(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : **0 636 763 A3**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **94305423.9**

(51) Int. Cl.[6] : **E21B 47/12**

(22) Date of filing : **22.07.94**

(30) Priority : **26.07.93 US 97570**

(43) Date of publication of application :
01.02.95 Bulletin 95/05

(84) Designated Contracting States :
FR GB NL

(88) Date of deferred publication of search report :
09.08.95 Bulletin 95/32

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(54) Method and apparatus for electric/acoustic telemetry in a well.

(57) A drill collar section (22) of a drill string (16) (i.e. at the downhole end of the drill string) includes an electric transmitter/receiver assembly (26) which communicates with an electric/acoustic repeater assembly (28) which communicates with an acoustic transmitter/ receiver assembly (29) uphole of the drill string by the transmission and receipt of electric and acoustic signals through the drill string. With drill strings that include downhole motors (30) the electric transmitter/receiver assembly may be positioned above or below the motor. Uphole telemetry comprises an electric current induced in the drill string by the downhole electric transmitter (26). The electric current contains encoded information of downhole conditions and travels up the drill string where it is detected at the electric receiver of the electric/acoustic repeater (28). The received signal is processed to drive the acoustic transmitter of the electric/acoustic repeater. An acoustic signal containing the encoded information is induced into the drill string by this acoustic transmitter and permeates up the drill string to the uphole acoustic receiver (29). This received signal is processed and utilized to evaluate and/or optimize the drilling process or to evaluate the earth formations being drilled. Downhole telemetry comprises an acoustic signal induced in drill string (16) by the uphole acoustic transmitter (29). The acoustic signal contains encoded information of uphole commands and travels down the drill string where it is detected at the acoustic receiver of the electric/acoustic repeater (28). The received signal is processed to drive the electric transmitter of the electric/acoustic repeater. An electric signal containing the encoded information is induced in the drill string by this electric transmitter and travels down the drill string to the downhole electric receiver (26). This received signal is processed and utilized to command a downhole processor (i.e., computer).

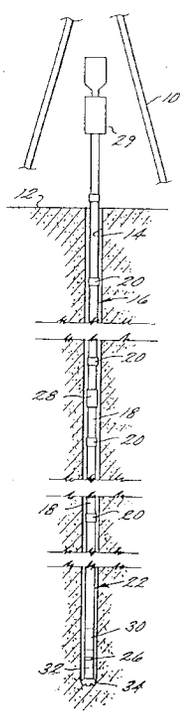

FIG. 4

EP 0 636 763 A3

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EUROPEAN SEARCH REPORT

Application Number
EP 94 30 5423

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.6)
X Y	WO-A-92 18882 (SMITH INTERNATIONAL) * abstract; figures 3-6 * * page 5, last paragraph * * page 27, last paragraph *	1,4,7,10 2,3,6,8, 9,12	E21B47/12
Y	EP-A-0 195 100 (SCHILLING) * abstract *	2,3,8,9	
Y	US-A-3 793 632 (STILL) * abstract; figures 1,2 *	6,12	
A	FR-A-2 617 901 (ALSTHOM) * abstract; figures *	1,2,7,8	
A	WO-A-90 14497 (EASTMAN CHRISTENSEN) * abstract; figures * * page 6, line 7 - page 7, line 23 *	1,2,7,8	
P,X	EP-A-0 553 908 (ANADRILL) * abstract; figures 1,2 * * column 3, line 50 - column 4, line 38 * * column 9, line 47 - column 10, line 6 * * column 10, line 34 - line 53 *	1,4,7,10	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

E21B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	16 June 1995	Weiand, T

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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