



US009205386B2

(12) **United States Patent**
Wu

(10) **Patent No.:** **US 9,205,386 B2**
(45) **Date of Patent:** **Dec. 8, 2015**

(54) **GAS INJECTION DEVICE HAVING CHECK VALVE**

USPC 261/76, 77, DIG. 56, DIG. 75
See application file for complete search history.

(71) Applicant: **Chao-Chung Wu, Taichung (TW)**

(56) **References Cited**

(72) Inventor: **Chao-Chung Wu, Taichung (TW)**

U.S. PATENT DOCUMENTS

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 155 days.

4,562,014 A * 12/1985 Johnson B01D 35/06
261/64.1

* cited by examiner

(21) Appl. No.: **14/192,716**

Primary Examiner — Robert A Hopkins

(22) Filed: **Feb. 27, 2014**

(57) **ABSTRACT**

(65) **Prior Publication Data**

US 2015/0238910 A1 Aug. 27, 2015

(51) **Int. Cl.**
B01F 3/04 (2006.01)
F16K 15/00 (2006.01)
C02F 1/78 (2006.01)
B01F 5/04 (2006.01)

A gas injection device is provided. A separation plate is disposed between inlet and outlet ends of a main body. At least one flow hole is disposed around a through hole of the separation plate. Top, middle and bottom sections of a valve body are disposed respectively at the inlet end, through the through hole and at the outlet end. Respective outer diameters of the top and bottom sections are larger than an inner diameter of the through hole, and the largest outer diameter of the bottom section is larger than a smallest inner diameter of the outlet end. A length of the middle section is longer than an axial length of the through hole. An elastic member through the middle section abuts against the separation plate and the bottom section to bias the valve body toward the outlet end and normally unclosure the bottom section.

(52) **U.S. Cl.**
CPC **B01F 3/0446** (2013.01); **B01F 3/04255** (2013.01); **B01F 5/0486** (2013.01); **C02F 1/78** (2013.01); **F16K 15/00** (2013.01); **B01F 2003/04886** (2013.01)

(58) **Field of Classification Search**
CPC B01F 3/04; B01F 3/04099; B01F 3/04255; B01F 3/0446

6 Claims, 5 Drawing Sheets

