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[Continued on next page]

(54) Title: WEAR INDICATORS FOR EXPANDABLE EARTH BORING APPARATUS

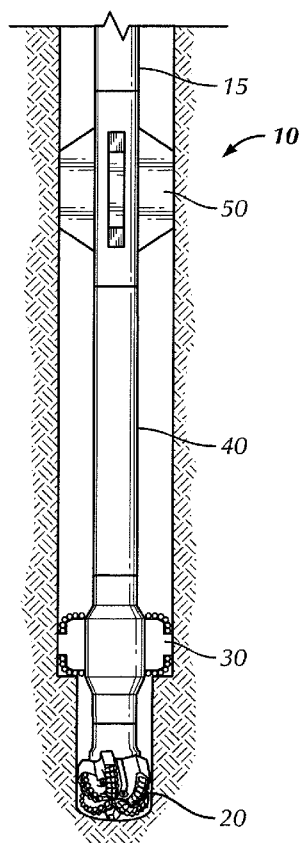


FIG. 1A

(57) Abstract: An expandable underreamer apparatus disposed on a distal end of a drillstring and configured to drill a formation includes a substantially tubular main body adjacent a cutting head, the main body providing at least one axial recess configured to receive an arm assembly, and the arm assembly configured to translate between a retracted position and an extended position. The apparatus further includes a plurality of cutting elements disposed on the arm assembly, and a plurality of wear indicators imbedded in at least one arm assembly and positioned behind the cutting elements with respect to a direction of rotation of the arm assembly, wherein the wear indicators are configured to provide an increased torque to the drillstring upon contacting the formation.





HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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Declarations under Rule 4.17:

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- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/043879**A. CLASSIFICATION OF SUBJECT MATTER****E21B 12/02(2006.01)i, E21B 12/04(2006.01)i, E21B 10/46(2006.01)i**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

E21B 12/02; E21B 10/46; E21B 12/04; E21B 3/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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) & Keywords: "drill", "underreamer", "wear", "indicator"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6167833 B1 (CARAWAY, D. B. et al.) 02 January 2001 See figures 1-4; column 2, line 66 - column 4, line 12.	1-20
A	WO 1999-028590 A1 (AUSTOIL TECHNOLOGY LIMITED) 10 June 1999 See abstract; figures 1-2.	1-20
A	US 4473125 A1 (ADDUDLE, L. S. et al.) 25 September 1984 See figures 3-5; column 3, lines 24-45.	1-20
A	US 4926950 A1 (ZIJSLING, D. H.) 22 May 1990 See column 3, lines 23-44.	1-20



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

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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		AU 1999-16966 A1	27.11.1998
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