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(54) **DRILLING TIP FOR A SOIL DISPLACEMENT DRILL**

(57) The invention relates to a drilling tip (1) for a soil displacement drill for placing a foundation pile, said drilling tip (1) comprising: an at least substantially cone-shaped body (2), a connection (12) for a supply line (13) for a liquid, in particular grout, and one or more exit

channels (14) for said liquid. The cone-shaped body (2) is provided with a central opening (10). In said opening (10) an insert (11) is mounted in which the connection (12) for a supply line (13) and one or more exit channels (14) are provided.

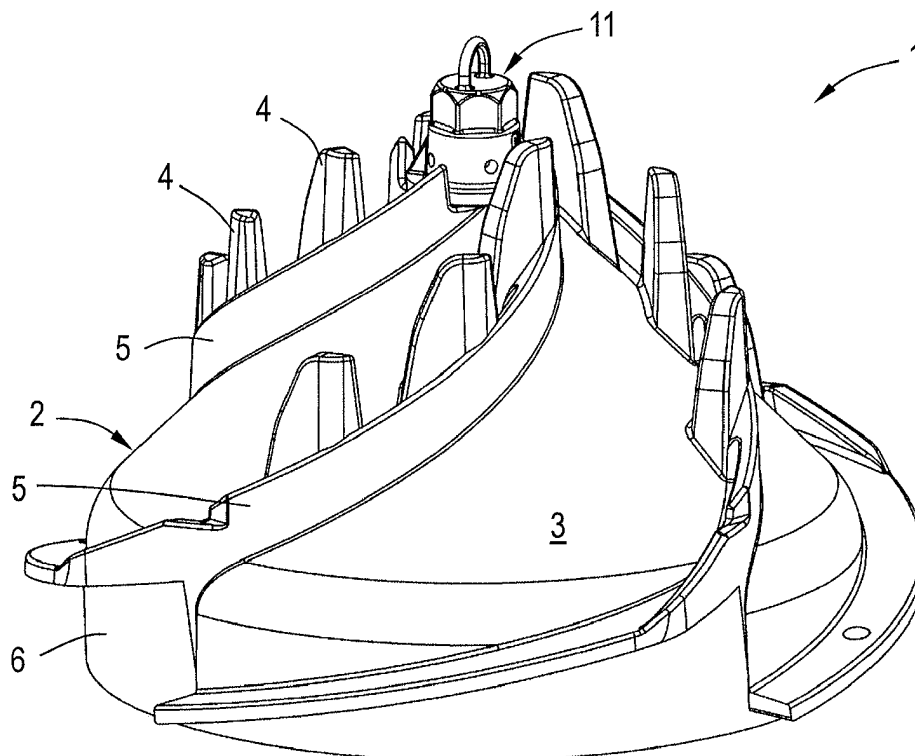


Fig.1

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Description

[0001] The invention relates to a drilling tip for a soil displacement drill for producing a foundation pile, said drilling tip comprising: an at least substantially cone-shaped body, preferably with a top angle (tip) between 80 and 100°, for example 90°, a connection for a supply line for a liquid, in particular grout, and one or more exit channels for said liquid, in particular two or more channels extending in a radial direction or at least a direction having a radial component and/or distributed regularly (mutually equal angles) along the circumference of the insert.

[0002] NL 1018702 relates to a method for inserting a foundation pile in the soil while using a soil displacement drill, in which a hollow drilling tube together with a soil displacement drill attached thereto in combination as foundation pile is inserted in the soil by axial pressure and in a rotating manner using a lengthener connected to the hollow drilling tube and wherein during insertion in the soil a liquid substance is supplied to the soil through the soil displacement drill via a liquid supply extending through the lengthener and the foundation pile.

[0003] NL 8401118 relates to a soil displacement drill comprising a drilling tube and a hollow drilling head connectable thereto which exists of a cylindrical edge and a substantially cone-shaped tip connecting thereto which is provided with at least two soil displacement faces extending spirally from the cone tip towards the cylindrical edge.

