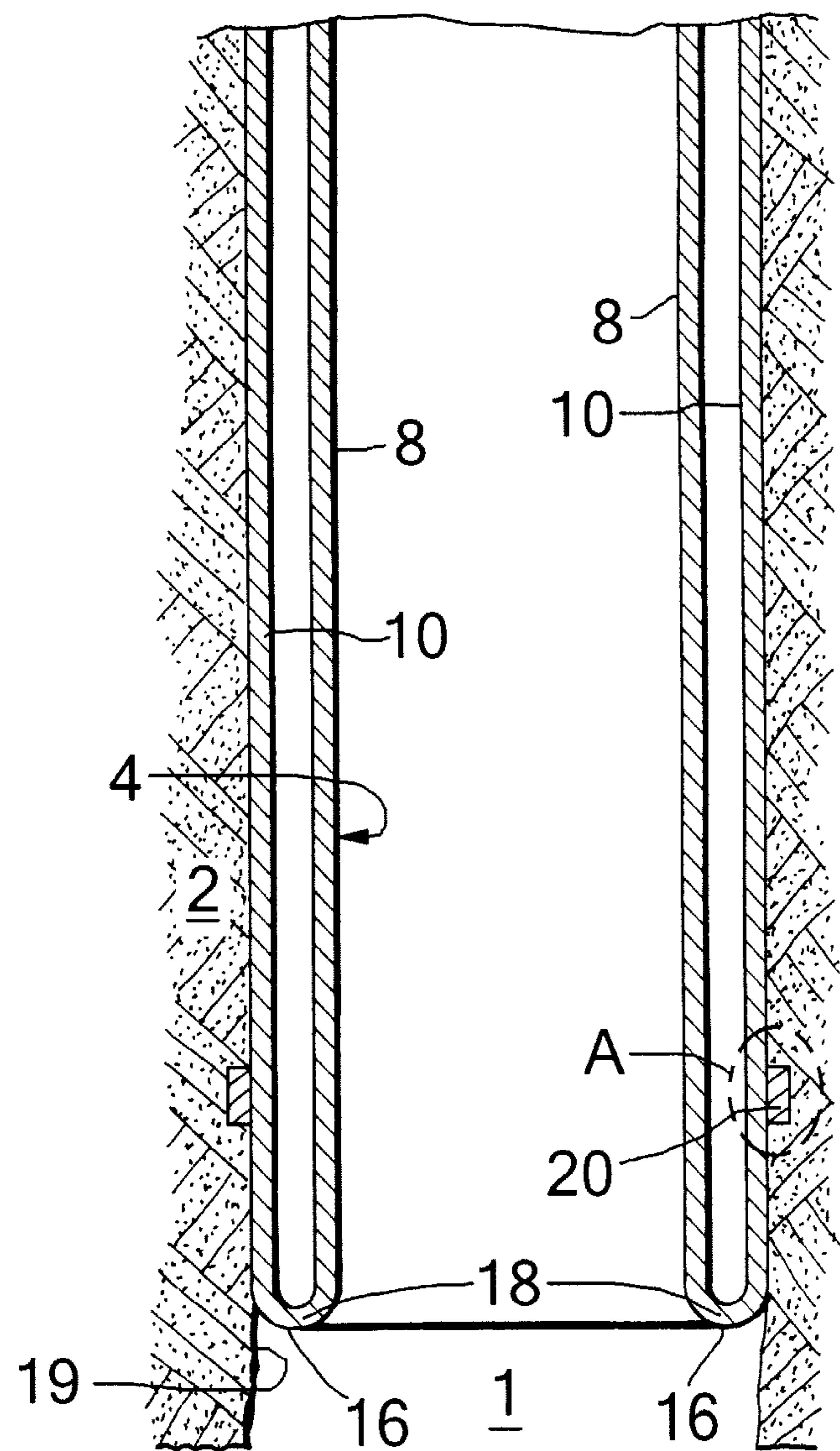


Fig.2



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