(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)
(19) World Intellectual Property Organization
(43) International Publication Date
8 August 2013 (08.08.2013)
(10) International Publication Number
WO 2013/116419 A3

(51) International Patent Classification:
H01M 2/02 (2006.01) H01M 2/12 (2006.01)

(21) International Application Number:
PCT/US2013/023978

(22) International Filing Date:
31 January 2013 (31.01.2013)

(25) Filing Language:
English

(26) Publication Language:
English

(30) Priority Data:
61/593,247 31 January 2012 (31.01.2012) US
13/754,410 30 January 2013 (30.01.2013) US


(74) Agents: FLETCHER, Michael, G. et al; P.O. Box 692289, Houston, Texas 77269 (US).

(54) Title: COVER FOR BATTERY CELL

(57) Abstract: A battery 24 includes a cell element 46 that is disposed in a housing 26, and the housing 26 is sealed with a top cover 28 made primarily of plastic. The top cover 28 may include a layer of metallic foil 68, which may make the top cover 28 more impermeable to moisture. The top cover 28 may also include a vent 38, which may or may not utilize the metallic foil 68 to determine the primary opening force of the vent. The top cover 28 may also have one or more stiffening ribs 102 that extend downwardly from a bottom portion of the top cover 28 to contact the cell element 46, so as to limit movement of the cell element 46 within the housing 26. In addition, the top cover 28 may have one or more conductive terminals 34, 36 that are at least partially overmolded by the plastic of the top cover 28.

FIG. 10
as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(Hi))

Published:
— with international search report (Art. 21(3))

before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

(88) Date of publication of the international search report: 16 January 2014
INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/023978

A. CLASSIFICATION OF SUBJECT MATTER
INV. H01M2/Q2 H01M2/04 H01M2/12
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
H01M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data, PAJ, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>CN 1 929 185 A (HUANG SUIYANG [CN]) 14 March 2007 (2007-03-14) page 6 - page 12</td>
<td>1-3</td>
</tr>
<tr>
<td>Y</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>X</td>
<td>CN 201 084 758 Y (YANG FEI [CN]) 9 July 2008 (2008-07-09) abstract</td>
<td>1-3</td>
</tr>
<tr>
<td>Y</td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:
  "A" document defining the general state of the art which is not considered to be of particular relevance
  "E" earlier application or patent but published on or after the international filing date
  "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
  "O" document referring to an oral disclosure, use, exhibition or other means
  "P" document published prior to the international filing date but later than the priority date claimed
  "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
  "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
  "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
  "Z" document member of the same patent family

Date of the actual completion of the international search 11 June 2013
Date of mailing of the international search report 20/11/2013

Name and mailing address of the ISA/
European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016

Authorized officer Wiedemann, Eric
INTERNATIONAL SEARCH REPORT

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
   because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
   because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
   because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ All required additional search fees were timely paid by the applicant, this international search report covers all searchable items.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:  

4. ☑ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.: 1–9

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.
This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-9

   A battery, comprising a housing having an open top portion, a cell element disposed within the housing; and a top cover disposed on the top portion of the housing, the top cover having at least one layer of plastic disposed adjacent a layer of metallic foil.

   ---

2. claims: 10-16

   A battery, comprising a housing having an open top portion, a cell element disposed within the housing and a top cover disposed on the top portion of the housing, the top cover being made primarily of plastic, wherein the top cover comprises at least one conductive terminal that is at least partially overmolded by the plastic.

   ---

3. claims: 17-20

   A battery, comprising a housing having an open top portion, a cell element disposed within the housing; and a top cover disposed on the top portion of the housing, the top cover having at least one stiffening rib disposed on a bottom portion of the top cover and extending downwardly to contact the cell element.

   ---
<table>
<thead>
<tr>
<th>Patent document cited in search report</th>
<th>Publication date</th>
<th>Patent family member(s)</th>
<th>Publication date</th>
</tr>
</thead>
<tbody>
<tr>
<td>CN 1929185</td>
<td>14-03-2007</td>
<td>NON E</td>
<td></td>
</tr>
<tr>
<td>CN 201084758</td>
<td>09-07-2008</td>
<td>NON E</td>
<td></td>
</tr>
</tbody>
</table>