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(54) **Mobile drilling unit**

Fahrbares Bohraggregat

Unité mobile de forage

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(56) References cited:
US-A- 3 741 322

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Description

[0001] The present invention refers to a mobile drilling unit.

[0002] Mobile drilling units of a well-known type comprise a means of transport, a drilling tower which is mounted in such a way as to be able to revolve around a horizontal rotation axis, a tilting device which is hinged to the means of transport in order to position the tower between a position for transport, in which the tower lies flat on the means of transport, and a working position, in which the tower is arranged vertically, and a motor head, which is mounted in such a way as to be able to slide along the tower, and which is suitable for carrying out drilling in the ground by means of drilling rods.

[0003] Once the above-described kinds of mobile drilling units have reached the drilling site and have been manoeuvred into position, they are equipped with a container which is used for storing and manoeuvring the rods, and which is suitable for supplying the drilling rods to the motor head during the drilling operation and for freeing the motor head itself during the extraction of the rods.

[0004] The fact that it is necessary to position this kind of container next to the mobile drilling unit means that the time necessary for preparing and setting up the site is prolonged; it also means that another means of transport is necessary for moving the container and all the drilling rods, resulting in a situation which is detrimental to the flexibility of the drilling unit itself in terms of use.

[0005] U5-3,741,322 discloses a drilling rig carried by a caterpillar truck and comprising a mast with a drilling carriage and a drilling roll magazine disposed on the mast.

[0006] The aim of the present invention is to produce a mobile drilling unit, which is, at the same time, extremely flexible and easy to set up, and which presents a high degree of autonomy in terms of drilling.

[0007] According to the present invention, a mobile drilling unit will be realised comprising a means of transport, a drilling tower, which is supported by the means of transport and which is revolvingly mounted around a horizontal rotation axis, tilting means which are used for tilting the tower from and to a flat position for transport, a motor head which is assembled so as to slide along the tower, and which is suitable for carrying out drilling by means of a determined number of drilling rods and a container for storing and manoeuvring said drilling rods which is associated with the drilling tower and which is mounted on said tilting means; the unit being characterised by the fact that the tilting means comprise a first support for the drilling tower and a second support for the container, the first and second supports being hinged to the means of transport in order to rotate independently from each other around the respective rotation axes which are parallel to each other.

[0008] The present invention will now be described with reference to the attached drawings, which illustrate a non-limiting form of embodiment, in which :

FIGURE 1 is an elevated side view of a preferred form of embodiment of the mobile drilling unit to which the present invention refers in a operating configuration for working;

FIGURE 2 is an elevated side view of the mobile drilling unit shown in FIGURE 1 in an operating configuration for transport;

FIGURE 3 is a plan view of the mobile drilling unit shown in FIGURE 1; and

FIGURE 4 is an elevated rear view of the mobile drilling unit shown in FIGURE 1.

[0009] With reference to FIGURES 1 and 2, the number 1 indicates a mobile drilling unit in its entirety which is suitable for carrying out drilling in the ground by means of a determined number of drilling rods 2.

[0010] The unit 1 comprises a means of transport 4 which is provided with a transport platform 4, a drilling tower 5 which is supported by the platform 4 and which is revolvingly mounted in relation to the platform 4 itself so that it can rotate around a horizontal rotation axis A1, and a motor head 6 which is supported by the tower 5 and which is suitable for sliding along the tower 5 itself in a direction D1 for drilling by means of the interposition of a trolley 7 which is slidingly coupled to the tower 5.

[0011] The unit 1 also comprises a tilting device 8 which is mounted on the platform 4 in correspondence with a rear edge 9 of the platform 4 itself and which is transverse to the direction D1, and which is suitable for tilting the tower 5 between a working position for transport, in which the tower lies flat on the platform 4, and a working position for drilling, in which the tower 5 is raised into a vertical position above the edge 9.

[0012] Finally, the unit 1 comprises a container 10 for storing and manoeuvring the rods 2 which is associated with the tower 5 and which is mounted on the tilting device 8 in order to follow the tower 5 between the 2 working positions described.

[0013] In particular, the tilting device 8 comprises a support 11 for the tower 5, a support 12 for the container 10 and, for each support 11 and 12, a pneumatic activating device 13 which is suitable for endowing the relevant support 11, 12 with a rotation which is independent of the rotation of the other support 12, 11.

