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(21) International Application Number: PCT/US98/12701 (22) International Filing Date: 18 June 1998 (18.06.98) (30) Priority Data: ① 60/068,816 19 December 1997 (19.12.97) US (71) Applicant: EXXON PRODUCTION RESEARCH COMPANY [US/US]; 3120 Buffalo Speedway, P.O. Box 2189, Houston, TX 77252-2189 (US). (72) Inventors: KOO, Jayoung; 10 Gateshead Drive, Bridgewater, NJ 08807 (US); BANGARU, Narasimha-Rao, V.; 5 Revere Court, Annandale, NJ 08807 (US). (74) Agents: CASAMASSIMA, Salvatore, J. et al.; Exxon Pro- duction Research Company, P.O. Box 2189, Houston, TX 77252-2189 (US).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, 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, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, 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, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>
(54) Title: ULTRA-HIGH STRENGTH DUAL PHASE STEELS WITH EXCELLENT CRYOGENIC TEMPERATURE TOUGHNESS		
(57) Abstract		
An ultra-high strength, weldable, low alloy, dual phase steel with excellent cryogenic temperature toughness in the base plate and in the heat affected zone (HAZ) when welded, having a tensile strength greater than 830 MPa (120 Ksi) and a microstructure comprising a ferrite phase (14) and a second phase of predominantly lath martensite and lower bainite (16), is prepared by heating a steel slab comprising iron and specified weight percentages of some or all of the additives, carbon, manganese, nickel, nitrogen, copper, chromium, molybdenum, silicon, niobium, vanadium, titanium, aluminum and boron; reducing the slab to form plate in one or more passes in a temperature range in which austenite recrystallizes; further reducing the plate in one or more passes in a temperature range below the austenite recrystallization temperature and above the Ar₃ transformation temperature; finish rolling the plate between the Ar₃ transformation temperature and the Ar₁ transformation temperature; quenching the finish rolled plate to a suitable Quench Stop Temperature (QST); and stopping the quenching.		