

METHOD AND DEVICE FOR DRILLING, PARTICULARLY PERCUSSION OR
ROTARY PERCUSSION DRILLING, A HOLE IN SOIL OR ROCK MATERIAL

The present invention relates to a method for drilling,
5 particularly percussion or rotary percussion drilling, a
hole in soil or rock material and fixing an anchorage in
said hole, wherein a borehole is formed by a drill bit
mounted on a drill rod assembly. The invention further
relates to a device for drilling, particularly percussion
10 or rotary percussion drilling, a hole in soil or rock
material and for the production of an anchorage, wherein a
borehole is formed by a drill bit mounted on a drill rod
assembly.

15 In the context of the production of a hole or borehole in
soil or rock material and the subsequent fixation of an
anchorage or lining in the borehole, it is, for instance,
known from WO 98/21439 and WO 98/58132 to introduce an
envelope or jacket tube into the borehole during the
20 drilling procedure, for instance percussion or rotary
percussion drilling, whereupon, after the completion of the
bore, part of the drill bit is optionally removed from the
borehole together with the drill rod assembly, while the
envelope tube remains within the borehole such that an
25 anchor will subsequently be formed within the borehole by
filling a curing mass into the same. According to the
configuration set out in WO 98/58132, the drill rod
assembly may be provided with additional ribs and grooves
on its outer periphery so as to ensure an accordingly good
30 anchoring effect in case the drill rod assembly remains
within the borehole, which is subsequently filled. To
further enhance the anchorage effect, it is, for instance,
known from AT-U 5644 to bring the envelope tube into

abutment on the inner wall of the borehole by widening its outer periphery.

Alternatively, it is known to remove the drilling tool
5 together with the drill rod assembly from a borehole after the production of the borehole, whereupon a separate anchor or anchoring means is subsequently introduced into the borehole, as has, for instance, become known from EP-B 0 241 451, US-A 4,490,074, DE-AS 21 05 888, US-A 4,310,266 or
10 EP-A 0 875 663. That known prior art involves the drawback that the borehole has to be made in a first method step, whereupon, after the removal of the drilling tool plus drill rod assembly, the anchoring device is introduced into the optionally very long borehole in a further method step,
15 after which abutment on the borehole wall is accomplished by removing the respective holding device while widening the outer diameter. It is immediately apparent that not only an accordingly increased amount of time is required for the two separate operating steps, but that an
20 optionally subsequent introduction of such an anchoring device of great length will entail problems. Furthermore, it is to be anticipated that the removal of the drilling device together with the drill rod assembly and the subsequent introduction of an anchoring device is feasible
25 only in comparatively solid soil or rock, whereby it must be safeguarded that no material will, for instance, break into the borehole during the drilling procedure or after the removal of the drilling tool and prior to the final introduction of the anchoring device, which material would
30 block the borehole so as to render the introduction of the anchoring device impossible.

The present invention aims to further develop a method and device of the initially defined kind to the effect that an anchorage to the inner wall of the borehole is achievable immediately after the completion of a borehole with a
5 simplified overall construction and reduced time expenditure.

To solve these objects, the method according to the invention, departing from a method of the initially defined
10 kind, is essentially characterized in that, after the completion of the borehole, a plurality of, in particular, wedge-shaped spreading elements arranged at a distance from the drill bit and oriented contrary to the drilling direction are extended into the wall of the borehole formed
15 by the drill bit. By realizing, immediately after the completion of the borehole, an anchorage via, in particular, wedge-shaped spreading elements oriented contrary to the drilling direction, the additional operating step of separately introducing an anchorage into
20 the completed borehole after the previous removal of the drill rod assembly and drilling tools can be obviated so as to achieve an accordingly large time saving. Moreover, the method according to the invention can be applied irrespectively of the soil or rock material to be drilled
25 through, since an anchorage is effected in the borehole immediately after the formation of the borehole, so that even with loose rock, with which breaking in is to be eventually feared at least after the removal of the drilling tool and prior to the introduction of an
30 anchorage, no difficulties need be feared as with anchorages to be produced subsequently. By extending or expanding the, in particular, wedge-shaped spreading elements oriented contrary to the drilling direction, the

introduction of at least the tips of the spreading elements oriented contrary to the drilling direction will be immediately caused so as to provide an accordingly good anchoring effect immediately after the borehole has been
5 completed.

