



US009526844B2

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

(10) **Patent No.:** **US 9,526,844 B2**  
(45) **Date of Patent:** **\*Dec. 27, 2016**

- (54) **PEN-TYPE INJECTOR**
- (71) Applicant: **SANOFI-AVENTIS DEUTSCHLAND GMBH**, Frankfurt am Main (DE)
- (72) Inventors: **Robert Frederick Veasey**, Warwickshire (GB); **Robert Perkins**, Warwickshire (GB); **David Aubrey Plumtre**, Worcestershire (GB)
- (73) Assignee: **SANOFI-AVENTIS DEUTSCHLAND GMBH**, Frankfurt am Main (DE)
- (\* ) 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.
- (21) Appl. No.: **15/156,616**
- (22) Filed: **May 17, 2016**

(65) **Prior Publication Data**  
US 2016/0256633 A1 Sep. 8, 2016

**Related U.S. Application Data**  
(60) Continuation of application No. 14/946,203, filed on Nov. 19, 2015, now Pat. No. 9,408,979, which is a (Continued)

(30) **Foreign Application Priority Data**  
Mar. 3, 2003 (GB) ..... 0304822.0

(51) **Int. Cl.**  
**A61M 5/315** (2006.01)  
**A61M 5/24** (2006.01)  
(Continued)

(52) **U.S. Cl.**  
CPC ..... **A61M 5/31551** (2013.01); **A61M 5/24** (2013.01); **A61M 5/3157** (2013.01);  
(Continued)

(58) **Field of Classification Search**  
CPC ..... A61M 5/31551; A61M 5/31533; A61M 5/31535; A61M 5/31536; A61M 5/31541; A61M 5/31546; A61M 5/31585; A61M 2005/2407; A61M 2205/581; A61M 2205/582  
(Continued)

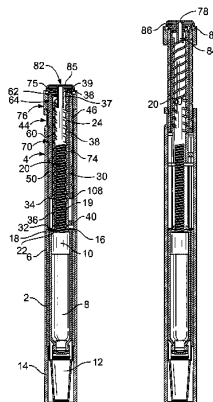
(56) **References Cited**  
**U.S. PATENT DOCUMENTS**  
533,575 A 2/1895 Wilkens  
2,717,597 A 9/1955 Hein, Jr.  
(Continued)  
**FOREIGN PATENT DOCUMENTS**  
DE 3609555 9/1987  
EP 0673482 4/1998  
(Continued)

**OTHER PUBLICATIONS**  
Reissue U.S. Appl. No. 10/442,855, "Injection Syringe", filed May 21, 2003.  
(Continued)

*Primary Examiner* — Manuel Mendez  
(74) *Attorney, Agent, or Firm* — McDonnell Boehnen Hulbert & Berghoff LLP

(57) **ABSTRACT**  
The present invention relates to injectors, such as pen-type injectors, that provide for administration of medicinal products from a multidose-cartridge and permit a user to set the delivery dose. The injector may include a housing, a piston rod adapted to operate through the housing, a dose dial sleeve located between the housing and the piston rod, and a drive sleeve located between the dose dial sleeve and the piston rod. The dose dial sleeve may have a helical thread of first lead and the drive sleeve may have a helical groove of second lead. The first lead of the helical thread and the second lead of the helical groove may be the same.

**30 Claims, 7 Drawing Sheets**



**Related U.S. Application Data**

continuation of application No. 14/635,573, filed on Mar. 2, 2015, now Pat. No. 9,233,211, which is a continuation of application No. 13/919,251, filed on Jun. 17, 2013, now Pat. No. 9,011,391, which is a division of application No. 13/040,198, filed on Mar. 3, 2011, now Pat. No. 8,512,297, which is a continuation of application No. 11/483,546, filed on Jul. 11, 2006, now Pat. No. 7,918,833, which is a continuation of application No. 10/790,225, filed on Mar. 2, 2004, now abandoned.