[0014] The support 12 is substantially L-shaped and presents a base 14 which is hinged to the platform 4 in correspondence to an axis A2 which is parallel to the axis A1, and a handling side frame 15 which is integral to the base 14 itself, and which is connected to the relative device 13. The support 11, instead, comprises a handling arm 16 which is hinged to the platform 4 and which is connected to the tower 5 on the part of the tower 5 which is opposite the part which is suitable for the trolley 7 to slide along.

[0015] According to the illustration shown in FIGURE 3, the container 10 comprises a frame 17 which is slidingly mounted on the base 14 of the support 12, and which presents a number of hackled compartments 18

which are arranged in series one after the other in a sliding direction D3 which is determined by the base 13 and which is transverse to the drilling direction D1. Each compartment 18 is suitable for containing at least four drillings rods 2, and presents an upper opening 19 for the upper section of the rods 2 to emerge, and a side opening 20 which faces the tower 5 for the total emergence of the rods 2.

[0016] According to the illustration shown in FIGURE 4, the trolley 7 comprises a handling device 21, which is associated with the motor head 6 in order to move the motor head 6 itself parallel to itself from and to a pick-up position in correspondence with the top of the container 10, and comprising a prismatic telescopic guide 22 which can be elongated in a direction D2 of elongation which is transverse to the drilling direction D1 and the direction D2 in which the container 10 itself slides.

[0017] When in use, the mobile drilling unit 1 is positioned with its own edge 9 in correspondence with the site where the drilling is to be carried out, and with the tower 5 and the container 10 arranged in their respective working configurations for transport, which means that they are flat in a horizontal position above the platform 4.

[0018] Once the tower 5 and the container 10 have been raised by the tilting device 8, the motor head 6 is raised to the top of the tower 5 by a raising device 23, and from there it is translated parallel to itself on the vertical to a rod 2 which is contained in one of the compartments 18.

[0019] When the rod 2 has been hooked to the motor head 6, the latter is once again translated in the direction D2 until it is vertical to the site where the drilling is to be carried out, and the pick-up movement is executed every time it is necessary to introduce a new rod 2 into the drilling site itself. The elongation of the guide 22 depends on the position occupied by the rod 2 which is to be picked up from the inside of the relevant compartment 18, and once a compartment 18 has been completely emptied, the frame 17 is moved in the direction D2 along the arm 14 in such a way as to present a new compartment 18 which is full of rods 2.

[0020] The sliding, parallel to itself, of the rotation axis of the motor head 6 determines a working plan, which is parallel to the directions D1 and D2 and which is transverse to the direction D3, and which is suitable for defining the position of each compartment 18.

[0021] Once the drilling has been completed, the container 10 is refilled by means of carrying out the above-described operations in reverse order.

[0022] It can be immediately deduced, from the foregoing description, that the unit 1 lends itself to the prompt and rapid preparation and dismantling of a drilling site and that, furthermore, the capacity of the container 10 results in a high level of operating autonomy.

[0023] It is intended that the present invention should not be limited to the form of embodiment herein described and illustrated, which is to be considered as an example of a form of embodiment of the mobile drilling unit to which

the present invention relates, and which may be subject to further modifications relating to the shape and arrangement of the parts, and details pertaining to construction and assembly.

Claims

1. Mobile drilling unit (1) comprising:

- means of transport (3),
- a drilling tower (5), which is supported by the means of transport (3) and which is revolvingly assembled around a horizontal rotation axis;
- tilting means (8) which are used for tilting the tower (5) from and to a flat position for transport,
- a motor head (6) which is assembled so as to slide along the tower (5), and which is suitable for carrying out drilling by means of a determined number of drilling rods (2); and
- a container (10) for storing and manoeuvring said drilling rods (2) which is associated with the drilling tower (5) and which is mounted on said tilting means (8);

the unit (1) being **characterised by** the fact that the tilting means (8) comprise a first support (11) for the drilling tower (5) and a second support (12) for the container (10), the first and second supports (11, 12) being hinged to the means of transport (3) in order to rotate independently from each other around the respective rotation axes (A1, A2) which are parallel to each other.

2. Unit according to Claim 1, **characterised by** the fact that it comprises a support trolley (7) for said motor head (6) which is mounted so as to be able to slide along the drilling tower (5) in a drilling direction (D1) which is parallel to the drilling tower (5) itself, and comprising handling means (21) associated with the motor head (6) for moving the motor head (6) itself from and to a pick-up position in correspondence with the container (10).

3. Unit according to Claim 2, **characterised by** the fact that the said handling means (21) comprise a prismatic telescopic guide (22) which can be elongated in a direction of elongation (D2) which is transverse to the said drilling direction (D1).