To ensure particularly simple extending of the spreading elements after the completion of the borehole, it is proposed according to a preferred embodiment that the
10 extension of the spreading elements is initiated and/or effected by a rotational movement of the drill rod assembly contrary to the direction of rotation for the production of the borehole by the drill bit. It is, thus, feasible to realize the production of a borehole in a conventional
15 manner by percussion drilling or rotary percussion drilling, by providing a defined direction of rotation during the drilling procedure, whereupon, after the completion of the borehole, the extension of the spreading elements is initiated and/or effected by a rotational
20 movement of the drill rod assembly contrary to the direction of rotation for the production of the borehole.

To enable the simple introduction of the spreading elements without interfering with the drilling procedure, it is
25 provided according to a further preferred embodiment that the spreading elements are prestressed in the direction towards the drill rod assembly during the drilling procedure.

30 In order to enhance the anchoring effect and/or support the proper introduction of the spreading elements having, in particular, wedge-shaped tips extending contrary to the drilling procedure, it is proposed according to a further

preferred embodiment that, during the emergence of the spreading elements, and/or alternately with the emerging movement of the same, the drill rod assembly is respectively powered or retracted in the direction towards
5 the open end of the borehole, contrary to the drilling direction. The simultaneous and/or alternating pulling or powering of the drill rod assembly and, hence, of the spreading elements during the emerging movement causes the tips of the spreading elements to penetrate more deeply
10 into the material so as to accordingly promote the anchoring effect.

After the spreading open or emergence of the spreading elements, an anchor element is formed via the drill rod
15 assembly remaining in the borehole as well as the drill bit. If special demands are made on the anchorage, it is proposed according to a further preferred embodiment that, after the completion of the borehole and emergence or anchoring of the spreading elements, the drill rod assembly
20 is subdivided, in particular, in the region of the spreading elements and removed from the borehole and replaced by an anchor element, in particular a cable strand anchor, which is connected, in particular screwed, with the drill rod assembly subportion remaining in the borehole. By
25 subdividing the drill rod assembly as in accordance with the invention, and, hence, offering the chance of removing a subportion, it has become possible to replace the drill rod assembly upon completion of the borehole and emergence or anchoring of the spreading elements, by an appropriately
30 specialized anchoring element, for instance a cable strand anchor, which is accordingly connected, for instance screwed, with the drill rod assembly subportion remaining in the borehole and with the drill bit.

To solve the objects set out in the beginning, a device of the initially defined kind is, moreover, essentially characterized in that, in a portion joining the drill bit,
5 a plurality of, in particular, wedge-shaped spreading elements oriented contrary to the drilling direction are provided, which are extensible into the wall of the borehole after the completion of the borehole formed by the drill bit. The, in particular, wedge-shaped spreading
10 elements oriented contrary to the drilling direction and emerging upon completion of the borehole allow for the immediate realization of a safe anchorage while achieving an accordingly large time saving.

15 For the reliable introduction of the spreading elements without interference with the drilling procedure, it is proposed according to a further preferred embodiment that the spreading elements are powered, particularly prestressed by at least one strap, in the direction towards
20 the drill rod assembly during the drilling procedure.

For the reliable expansion of the spreading elements and introduction of an appropriate anchoring force or effect, it is proposed according to a further preferred embodiment
25 that an, in particular, annular expansion element is mounted about the periphery of the drill rod assembly and, at a rotational movement of the drill rod assembly in a direction contrary to a rotational movement carried out during the performance of the drilling procedure, is
30 displaceable in the direction towards the drill bit along the longitudinal direction of the drill rod assembly and cooperates with the wedge-shaped spreading elements, which are pivotally articulated to a bearing element which is, in

particular, fixedly connected to the drill rod assembly and arranged between the expansion element and the drill bit.

As already indicated above, percussion or rotary percussion
5 drilling is effected by a movement of the drill bit of the drill rod assembly in a predefined direction of rotation, wherein said direction of rotation of the drill rod assembly is reversed for the extension of the spreading elements. In order to avoid any interference with the
10 drilling procedure and enable the spreading elements to be safely extended at a reversal of the rotational movement of the drill rod assembly after the completion of the borehole, it is, moreover, proposed that at least one spring element is provided on the expansion element, which
15 spring element, during the drilling procedure, can be received in a recess or depression provided on the periphery of the expansion element and, at a reversal of the direction of rotation, cooperates with at least one profiling provided on at least one spreading element and
20 oriented to the interior of the device, in order to prevent the expansion element from a rotational movement and cause its displacement along the longitudinal direction by the provision of a threaded connection, as in correspondence with a further preferred embodiment of the device according
25 to the invention. The drilling procedure is, thus, realized in a manner that the expansion element is moved relative to spreading elements in the fashion of a ratchet, while the spring element, after a reversal of the direction of rotation, immediately cooperates with at least one
30 profiling provided on at least one spreading element, in order to prevent a rotational movement of the expansion element, whereby the provision of an accordingly extending threaded connection effects a displacement of the expansion