[0004] Among others such foundation piles are used when pile driving is not possible or desirable, for example because it causes too much nuisance for third parties or a risk of damaging nearby constructions. A displacement drill for producing a foundation pile comprises a drilling tip which, by means of welding (in a fixed manner) or lugs (in a detachable manner) is attached to a (drilling) tube and is inserted in the soil by axial pressure and in a rotating manner. During inserting the tube in the soil a liquid, such as grout or bentonite suspension, is supplied to the soil through exit channels in the drilling tip via a liquid supply extending along the tube. By supplying the liquid a reduction of the rotational resistance of the drill in the soil is achieved. Further, the supply of for example cement emulsion to a soil layer, for example a sand layer, may enhance the fixation of the foundation pile to the soil. After the drill has reached the desired depth, the tube is filled with concrete and possibly a reinforcement and the liquid supply is detached and is withdrawn and then possibly is vibrated for compacting the concrete. Depending on the chosen construction the tube remains in the soil or the tube is withdrawn.

[0005] Drilling tips for foundation piles are big and heavy, for example weigh 70 kg, and comprise components which have to be manufactured with precision. The invention intends to provide an improved drilling tip.

[0006] To this end, the cone-shaped body of the drilling tip is provided with a central opening and in said opening

an insert is mounted in which the connection for the supply line and one or more exit channels are provided. In an embodiment, the insert is welded into the opening. In a further embodiment, the insert comprises a valve, preferably a check valve, between the connection for the supply line and one or more exit channels.

[0007] Owing to the insert according to the invention a number of critical elements and/or functions of the drilling tip are integrated in a relatively small part which, compared to a heavy and clumsy casting, can be machined in a more simple and/or more precise manner before it is mounted into the drilling tip. Moreover, a design or type of insert can be applied to different designs or types of drilling tips: users of this type of drilling tips have different wishes, for example relating to the drill geometry, the connection of the grout and/or the connection of the drive, in particular the rotatably drivable drilling tube. Further, the drilling tips, as long as the inserts or at least the grout tubes are not yet attached therein, can be stacked (nested) more easily, such that the drilling tips require less space during transport and more drilling tips can be transported per packaging, pallet or (sea)container.

[0008] In an embodiment, the valve comprises a valve body, preferably a ball, a valve seat and a spring to urge the valve body onto the valve seat. During, and possibly even after drilling, the valve allows passage of the liquid, such as grout, but prevents groundwater from entering the drilling tube. Groundwater entering the drilling tube will mix with the concrete supplied into the tube after drilling and will severely compromise the strength of the cured concrete.

[0009] In an embodiment, the insert at its outer side is provided with an attachment member, preferably a hoisting lug, for hoisting means. Therewith the drilling tips, also relatively heavy drilling tips, can be easily moved, for example unloaded from a packaging or a truck and be positioned alongside a picket pole marking the location for the foundation pile to be manufactured.

[0010] In an embodiment, the cone-shaped body and/or the insert are made of cast steel. Cast steel enhances the weldability of the insert into the cone-shaped body and enables a relatively strong hoisting lug.

[0011] In an embodiment, the insert comprises one or more exit channels for the liquid, in particular two or more channels, for example three or four, extending in a radial direction, at least a direction having a radial component and/or distributed regularly along the circumference of the insert.

[0012] In an embodiment, the central opening and the insert at least comprise a feature, for example a flat face on an otherwise round circumference, determining the orientation of the insert in the opening. Thus, for example, the position of the exit channels relative to other elements of the drilling tip, such as spiral ribs or teeth, can be assured.

[0013] The invention further relates to an insert for a drilling tip for a soil displacement drill for producing a foundation pile, comprising a connection for a supply line

for a liquid, in particular grout, one or more exit channels for said liquid, in particular two or more channels extending in a radial direction, at least a direction having a radial component and/or distributed regularly (mutually equal angles) along the circumference of the insert, and a valve, preferably a check valve, between the connection for the supply line and one or more exit channels.

[0014] In an embodiment, the valve comprises a valve body, preferably a ball, a valve seat and a spring urging the valve body onto the valve seat.

