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(54) Title: METHOD AND APPARATUS FOR CONTROLLING DOWNHOLE ROTATIONAL RATE OF A DRILLING TOOL

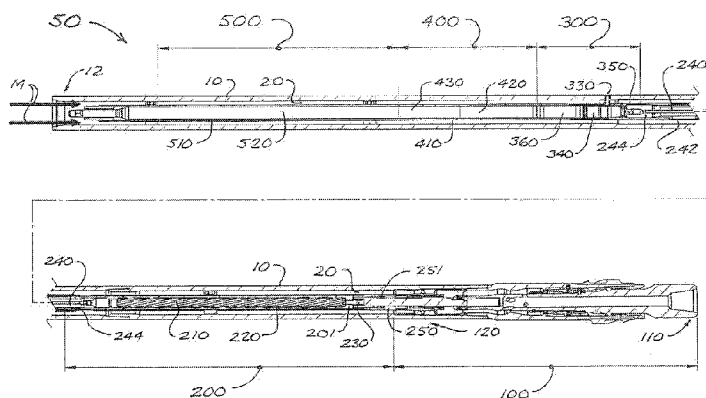


Figure 1

(57) Abstract: A downhole rotational rate control apparatus, adapted for coupling to the lower end of a drill string, includes a progressive cavity (PC) motor, a driveshaft, a mud flow control valve, and an electronics section. Drilling mud flowing downward through the drill string is partially diverted to flow upward through the PC motor and out into the wellbore annulus, with the mud flow rate and, in turn, the PC motor speed being controlled by the mud flow control valve. The control valve is actuated by a control motor in response to inputs from a sensor assembly in the electronics section. The PC motor drives the driveshaft and a controlled downhole device at a specific zero or non-zero rotational rate. By varying the rotational rate of the PC motor relative to the rotational rate of the drill string, the tool face orientation or non-zero rotational speed of the controlled device in either direction can be varied in a controlled manner.



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**A. CLASSIFICATION OF SUBJECT MATTER***E21B 44/00(2006.01)i, E21B 44/02(2006.01)i*

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**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

E21B 44/00; E21B 44/02; E21B 4/00; E21B 4/02; E21B 4/20; E21B 7/06; E21B 7/08

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Korean utility models and applications for utility models since 1975.

Japanese utility models and applications for utility models since 1975.

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) &amp; Keywords: mud motor, progressive cavity motor, sensor, flow control valve

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6176327 B1 (HEARN) 23 January 2001 See column 4 lines 19-23, column 4 line 54 - column 5 line 17, column 5 lines 48-67; figs. 1-3	1-21
A	EP 1106777 A1 (SCHLUMBERGER HOLDINGS LIMITED et al.) 13 June 2001 See paragraphs [0030],[0032]; figs. 9,12	1-21
A	US 2006-0243493 A1 (EL-RAYES et al.) 02 November 2006 See abstract; paragraphs [0035]-[0038]; figs. 1,2	1-21
A	US 7086486 B2 (RAVENSBERGEN et al.) 08 August 2006 See column 5 lines 22-28, column 12 lines 17-33; fig. 1	1-21

 Further documents are listed in the continuation of Box C. See patent family annex.

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Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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