Fig.3

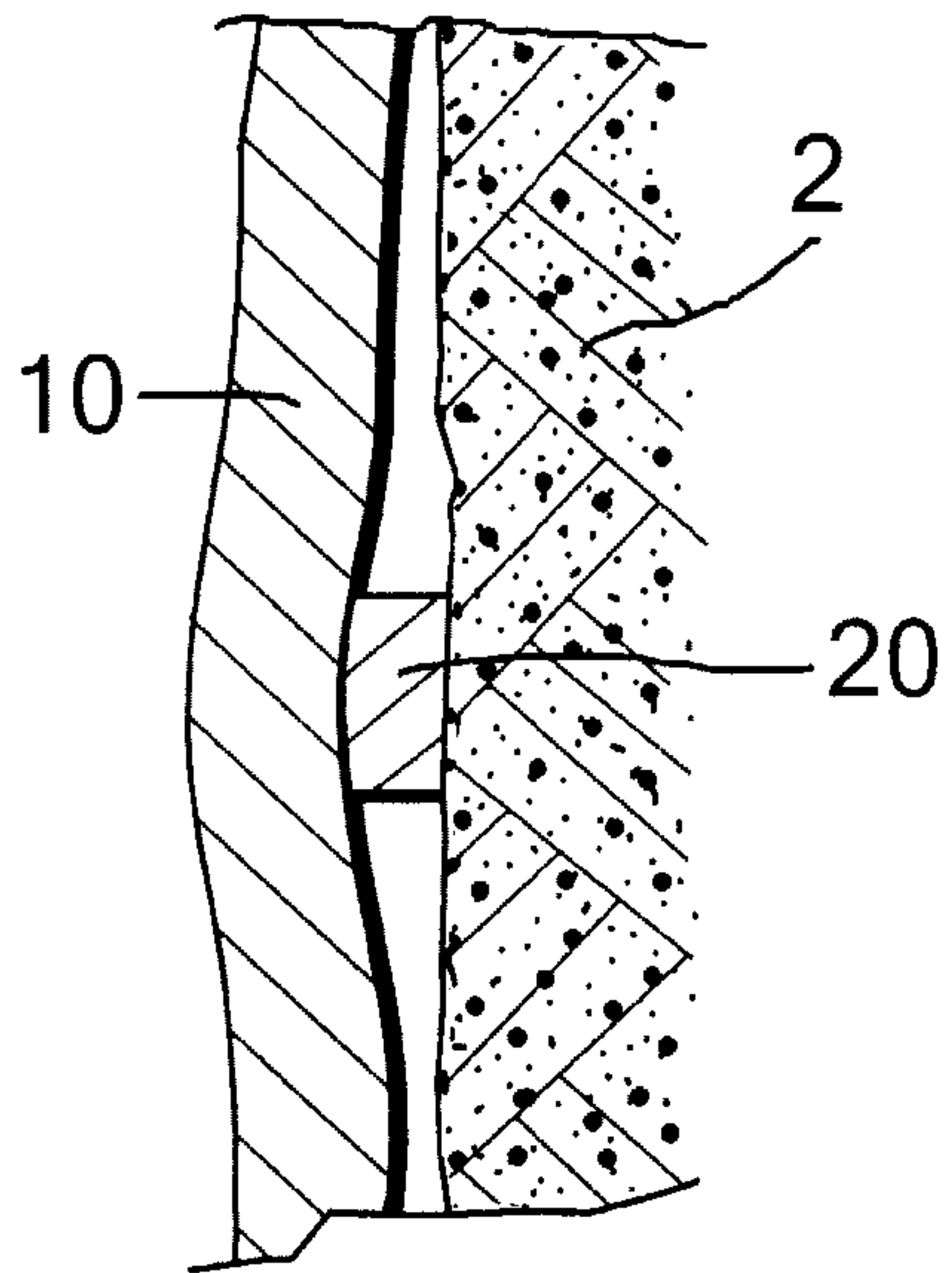
