



(51) International Patent Classification:
F28D 7/00 (2006.01) *F28D 7/02* (2006.01)

(21) International Application Number:
PCT/US2009/044605

(22) International Filing Date:
20 May 2009 (20.05.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
12/133,917 5 June 2008 (05.06.2008) US

(71) Applicant (for all designated States except US): **LUM-MUS TECHNOLOGY INC.** [—/US]; 1515 Broad Street, Bloomfield, NJ 07003-3096 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **KARRS, Mark, S.** [US/US]; 5 Eugene Circle, Lincoln Park, NJ 07035 (US). **CHUNANGAD, Krishnan, S.** [US/US]; 508 King Place, Landing, NJ 07850 (US). **MASTER, Bashir, I.** [US/US]; 40 Hamilton Avenue, Wayne, NJ 07470 (US).

(74) Agents: **BERGMAN, Jeffrey, S.** et al.; Osha . Liang LLP, 909 Fannin Street, Suite 3500, Houston, TX 77010 (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, 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, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

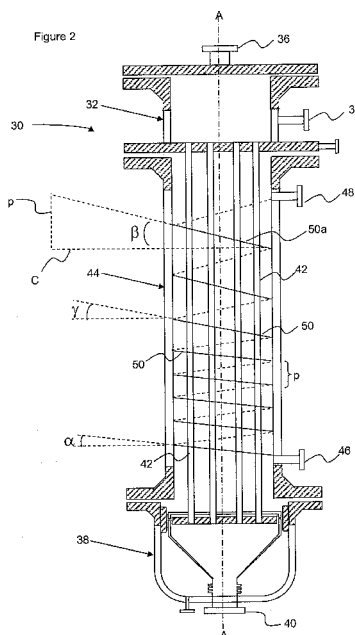
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, 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))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

[Continued on next page]

(54) Title: VERTICAL COMBINED FEED/EFFLUENT HEAT EXCHANGER WITH VARIABLE BAFFLE ANGLE



(57) Abstract: A shell and tube heat exchanger, such as a vertical combined feed / effluent heat exchanger (VCFE), including: a shell having a fluid inlet and a fluid outlet; a plurality of baffles mounted in the shell to guide the fluid into a helical flow pattern through the shell; wherein a helix angle α of a baffle proximate the inlet is different than a helix angle β of a baffle proximate the outlet.

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

11 March 2010

- *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))*