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None

DESCRIPTION

[0001] The present invention relates to a stroker. The invention relates more particularly to a stroker for use in a borehole in the ground, the stroker at least comprising an actuator arranged for being able to displace a tool in the longitudinal direction of the borehole, and grippers arranged to anchor the stroker to the wall of the borehole, alternatively to a pipe wall.

[0002] The English term stroker is used in the original description as the term is common in the petroleum industry.

[0003] During downhole work operations, especially in so-called deviated wells, it is common practice to connect a wireline tractor to a stroker to enable displacement of the stroker to the work location.

[0004] A stroker is typically four to six meters long, while a wireline tractor is generally about five to seven meters long. The overall length can therefore be up to thirteen meters, which might lead to sluicing problems at the surface valve and complicate downhole operations.

[0005] A further disadvantage with prior art stroker-wireline tractors is that the control system for one of the units must be switched off in order to operate the other. This is because the two machines utilize the same cables in the wireline for power supply and control. It is known that this lack of simultaneous control, due to gravitation and forces from fluid flowing in the borehole, may result in displacement of the wireline tractor during the time span between disconnection of the wireline tractor's control system and the anchoring of the stroker, which might cause failure of the downhole work operation.

[0006] Patent application EP 1640556 discloses a dual tractor drilling system. A drilling drive controls the weight applied to a drill bit during drilling. A conveyance drive moves a drilling assembly through portions of the borehole at a higher speed than achievable by the drilling drive. Patent application EP 1029147 discloses a running tool to be lowered down a tubular member via a wireline. The running tool is capable of advancing itself along a wall of the tubular member by repeated application and release of tension force in the wireline.

[0007] Patent application WO 2008/128543 discloses a hydraulically operated stroker tool.

[0008] It is the object of the present invention to remedy or reduce at least one of the disadvantages with prior art.

[0009] The object is achieved in accordance with the present invention, by the features given in the description below, and in the subsequent claims.

[0010] The invention is defined by the independent patent claims.

[0011] There is provided a stoker for use in a borehole in the ground, the stoker comprising at least an actuator arranged for displacing a tool in the longitudinal direction of the borehole, and grippers arranged to anchor the stoker in the wall of the borehole, alternatively to a pipe wall. The stoker is provided with a propulsive module, said propulsive module comprises driving wheels or driving belts for propulsion. At least the grippers and the propulsive module are controlled by a common control module adapted for simultaneous control of at least the grippers and the propulsive module, and at least the grippers and the propulsive module are provided with power from a common power module, said common power module being positioned in use between a wireline and the common control module

[0012] Providing the stoker with a propulsive module renders the connection to a wireline tractor superfluous, even during operations in deviated wells. This results in a considerably reduced overall length compared to prior art.

[0013] The actuator, grippers and propulsive module can be supplied with hydraulic pressure fluid from a common hydraulic module. The common hydraulic module may be positioned between the actuator and the grippers.

[0014] The actuator, the grippers, and the propulsive means may be separately or collectively electrically driven.

[0015] There is provided a method for operating a stoker, as described above, when an operation is to be carried out by means of the tool at a certain operation position in the borehole, wherein the stoker is driven by the propulsive module to the operation position, the driving wheels are forced to the wall of the borehole during propulsion and after the stoker has stopped at the operation position. The driving wheels are also controlled as the grippers are forced to the wall.

[0016] It is thus well arranged for controlling the different functions, including propulsion, simultaneously from a common control means, power supply and hydraulic module.

[0017] Even if oil-hydraulics is normally used, the actuator, grippers and the propulsive means, might, given the right conditions, separately or collectively be electrically driven.

[0018] The provided stoker solves a long felt problem in relation to overall length and lack of coordination of assembled machines in connection with a wireline. A stoker in accordance with the present invention is considerably more flexible in the work operations than a prior art stoker-wireline tractor.