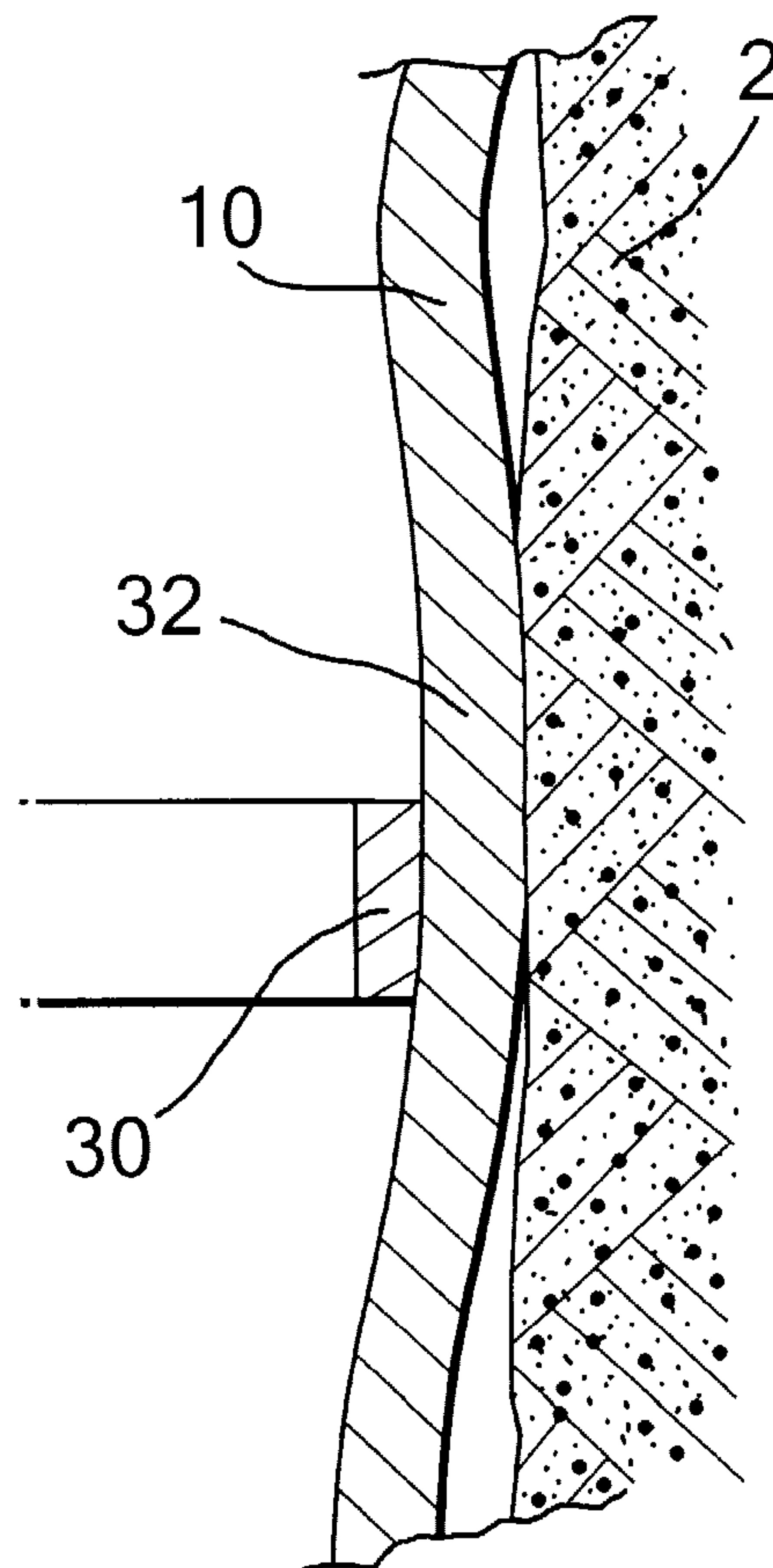


Fig.8



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