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EUROPEAN PATENT APPLICATION

21 Application number: **89302618.7**

51 Int. Cl.⁴: **E 21 B 7/24**
E 21 B 21/00, E 21 B 4/14,
E 21 B 7/18

22 Date of filing: **16.03.89**

30 Priority: **18.03.88 GB 8806465**

43 Date of publication of application:
20.09.89 Bulletin 89/38

84 Designated Contracting States: **DE FR GB NL**

88 Date of deferred publication of search report:
28.03.90 Bulletin 90/13

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54 **Flow pulsing apparatus for down-hole drilling equipment.**

57 Flow pulsing apparatus is adapted to be connected in a drill string above a drill bit. The apparatus includes a housing providing a passage for a flow of drilling fluid toward the bit. A valve which oscillates in the axial direction of the drill string periodically restricts the flow through the passage to create pulsations in the flow and a cyclical water hammer effect thereby to vibrate the housing and the drill bit during use. Drill bit induced longitudinal vibrations in the drill string can be used to generate the oscillation of the valve along the axis of the drill string to effect the periodic restriction of the flow or, in another form of the invention, a special valve and spring arrangement is used to help produce the desired oscillating action and the desired flow pulsing action.

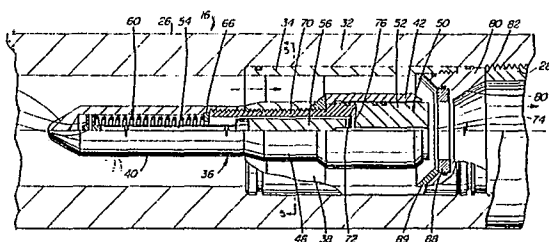


FIG. 4



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. 4)
X	US-A-3 065 805 (L. MARTINI) * Column 2, lines 15-22,43-51,57-64; column 3, lines 5-13; figure 3A *	1-3,5-10	E 21 B 7/24 E 21 B 21/00
Y	---	12-14	E 21 B 4/14 E 21 B 7/18
X	US-A-2 746 721 (T. MOORE) * Column 2, lines 22-59; figure 10 *	1-4,6,8	
A	---	9,10	
X	DE-C-3 323 774 (COMPAGNIE FRANCAISE DES PETROLES) * Column 4, lines 5-54; figure 1 *	1-3,6,8	
A	---	5,13,14	
D,Y	US-A-3 307 641 (J.WIGGINS) * Column 1, lines 64-67 *	12,13	
Y	US-A-3 958 217 (R. SPINNLER) * Column 3, lines 15-17,51-56; figure 2 *	14	
A	US-A-2 713 472 (A. BODINE) * Column 5, lines 3-8,35-56 *	12	TECHNICAL FIELDS SEARCHED (Int. Cl.4) E 21 B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 22-12-1989	Examiner RAMPOLMANN K.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			