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(21) International Application Number: PCT/US99/19992 (22) International Filing Date: 31 August 1999 (31.08.99) (30) Priority Data: 60/098,442 31 August 1998 (31.08.98) US (71) Applicant (for all designated States except US): HALLIBURTON ENERGY SERVICES, INC. [US/US]; 2601 Belt Line Road, Carrollton, TX 75006 (US). (72) Inventor; and (75) Inventor/Applicant (for US only): CHEN, Shilin [CN/US]; 15505 Hillcrest Road, #2003, Dallas, TX 75248 (US). (74) Agents: GROOVER, Robert et al.; Groover & Associates, 17000 Preston Road #230, Dallas, TX 75248 (US).		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> (88) Date of publication of the international search report: 8 June 2000 (08.06.00)
(54) Title: ROLLER-CONE BITS, SYSTEMS, DRILLING METHODS, AND DESIGN METHODS WITH OPTIMIZATION OF TOOTH ORIENTATION (57) Abstract A novel and improved roller cone drill bit and method of design are disclosed. A roller cone drill bit (10) for drilling through subterranean formations having an upper connection for attachment to a drill string (12), and a plurality cutting structures (16) rotatably mounted on arms extending downward from the connection. A number of teeth (18) are located in generally concentric rows on each cutting structure (16). The actual trajectory by which the teeth (18) engage the formation is mathematically determined. A straight-line trajectory is calculated based on the actual trajectory. The teeth (18) are positioned in the cutting structures such that each tooth (18) having a designed engagement surface is oriented perpendicular to the calculated straight-line trajectory.		

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