Fig.4

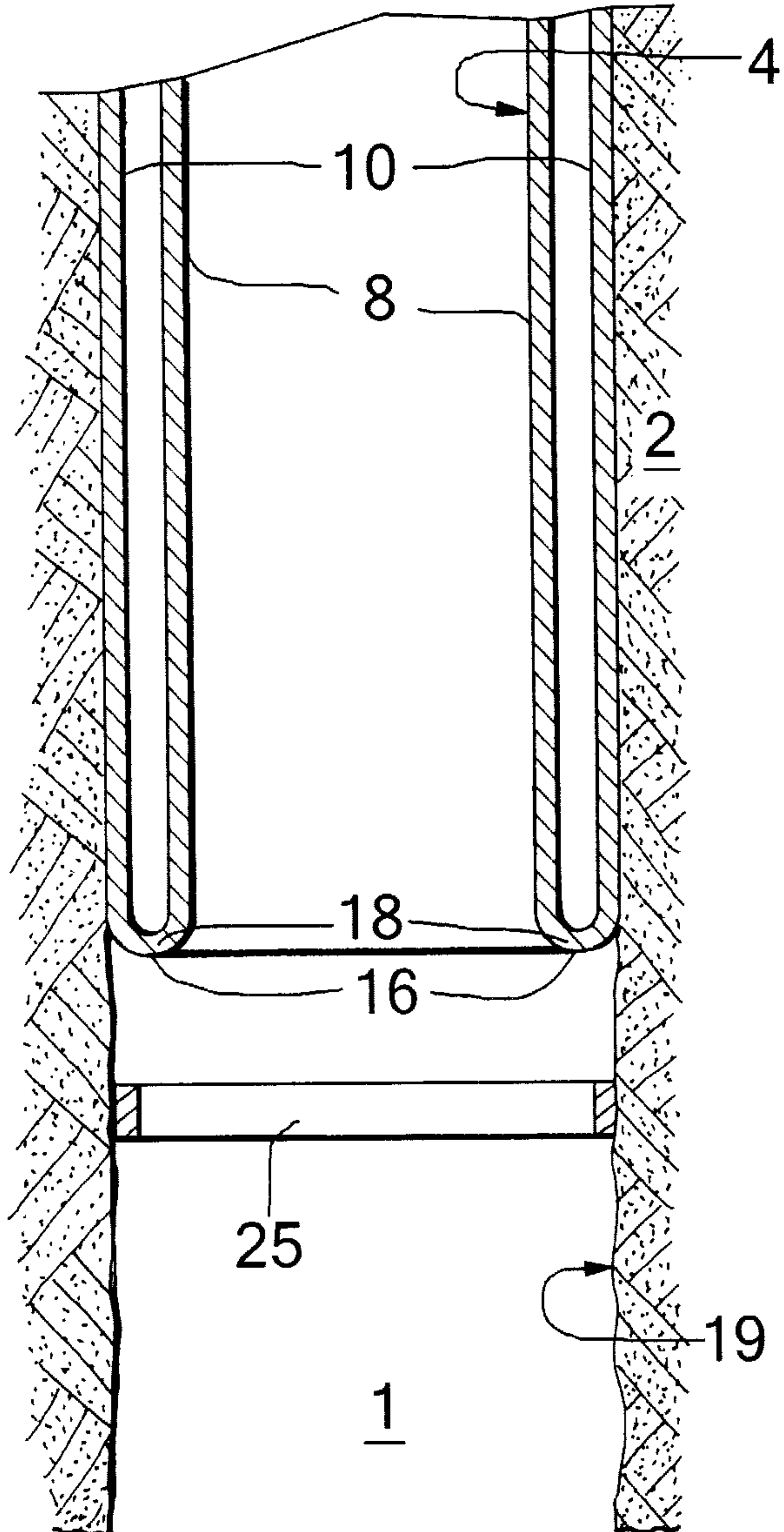