4. Unit according to Claim 3, **characterised by** the fact that the container (10) comprises a frame (17) which is slidably mounted on the said tilting means (8), and presenting a number of compartments (18) for storing and manoeuvring said drilling rods (2); each compartment (18) being open at the top and at the side at least on the part which is turned towards the drilling tower (5), and being arranged in series in relation to

the other compartments (18) in a sliding direction (D3) which is transverse to the said directions (D2, D1) of elongation and drilling.

5. Unit according to Claim 4, **characterised by** the fact that the tilting means (8) comprise a pneumatic activating device (13) for each of the said supports (11, 12).

Patentansprüche

1. Fahrbares Bohraggregat (1) umfassend:

- ein Transportmittel (3),
- einen Bohrturm (5), der von dem Transportmittel (3) gestützt wird und der um eine horizontale Rotationsachse umlaufend montiert ist;
- Kippmittel (8), die verwendet werden, um den Turm (5) aus und in eine flache Position zum Transport zu kippen,
- einen Motorkopf (6), der so montiert ist, dass er an dem Turm (5) entlang gleitet, und der durch eine bestimmte Anzahl von Bohrstangen (2) zum Bohren geeignet ist;
- einen Behälter (10) zum Aufbewahren und Bewegen der Bohrstangen (2), der mit dem Bohrturm (5) verbunden ist und der auf den Kippmitteln (8) befestigt ist; das Aggregat (1) ist **dadurch gekennzeichnet, dass** die Kippmittel (8) eine erste Stütze (11) für den Bohrturm (5) und eine zweite Stütze (12) für den Behälter (10) umfassen, wobei die erste und die zweite Stütze (11, 12) gelenkig mit dem Transportmittel (3) verbunden sind, um unabhängig voneinander um die jeweilige Rotationsachse (A1, A2), die parallel zueinander liegen, zu rotieren.

2. Aggregat nach Anspruch 1, **dadurch gekennzeichnet, dass** es einen Stützwagen (7) für den Motorkopf (6) umfasst, der so montiert ist, dass er entlang des Bohrturms (5) in einer Bohrrichtung (D1) gleiten kann, die parallel zum Bohrturm (5) selbst liegt, und dass der Stützwagen eine Bedienungsvorrichtung (21) umfasst, die mit dem Motorkopf (6) verbunden ist, um diesen in Übereinstimmung mit dem Behälter (10) aus und in eine Aufnahmeposition zu bewegen.

3. Aggregat nach Anspruch 2, **dadurch gekennzeichnet, dass** die Bedienungsvorrichtung (21) eine prismatische teleskopartig ausziehbare Führung (22) umfasst, die in eine Verlängerungsrichtung (D2) verlängert werden kann, welche quer zur Bohrrichtung (D1) liegt.

4. Aggregat nach Anspruch 3,

dadurch gekennzeichnet,

dass der Behälter (10) einen Rahmen (17) umfasst, der gleitend auf dem Kippmittel (8) montiert ist, und eine Anzahl von Fächern (18) zum Aufbewahren und Bewegen der Bohrstangen (2) aufweist; jedes Fach (18) ist dabei oben und zumindest an dem Teil, der zum Bohrturm (5) weist, an der Seite offen und bezüglich der anderen Fächer (18) in einer Gleitrichtung (D3), die quer zur Verlängerungs- und zur Bohrrichtung (D2, D1) liegt, hintereinander angeordnet.

5. Aggregat nach Anspruch 4, **dadurch gekennzeichnet,**

dass die Kippmittel (8) eine pneumatische Betätigungsvorrichtung (13) für jede der Stützen (11, 12) umfassen.

Revendications

1. unité mobile de forage (1) comprenant :

- un moyen de transport (3),
- une tour de forage (5) qui est supportée par le moyen de transport (3) et qui est montée de manière à pouvoir tourner autour d'un axe de rotation horizontal,
- un moyen d'inclinaison (8) qui est utilisé pour incliner la tour (5) depuis et vers une position couchée pour le transport,
- une tête de moteur (6) qui est assemblée de manière à coulisser le long de la tour (5), et qui convient pour exécuter un forage au moyen d'un nombre déterminé de tiges de forage (2), et
- un conteneur (10) destiné à stocker et manoeuvrer lesdites tiges de forage (2), qui est associé à la tour de forage (5) et qui est monté sur ledit moyen d'inclinaison (8),

l'unité (1) étant **caractérisée par le fait que** le moyen d'inclinaison (8) comprend un premier support (11) pour la tour de forage (5) et un second support (12) pour le conteneur (10), les premier et second supports (11, 12) étant articulés sur le moyen de transport (3) de manière à pouvoir pivoter indépendamment l'un de l'autre autour des axes de rotation respectifs (A1, A2), lesquels sont parallèles l'un à l'autre.