[0015] The invention further relates to a kit for producing a drilling tip for a soil displacement drill, said kit comprising: a substantially cone-shaped body that is provided with a central opening and an insert as described above.

[0016] Within the scope of the invention the term "substantially cone-shaped body" relates to cones with, in a longitudinal section, a straight wall and/or a concavely and/or convexly curved wall and/or provided with teeth and/or one or more spiral ribs, and/or which moreover comprises non-conical parts, such as a cylindrical part, in particular a cylindrical part which can be engaged by a drilling tube or to which a drilling tube can be welded. The term "liquid" comprises all liquid media that can flow through the supply line and the exit channels, in particular multiphase systems, such as suspensions, for example grout and bentonite suspended in water.

[0017] Next the invention will be elucidated while referring to the figures in which an embodiment of the invention is shown.

Figure 1 is an isometric view of a drilling tip according to the invention.

Figure 2 is a cross-section of the drilling tip shown in Figure 1.

Figure 3 shows an insert of the drilling tip shown in Figures 1 and 2.

Figures 4 and 5 show cross-sections of the insert shown in Figure 3.

[0018] Figures 1 and 2 illustrate a drilling tip 1 for a soil displacement drill for positioning a foundation pile. The drilling tip comprises a cone-shaped body 2, in this example a cone with (in the illustrated longitudinal cross-section) a straight wall 3 on which four rows of teeth 4 and four spiral ribs 5 are provided, and a cylindrical part 6 that at its inner side is provided with projections 7 which are complementary to recesses on the outer wall of a drilling tube (not shown) known per se, such that the drilling tube, when driven in rotation, drive the drilling tip in said rotational movement. The cone has a tip angle of 90°. The cone-shaped body is provided with a central opening 10 in which an insert 11 is welded.

[0019] The insert, illustrated in more detail in Figures 3-5, comprises a connection 12 for a supply line, i.e. a so-called grout tube 13, and one or more exit channels, in this example four straight channels 14 which extend radially, mutually (in top plan view) extend at an angle of 90° and de-bouche between the spiral ribs 5. In this ex-

ample, the connection 12 comprises an annular edge which is provided with an inner thread. The end of the grout tube that is screwed into the connection is provided with an external conical thread. Because the external thread is conical, it better seals in the connection.

[0020] The insert 11 further comprises a check valve, between the connection 12 for the supply line and the exit channels 14. The check valve comprises: a plastic ball 15, a valve seat 16 and a helical spring 17 urging the ball onto the valve seat. In this example, the valve seat is screwed into the insert, preferably from the side of the connection for the liquid. Finally, the insert at its tip is provided with a hoisting lug 18.

[0021] Thus, the connection for the grout tube, the check valve, the exit channels, and the hoisting lug all are provided in the insert which, compared to the cone-shaped body, can be machined easier and/or more precisely before it is mounted in said body. Moreover, a single design or type of insert can be applied on different designs or types of drilling tips. Further, as long as the inserts are not yet mounted therein, the drilling tips can be stacked (nested) more easily, such that the drilling tips require considerably less space during transport and more drilling tips can be transported per packaging, pallet or (sea)container.

[0022] The invention is not limited to the described embodiments and can be varied within the scope of the claims.

Claims

1. Drilling tip (1) for a soil displacement drill for placing a foundation pile, said drilling tip (1) comprising: an at least substantially cone-shaped body (2), a connection (12) for a supply line (13) for a liquid, in particular grout, and one or more exit channels (14) for said liquid, **characterized in that** the cone-shaped body (2) is provided with a central opening (10) **and in that** in said opening (10) an insert (11) is mounted in which the connection (12) for the supply line (13) and one or more exit channels (14) are provided.
2. Drilling tip (1) according to claim 1, wherein the insert (11) is welded into the opening (10).
3. Drilling tip (1) according to claim 1 or 2, comprising a valve, preferably a check valve (15, 16, 17), between the connection (12) for the supply line (13) and one or more exit channels (14), said valve (15, 16, 17) being housed in the insert (11).
4. Drilling tip (1) according to claim 3, wherein the valve comprises: a valve body, preferably a ball (15), a valve seat (16) and a spring (17) urging the valve body (15) onto the valve seat (16).