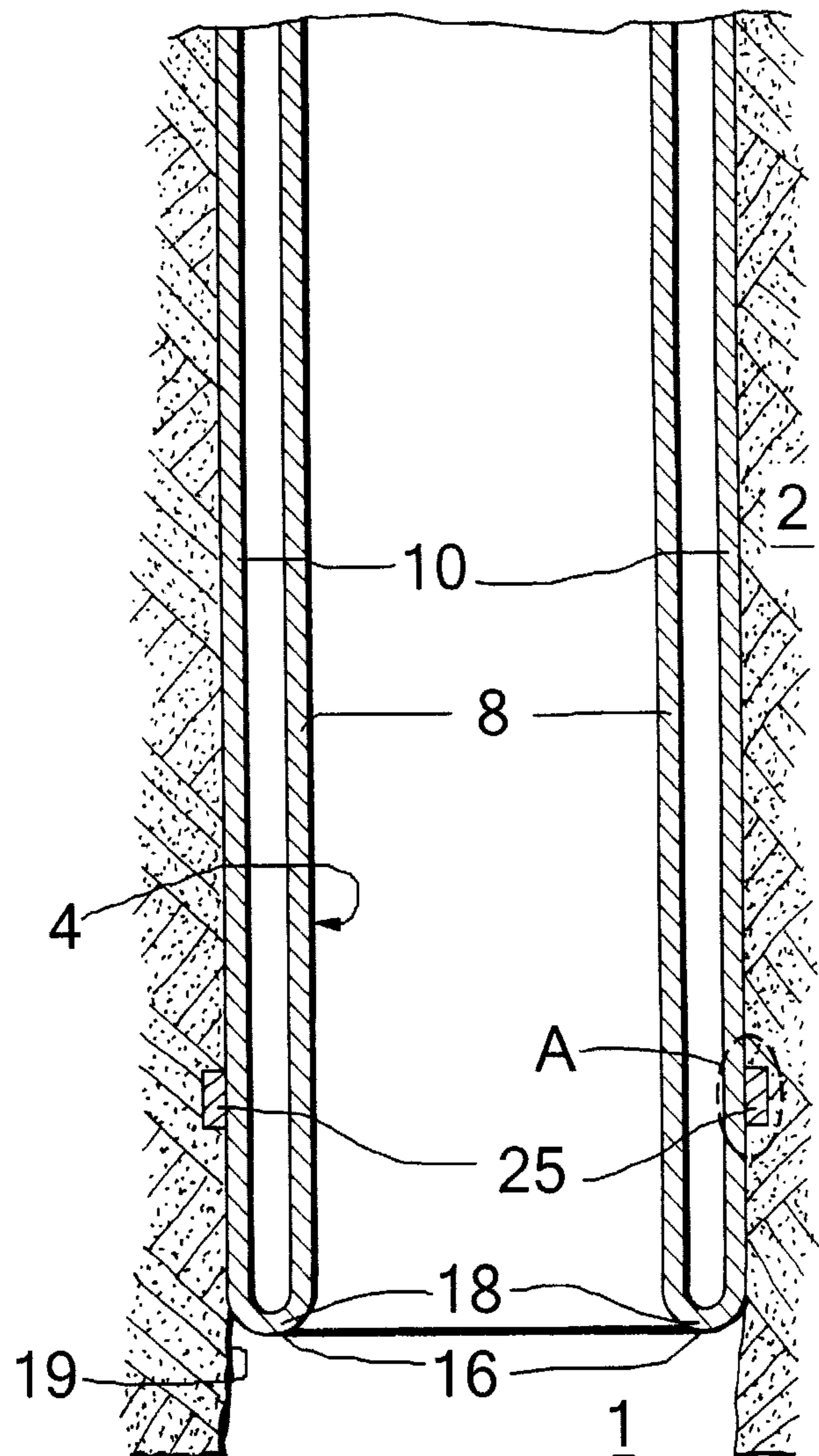


Fig.5



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Fig.6

