



US009410114B2

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

(10) **Patent No.:** **US 9,410,114 B2**  
(45) **Date of Patent:** **\*Aug. 9, 2016**

(54) **CELL CULTURE METHODS AND DEVICES UTILIZING GAS PERMEABLE MATERIALS**

(2013.01); *C12M 25/06* (2013.01); *C12M 25/14* (2013.01); *C12N 5/00* (2013.01); *C12N 5/0602* (2013.01); *C12N 2500/02* (2013.01)

(71) Applicant: **Wilson Wolf Manufacturing**, New Brighton, MN (US)

(58) **Field of Classification Search**  
CPC ..... *C12M 23/06*; *C12M 23/08*; *C12M 23/24*; *C12M 27/12*; *C12M 25/06*; *C12M 25/14*; *C12N 5/00*; *C12N 5/0602*; *C12N 2500/02*  
See application file for complete search history.

(72) Inventors: **John R. Wilson**, New Brighton, MN (US); **Douglas A. Page**, Eden Prairie, MN (US); **Daniel Welch**, Zimmerman, MN (US); **Alison Robeck**, Monticello, MN (US)

(56) **References Cited**

(73) Assignee: **Wilson Wolf Manufacturing**, New Brighton, MN (US)

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 0 days.

This patent is subject to a terminal disclaimer.

3,459,176 A 8/1969 Leonard  
3,839,155 A 10/1974 McAleer et al.

(Continued)

FOREIGN PATENT DOCUMENTS

(21) Appl. No.: **14/809,484**

CA 2105419 3/1994  
DE 4229334 3/1994

(Continued)

(22) Filed: **Jul. 27, 2015**

OTHER PUBLICATIONS

(65) **Prior Publication Data**

US 2015/0329815 A1 Nov. 19, 2015

English Language Machine Translation of JP734699. Jun. 1995. 8 pages.

(Continued)

**Related U.S. Application Data**

(62) Division of application No. 10/961,814, filed on Oct. 8, 2004.

*Primary Examiner* — William H Beisner

(74) *Attorney, Agent, or Firm* — Patterson Thuent Pedersen, P.A.

(60) Provisional application No. 60/509,651, filed on Oct. 8, 2003.

(57) **ABSTRACT**

(51) **Int. Cl.**

*C12M 3/00* (2006.01)  
*C12M 1/24* (2006.01)  
*C12N 5/00* (2006.01)

(Continued)

Gas permeable devices and methods are disclosed for cell culture, including cell culture devices and methods that contain medium at heights, and certain gas permeable surface area to medium volume ratios. These devices and methods allow improvements in cell culture efficiency and scale up efficiency.

(52) **U.S. Cl.**

CPC ..... *C12M 23/08* (2013.01); *C12M 23/24*

**30 Claims, 16 Drawing Sheets**

