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- 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:**
9 September 2016

(54) **Title:** CHILD RESTRAINT SYSTEM

(57) **Abstract:** The child restraint systems (100) can include a base portion (102) and a seat portion (104). The child restraint systems can include at least one motor-driven subsystem for installing the child restraint system in a vehicle, such as a motor-driven tensioner and/or motor-driven leveler. The motor-driven subsystem(s) can be coupled to a power source, such as a battery pack. The child restraint systems can also include a microcontroller, which can be coupled to the power source and a motor for the motor-driven subsystem. The base portion and/or the seat portion can include a plurality of sensors in communication with microcontroller. The sensors can detect an installation condition and/or state of the child restraint system.



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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2016/013435

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.:

1-11

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/US2016/013435

A. CLASSIFICATION OF SUBJECT MATTER
INV. B60N2/28 B60N2/26
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)
B60N

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)

EP0-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.
A	US 2013/088057 A1 (SZAKELYHIDI DAVE [US] ET AL) 11 April 2013 (2013-04-11) paragraph [0007]; figures paragraph [0065] paragraph [0067] paragraph [0105]	1-11
A	----- EP 2 272 709 A2 (GRACO CHILDRENS PROD INC [US]) 12 January 2011 (2011-01-12) the whole document -----	1-11



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

"&" document member of the same patent family

Date of the actual completion of the international search

26 April 2016

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2013088057	A1	11-04-2013	CA 2851248 A1 11-04-2013
			CN 104024042 A 03-09-2014
			EP 2763871 A1 13-08-2014
			RU 2014117965 A 20-11-2015
			US 2013088057 A1 11-04-2013
			US 2013088058 A1 11-04-2013
			US 2014354022 A1 04-12-2014
			US 2015336480 A1 26-11-2015
			WO 2013052777 A1 11-04-2013

EP 2272709	A2	12-01-2011	CN 101961987 A 02-02-2011
			EP 2272709 A2 12-01-2011
			US 2011074194 A1 31-03-2011

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-11

Automated, motorised tensioning of two belts

2. claims: 12-20

Adjusting position of the seat portion relatively to the seat base

3. claims: 21-31

Manually adjusting and locking the harness

4. claims: 32-36

Providing electrical connection between the seat portion and the seat base

5. claims: 37-41

Adjusting position of the latch and preventing it from moving into another direction
