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(54) Ground drilling device.

(57) Device for well drilling consisting of a pipe which can be rotated and a lost drill point (2) which has a conical surface with a helical profile thereon and can be detachably connected to said pipe.

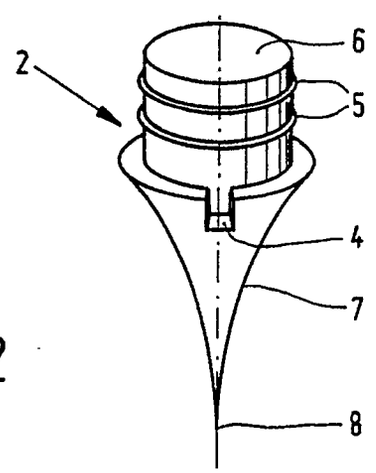

FIG. 2

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GROUND DRILLING DEVICE

The invention relates to a device for carrying out well drilling, said device containing a pipe, a detachable, substantially conical lost drill point to be detachably attached to a subterranean end of said pipe, and means to be coupled to the pipe in driving relationship for driving the lost drill point into the ground while carrying out a rotary motion.

Such a device is disclosed in the Dutch Patent Application No. 8802005, which is not open to public inspection yet. Said Patent Application describes the manner in which a pipe and a drill point are driven into the ground, inter alia for seismic and geological puposes, by means in the shape of a hydraulic hammer. The known drill point has a conical outer surface, possibly having helical ridges provided across the surface, which automatically communicate a rotary motion to the pipe when the lost drill point is driven into the ground by means of the hydraulic hammer.

The drawback of the known device is that it requires a comparatively great deal of energy to force the known drill point into the ground by strokes of the hydraulic hammer, and that a great deal of noise, as much as 120 - 130 dB, is produced as a result of the large amount of energy required, which, even when ear mufflers are used, constitutes a high auditive load for the operators, and that furthermore a lot of undesirable vibrations are produced.

The object of the invention is to provide a device whereby a lost drill point is effectively driven into the ground, and whereby less noise and fewer vibrations are produced.

In order to accomplish that objective the device is according to the invention characterized in that means are provided to communicate a substantially continuous rotary motion to the lost drill point, and that the conical outer surface of the drill point has a helical profile. The advantage of the device according to the invention is that as a result of the combination of the substantially continuous rotary motion, with a substantially constant angular velocity, and the helical profile of the outer surface of the drill point, said drill point is rotated into the ground, instead of being hammered, as a result of which considerably less noise and fewer vibrations are produced. When an equal amount of mechanical energy is communicated to the means for driving the drill point into the ground, it is surprisingly found that in comparable circumstances it is at the same time possible to drill substantially deeper than with conventional devices. For environmental reasons this constitutes a considerable advantage in circumstances where in particular the structure of the higher ground layers, also after detonation of an explosive charge to be provided near the drill point in the borehole, should remain intact as much as possible, in order that the soil examination affects the ground water regime is as little as possible.

One embodiment of the device is according to the invention characterized in that, with a given rotary velocity of the drill point, the pitch of the helical profile is dependent on the expected local soil conditions.

This embodiment of the device according to the invention makes it possible to optimally adapt the pitch of the profile of the drill point to the rotary motion of the drill point, and in particular to the local soil structure and soil density. As a result of this a minimal amount of energy is required for leading the drill point into the ground in a smooth and noiseless manner.

The pitch is preferably selected such that when the drill point is moved along its axial length the displacement will be in the range of 10 - 40°.

The means for driving the pipe into the ground is preferably a silent and commonly used hydraulic motor.

In a preferred embodiment of the device according to the invention the pipe has two projections, and the drill point has two corresponding recesses.

In practice this has appeared to be the most satisfactory embodiment, which in addition can be produced at a minimal cost price.

The invention furthermore relates to a drill point for use in the device according to the invention.

The invention will be further explained hereafter, with reference to the drawing, in which like numerals indicate like elements. In the drawing:

Figure 1 is a possible embodiment of the subterranean end of the pipe for use in the device according to the invention;

Figure 2 is an elevational view of the drill point which is to co-operate with the subterranean end of the pipe according to Figure 1;

Figure 3 is a bottom view of the specific helical extension of the outer surface of the drill point of Figure 2; and

Figure 4 is a partial right-hand side elevational view of the drill point of Figure 2.

Description of the Figures.

Figure 1 shows the bottom end of a pipe 1, said pipe 1, together with the drill point 2 illustrated in the Figures 2, 3 and 4, and the means (not shown) for carrying out the rotary motion of the pipe 1 and the drill point 2, forming part of the

device for carrying out well drilling. The device comprises a hydraulic motor provided at the other end (not shown) of the pipe 1. As regards the further details of the device reference is made to the aforesaid Dutch Patent Application No. 8802005.

The pipe 1 is detachably coupled to the drill point 2, via projections 3 provided on the subterranean end of the pipe 1 and recesses 4, provided in the drill point 2, which cor respond with said projections 3. A cylindrical part 6, provided with O-rings 5, of the drill point 2 fits into the pipe 1, whereby the projections 3 and the corresponding recesses 4 engage one another. By activating the hydraulic motor the drill point 2 is driven into the ground, after which the drill point 2 remains behind in the ground as a lost drill point 2.

