



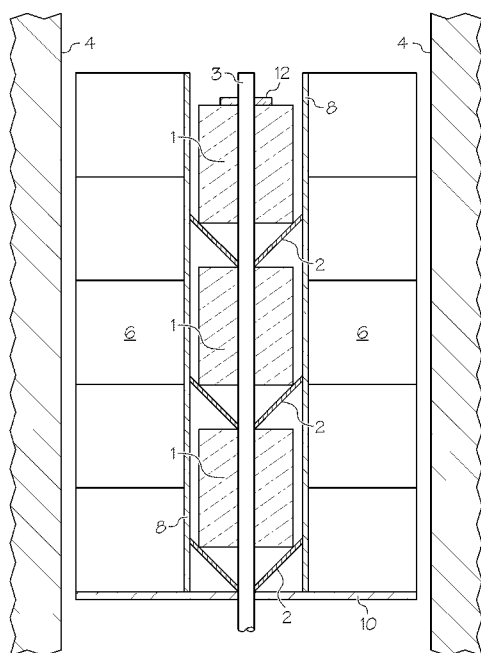
- (51) **International Patent Classification:**  
*F28F 13/00* (2006.01) *B01J 19/00* (2006.01)
- (21) **International Application Number:**  
PCT/US2013/034590
- (22) **International Filing Date:**  
29 March 2013 (29.03.2013)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**  
61/619,497 3 April 2012 (03.04.2012) US
- (71) **Applicant:** CATACEL CORP. [US/US]; 7998 Gotham Road, Garrettsville, OH 44231 (US).
- (72) **Inventors:** WHITTENBERGER, William, A.; 5950 Eagle Creek Road, Leavittsburg, OH 44430 (US). WHITTENBERGER, Joseph, W.; 424 Mill Road, Ravenna, OH 44266 (US). DAVIS, Brain, L.; 5626 Chadwell Circle, Ravenna, OH 44266 (US). RUNDO, James, A.; 11505 Fox Haven Drive, Chesterland, OH 44026 (US).
- (74) **Agents:** CHRISMAN, Gregory, J. et al.; Pearne & Gordon, LLP, 1801 East 9th Street, Suite 1200, Cleveland, OH 44114 (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, 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, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, 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, 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, ML, MR, NE, SN, TD, TG).

**Published:**

- 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))

(54) **Title:** EXPANDING CENTERS FOR STACKABLE STRUCTURAL REACTORS

(57) **Abstract:** Described herein are expandable center arrangements for use in a tubular reactor, such as a reformer, for enhancing heat transfer and reactor efficiency. The expandable center arrangement can include a cone being expandable in the radial direction and an expansion weight for promoting expansion of the cone. The cone and expansion weight can be slidably arranged on a center support. Expansion of the cones in the radial direction forces reactor components radially outward to an outer tube that houses the reactor components and expandable center arrangement. Expansion of reactor components towards the outer tube promotes heat for carrying out catalytic reactions.