element in the longitudinal direction of the drill rod assembly and, in particular, in the direction towards the drill bit so as to allow the emergence of the wedge-shaped spreading elements extending contrary to the drilling
5 direction.

In order to ensure an appropriate flushing effect even with the provision of expansion element surrounding the drill rod assembly, it is proposed according to a further
10 preferred embodiment that at least one flushing channel extending in the longitudinal direction of the device is provided within the expansion element.

In order to ensure a uniform anchoring effect over the
15 region of the borehole, it is, moreover, provided that the expandable spreading elements are arranged to be substantially uniformly distributed about the periphery of the drill rod assembly, as in correspondence with a further preferred embodiment of the device according to the
20 invention. As a result, uniformly high anchoring forces will be introduced into the surrounding soil or rock material via the peripheries of the borehole and drill rod assembly.

25 In addition to such a homogenization of the forces to be introduced, via the periphery of the device according to the invention, it may be provided, in order to further increase the anchoring forces to be introduced, that a plurality of expandable spreading elements are provided
30 about the periphery of the drill rod assembly at different distances from the drill bit, as in correspondence with a further preferred embodiment of the device according to the invention. Such expandable spreading elements arranged at

different distances from the drill bit provide an accordingly safe anchorage over an enlarged length and, in particular, in the front region of the device according to the invention, during the expansion of the expandable
5 spreading elements, so that at least some of the spreading elements arranged at different distances from the drill bit and additionally distributed about the periphery of the device according to the invention will ensure a safe and reliable anchorage even in the event of possibly loose
10 rock.

In order to further homogenize the anchoring effect via the periphery as well as a longitudinal extension of the device according to the invention, it is proposed according to a
15 further preferred embodiment that spreading elements arranged at different distances from the drill bit are arranged to be relatively offset in the peripheral direction of the drill rod assembly.

20 In order to facilitate the extension procedure of the individual spreading elements, which, according to a preferred embodiment, are arranged at different distances from the tip of the borehole or drill bit, respectively, it is proposed according to a further preferred embodiment
25 that spreading elements arranged at different distances from the drill bit cooperate with a common expansion element arranged to be displaceable along the drill rod assembly.

30 Instead of forming an anchor by the drill rod assembly remaining in the borehole as well as by the drill bit, it is proposed according to a further preferred embodiment that the drill rod assembly is divisible into subportions,

particularly in the region of the spreading elements, and an anchor element, in particular a screw head of a cable strand anchor, is connectable with the drill rod assembly subportion remaining in the borehole and connected with the
5 drill bit. It will thereby be possible, upon completion of the borehole and anchorage or emergence of the spreading elements, to introduce anchoring elements adapted for special anchoring effects, in particular a cable strand anchor, which is particularly easy to connect with the
10 drill rod assembly subportion remaining in the borehole.

In order to ensure an appropriate flushing effect, it is, moreover, preferably provided that the drill rod assembly, in a manner known per se, is formed with a flushing channel
15 in its interior. Such a flushing channel cannot only be used to introduce flushing fluid during the drilling procedure, but can optionally also be employed to introduce a curable material, which is to be introduced in the region of the tip and/or in the region of the spreading elements.

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In the following, the invention will be explained in more detail by way of an exemplary embodiment schematically illustrated in the accompanying drawing. Therein,

Fig. 1 is a partial section through a first embodiment
25 of a device according to the invention for carrying out the method of the invention;

Fig. 2 is a section similar to the illustration of Fig. 1, with wedge-shaped spreading elements extending contrary to the drilling direction entering the borehole
30 wall after the completion of a drilling procedure;

Fig. 3 is a section along line III-III, through the region of the spreading elements as well as the expansion element of the device according to the invention;

Fig. 4, in an illustration similar to that of Fig. 1, depicts a section through a modified embodiment of a device according to the invention for carrying out the method of the invention, with a plurality of spreading elements being
5 provided along the longitudinal direction of the device;

Fig. 5 is a partial section similar to that of Fig. 4, with at least one spreading element having emerged into the wall of the surrounding borehole;

Fig. 6, in an illustration similar to that of Fig. 4, depicts a section through a further modified embodiment of a device according to the invention for carrying out the method of the invention, with the drill rod assembly being designed to be subdivided in the region of the spreading
10 elements; and

Fig. 7, in an illustration similar to that of Fig. 5, depicts a partial section through the embodiment according to Fig. 6, with the drill rod assembly portion facing away from the drill bit being removed and replaced by an anchor element, in particular a cable strand anchor, after the
15 emergence of at least one spreading element into the wall of the surrounding borehole.

