US009410738B2

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

(10) **Patent No.: US 9,410,738 B2**
(45) **Date of Patent: Aug. 9, 2016**

(54) **METHOD AND APPARATUS FOR PRODUCING CARBON MONOXIDE BY CRYOGENIC DISTILLATION**

(75) Inventors: **Alain Briglia**, Corze (FR); **Arthur Darde**, Paris (FR); **Natacha Haik-Beraud**, Champigny-sur-Marne (FR); **Marie-Khuny Khy**, Shanghai (CN)

(73) Assignee: **L'Air Liquide Société Anonyme Pour L'Étude Et L'Exploitation Des Procedes Georges Claude**, Paris (FR)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1150 days.

(21) Appl. No.: **12/525,349**

(22) PCT Filed: **Jan. 30, 2008**

(86) PCT No.: **PCT/FR2008/050147**

§ 371 (c)(1),
(2), (4) Date: **Oct. 7, 2009**

(87) PCT Pub. No.: **WO2008/099123**

PCT Pub. Date: **Aug. 21, 2008**

(65) **Prior Publication Data**

US 2010/0047150 A1 Feb. 25, 2010

(30) **Foreign Application Priority Data**

Feb. 1, 2007 (FR) 07 53001

(51) **Int. Cl.**
C01B 31/18 (2006.01)
F25J 3/02 (2006.01)

(52) **U.S. Cl.**
CPC ***F25J 3/0223*** (2013.01); ***F25J 3/0252*** (2013.01); ***F25J 3/0257*** (2013.01); ***F25J 3/0261*** (2013.01); *F25J 2205/04* (2013.01); *F25J 2205/30* (2013.01); *F25J 2245/02* (2013.01); *F25J 2280/02* (2013.01)

(58) **Field of Classification Search**
USPC 423/418.2
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,729,954	A *	1/1956	Etienne	62/643
4,478,621	A	10/1984	Fabian	
4,784,677	A *	11/1988	Al-Chalabi	62/656
5,609,040	A *	3/1997	Billy et al.	62/622
5,682,767	A *	11/1997	De Bussy et al.	62/648
2002/0140932	A1*	10/2002	Satou et al.	356/311
2007/0033967	A1*	2/2007	Briglia	62/617

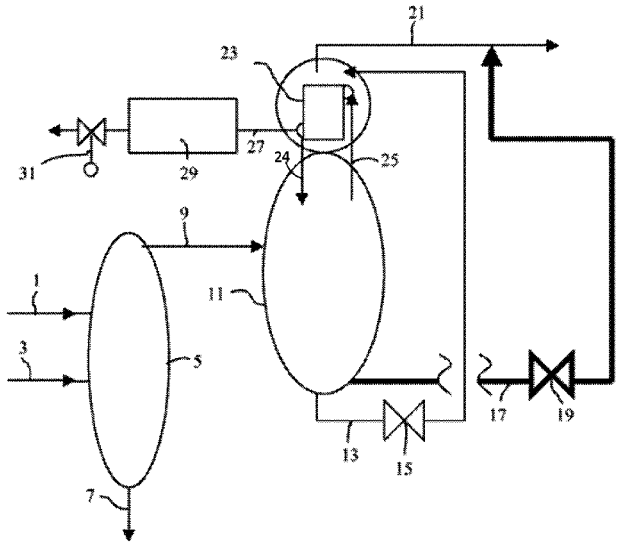
OTHER PUBLICATIONS

Berninger, R., "Fortschritte Bei Der H2/CO-Tieftemperaturzerlegung Progress in H2/CO Low Termperature Separation" Berichte Aus Technik Und Wissenschaft, Linde AG, Unternehmenszentrale, Unternehmenskommunikation, Wie, De, vol. 62, 1988, p. 18-32, XP009045782, Figures 3,6.
Search Report for PCT/FR2008/050147.

* cited by examiner

Primary Examiner — Melvin C Mayes
Assistant Examiner — Kenneth Vaden
(74) *Attorney, Agent, or Firm* — Justin K. Murray

(57) **ABSTRACT**

A method and an apparatus for producing carbon dioxide by cryogenic distillation is provided.

8 Claims, 1 Drawing Sheet