



US006811590B2

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

(10) **Patent No.:** US 6,811,590 B2
(45) **Date of Patent:** Nov. 2, 2004

(54) **GAS CONCENTRATING METHOD AND APPARATUS USING PRESSURE SWING ADSORPTION**

(75) Inventors: **Tae Soo Lee**, Gyonggi-do (KR); **Yoon Sun Choi**, Seoul (KR)

(73) Assignee: **Oxus Co., Ltd.**, Seoul (KR)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

5,108,467 A *	4/1992	Schroter et al.	95/103
5,137,549 A *	8/1992	Stanford et al.	95/98
5,183,483 A *	2/1993	Servido et al.	95/98
5,258,056 A *	11/1993	Shirley et al.	95/22
5,711,787 A *	1/1998	Neill et al.	95/96
5,858,063 A *	1/1999	Cao et al.	95/11
5,871,564 A *	2/1999	McCombs	95/98
6,077,331 A *	6/2000	Phillips	95/12
6,514,319 B2 *	2/2003	Keefer et al.	95/101
6,527,830 B1 *	3/2003	Neu et al.	95/98
2002/0029691 A1 *	3/2002	McCombs et al.	95/96
2002/0121193 A1 *	9/2002	Baksh et al.	95/96

FOREIGN PATENT DOCUMENTS

EP 0609620 A1 * 8/1994

* cited by examiner

Primary Examiner—Robert H. Spitzer

(74) *Attorney, Agent, or Firm*—Linjak, Berenato & White, LLC

(21) Appl. No.: **10/411,229**

(22) Filed: **Apr. 11, 2003**

(65) **Prior Publication Data**

US 2003/0192431 A1 Oct. 16, 2003

(30) **Foreign Application Priority Data**

Apr. 12, 2002 (KR) 10-2002-20176

(51) **Int. Cl.**⁷ **B01D 53/047**

(52) **U.S. Cl.** **95/98; 95/105; 95/130; 96/109; 96/115; 96/130**

(58) **Field of Search** 95/98, 100, 103, 95/105, 130; 96/109, 115, 130

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,659,399 A *	5/1972	Kauer et al.	95/19
3,923,477 A *	12/1975	Armond et al.	95/103
4,348,213 A *	9/1982	Armond	95/103
4,349,357 A *	9/1982	Russell	95/26
4,376,640 A *	3/1983	Vo	95/26
4,917,710 A *	4/1990	Haruna et al.	95/102
4,925,461 A *	5/1990	Gemba et al.	95/98

(57) **ABSTRACT**

A gas concentrating method and apparatus is provided in which equalization is accomplished below two sieve beds, to thereby save compression energy, to reduce exit noise, and to obtain a gas whose gas purity with respect to an amount of flow has been enhanced. The gas concentrating method makes two sieve beds communicate with each other at their bottoms when a pressure difference between a pressurized pressure and a decompressed pressure is maximized in the multi-bed type sieve beds which alternately operate between pressurization and decompression, to equalize an internal pressure in the sieve beds. The gas concentrating apparatus includes a compressor (50), sieve beds (60-1, 60-2), solenoid valves (40-1, 40-2), an orifice (90), check valves (90-1, 90-2), a storage tank (100), a pressure controller (70), a flow meter (80), a controller (110), and a muffler (20).

20 Claims, 8 Drawing Sheets