In Figs. 1 and 2, 1 serves to denote the wall of a borehole produced by a drill bit schematically indicated by 2, which drill bit 2 is mounted on a drill rod assembly 3, wherein an impact and rotational stress is exerted on the
25 drill rod assembly 3 for the production of a borehole 1 in a known manner by devices not illustrated in detail via driving means provided outside the borehole 1. The drill rod assembly 3 is, moreover, provided with a flushing channel schematically denoted by 4, which is used for
30 flushing the drill bit 2 and optionally for discharging material excavated during the drilling procedure.

At a distance from the drill 2, a fixed nut 5 is provided on the drill rod assembly 3, consecutively to which a plurality of wedge-shaped spreading elements 7 oriented in a direction extending opposite the drilling direction 6 are arranged in a manner distributed about the periphery of the drill rod assembly 3. During the drilling procedure illustrated in Fig. 1, the spreading elements 7, by a strap or clamp strap 8, are forced into a position in which the spreading elements 7 are located within the clear cross section of the borehole 1 defined by the drill bit 2 in order not to interfere with the drilling procedure.

After the completion of the borehole 1, with the drill bit 2 being, for instance, rotated in a counter-clockwise direction in the sense of arrow 9 in Fig. 3, i.e. towards the left, the direction of rotation of the drill rod assembly 3 is reversed to opposite the drilling direction 9 so as to cause a spring element 11 provided between at least one wedge-shaped spreading element 7 and an expansion element 10 mounted on the drill rod assembly 3 to emerge from its respective recess or depression 12 provided on the periphery of the expansion element 10 and cooperate with a profiling 13 provided on the inner periphery of the spreading element 7 such that, during the reversal of the direction of rotation of the drill rod assembly 3 and with appropriate threads formed on the outer periphery of the drill rod assembly 3 as well as on the expansion element 10, the expansion element 10 will be displaced or shifted in the direction towards the drill bit 2, in the sense of arrow 6, as is indicated in Fig. 2 by arrow 14. The displacement of the expansion element 10 in the sense of arrow 14, or drilling direction 6, causes pivotal movements of the spreading elements 7 into the positions illustrated

in Fig. 2, with each of the tips 15 of the spreading elements 7 entering the surrounding borehole wall 1 and, hence, safely anchoring in the produced borehole 1 the anchor formed by the drill rod assembly 3 and the drill bit
5 2.

In order to promote or enhance the anchoring effect, it may be provided that either simultaneously with the movement of the expansion element 10 and, hence, extension of the
10 spreading elements 7 into the surrounding borehole wall 1, a tensile stress is exerted on the drill rod assembly 3 in a sense opposite to arrows 6 and 14 so as to cause the tips 15 of the wedge-shaped spreading elements 7 to dig their way, or eat, (more) deeply into the surrounding borehole
15 wall 1.

In order to ensure proper haulage of the excavated material and provide an appropriate flushing action, at least one flushing channel 16 is, moreover, indicated within the
20 expansion element 10 in Figs. 1 and 2.

As is apparent from Figs. 1 to 3, a plurality of wedge-shaped spreading elements 7 are arranged about the periphery of the drill rod assembly 3, wherein, in the
25 embodiment illustrated in Figs. 1 to 3, four segment-shaped, wedge-shaped spreading elements 7 are provided to ensure an appropriate anchoring effect. The spreading elements 7 are suitably mounted on the biasing strap 8 or pivotally hinged to a bearing element likewise provided on
30 the drill rod assembly 3.

Depending on the anchoring effect to be achieved and/or the nature of the surrounding soil or rock material, the

spreading elements 7 are accordingly arranged about the periphery of the drill rod assembly 3 in terms of length, configuration, biasing force and number.