The drill point 2 has a substantially conical outer surface 7. In the right-hand side elevational view of the drill point of Figure 2, which is shown in Figure 4, the outer surface 7 is even exactly conical, when seen in elevational view. However, when studying the extension of the section of the outer surface 7, in the direction of the point 8 of the drill point 2, in the elevational view of Figure 2 and the bottom view of Figure 3, in particular in Figure 2, said outer surface 7 appears to be more strongly contracted than can be derived from Figure 4. This stronger contraction, when seen in the elevational view of Figure 2, results from the helical profile of the outer surface 7. Figure 3 shows a bottom view of the helical extension, which is difficult to illustrate in a drawing, of the outer surface 7 of the drill point 2 illustrated in Figure 2.

When the drill point 2 e.g. runs through two fingers, said drill point 2 will be displaced, as a result of the specific helical shape of the outer surface. This property, which is typical of the outer surface 7, is expressed in terms of pitch of the helical outer surface 7. Said pitch is preferably such that when the drill point is moved along its axial length the displacement of the drill point will be in the range of 10 - 40°.

With an axial length which is generally determined by the required mechanical strength of the drill point 2, the pitch of the helical outer surface 7 is to be determined such that, with a certain rotary velocity of the drill point 2 and with certain expected local soil conditions, the rotating drill point 2 is optimally adapted to the local soil structure and soil density. Embodiments which are obvious to a person skilled in the art are considered to fall within the scope of the claims hereinafter.

Claims

1. A device for carrying out well drilling, said device containing a pipe, a detachable, substantially conical lost drill point to be detachably attached to a subterranean end of said pipe, and means to be coupled to the pipe in driving relationship for driving the lost drill point into the ground while carrying out a rotary motion, characterized in that said means are adapted to communicate a substantially continuous rotary motion to the lost drill point, and that the conical outer surface of the drill point has a helical profile.

2. A device according to claim 1, characterized in that the pitch of the helical profile is dependent on the expected local soil conditions.

3. A device according to claim 2, characterized in that the pitch is such that when the drill point is moved along its axial length the displacement will be in the range of 10 - 40°.

4. A device according to any one of the claims 1 - 3, characterized in that said means comprise a hydraulic motor.

5. A device according to any one of the preceding claims 1 - 4, characterized in that the subterranean end of the pipe has at least two projections, and that the drill point has at least two corresponding recesses, for detachably attaching the drill point to the subterranean end of the pipe.

6. A device according to claim 5, characterized in that said drill point has two projections, and that the pipe has two corresponding recesses.

7. A drill point for use in the device according to any one of the claims 1 - 6.

FIG. 1

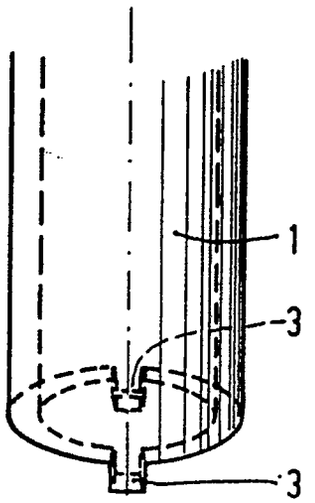


FIG. 2

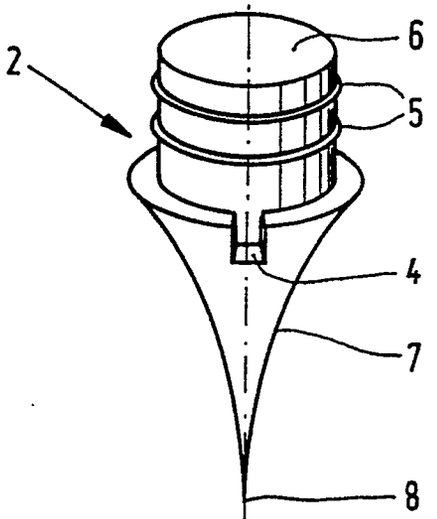
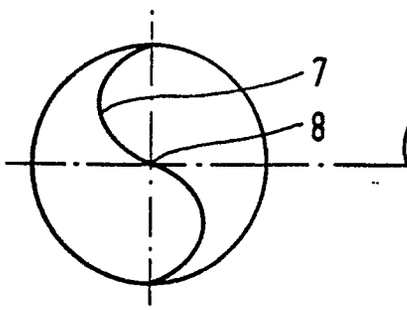


FIG. 3



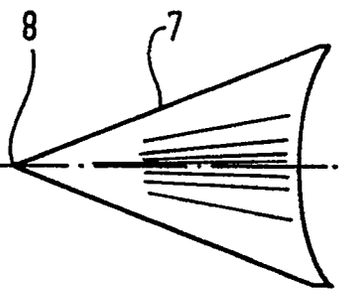


FIG. 4

N1555

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EUROPEAN SEARCH REPORT

Application Number

EP 90 20 3015

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	GB-A-1 115 796 (BAUER) * Page 3, lines 18-73; figures 1-4 *	1,5-7	E 02 D 1/02 E 21 B 7/26
Y	FR-A-7 813 14 (GRIMAUD) * Page 1, lines 1-14,33-52; page 2, lines 15-36,44-50; figures 7-9 *	1,5-7	
A		2,3	
A	US-A-3 344 871 (GOODMAN) * Column 2, lines 49-56; figures 1,2 *	1	
A	FR-A-1 451 807 (TSENTRALNOE KONSTRUKTORSKOE BJURO) * Page 2, left-hand column, lines 6-16; figures 1,2 *	4	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

E 02 D
E 21 B

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	19 February 91	KERGUENO J.P.D.

CATEGORY OF CITED DOCUMENTS

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