- (51) **Int. Cl.**  
*A61M 5/32* (2006.01)  
*A61M 5/31* (2006.01)
- (52) **U.S. Cl.**  
 CPC .... *A61M 5/31528* (2013.01); *A61M 5/31533* (2013.01); *A61M 5/31535* (2013.01); *A61M 5/31536* (2013.01); *A61M 5/31541* (2013.01); *A61M 5/31546* (2013.01); *A61M 5/31563* (2013.01); *A61M 5/31568* (2013.01); *A61M 5/31585* (2013.01); *A61M 5/31593* (2013.01); *A61M 5/32* (2013.01); *A61M 5/3156* (2013.01); *A61M 5/31565* (2013.01); *A61M 5/31575* (2013.01); *A61M 5/31578* (2013.01); *A61M 2005/2407* (2013.01); *A61M 2005/3126* (2013.01); *A61M 2205/581* (2013.01); *A61M 2205/582* (2013.01)
- (58) **Field of Classification Search**  
 USPC ..... 604/208–211, 68; 128/DIG. 12, DIG. 13  
 See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,722,931 A 11/1955 May  
 3,815,785 A 6/1974 Gilmont  
 4,470,317 A 9/1984 Sabloewski et al.  
 4,498,904 A 2/1985 Turner et al.  
 4,568,335 A 2/1986 Updike et al.  
 4,585,439 A 4/1986 Michel  
 4,592,745 A 6/1986 Rex et al.  
 4,833,379 A 5/1989 Kaibel et al.  
 4,863,072 A 9/1989 Perler  
 4,865,591 A 9/1989 Sams  
 4,883,472 A 11/1989 Michel  
 4,919,596 A 4/1990 Slate et al.  
 4,936,833 A 6/1990 Sams  
 4,973,318 A 11/1990 Holm et al.  
 4,994,033 A 2/1991 Shockey et al.  
 5,030,209 A 7/1991 Wanderer et al.  
 5,112,317 A 5/1992 Michel  
 5,207,752 A 5/1993 Sorenson et al.  
 5,226,895 A 7/1993 Harris  
 5,246,417 A 9/1993 Haak et al.  
 5,257,987 A 11/1993 Athayde et al.  
 5,271,527 A 12/1993 Haber et al.  
 5,279,585 A 1/1994 Balkwill  
 5,279,586 A 1/1994 Balkwill  
 5,281,198 A 1/1994 Haber et al.  
 5,304,152 A 4/1994 Sams  
 5,308,340 A 5/1994 Harris  
 5,314,412 A 5/1994 Rex  
 5,318,540 A 6/1994 Athayde et al.  
 5,320,609 A 6/1994 Haber et al.  
 5,328,486 A 7/1994 Woodruff  
 5,331,954 A 7/1994 Rex et al.  
 5,370,629 A 12/1994 Michel et al.  
 5,383,865 A 1/1995 Michel  
 5,440,976 A 8/1995 Giuliano et al.  
 5,445,606 A 8/1995 Haak et al.