[0019] In the following is described an example of a preferred embodiment which is illustrated in the enclosed drawings, where:

Fig. 1

shows a schematic view of the stoker in accordance with the present invention, during

displacement in a borehole; and

Fig. 2

shows a schematic view of a lower part of the stoker in fig. 1, the stoker being anchored to the wall of the borehole.

[0020] In the drawings the reference number 1 indicates a stoker located in a borehole 2 in the ground 4. The borehole 2 can, in a way known *per se*, be cased and provided with not shown completion pipes in which the stoker is displaced.

[0021] The stoker 1 comprises an actuator 6 with a bolt- or piston rod, indicated below as an actuator rod 8, being arranged to displace a tool 10 of any known type in the longitudinal direction of the borehole 2.

[0022] The stoker 1 further comprises a hydraulic module 12, a gripper module 14, a propulsive module 16, a control module 18 and a power module 20. The stoker 1 is connected to necessary but not shown utility equipment known *per se*, at the surface by means of a wireline 22 comprising power- and control cables 24.

[0023] The hydraulic module 12, the gripper module 14 with grippers 26, the control module 18 and the power module 20, and also not shown pipes and cables for connection, are designed in a way known *per se* for a stoker, but are extended to comprise the propulsive module 16 as well.

[0024] The propulsive module 16 is designed with a first set of driving wheels 28 and a second set of driving wheels 30 which are mutually rotated 90 degrees about the longitudinal axis 32 of the stoker 1. Each set of driving wheels 28, 30 comprise four driving wheels 34 forced to the wall 36 of a borehole 2 by means of accompanying driving wheel arms 38.

[0025] Two of the driving wheels 34 are arranged on radially opposite side of the propulsive means 16 relatively to the other two driving wheels 34. The first and the second driving module 28, 30 are thereby centering the propulsive means 16 in the borehole 2. Incidentally, the propulsive means 16 is designed in a way known *per se* from the art of wireline tractors.

[0026] When an operation is to be carried out by means of the tool 10 at a certain position in the borehole 2, the stoker 1 is driven by the propulsive module 16 to the operation position. The driving wheels 34 are forced to the wall 36 of the borehole during the propulsion and after the stoker 1 has stopped at the operation position. The driving wheels 34 are also controlled as the grippers 26 of the gripper module 14 are forced to the wall 36 of the borehole. The stoker 1 is thereby prevented from displacement in the borehole 2 as the grippers 26 are forced up.

[0027] In fig. 2 the stoker 1 is anchored to the wall 36 of the borehole by means of the

grippers 26, as the actuator rod 8 displaces the tool 10 during execution of the work.

REFERENCES CITED IN THE DESCRIPTION

Cited references

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Patent documents cited in the description

- [EP1640556A \[0006\]](#)
- [EP1029147A \[0006\]](#)
- [WO2008128543A \[0007\]](#)

Patentkrav

1. Stroker (1) til anvendelse i et borehul (2) i jorden, hvilken stroker (1) mindst omfatter en aktuator (6), der er anbragt til forskydning af et værktøj (10) i en længderetning af borehullet (2), og griberne (26), der er anbragt til forankring af strokeren (1) til en væg (36) i borehullet (2), alternativt til en rørvæg, idet strokeren (1) er forsynet med et fremdrivningsmodul (16), hvilket fremdrivningsmodul (16) omfatter drivhjul (34) eller drivremme til fremdrift,

kendetegnet ved, at mindst griberne (26) og fremdrivningsmodulet (16) styres af et fælles styremodul (18), som er tilpasset til samtidig styring af mindst griberne (26) og fremdrivningsmodulet (16); og

mindst griberne (26) og fremdrivningsmodulet (16) forsynes med støm fra et fælles strømforsyningsmodul (20), idet det fælles strømforsyningsmodul (20) i brug er positioneret mellem et kabel (22) og det fælles styremodul (18)

2. Stroker (1) ifølge krav 1, hvor aktuatoren (6), griberne (26) og fremdrivningsmodulet (16) forsynes med hydraulisk trykfluid fra et fælles hydraulikmodul (12).

