

# EXHIBIT D

(54) **BUTTON CELL HAVING WINDING ELECTRODE AND METHOD FOR THE PRODUCTION THEREOF**

(75) Inventor: **Winfried Gaugler**, Ellwangen (DE)

(73) Assignee: **VARTA Microbattery GmbH** (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.

(21) Appl. No.: **13/378,117**

(22) PCT Filed: **Jun. 18, 2010**

(86) PCT No.: **PCT/EP2010/058637**

§ 371 (c)(1),  
(2), (4) Date: **Dec. 14, 2011**

(87) PCT Pub. No.: **WO2010/146154**

PCT Pub. Date: **Dec. 23, 2010**

(65) **Prior Publication Data**

US 2012/0100406 A1 Apr. 26, 2012

(30) **Foreign Application Priority Data**

Jun. 18, 2009 (DE) ..... 10 2009 030 359  
Dec. 31, 2009 (DE) ..... 10 2009 060 800

(51) **Int. Cl.**  
**H01M 4/00** (2006.01)  
**H01M 2/02** (2006.01)

(Continued)

(52) **U.S. Cl.**  
CPC ..... **H01M 2/0222** (2013.01); **H01M 2/0413** (2013.01); **H01M 2/0439** (2013.01);  
(Continued)

(58) **Field of Classification Search**  
CPC ..... H01M 2/0439; H01M 10/0587; H01M 10/0525; H01M 2/0413; H01M 2/0222;  
(Continued)

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,827,916 A 8/1974 Fagan, Jr.  
3,960,599 A 6/1976 Reynier et al.  
(Continued)

FOREIGN PATENT DOCUMENTS

CN 201440429 4/2010  
DE 1 471 758 5/1969  
(Continued)

OTHER PUBLICATIONS

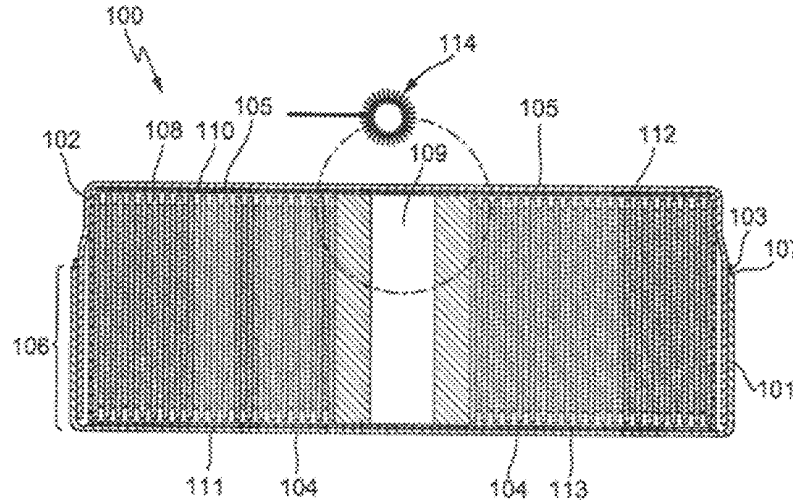
English language machine translation of JP 2008-262825.\*  
(Continued)

*Primary Examiner* — Jonathan Jelsma  
*Assistant Examiner* — Omar Kekia  
(74) *Attorney, Agent, or Firm* — DLA Piper LLP (US)

(57) **ABSTRACT**

A button cell includes a housing consisting of two metal housing halves, an electrode separator assembly in the form of a preferably spiral-shaped winding inside the housing, and metal conductors which electrically connect the electrodes of the assembly to the housing halves, wherein at least one of the conductors is connected to the respective housing half by welding.

