

(43) International Publication Date
26 September 2019 (26.09.2019)



(10) International Publication Number
WO 2019/183176 A1



(51) International Patent Classification:

F28F 9/02 (2006.01) **F16J 15/02 (2006.01)**
F28F 27/00 (2006.01) **F28D 7/16 (2006.01)**

(21) International Application Number:

PCT/US2019/023097

(22) International Filing Date:

20 March 2019 (20.03.2019)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

62/645.662	20 March 2018 (20.03.2018)	US
------------	----------------------------	----

(71) Applicant: LUMMUS TECHNOLOGY INC. [US/US];
1515 Broad Street, Bloomfield, NJ 07003 (US).

(72) **Inventors:** **JIBB, Richard**; 64 Southfield Falls, Monroe, NY 10950 (US). **JAYE, Trevor**; 1447 Chalcedony St.

Apt A., San Diego, CA 92109 (US). **BOEKHOUDER, Henk**; Brechtzijde 41, 272 5NR Zoetermeer (NL). **GROPI, Robert**; 1515 Broad Street, Bloomfield, NJ 07003 (US). **BRIGNONE, Vincenzo, Marco**; Langebrug 2A, 2311TK Leiden (NL). **EBERLY, Randy**; 5005 Saint Andrews Drive, Plainfield, IL 60586 (US). **CREECH, David**; 697 Saint Charles Road, Glen Ellyn, IL 60137 (US). **MEACHAM, Elizabeth**; 267 North Garfield Street, Lombard, IL 60148 (US).

(74) **Agent: CAPELLI, Christopher, J.** et al.; Locke Lord LLP,
P.O. Box 55874, Boston, MA 02205 (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, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME,

(54) Title: HEAT EXCHANGER CLOSURE ASSEMBLIES AND METHODS OF USING AND INSTALLING THE SAME

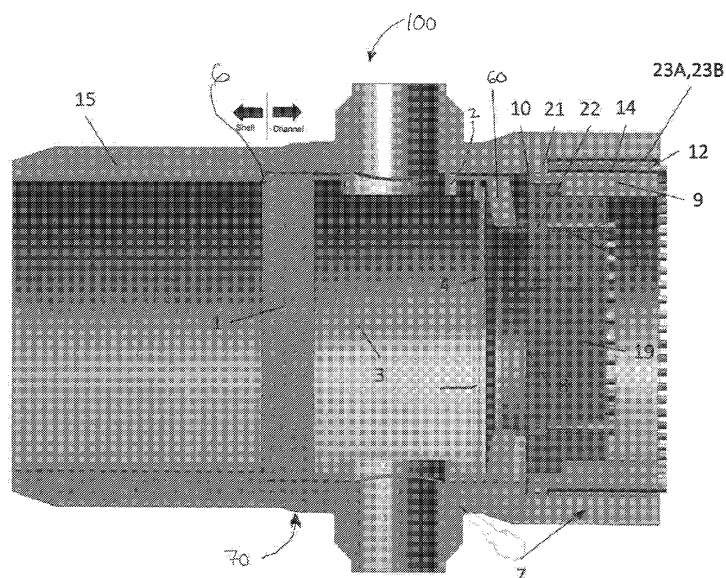


FIGURE 1B

(57) **Abstract:** A heat exchanger assembly including an elongated tubular heat exchanger enclosure defining an interior chamber. A tube sheet is positioned within the interior chamber of the heat exchanger enclosure separating the interior chamber into a shell side and a channel side. The interior portion is configured to removably receive a tube bundle positioned within the shell side of the interior chamber. An annular sleeve member is positioned within the channel side of the interior chamber of the heat exchanger enclosure. An annular elastic torsion member is positioned within the channel side of the interior chamber of the heat exchanger such that the sleeve member is positioned between the tube sheet and the elastic torsion member. The elastic torsion member has an inner circumference deflectable relative to its outer circumference for torsioning the elastic torsion member.

[Continued on next page]

WO 2019/183176 A1

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,
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, ST, 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).

Published:

— with international search report (Art. 21(3))