Title (en)
Directional drilling system with eccentric mounted motor and biaxial sensor.

Title (de)
Richtbohrsystem mit exzentrisch eingebautem Motor und biaxialem Sensor.

Title (fr)
Système de forage dirigé comportant un moteur monté d'une façon excentrique et un capteur biaxial.

Publication
EP 0562147 A1 19930929

Application
EP 92105313 A 19920327

Priority
EP 92105313 A 19920327

Abstract (en)
Apparatus and method for a directional drilling system is disclosed wherein a concrete pit is poured at a reference entry angle in the earth so that a drilling platform cartridge inserted into the concrete pit is set at the desired entry angle. A frame ,including elongated guide ways extending between ends of the platform cartridge, guides a carriage that advances a drill string through the earth at the reference angle. Preferably, a drilling head at the end of the drill sting and the remainder of the drill string are rotated by a drive motor carried on the carriage. A drill bit and drill bit motor are mounted coaxially and eccentric with respect to the drilling head. The center axis of the drill bit and drill bit motor, and the center axis of the rotating drilling head are offset and define a known relationship. The offset relationship between the center axis of the drill bit and drilling head defines an eccentric position in which the drill bit overcuts relative to the outside diameter of the drilling head in an eccentric position. As long as the drilling bit and drilling head rotate simultaneously, movement of the drill string is controlled generally in a straight line. If rotation of the drilling head is stopped, the drill string is steered in the direction of the eccentric position of the drill bit since there is no clearance on the opposing side of the drilling head. With the drill bit and drill string continuously rotating, a slight overcut of approximately one-half inch occurs in the bore. A guidance system for measuring the position of the drilling head is provided by a single axis angular rate sensor which rotates with the drilling head to generate horizontal and vertical angular rates which are integrated to provide the horizontal and vertical position angles of the drilling head as it rotates through the predetermined quadrants over which the angular rates are integrated. An encoded gravity referenced disk is utilized to measure the quadrant positions of the rotating sensor and the eccentric position of the drill bit. An accelerometer is utilized to measure the distance travelled from the drilling platform. By multiplying the distance travelled by the horizontal and vertical position angles, the position of the drilling head is known and deviations from the desired drill direction can be determined. The drilling head can be steered in a desired direction to eliminate the deviation by stopping rotation of the drilling head. Upon eliminating the deviations, simultaneous rotation of the drilling head and drill bit again commence to drill in a straight line. <IMAGE>

IPC 1-7
E21B 7/06; E21B 15/04; E21B 19/08; E21B 47/024

IPC 8 full level
E21B 7/06 (2006.01); E21B 15/04 (2006.01); E21B 19/081 (2006.01); E21B 47/022 (2012.01); E21B 47/024 (2006.01)

CPC (source: EP)
E21B 7/068 (2013.01); E21B 19/081 (2013.01); E21B 47/022 (2013.01); E21B 47/024 (2013.01)

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Designated contracting state (EPC)
DE FR GB IT

DOCDB simple family (publication)
EP 0562147 A1 19930929

DOCDB simple family (application)
EP 92105313 A 19920327