**9 Claims, 5 Drawing Sheets**



- (51) **Int. Cl.**  
**H01M 2/04** (2006.01)  
**H01M 2/06** (2006.01)  
**H01M 2/26** (2006.01)  
**H01M 10/04** (2006.01)  
**H01M 10/0587** (2010.01)  
**H01M 10/0525** (2010.01)
- (52) **U.S. Cl.**  
CPC ..... **H01M 2/06** (2013.01); **H01M 2/263**  
(2013.01); **H01M 10/0427** (2013.01); **H01M**  
**10/0436** (2013.01); **H01M 10/0587** (2013.01);  
**H01M 2/0227** (2013.01); **H01M 10/0525**  
(2013.01); **Y10T 29/4911** (2015.01)
- (58) **Field of Classification Search**  
CPC .... H01M 10/0436; H01M 2/06; H01M 2/263;  
H01M 2/0465; H01M 2/0227; Y10T  
29/4911  
USPC ..... 429/1-11, 47-255; 29/623.1-623.5;  
219/121.64  
See application file for complete search history.
- (56) **References Cited**

## U.S. PATENT DOCUMENTS

- 4,091,181 A 5/1978 Merritt, Jr.  
4,220,695 A 9/1980 Ishida et al.  
4,224,387 A 9/1980 Nakayama  
4,487,819 A 12/1984 Koga  
4,539,271 A 9/1985 Crabtree  
4,927,719 A 5/1990 Ashihara et al.  
5,273,842 A 12/1993 Yamahira et al.  
5,356,736 A 10/1994 Kita et al.  
5,567,538 A 10/1996 Oltman et al.  
5,603,737 A 2/1997 Marincic et al.  
5,631,104 A 5/1997 Zhong et al.  
5,698,340 A 12/1997 Xue et al.  
5,792,574 A 8/1998 Mitate et al.  
6,066,184 A 5/2000 Brenner  
6,143,440 A 11/2000 Votz et al.  
6,245,452 B1 6/2001 Oltman  
6,265,100 B1\* 7/2001 Saaski et al. .... 429/163  
6,277,522 B1 8/2001 Omaru et al.  
6,443,999 B1 9/2002 Cantave et al.  
7,488,553 B2 2/2009 Tsukamoto et al.  
7,566,515 B2 7/2009 Suzuki et al.  
2001/0009737 A1\* 7/2001 Lane ..... 429/174  
2002/0034680 A1 3/2002 Inoue et al.  
2002/0192559 A1 12/2002 Yoshimura et al.  
2003/0013007 A1 1/2003 Kaun  
2004/0029004 A1 2/2004 Miyaki  
2004/0048160 A1 3/2004 Omaru  
2004/0110061 A1 6/2004 Haug et al.  
2005/0058904 A1 3/2005 Kano et al.  
2005/0181276 A1 8/2005 Miyaki  
2005/0271938 A1\* 12/2005 Suzuki et al. .... 429/185

