

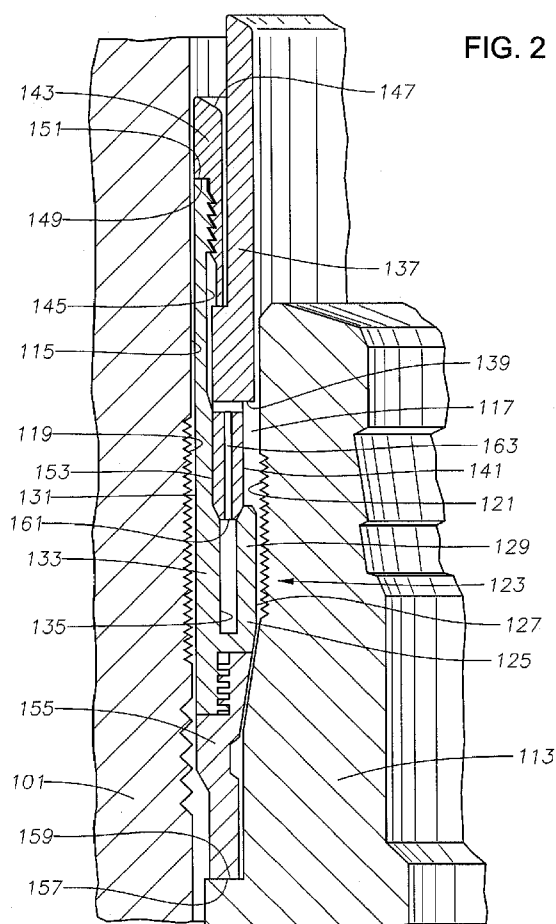


- (51) International Patent Classification:
E21B 33/04 (2006.01) *E21B 33/03* (2006.01)
- (21) International Application Number:
PCT/US2013/064230
- (22) International Filing Date:
10 October 2013 (10.10.2013)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
13/659,499 24 October 2012 (24.10.2012) US
- (71) Applicant: VETCO GRAY INC [US/US]; 4424 West Sam Houston Pkwy, Houston, TX 77041 (US).
- (72) Inventors: GARNER, Detrick, Deyon; 4424 West Sam Houston Parkway North, Westway 2, Houston, TX 77041-8200 (US). YATES, Chad, Eric; 12221 N. Houston Rosslyn Road, P.O. Box 2291, Houston, TX 77092 (US).
- (74) Agents: DOMBROWSKI, Joanna, M. et al.; General Electric Company, Global Patent Operation, 2 Corporate Drive, Suite 648, Shelton, CT 06484 (US).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, 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, IR, IS, JP, KE, KG, 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, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,

[Continued on next page]

(54) Title: HARD STOP ENERGIZING RING

FIG. 2



(57) Abstract: A wellhead seal assembly that forms a metal-to-metal seal between inner and outer wellhead members. A metal seal ring has inner and outer legs separated by a slot. An extension of seal ring contacts an upward facing shoulder of the inner wellhead member. An energizing ring with a tapered nose is moved into the slot. The tapered nose has a downward facing stop shoulder that contacts an upper end of inner leg when the energizing ring is in its lower position.



SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, 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, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

(88) Date of publication of the international search report:

27 November 2014