5. Drilling tip (1) according to claim 4, wherein the valve seat (16) is screwed into the insert (11), preferably from the side of the connection (12) for the supply line (13) for a liquid. 5
6. Drilling tip (1) according to any of the preceding claims, wherein the insert (11) at its outer side is provided with an attachment member, preferably a hoisting lug (18), for hoisting means. 10
7. Drilling tip (1) according to any of the preceding claims, wherein the cone-shaped body (2) and/or the insert (11) are made of cast steel.
8. Drilling tip (1) according to any of the preceding claims, wherein the insert (11) comprises one or more exit channels (14) for the liquid, in particular two or more channels (14) extending in a radial direction or at least a direction having a radial component and/or distributed regularly along the circumference of the insert (11). 15 20
9. Drilling tip (1) according to any of the preceding claims, wherein the central opening (10) and the insert (11) at least comprise a feature determining the orientation of the insert (11) in the opening (10). 25
10. Insert (11) for a drilling tip (1) for a soil displacement drill for producing a foundation pile, comprising a connection (12) for a supply line (13) for a liquid, in particular grout, one or more exit channels (14) for said liquid, in particular two or more channels (14) extending in a radial direction or at least a direction having a radial component and/or distributed regularly along the circumference of the insert (11), and a valve, preferably a check valve (15, 16, 17), between the connection (12) for the supply line (13) and one or more exit channels (14). 30 35
11. Insert (11) according to claim 10, wherein the valve comprises: a valve body, preferably a ball (15), a valve seat (16) and a spring (17) urging the valve body (15) onto the valve seat (16). 40
12. Insert (11) according to claim 11, wherein the valve seat (16) is screwed into the insert (11), preferably from the side of the connection (12) for the liquid. 45
13. Insert (11) according to any of the claims 10-12, wherein the insert (11) at its outer side is provided with an attachment member, preferably a hoisting lug (18), for hoisting means. 50
14. Insert (11) according to any of the claims 11-13, wherein the insert (11) is made of cast steel. 55
15. Kit (2, 11) for producing a drilling tip (1) for a soil displacement drill, said kit comprising: a substantial-

ly cone-shaped body (2) that is provided with a central opening (10) and an insert (11) according to any of the claims 11-14.

