

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
12 March 2009 (12.03.2009)

PCT

(10) International Publication Number
WO 2009/030977 A2

(51) International Patent Classification: **Not classified**

(21) International Application Number:
PCT/IB2007/004350

(22) International Filing Date:
4 September 2007 (04.09.2007)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant (for all designated States except US): **GLR SOLUTIONS, LTD.** [CA/CA]; 1721 27th Avenue N.E., Calgary, Alberta, T2E 7E1 (CA).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **LEE, Douglas, W.** [CA/CA]; 1721 27th Avenue N.E., Calgary, Alberta, T2E 7E1 (CA). **OWENS, Nicholas** [GB/CA]; 1721 27th Avenue N.E., Calgary, Alberta, T2E 7E1 (CA).

(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).

Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- of inventorship (Rule 4.17(iv))

Published:

- without international search report and to be republished upon receipt of that report

(54) Title: A METHOD AND DEVICE FOR CONVERTING HORIZONTAL TANKS INTO GAS FLOTATION SEPARATORS

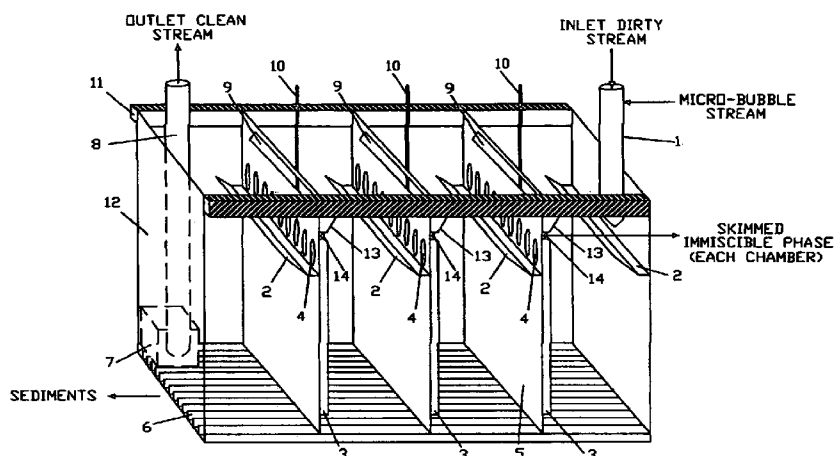


FIG. 1

(57) Abstract: A gas flotation separator for use in horizontal tanks, such as those used for oil storage on board Floating Production Storage and Off-loading (FPSO) vessels, includes dividing the tank into a plurality of chambers operating in series. Prior to entering each chamber, the contaminated aqueous phase is mixed with a stream containing gas bubbles to aid in flocculation and flotation of the immiscible phase contaminant. The gas bubble recycle stream can be generated by injecting a controlled rate of a pressurized gas into a liquid stream of the clean produced water in a process external to the tank or by induction of a gas phase internal to the tank. The mixture flows into the first chamber and impinges on an angled

inlet water weir. A portion of the immiscible phase and the gas phase rises to the top of the chamber while the remaining immiscible contaminants flow downward with the aqueous phase to the bottom of the chamber. The aqueous phase makes a 180° turn upward by entering a plurality of parallel flow conduits formed into the wall of the baffle that separates the each series chamber. In each parallel duct a second gas bubble stream is injected to further aid in flocculation and flotation of the immiscible contaminants. The aqueous phase remixes at the top of the second chamber where it impinges on a second angled weir. This process is repeated in each series chamber until the last chamber where the cleaned water is pumped out of the chamber via a liquid pump. Varying the rate of water removal there from controls the water level in last chamber. The flocculated and floating oil contaminant can be removed by either 1) periodic skimming into an over-flow weir by raising the water level in the chamber, or 2) a continuously rotating paddle or brush object that lifts or carries the floating oil layer away from the water surface and transfers it to a collector system.