5,447,150 A 9/1995 Bacon  
 5,478,316 A 12/1995 Bitdinger et al.  
 5,480,387 A 1/1996 Gabriel et al.  
 5,492,534 A 2/1996 Athayde et al.  
 5,505,704 A 4/1996 Pawelka et al.  
 5,546,932 A 8/1996 Galli  
 5,547,131 A 8/1996 Brace  
 5,549,575 A 8/1996 Giambattista et al.  
 5,582,598 A 12/1996 Chanoch  
 5,584,815 A 12/1996 Pawelka et al.  
 5,591,136 A 1/1997 Gabriel  
 5,599,314 A 2/1997 Neill  
 5,611,783 A 3/1997 Mikkelsen  
 5,626,566 A 5/1997 Petersen et al.  
 5,645,052 A 7/1997 Kersey  
 5,674,204 A 10/1997 Chanoch  
 5,681,285 A 10/1997 Ford et al.  
 5,688,251 A 11/1997 Chanoch  
 5,709,662 A 1/1998 Olive et al.  
 5,716,990 A 2/1998 Bagshawe et al.  
 5,728,075 A 3/1998 Levander  
 5,743,889 A 4/1998 Sams  
 5,755,692 A 5/1998 Manicom  
 5,823,998 A 10/1998 Yamagata  
 5,843,036 A 12/1998 Olive et al.  
 5,882,718 A 3/1999 Pommer et al.  
 5,898,028 A 4/1999 Jensen et al.  
 5,921,966 A 7/1999 Bendek et al.  
 5,928,201 A 7/1999 Poulsen et al.  
 5,947,934 A 9/1999 Hansen et al.  
 5,951,530 A 9/1999 Steengaard et al.  
 5,954,689 A 9/1999 Poulsen  
 5,957,896 A 9/1999 Bendek et al.  
 5,961,495 A 10/1999 Walters et al.  
 5,961,496 A 10/1999 Nielsen et al.  
 5,980,491 A 11/1999 Hansen  
 5,984,900 A 11/1999 Mikkelsen  
 6,001,089 A 12/1999 Burroughs et al.  
 6,003,736 A 12/1999 Ljunggren  
 6,004,297 A 12/1999 Steinfeldt-Jensen et al.  
 6,010,485 A 1/2000 Buch-Rasmussen et al.  
 6,033,376 A 3/2000 Rockley  
 6,033,377 A 3/2000 Rasmussen et al.  
 6,059,755 A 5/2000 Michel  
 6,074,372 A 6/2000 Hansen  
 6,083,197 A 7/2000 Umbaugh  
 6,110,149 A 8/2000 Klitgaard et al.  
 6,129,080 A 10/2000 Pitcher et al.  
 6,146,361 A 11/2000 DiBiasi et al.  
 6,193,698 B1 2/2001 Kirchhofer et al.  
 6,221,046 B1 4/2001 Burroughs et al.  
 6,221,053 B1 4/2001 Walters et al.  
 6,231,540 B1 5/2001 Smedegaard  
 6,235,004 B1 5/2001 Steinfeldt-Jensen et al.  
 6,248,090 B1 6/2001 Jensen et al.  
 6,248,095 B1 6/2001 Giambattista et al.  
 6,258,062 B1 7/2001 Thielen et al.  
 6,269,340 B1 7/2001 Ford et al.  
 6,277,097 B1 8/2001 Mikkelsen et al.  
 6,277,098 B1 8/2001 Klitmose et al.  
 6,277,099 B1 8/2001 Strowe et al.  
 6,277,101 B1 8/2001 Kirchhofer et al.  
 6,281,225 B1 8/2001 Hearst et al.  
 6,283,941 B1 9/2001 Schoenfeld et al.  
 6,287,283 B1 9/2001 Ljunggreen et al.  
 6,302,869 B1 10/2001 Klitgaard  
 6,312,413 B1 11/2001 Jensen et al.  
 6,340,357 B1 1/2002 Poulsen et al.  
 6,383,167 B2 5/2002 Kirchhofer et al.  
 6,514,230 B1 2/2003 Munk et al.  
 6,547,763 B2 4/2003 Steinfeldt-Jensen et al.  
 6,547,764 B2 4/2003 Larsen et al.  
 6,562,011 B1 5/2003 Buch-Rasmussen et al.  
 6,569,126 B1 5/2003 Poulsen et al.  
 6,582,404 B1 6/2003 Klitgaard et al.  
 6,605,067 B1 8/2003 Larsen  
 6,613,019 B2 9/2003 Munk  
 6,663,602 B2 12/2003 Moller  
 6,692,472 B2 2/2004 Hansen et al.

(56)

