



US009216260B2

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

(10) **Patent No.:** **US 9,216,260 B2**  
(45) **Date of Patent:** **Dec. 22, 2015**

(54) **DOSE COUNTERS FOR INHALERS, INHALERS AND METHODS OF ASSEMBLY THEREOF**

(71) Applicants: **IVAX PHARMACEUTICALS IRELAND**, Utrecht (NL); **NORTON WATERFORD**, Utrecht (NL); **TEVA PHARMACEUTICALS IRELAND**, Utrecht (NL)

(72) Inventors: **Declan Walsh**, Co. Kilkenny (IE); **Derek Fenlon**, Co. Wexford (IE); **Simon Kaar**, Co. Cork (IE); **Jan Geert Hazenberg**, Co. Kilkenny (IE); **Dan Buck**, Co. Waterford (IE); **Paul Clancy**, Waterford (IE); **Robert Charles Uschold**, Leominster, MA (US); **Jeffrey A. Karg**, Hopkinton, MA (US)

(73) Assignees: **IVAX Pharmaceuticals Ireland**, Utrecht (NL); **Norton Waterford**, Utrecht (NL); **Teva Pharmaceuticals Ireland**, Utrecht (NL)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 41 days.

(21) Appl. No.: **14/103,392**

(22) Filed: **Dec. 11, 2013**

(65) **Prior Publication Data**

US 2015/0157813 A1 Jun. 11, 2015

**Related U.S. Application Data**

(62) Division of application No. 13/110,532, filed on May 18, 2011, now Pat. No. 8,978,966.

(60) Provisional application No. 61/345,763, filed on May 18, 2010, provisional application No. 61/417,659, filed on Nov. 29, 2010.

(51) **Int. Cl.**  
**G06M 1/06** (2006.01)  
**A61M 11/00** (2006.01)

(Continued)

(52) **U.S. Cl.**  
CPC ..... **A61M 15/0071** (2014.02); **A61M 11/00** (2013.01); **A61M 15/009** (2013.01);  
(Continued)

(58) **Field of Classification Search**  
USPC ..... 235/103; 128/200.23  
See application file for complete search history.

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

4,174,890 A 11/1979 Johnson  
4,669,838 A 6/1987 Hibbard  
(Continued)

**FOREIGN PATENT DOCUMENTS**

CA 2501726 9/2006  
EP 1330280 11/2004  
(Continued)

**OTHER PUBLICATIONS**

Entire patent prosecution history of U.S. Appl. No. 13/110,532, filed May 18, 2011, entitled, "Dose Counters for Inhalers, Inhalers and Methods of Assembly Thereof."

(Continued)

*Primary Examiner* — Daniel Hess

(74) *Attorney, Agent, or Firm* — RatnerPrestia

(57) **ABSTRACT**

A manually operated metered dose inhaler includes a dose counter chamber including a dose display tape driven by a ratchet wheel which is driven in turn by an actuator pawl actuated by movement of a canister, the tape unwinding from a stock bobbin during use of the inhaler, a rotation regulator being provided for the stock bobbin and including a wavelike engagement surface with concavities which engage against control elements in the form of protrusions on resilient forks of a split pin thereby permitting incremental unwinding of the stock bobbin yet resisting excessive rotation if the inhaler is dropped onto a hard surface.

**20 Claims, 17 Drawing Sheets**