2. Unité selon la revendication 1, **caractérisée par le fait qu'elle** comprend un chariot de support (7) pour ladite tête de moteur (6) qui est monté de manière à pouvoir coulisser le long de la tour de forage (5) dans une direction de forage (D1) qui est parallèle à la tour de forage (5) proprement dite, et comprenant un moyen de manutention (21) associé à la tête de moteur (6), destiné à déplacer la tête de moteur (6) proprement dite depuis et vers une position de

prélèvement en correspondance avec le conteneur (10).

3. Unité selon la revendication 2, **caractérisée par le fait que** ledit moyen de manutention (21) comprend un guide télescopique prismatique (22) qui peut être allongé dans une direction d'allongement (D2) transversale à ladite direction de forage (D1). 5
4. Unité selon la revendication 3, **caractérisée par le fait que** le conteneur (10) comprend une structure (17) qui est montée de manière coulissante sur ledit moyen d'inclinaison (8), et présentant un certain nombre de compartiments (18) pour stocker et manoeuvrer lesdites tiges de forage (2), chaque compartiment (18) étant ouvert au sommet et latéralement au moins sur la partie qui est tournée vers la tour de forage (5), et étant agencé en série par rapport aux autres compartiments (18) dans une direction de coulissement (D3) qui est transversale auxdites directions (D2, D1) d'allongement et de forage. 10 15 20
5. Unité selon la revendication 4, **caractérisée par le fait que** le moyen d'inclinaison (8) comprend un dispositif d'actionnement pneumatique (13) pour chacun desdits supports (11, 12). 25

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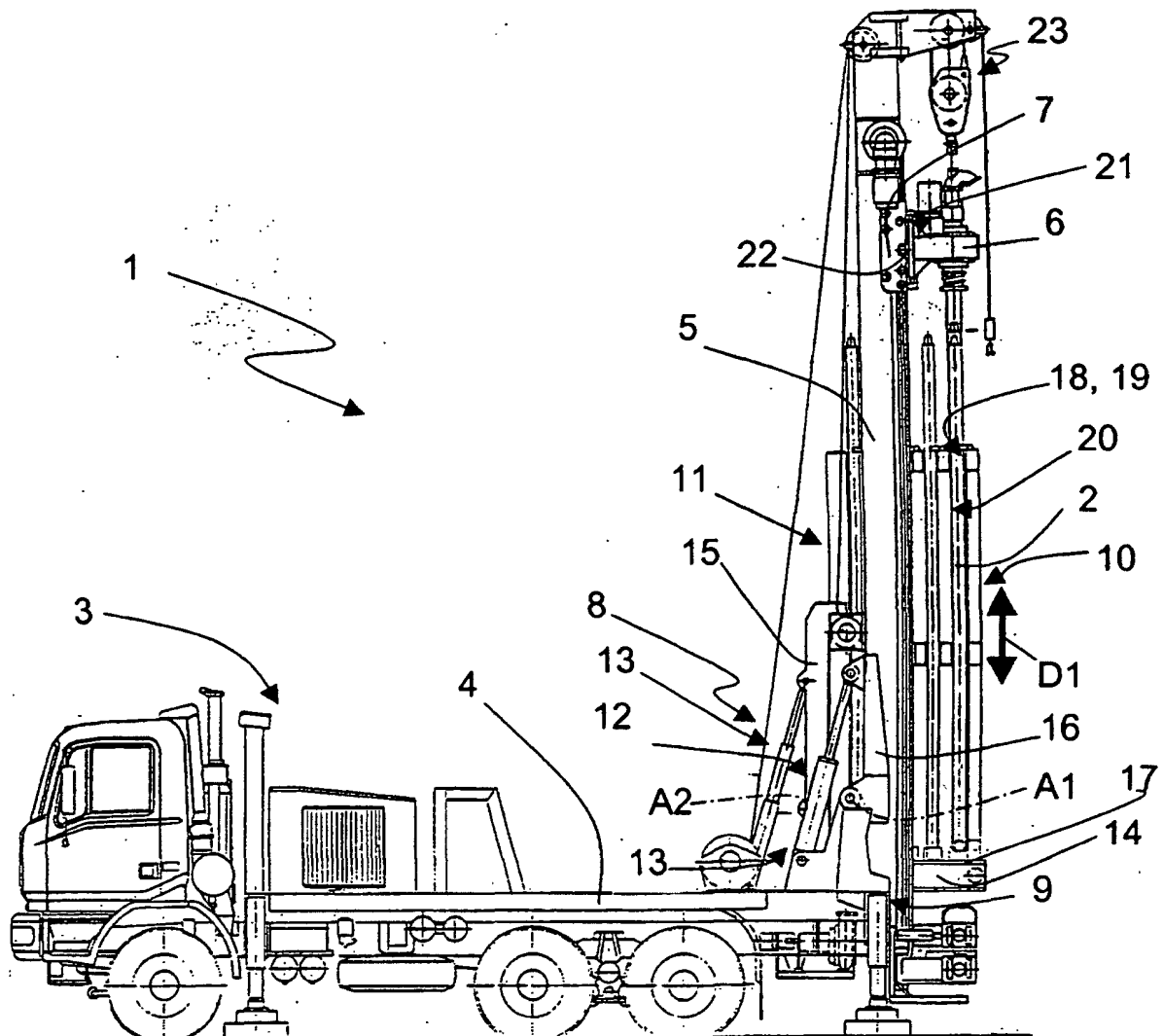