5 Fig. 1, moreover, depicts a securing pin 20 arranged behind the expansion element 10 to secure the latter from being inadvertently moved or lost. The extent of the longitudinal displacement of the expansion element 10 during the extension of the wedge-shaped spreading elements 7 can be
10 taken from the distance between the securing pin 20 and the expansion element end facing away from the drill bit 2, which is apparent from Fig. 2.

In the embodiment illustrated in Figs. 4 and 5, a drill bit
15 2 for the production of a borehole 1 is again mounted on a drill rod assembly denoted by 3.

While, in the embodiment according to Figs. 1 to 3, the wedge-shaped spreading elements 7 are provided about the
20 periphery of the drill rod assembly 3 in a substantially adjacent manner, it is provided in this embodiment that a plurality of spreading elements 17 and 18 are arranged at different distances from the drill bit 2.

25 Similarly to the preceding embodiment, drilling is, for instance, effected by a movement of the drill rod assembly 3 in an anti-clockwise direction, while, after the completion of the borehole 1, by a reversal of the direction of rotation of the drill rod assembly 3, the
30 extension or extraction of the spreading elements 17 and 18 is again ensured by the respective engagement of a spring element 12, which causes a displacement or shift of the expansion element again denoted by 10, in the direction

towards the drill bit 2, as is indicated in Fig. 5, such that the spreading elements 17 and 18, which are arranged at different distances from the drill bit 2, will enter the borehole wall 1 by the aid of appropriate, ramp-shaped subportions 19 of the expansion element 10. In addition to different distances of the spreading elements 17 and 18 from the drill bit 2, it may moreover be provided, in order to equalize the anchoring effect, that the spreading elements 17 and 18 are arranged to be distributed and offset about the periphery of the drill rod assembly 3, this being of particular interest to the spreading elements 17 and 18 extending over small subportions or opening angles about the periphery of the drill rod assembly 3.

In the embodiment illustrated in Figs. 6 and 7, a plurality of spreading elements again denoted by 17 and 18 are arranged at different distances from the drill bit 2 in a manner similar to the configuration according to Figs. 4 and 5. Similarly to the preceding embodiment, drilling is again effected by a movement of the drill rod assembly 3 in a counter-clockwise sense, while, after the completion of a borehole 1, by a reversal of the drilling direction of the drill rod assembly 3, the extension or emergence of the spreading elements 17 and 18 is again ensured in that, by the appropriate engagement of the spring element 12, a displacement or shift of the expansion element again denoted by 10 is caused in the direction towards the drill bit 2, as is apparent from Fig. 7. Like in the embodiment according to Figs. 4 and 5, a common expansion element 10 is employed for the plurality of spreading elements 17 and 18 arranged in the longitudinal direction.

From the embodiment according to Figs. 6 and 7, it is apparent that the drill rod assembly 3 is subdivided into relatively separable subportions 3' and 3'', a connection 23 between the subportions 3' and 3'' of the drill rod assembly
5 being, for instance, realized by a conical hexagon guide.

After the completion of a bore and the emergence of at least some spreading elements, as is indicated in Fig. 7, a separation of the drill rod assembly elements 3' and 3''
10 occurs, whereupon a screw head 21 of a cable strand anchor 22 is subsequently introduced and screwed into an internal thread of the hollow drill rod assembly or subportion 3' remaining in the borehole 1. It is, thus, feasible, after the completion of the borehole 1 and the accordingly safe
15 anchorage by the extension of the spreading elements 17 and 18 upon reversal of the direction of rotation of the drill rod assembly 3, as has been described in connection with the preceding embodiments, to introduce and safely anchor, after the removal of the subportion 3'' of the drill rod
20 assembly 3, an anchoring element adapted, for instance, to the conditions of the surrounding soil or rock and configured, for instance as a cable strand anchor 22. Depending on the material selected for the anchor 22 to be introduced, such a mode of procedure may constitute an
25 alternative for providing other possible permanent anchors.

C l a i m s

1. A method for drilling, particularly percussion or rotary
percussion drilling, a hole (1) in soil or rock material
5 and fixing an anchorage in said hole (1), wherein a
borehole is formed by a drill bit (2) mounted on a drill
rod assembly (3), characterized in that, after the
completion of the borehole (1), a plurality of, in
particular, wedge-shaped spreading elements (7, 17, 18)
10 arranged at a distance from the drill bit and oriented
contrary to the drilling direction are extended into the
wall of the borehole (1) formed by the drill bit (2).