3. Stroker (1) ifølge krav 2, hvor det fælles hydraulikmodul (12) er positioneret mellem aktuatoren (6) og griberne (26).

4. Stroker (1) ifølge krav 1, hvor aktuatoren (6), griberne (26) og fremdrivningsmodulet (16) er elektrisk drevet, hver for sig eller samlet.

5. Fremgangsmåde til drift af en stroker (1) ifølge et hvilket som helst af de foregående krav, når der ved hjælp af værktøjet (10) skal udføres en arbejdsgang ved en vis driftsposition i borehullet (2), hvor strokeren (1) drives af fremdrivningsmodulet (16) til driftspositionen, idet drivhjulene (34) under fremdrift og efter, at strokeren (1) er stoppet ved driftspositionen, tvinges til borehullets (2) væg (36), **kendetegnet ved, at** drivhjulene (34) også styres, efterhånden som griberne (26) tvinges til væggen (36).

DRAWINGS

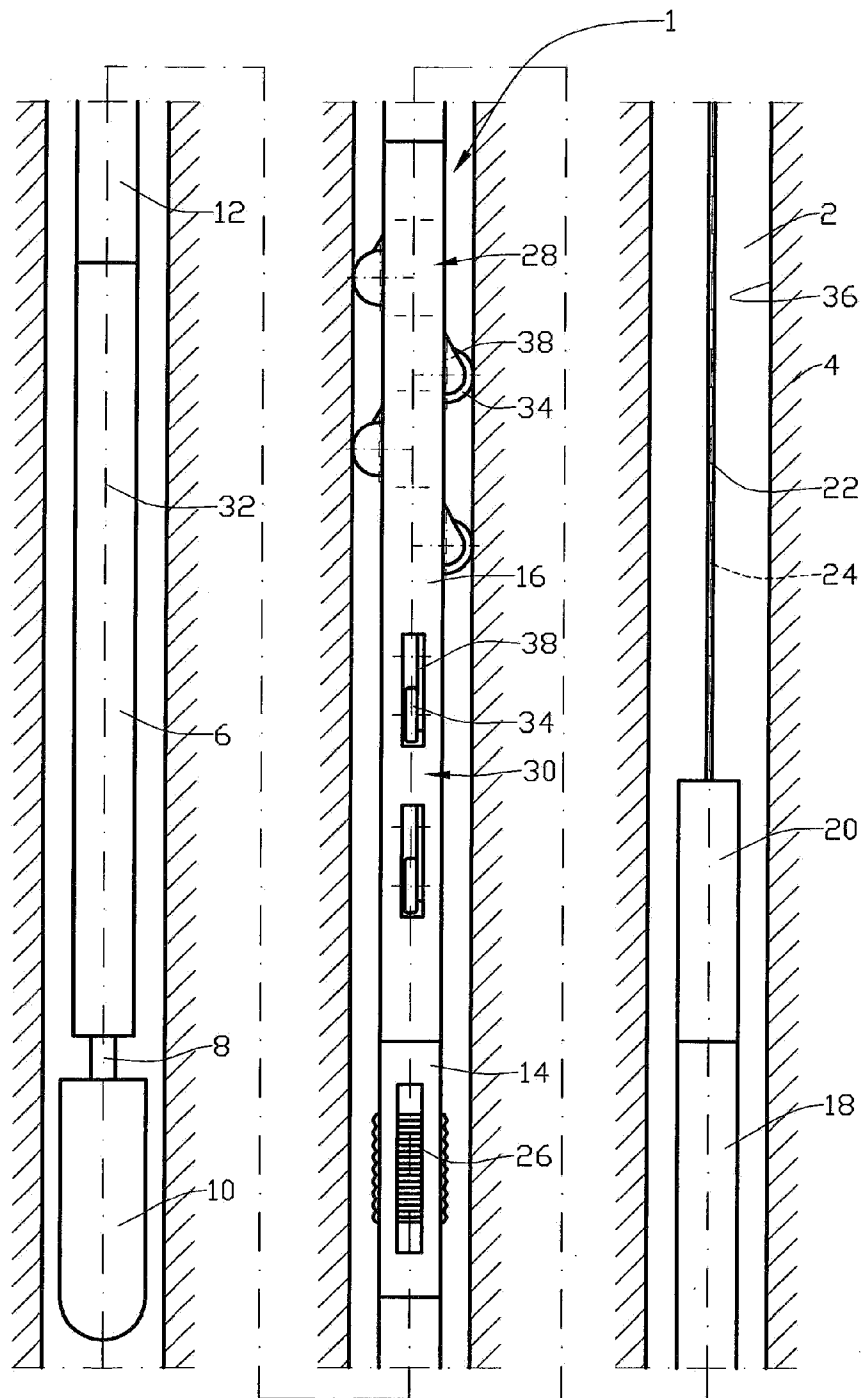


Fig. 1

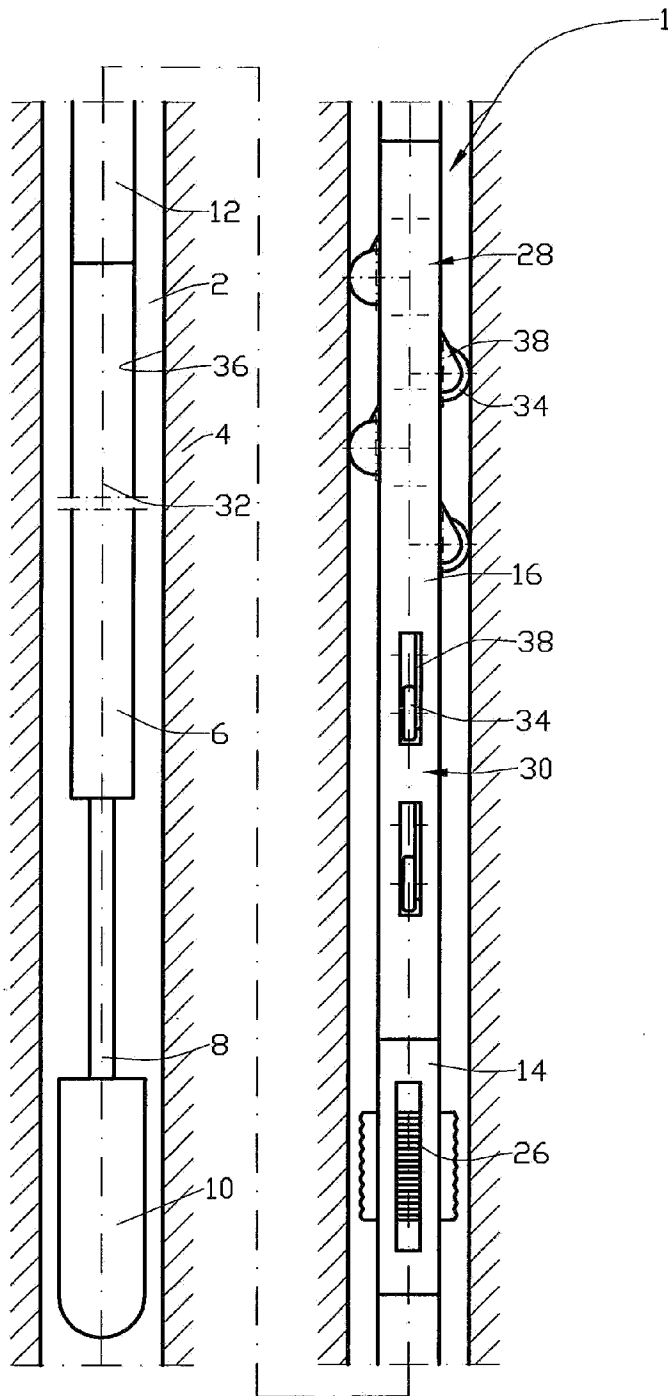


Fig. 2