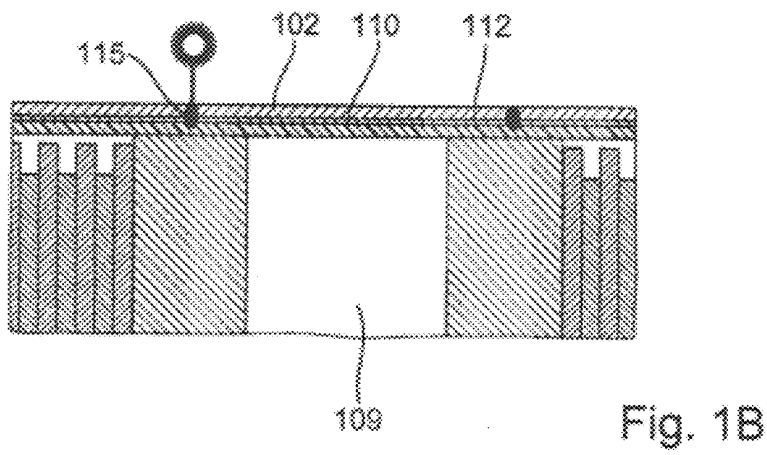
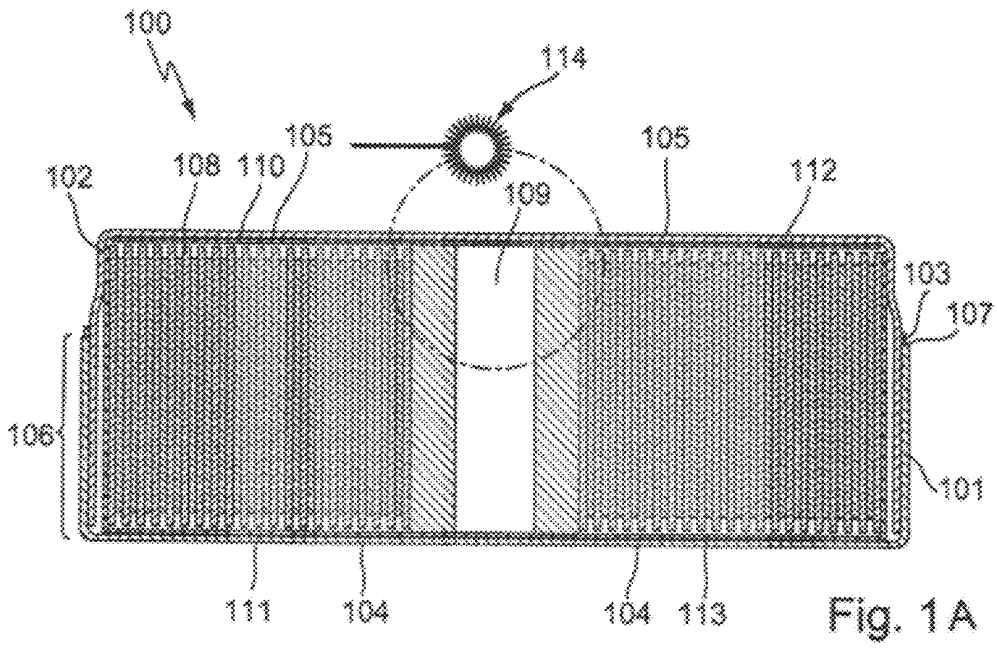
- 2008/0003500 A1\* 1/2008 Issaev et al. .... 429/200  
2008/0318126 A1 12/2008 Ishii  
2009/0325062 A1 12/2009 Brenner et al.  
2010/0227217 A1 9/2010 Fujikawa et al.  
2011/0091753 A1 4/2011 Wang et al.  
2011/0200871 A1 8/2011 Pytlik et al.  
2012/0015224 A1 1/2012 Pytlik et al.  
2012/0028110 A1 2/2012 Brenner  
2012/0100406 A1 4/2012 Gaugler  
2013/0130066 A1 5/2013 Pytlik et al.  
2013/0216881 A1 8/2013 Gaugler et al.

## FOREIGN PATENT DOCUMENTS

- DE 31 13 309 A1 10/1982  
DE 36 38 793 A1 5/1988  
DE 196 47 593 A1 5/1998  
DE 697 00 312 2/2000  
DE 198 57 638 6/2000  
DE 10 2009 008 859 A1 8/2010  
DE 10 2009 017 514 A1 10/2010  
EP 0 202 857 7/1991  
EP 1 318 561 A1 6/2003  
EP 1 339 115 A1 8/2003  
EP 1 372 209 A1 12/2003  
EP 1 808 916 A1 7/2007  
EP 1 968 134 9/2008  
GB 1088271 10/1967  
GB 2 110 464 6/1983  
JP 1-307176 12/1989  
JP H05-121056 5/1993  
JP 7-153488 6/1995  
JP 8-293299 11/1996  
JP 11-345626 A 12/1999  
JP 11-354150 A 12/1999  
JP 2000-77040 3/2000  
JP 2002-352789 12/2002  
JP 2003-31266 1/2003  
JP 2004-158318 6/2004  
JP 3902330 B2 4/2007  
JP 2007-200683 8/2007  
JP 2007-294111 A 11/2007  
JP 2008-251192 10/2008  
JP 2008-262825 \* 10/2008 ..... H01M 10/36  
JP 2008-262825 A 10/2008  
JP 2008-262826 10/2008  
WO 2010/089152 A1 8/2010

## OTHER PUBLICATIONS

- US Official Action dated Mar. 27, 2014 from related U.S. Appl. No. 13/146,669.  
US Official Action dated Sep. 2, 2014 from related U.S. Appl. No. 13/146,669.  
Linden, D. et al., "Handbook of Batteries," 2002, Third Edition, The McGraw-Hill Companies, Inc., Sections 11.4, 11.4.1, 14.1, 14.5.2, 14.8 and 14.8.2, and Figs. 11.2, 11.5, 14.38, 34.13, 35.30 and 35.32.  
\* cited by examiner



