

REVISED VERSION

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
10 January 2008 (10.01.2008)

PCT

(10) International Publication Number  
**WO 2008/005495 A1**

(51) International Patent Classification:

*E21B 23/04* (2006.01) *E21B 34/14* (2006.01)  
*E21B 34/10* (2006.01)

(21) International Application Number:

PCT/US2007/015478

(22) International Filing Date: 3 July 2007 (03.07.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

60/818,425 3 July 2006 (03.07.2006) US

(71) Applicant (for all designated States except US): **BJ SERVICES COMPANY** [US/US]; 4601 Westway Park Blvd., Houston, TX 77041 (US).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **ROSS, Richard, J.** [US/US]; 5910 Foresthaven Drive, Houston, TX 77066 (US).

(74) Agent: **LECHTENBERGER, J., Dean**; Howrey LLP, 1111 Louisiana, 25th Floor, Houston, TX 77002 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH,

CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, 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, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

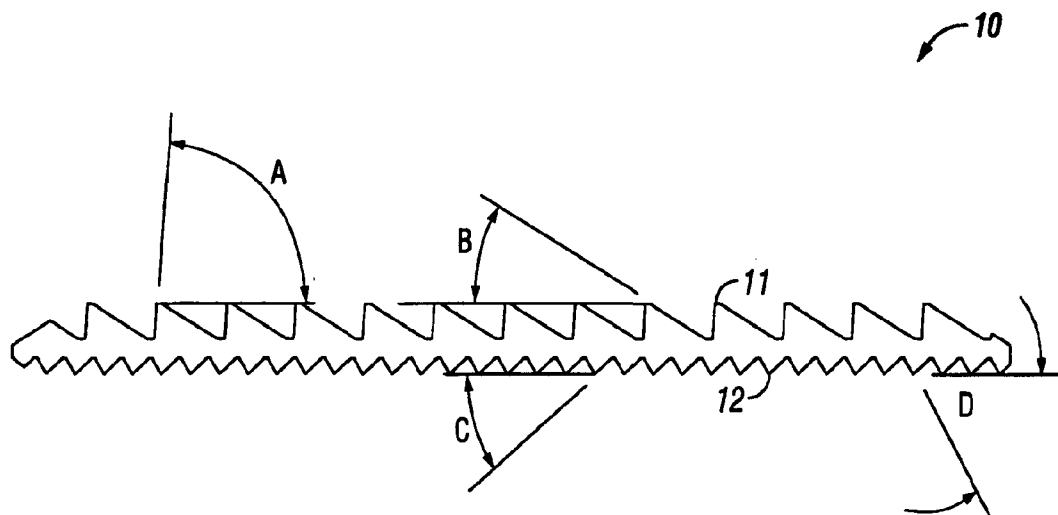
Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the revised international search report: 20 March 2008

[Continued on next page]

(54) Title: STEP RATCHET MECHANISM



(57) Abstract: A step ratchet mechanism that allows for the incremental movement of an assembly that may be adapted to incrementally open or close an adjustable orifice (550). The step ratchet mechanism may be comprised of a modified body lock ring (10) that permits incremental movement along a mandrel (20) in either direction along the mandrel. The step ratchet mechanism may be actuated a designated distance by the application of pressure to the mechanism. The step ratchet mechanism may be ideal for using pressure to drive a downhole multi-position device. The modified body lock ring is adapted to both secure the mechanism at each set position as the mandrel is pumped down as well as allowing the mechanism to ratchet when the mandrel is pumped back.

WO 2008/005495 A1



---

**(15) Information about Correction:**  
see Notice of 20 March 2008