



(12) **United States Patent**  
**Petersen**

(10) **Patent No.:** **US 9,510,608 B2**  
(45) **Date of Patent:** **Dec. 6, 2016**

(54) **METHOD AND APPARATUS FOR MAKING AN AIR-CONTAINING MIXTURE**

(71) Applicant: **Gram Equipment A/S, Vojens (DK)**

(72) Inventor: **Tage Petersen, Vojens (DK)**

(73) Assignee: **Gram Equipment A/S, Vojens (DK)**

(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 355 days.

(21) Appl. No.: **14/062,936**

(22) Filed: **Oct. 25, 2013**

(65) **Prior Publication Data**

US 2014/0106043 A1 Apr. 17, 2014

**Related U.S. Application Data**

(62) Division of application No. 11/887,036, filed as application No. PCT/DK2006/000547 on Oct. 4, 2006, now Pat. No. 8,631,740.

(30) **Foreign Application Priority Data**

Oct. 7, 2005 (DK) ..... 2005-01404

(51) **Int. Cl.**  
*A23L 1/00* (2006.01)  
*A23G 9/20* (2006.01)  
*A23G 9/46* (2006.01)  
*A23P 1/16* (2006.01)

(52) **U.S. Cl.**  
CPC . *A23G 9/20* (2013.01); *A23G 9/46* (2013.01);  
*A23L 1/0097* (2013.01); *A23P 1/16* (2013.01)

(58) **Field of Classification Search**  
CPC ..... A23L 1/0097; A23G 9/46; A23G 9/34  
USPC ..... 426/564, 565, 399, 393; 62/69, 306, 346  
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

1,828,853 A	10/1931	Vogt
2,594,442 A	4/1952	Irwin
3,052,557 A	9/1962	Pierre
3,468,137 A	9/1969	Welty
3,479,835 A	11/1969	Lane
3,928,199 A	12/1975	Kirk
3,959,513 A	5/1976	Strohbach
4,157,017 A	6/1979	Reid
4,271,099 A	6/1981	Kukla
5,394,705 A	3/1995	Torii
5,758,571 A	6/1998	Kateman
6,543,248 B2	4/2003	Cathenaut

FOREIGN PATENT DOCUMENTS

EP	0218253 B1	4/1987
EP	0351476 A1	1/1990
WO	WO92/02146 A1	2/1992
WO	9618310 A1	6/1996
WO	WO2004/089102 A1	10/2004

*Primary Examiner* — Reginald L Alexander

(74) *Attorney, Agent, or Firm* — James Creighton Wray;  
Meera P. Narasimhan

(57) **ABSTRACT**

A new method for making an air-containing mixture introduces air into a viscous mass of raw mixture for forming the air-containing mixture. The introduction of air is performed in connection with introducing the mixture in a treating unit. The raw mixture is pumped under pressure through a nozzle for forming at least one jet which is sprayed through an air space against the surface of the mixture. Air is entrained in the jet of the mixture. The air-entraining jet enters the mixture, forming the air-containing mixture. The air-containing mixture formed thereby is subsequently introduced into the treatment unit.

**14 Claims, 3 Drawing Sheets**