References Cited

U.S. PATENT DOCUMENTS

6,716,198 B2 4/2004 Larsen  
 6,726,661 B2 4/2004 Munk et al.  
 6,770,288 B2 8/2004 Duirs  
 6,796,970 B1 9/2004 Klitnose et al.  
 6,893,415 B2 5/2005 Madsen et al.  
 6,899,698 B2 5/2005 Sams  
 6,899,699 B2 5/2005 Enggaard  
 6,936,032 B1 8/2005 Bush, Jr. et al.  
 6,945,961 B2 9/2005 Miller et al.  
 7,008,399 B2 3/2006 Larsen et al.  
 7,090,662 B2 8/2006 Wimpenny et al.  
 7,094,221 B2 8/2006 Veasey et al.  
 7,104,972 B2 9/2006 Moller et al.  
 7,133,329 B2 11/2006 Skyggebjerg et al.  
 7,175,055 B2 2/2007 Hansen et al.  
 7,195,616 B2 3/2007 Diller et al.  
 7,241,278 B2 7/2007 Moller  
 7,361,161 B2 4/2008 Bainton  
 7,771,400 B2 8/2010 Nielsen  
 7,905,867 B2 3/2011 Veasey et al.  
 7,918,833 B2\* 4/2011 Veasey ..... A61M 5/31546  
 604/209  
 7,935,088 B2 5/2011 Veasey et al.  
 8,021,345 B2 9/2011 Veasey et al.  
 8,512,297 B2 8/2013 Veasey et al.  
 8,608,709 B2 12/2013 Moller et al.  
 8,679,069 B2 3/2014 Veasey et al.  
 9,233,211 B2 1/2016 Veasey et al.  
 2001/0034507 A1 10/2001 Kirchhofer et al.  
 2002/0052578 A1 5/2002 Moller  
 2002/0077852 A1 6/2002 Ford et al.  
 2002/0120235 A1 8/2002 Enggaard  
 2002/0165499 A1 11/2002 Slate et al.  
 2003/0039679 A1 2/2003 Duirs  
 2003/0050609 A1 3/2003 Sams  
 2003/0172924 A1 9/2003 Staniforth et al.  
 2004/0059299 A1 3/2004 Moller et al.  
 2004/0186431 A1 9/2004 Graf et al.  
 2004/0210199 A1 10/2004 Atterbury et al.  
 2004/0236282 A1 11/2004 Braithwaite  
 2004/0249348 A1 12/2004 Wimpenny et al.  
 2004/0260247 A1 12/2004 Veasey et al.  
 2004/0267207 A1 12/2004 Veasey et al.  
 2004/0267208 A1 12/2004 Veasey et al.  
 2005/0004529 A1 1/2005 Veasey et al.  
 2005/0019400 A1 1/2005 Deveney et al.  
 2005/0033244 A1 2/2005 Veasey et al.

2005/0055011 A1 3/2005 Enggaard  
 2005/0113765 A1 5/2005 Veasey et al.  
 2005/0205083 A1 9/2005 Staniforth et al.  
 2005/0209570 A1 9/2005 Moller  
 2005/0268915 A1 12/2005 Wassenaar et al.  
 2007/0123829 A1 5/2007 Atterbury et al.  
 2009/0275916 A1 11/2009 Harms et al.  
 2010/0042054 A1 2/2010 Elahi et al.  
 2012/0053528 A1 3/2012 Bollenbach et al.

FOREIGN PATENT DOCUMENTS

EP 0937471 8/1999  
 EP 0937476 8/1999  
 EP 0937477 A2 8/1999  
 EP 1294418 7/2005  
 EP 1855743 B1 12/2008  
 FR 2583291 12/1986  
 FR 2767479 2/1999  
 JP 05-337179 12/1993  
 JP 06-296691 10/1994  
 RU 2111019 5/1998  
 WO 90/09202 8/1990  
 WO 91/10460 7/1991  
 WO 91/14467 10/1991  
 WO 96/25965 A1 8/1996  
 WO 96/26754 9/1996  
 WO 98/57688 12/1998  
 WO 99/16487 4/1999  
 WO 99/38554 8/1999  
 WO 01/10484 7/2000  
 WO 01/10484 A1 2/2001  
 WO 02/053214 A1 7/2002  
 WO 02/092153 A2 11/2002  
 WO 03/080160 A1 10/2003  
 WO 2011/051366 A2 5/2011

OTHER PUBLICATIONS

Reissue U.S. Appl. No. 10/960,900, "Injection Syringe", filed Oct. 7, 2004.  
 Reissue U.S. Appl. No. 11/121,331, "Injection Syringe", filed May 3, 2005.  
 Reissue U.S. Appl. No. 11/640,610, "Injection Syringe", filed Dec. 18, 2006.  
 First Office Action on merits mailed Mar. 14, 2006 in U.S. Appl. No. 10/790,866 (11 pages).