Fig. 1

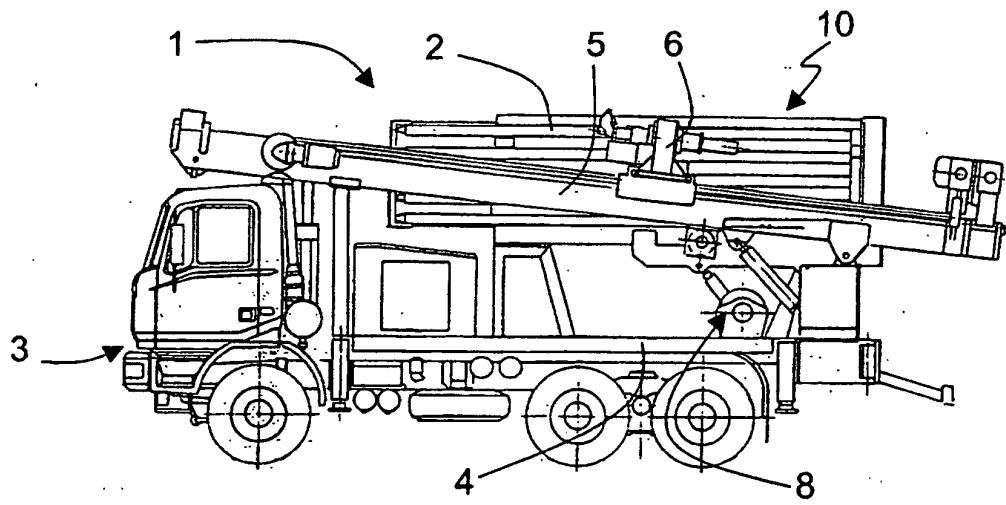


Fig. 2

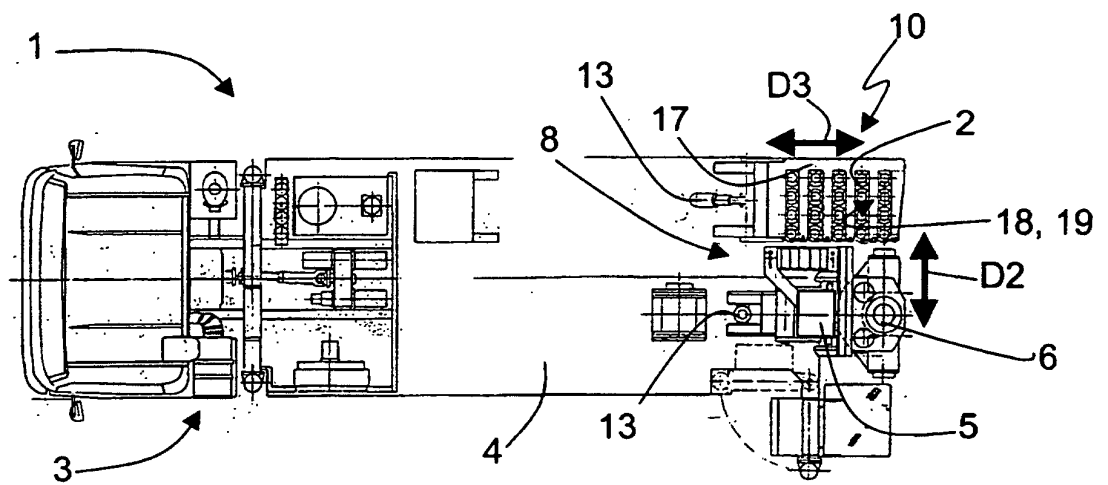


