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(54) Title: ELECTROCHEMICAL CELL DESIGN AND STRUCTURE

(57) Abstract: An electrochemical cell including a can defining a lumen, an electrode assembly, a current collector and an insulator is provided. The current collector includes an attachment portion for coupling to the electrode assembly and a current collector strap. The insulator comprises a disc defining a first aperture sized such that the current collector strap is capable of extending through the first aperture. The insulator further comprises a first guide portion including a first arcuate surface for controlling a first bend radius of the current collector strap. Further, the insulator is press-fitted into the lumen to prevent the electrode assembly from pistoning.

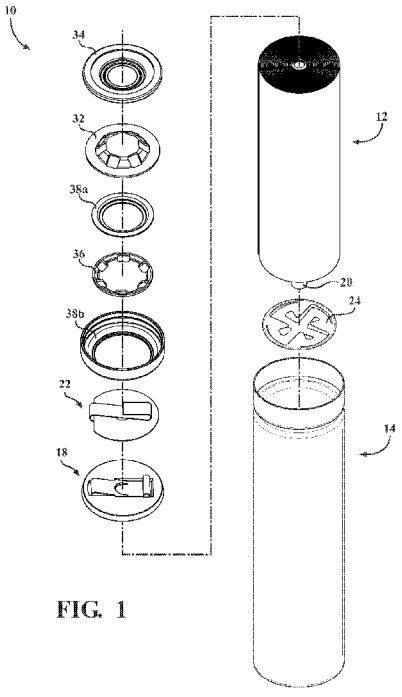

FIG. 1

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[Continued on next page]

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:
02 December 2021 (02.12.2021)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2021/024634

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. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

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.:

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.

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2021/024634

A. CLASSIFICATION OF SUBJECT MATTER
INV. H01M6/14 H01M10/0587 H01M10/12 H01M50/166 H01M50/172
H01M50/54 H01M50/559 H01M50/593
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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2 181 482 A1 (A123 SYSTEMS INC [US]) 5 May 2010 (2010-05-05) paragraph [0001] - paragraph [0003] paragraph [0004] paragraph [0005] paragraph [0006] paragraph [0007] paragraph [0009] paragraph [0010] paragraph [0012] paragraph [0013] paragraph [0041] paragraph [0055] paragraph [0059] - paragraph [0063] paragraph [0065] claims 1-15 figures 1-18	1-13, 16-19,23

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[X] Further documents are listed in the continuation of Box C.

[X] 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

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 October 2021	03/11/2021

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

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Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2017/346064 A1 (FUKUOKA TAKAHIRO [JP] ET AL) 30 November 2017 (2017-11-30) paragraph [0001] paragraph [0011] paragraph [0012] paragraph [0017] - paragraph [0019] paragraph [0020] - paragraph [0024] paragraph [0025] paragraph [0026] paragraph [0037] claims 1-6 figures 1,3,4	1-13, 16-19,23
A	EP 2 272 124 A1 (POWERGENIX SYSTEMS INC [US]) 12 January 2011 (2011-01-12) paragraph [0001] paragraph [0006] paragraph [0033] paragraph [0034] - paragraph [0035] paragraph [0036] paragraph [0037] claims 1-13 figures 2a,4,6	1-23
A	EP 3 196 958 A1 (SAMSUNG SDI CO LTD [KR]) 26 July 2017 (2017-07-26) paragraph [0049] - paragraph [0054] claims 1-11 figures 2, 4A, 4B	14-22

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2021/024634

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2181482 A1	05-05-2010	CN 101816093 A	25-08-2010
		EP 2181482 A1	05-05-2010
		JP 5378377 B2	25-12-2013
		JP 2010534916 A	11-11-2010
		KR 20100058501 A	03-06-2010
		US 2009029240 A1	29-01-2009
		WO 2009015282 A1	29-01-2009
US 2017346064 A1	30-11-2017	CN 107112487 A	29-08-2017
		JP 6593344 B2	23-10-2019
		JP WO2016098291 A1	28-09-2017
		US 2017346064 A1	30-11-2017
		WO 2016098291 A1	23-06-2016
EP 2272124 A1	12-01-2011	CA 2720078 A1	08-10-2009
		CN 101557010 A	14-10-2009
		EP 2272124 A1	12-01-2011
		JP 5599384 B2	01-10-2014
		JP 2011519121 A	30-06-2011
		KR 20100139016 A	31-12-2010
		US 2009233159 A1	17-09-2009
		WO 2009123888 A1	08-10-2009
EP 3196958 A1	26-07-2017	CN 106992271 A	28-07-2017
		EP 3196958 A1	26-07-2017
		KR 20170087281 A	28-07-2017
		US 2017207439 A1	20-07-2017

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-13, 23(completely); 16-19(partially)

An insulator suitable for guiding a current collector strap of an electrochemical cell, the insulator comprising: a disc defining a first aperture; a first guide portion including a first arcuate surface for controlling a first bend radius of the current collector strap; and a second guide portion including a second arcuate surface for controlling a second bend radius of the current collector strap, wherein the first aperture is sized such that the current collector strap is capable of extending through the first aperture and an electrochemical cell comprising such an insulator.

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2. claims: 14, 15, 20-22(completely); 16-19(partially)

An electrochemical cell comprising: a can defining a lumen having a lumen diameter; an electrode assembly positioned in the lumen, the electrode assembly formed with a positive electrode sheet and a negative electrode sheet interleaved with a separator interposed therebetween; and an insulator having a disc shaped portion and a flange surrounding the disc shaped portion, the insulator is configured to assume an undeformed state having a first diameter and a deformed state having a second diameter, wherein the insulator is configured to be press-fit into the lumen to cause the insulator to assume the deformed state and to prevent the electrode assembly from pistoning, wherein the first diameter is larger than the lumen diameter and the second diameter is smaller than or equal to the lumen diameter and a method of assembling such an electrochemical cell.