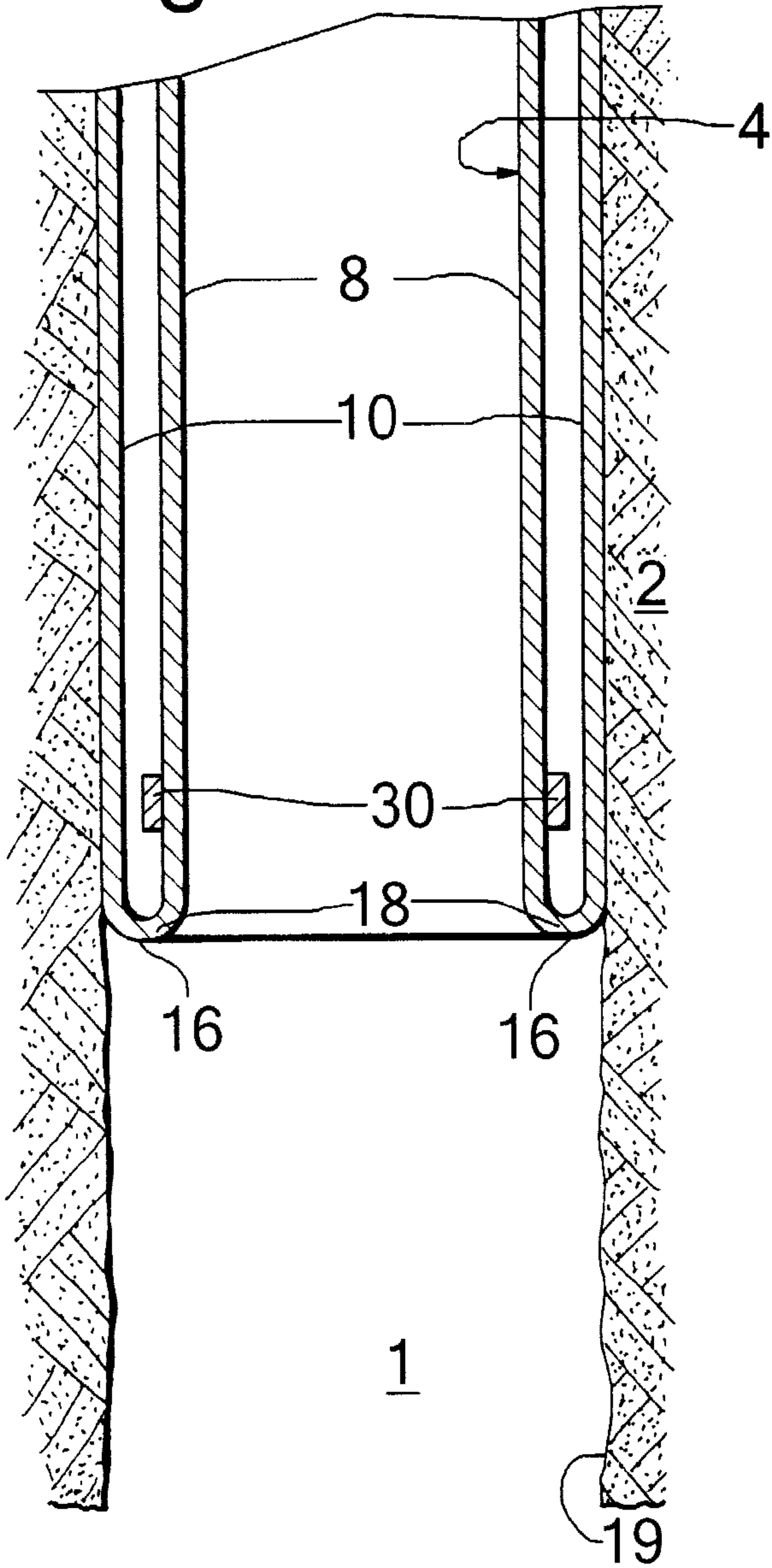
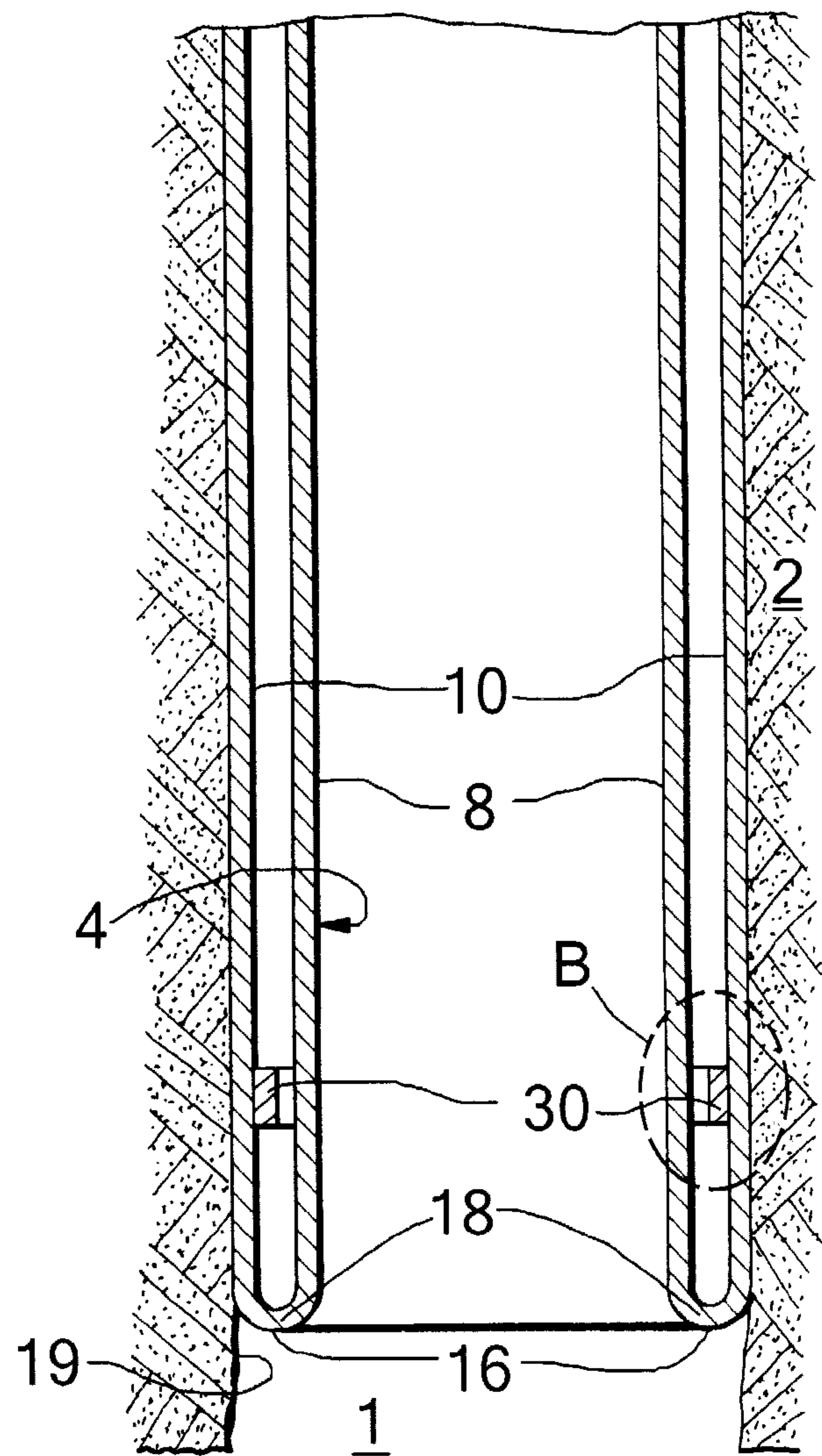


Fig.7



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Fig.9