Fig. 3

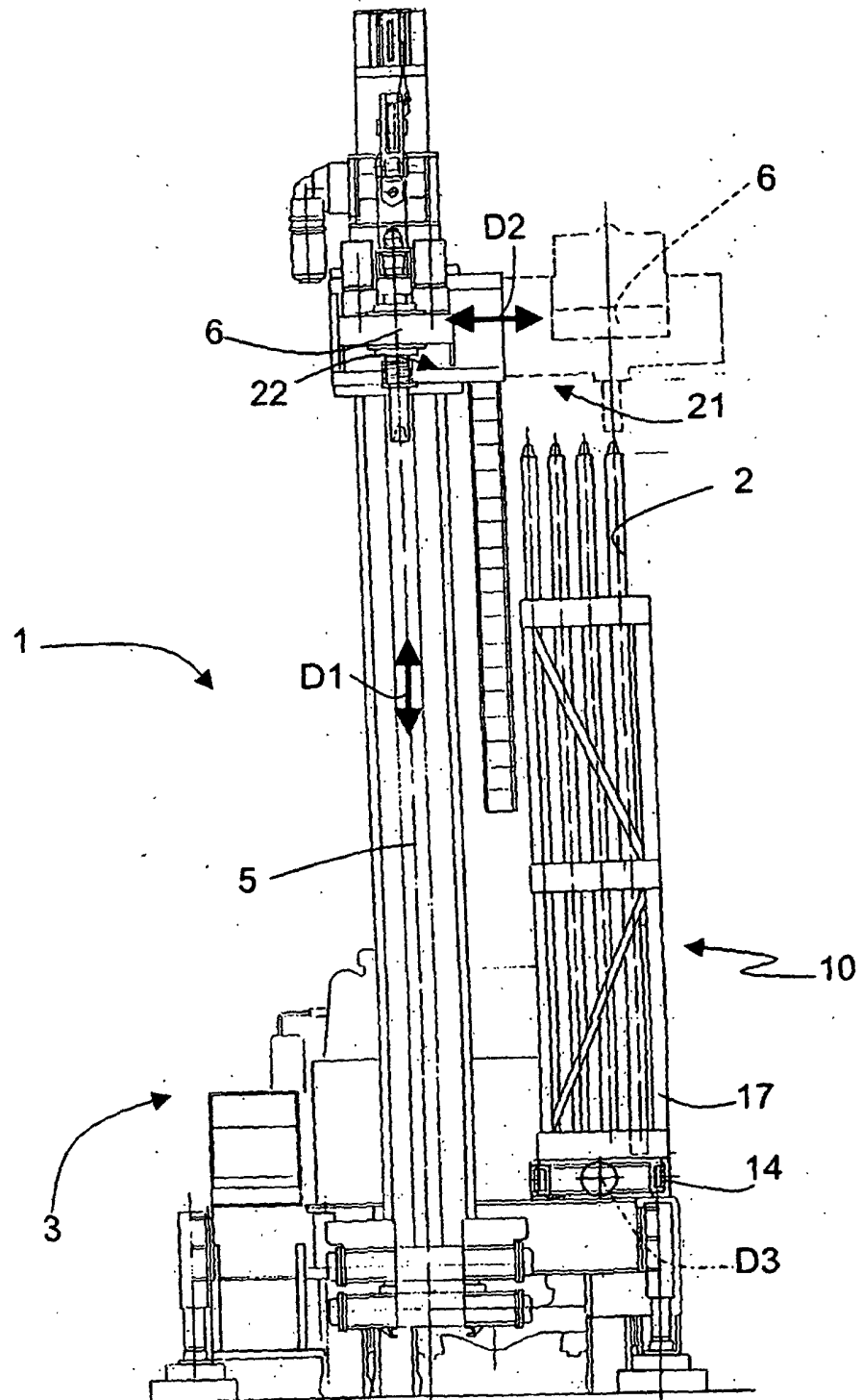


Fig. 4