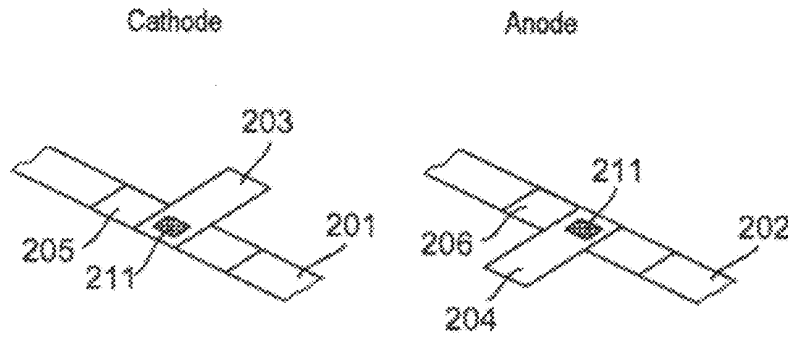


Fig. 2A

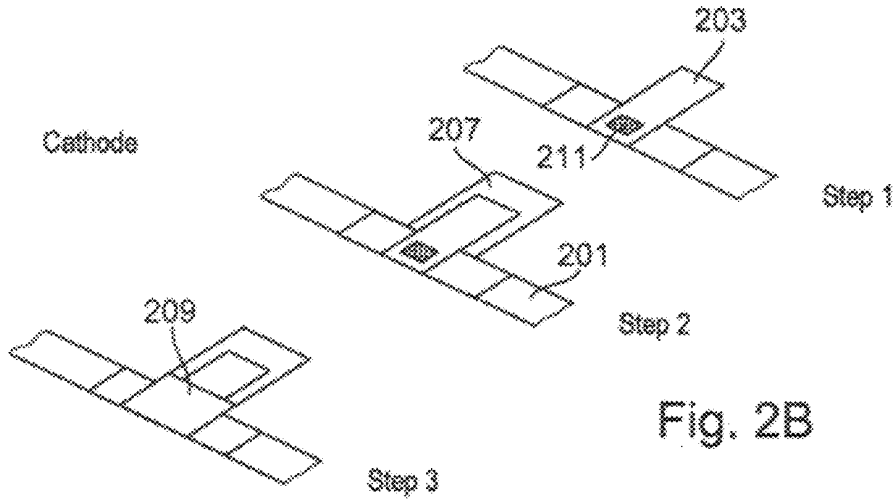


Fig. 2B

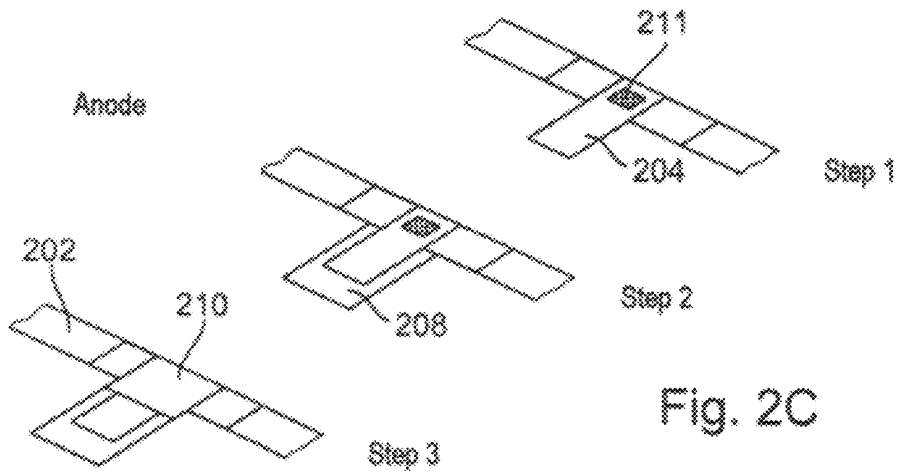


Fig. 2C

# 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.