



US009409137B1

(12) **United States Patent**
Williams et al.

(10) **Patent No.:** **US 9,409,137 B1**
(45) **Date of Patent:** **Aug. 9, 2016**

- (54) **CATALYST SUPPORT GRID**
- (71) Applicant: **Woven Metal Products, Inc.**, Alvin, TX (US)
- (72) Inventors: **Lawrence L. Williams**, Houston, TX (US); **Gregorio Castillo**, Houston, TX (US)
- (73) Assignee: **Woven Metal Products, Inc.**, Alvin, TX (US)
- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/627,827**
(22) Filed: **Feb. 20, 2015**

- (51) **Int. Cl.**
B01J 8/00 (2006.01)
B01J 8/02 (2006.01)
B01J 19/00 (2006.01)
B01J 19/24 (2006.01)
B01J 19/30 (2006.01)
B01J 19/32 (2006.01)

- (52) **U.S. Cl.**
CPC **B01J 8/008** (2013.01); **B01J 8/0292** (2013.01); **B01J 2208/00884** (2013.01); **B01J 2208/027** (2013.01)

- (58) **Field of Classification Search**
CPC B01J 8/00; B01J 8/008; B01J 8/02; B01J 8/0292; B01J 19/00; B01J 19/24; B01J 19/245; B01J 19/30-19/325; B01J 2208/00796; B01J 2208/00884; B01J 2208/02; B01J 2208/023; B01J 2208/027; B01J 2219/24; B01J 2219/30; B01J 2219/32-2219/32203; B01J 2219/32237; B01J 2219/32282-2219/32289

See application file for complete search history.

- (56) **References Cited**
U.S. PATENT DOCUMENTS
5,449,498 A * 9/1995 Cetinkaya C10G 11/18 208/113
5,779,773 A * 7/1998 Cam B01D 53/0423 55/418
2012/0156111 A1* 6/2012 Ramos B01J 8/008 422/311
2013/0064731 A1* 3/2013 Boyak B01J 8/025 422/239

OTHER PUBLICATIONS
D. Kelling et al., "Improvements to Shift Reactor Operations Based on Computational Fluid Dynamics Modeling", Presentation at the 45th Annual Safety in Ammonia Plants and Related Facilities Symposium Tuscon, Arizona, Sep. 11-14, 2000.

* cited by examiner
Primary Examiner — Natasha Young
(74) *Attorney, Agent, or Firm* — Blank Rome LLP

(57) **ABSTRACT**
A support grid for a chemical reactor fixed bed catalyst. The support grid is formed of (i) a center support cylinder, made in areas of a vertical cylinder, that is assembled within the vessel on the bottom closure head; (ii) a peripheral support skirt located at the outer circumference of the grid, assembled in sections inside the reactor pressure vessel, that sets without welding to bottom closure head of the reactor vessel; (iii) a set of radial support arms that extend from the center support structure to the support skirt to tie these sections into a rigid frame to support the catalyst bed support grid wedges; and (iv) a grid or disc formed of a plurality of catalyst bed support grid wedges or sections that are radial in orientation and are assembled inside the reactor pressure vessel to form a disc that is about 80% of the reactor vessel in outside diameter.

28 Claims, 4 Drawing Sheets