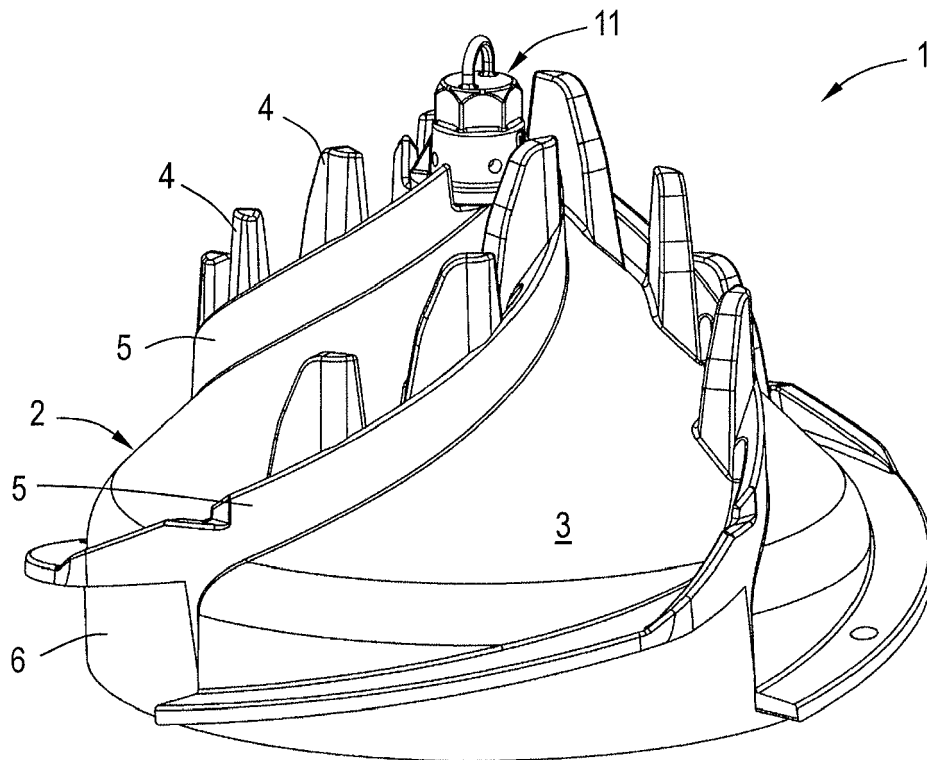


Fig.1

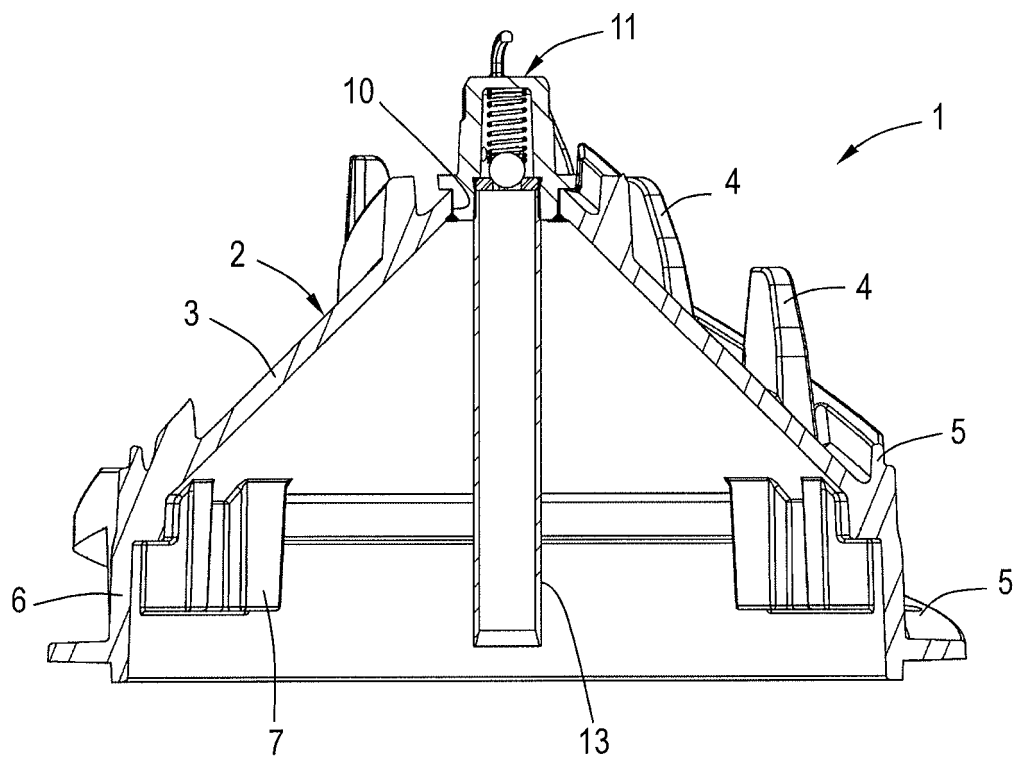
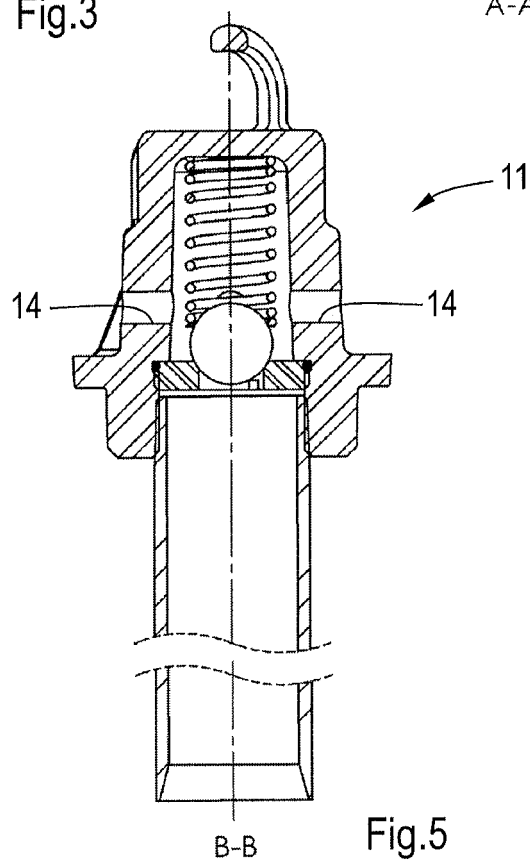
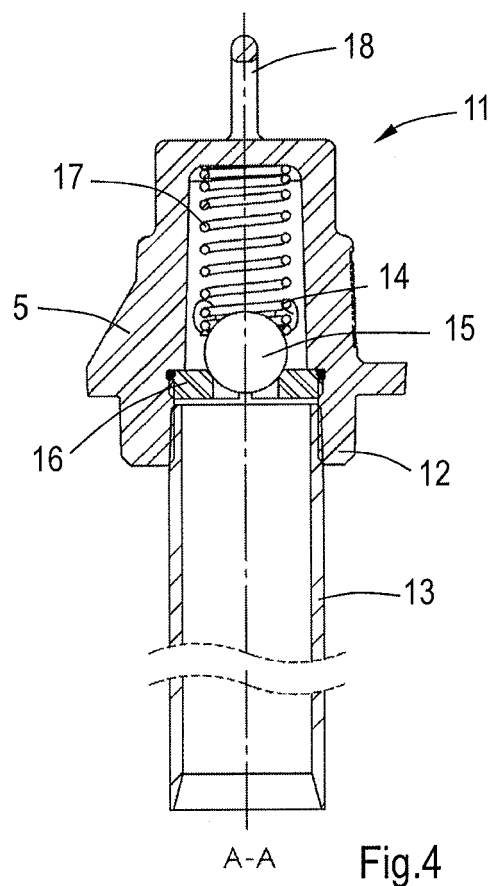