2. A method according to claim 1, characterized in that the
15 extension of the spreading elements (7, 17, 18) is
initiated and/or effected by a rotational movement of the
drill rod assembly (3) contrary to the direction of
rotation for the production of the borehole (1) by the
drill bit (2).

20 3. A method according to claim 1 or 2, characterized in
that the spreading elements (7, 17, 18) are prestressed in
the direction towards the drill rod assembly (3) during the
drilling procedure.

25 4. A method according to claim 1, 2 or 3, characterized in
that, during the emergence of the spreading elements (7,
17, 18), and/or alternately with the emerging movement of
the same, the drill rod assembly (3) is respectively
30 powered or retracted in the direction towards the open end
of the borehole (1), contrary to the drilling direction.

5. A method according to any one of claims 1 to 4, characterized in that, after the completion of the borehole (1) and emergence or anchoring of the spreading elements (7, 17, 18), the drill rod assembly (3) is subdivided, in particular, in the region of the spreading elements (7, 17, 18) and removed from the borehole (1) and replaced by an anchor element, in particular a cable strand anchor (22), which is connected, in particular screwed, with the drill rod assembly subportion remaining in the borehole (1).

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6. A device for drilling, particularly percussion or rotary percussion drilling, a hole (1) in soil or rock material and for the production of an anchorage, wherein a borehole (1) is formed by a drill bit (2) mounted on a drill rod assembly (3), characterized in that, in a portion joining the drill bit (2), a plurality of, in particular, wedge-shaped spreading elements (7, 17, 18) oriented contrary to the drilling direction (6) are provided, which are extensible into the wall of the borehole (1) after the completion of the borehole (1) formed by the drill bit (2).

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7. A device according to claim 6, characterized in that the spreading elements (7, 17, 18) are powered, particularly prestressed by at least one strap (8), in the direction towards the drill rod assembly (3) during the drilling procedure.

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8. A device according to claim 6 or 7, characterized in that an, in particular, annular expansion element (10) is mounted about the periphery of the drill rod assembly (3) and, at a rotational movement of the drill rod assembly (3) in a direction contrary to a rotational movement (9) carried out during the performance of the drilling

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procedure, is displaceable in the direction towards the drill bit (2) along the longitudinal direction of the drill rod assembly (3) and cooperates with the wedge-shaped spreading elements (7, 17, 18), which are, in particular, pivotally articulated to a bearing element which is, in particular, fixedly connected to the drill rod assembly (3) and arranged between the expansion element (10) and the drill bit (2).

9. A device according to claim 8, characterized in that at least one spring element (11) is provided on the expansion element (10), which spring element, during the drilling procedure, can be received in a recess or depression (12) provided on the periphery of the expansion element (10) and, at a reversal of the direction of rotation, cooperates with at least one profiling (13) provided on at least one spreading element (7) and facing the interior of the device, in order to prevent a rotational movement the expansion element (10) and cause its displacement (14) along the longitudinal direction by the provision of a threaded connection.

10. A device according to claim 8 or 9, characterized in that at least one flushing channel (16) extending in the longitudinal direction of the device is provided within the expansion element (10).

11. A device according to any one of claims 6 to 10, characterized in that the expandable spreading elements (7, 17, 18) are arranged to be substantially uniformly distributed about the periphery of the drill rod assembly.

12. A device according to any one of claims 6 to 11,
characterized in that a plurality of expandable spreading
elements (17, 18) are provided about the periphery of the
drill rod assembly (3) at different distances from the
5 drill bit (2).

13. A device according to claim 12, characterized in that
spreading elements (17, 18) arranged at different distances
from the drill bit (2) are arranged to be relatively offset
10 in the peripheral direction of the drill rod assembly (3).

14. A device according to claim 12 or 13, characterized in
that spreading elements (17, 18) arranged at different
distances from the drill bit (2) cooperate with a common
15 expansion element (10) arranged to be displaceable along
the drill rod assembly (3).

15. A device according to any one of claims 6 to 14,
characterized in that the drill rod assembly (3) is
20 divisible into subportions (3', 3''), particularly in the
region of the spreading elements (17, 18), and an anchor
element, in particular a screw head (21) of a cable strand
anchor (22), is connectable with the drill rod assembly
subportion remaining in the borehole (1) and connected with
25 the drill bit (2).

16. A device according to any one of claims 6 to 15,
characterized in that the drill rod assembly (3), in a
manner known per se, is formed with a flushing channel (4)
30 in its interior.