\* cited by examiner

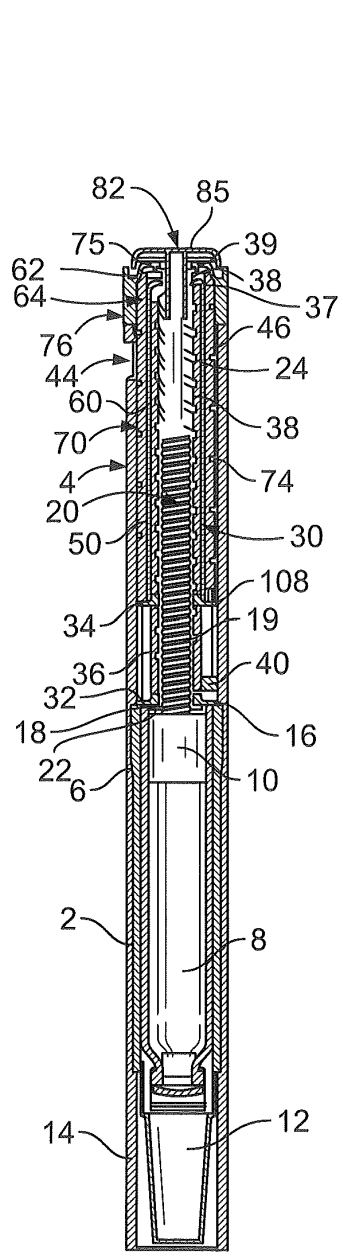


FIG. 1

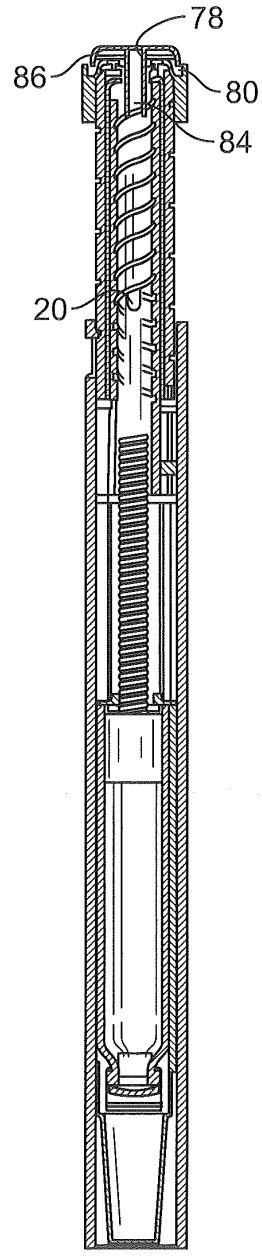


FIG. 2

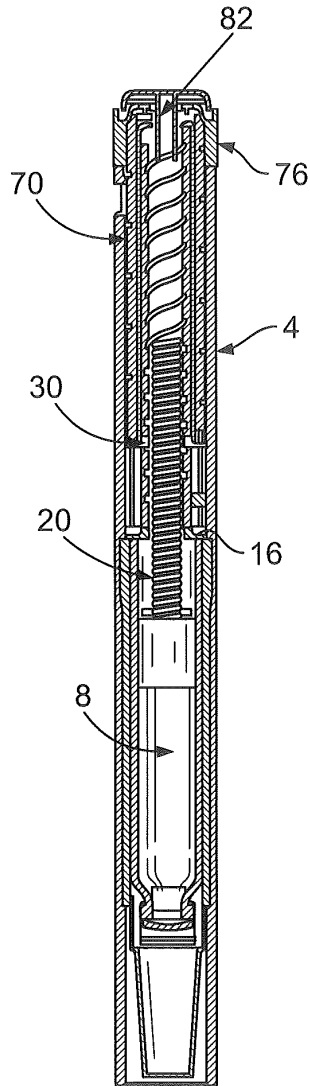


FIG. 3

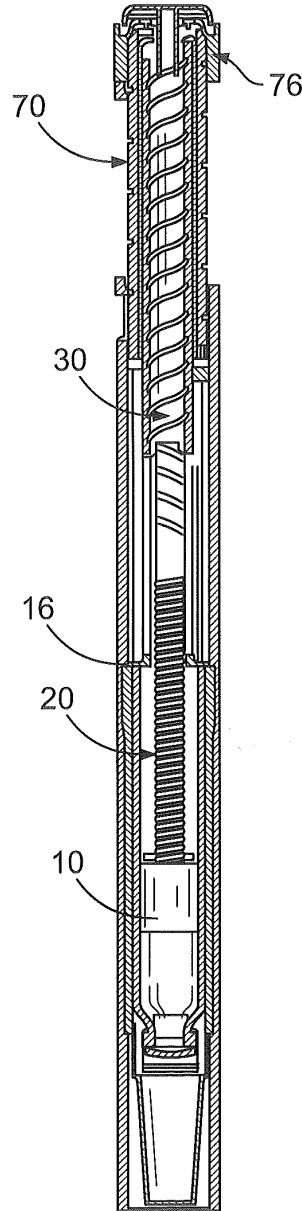


FIG. 4

# Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

## Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

## Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

## API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

## LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

## FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

## E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.