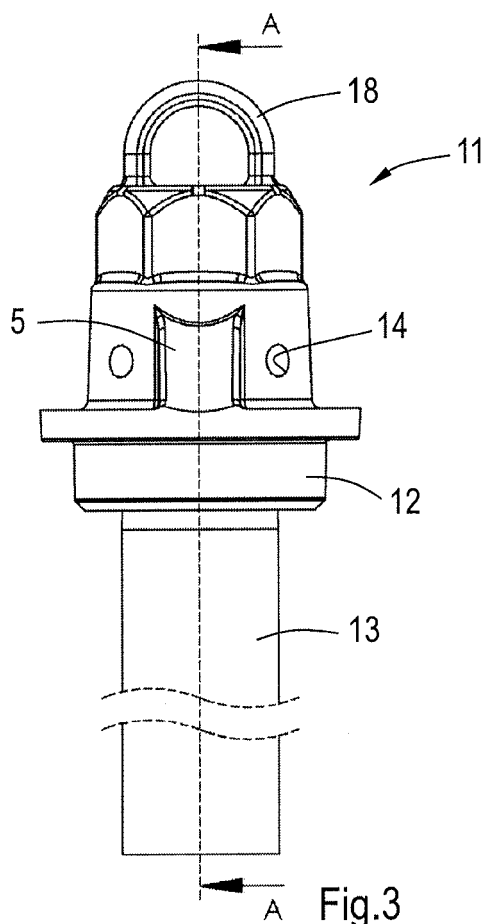


Fig.2



REFERENCES CITED IN THE DESCRIPTION

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