



(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:  
**06.05.2020 Bulletin 2020/19**

(51) Int Cl.:  
**B61L 23/04** (2006.01) **B61L 25/02** (2006.01)  
**B61L 27/00** (2006.01) **B61L 3/00** (2006.01)

(43) Date of publication A2:  
**15.01.2020 Bulletin 2020/03**

(21) Application number: **19195002.1**

(22) Date of filing: **01.03.2016**

(84) Designated Contracting States:  
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**

(30) Priority: **05.03.2015 US 201514639290**

(62) Document number(s) of the earlier application(s) in accordance with Art. 76 EPC:  
**16758529.8 / 3 265 361**

(71) Applicant: **Thales Canada Inc.**  
**Toronto, Ontario M3B 0A4 (CA)**

(72) Inventors:  
• **GREEN, Alon**  
**TORONTO, Ontario M3H 4N7 (CA)**

- **IGNATIUS, Rodney**  
**Markham, Ontario L6C 1Y3 (CA)**
- **WHITWAM, Firth**  
**TORONTO, Ontario M4G 1H7 (CA)**
- **KINIO, Walter**  
**Mississauga, Ontario L4W 4K9 (CA)**
- **DIMMER, David**  
**TORONTO, Ontario M8X 2M1 (CA)**
- **GEORGESCU, Mircea**  
**TORONTO, Ontario M3B 0A4 (CA)**

(74) Representative: **Hautier IP**  
**1, Rue du Gabian**  
**Le Thalès - 12 Etg - Bloc A**  
**98000 Monaco (MC)**

(54) **GUIDEWAY MOUNTED VEHICLE LOCALIZATION SYSTEM**

(57) A system comprises a speed detector, a marker sensor, a controller, a sensor unit, and a processor. The speed detector is configured to generate speed data associated with a movement of a vehicle. The marker sensor is configured to generate marker data based on a detection of an object along a wayside of a guideway. The controller is configured to calculate a distance the vehicle moved, generate location information, and generate an indication the vehicle is stationary. The sensor unit comprises an accelerometer, a gyroscope, and a magnetometer. The sensor unit is configured to generate sensor data based on information gathered by one or more of the accelerometer, the gyroscope, or the magnetometer. The processor is configured to process the sensor data to determine a vehicle position based on the sensor data and the location information. The controller is further configured to compare the location information with the vehicle position.

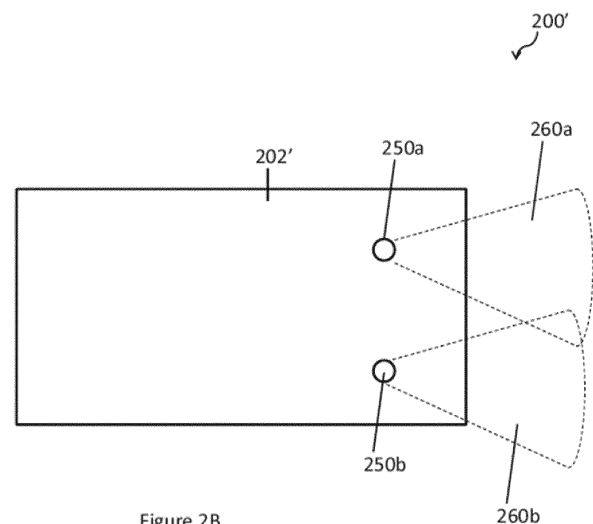


Figure 2B



## EUROPEAN SEARCH REPORT

 Application Number  
 EP 19 19 5002

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2012/296562 A1 (CARLSON RICHARD C [US] ET AL) 22 November 2012 (2012-11-22)	1,7,9	INV. B61L23/04 B61L25/02 B61L27/00 B61L3/00
Y	* paragraph [0025] - paragraph [0030] * * paragraph [0047] - paragraph [0050] * * paragraph [0121] * * paragraph [0191] * * figures 1,7,11 *	2-6,8, 10-15	
Y	----- "Overview of ERTMS/ETCS (Doc. No. 98E516)", ERTMS SYSTEM REQUIREMENTS SPECIFICATION, MANAGEMENT SYSTEM, BRUSSELS, no. version 1, 31 July 1998 (1998-07-31), pages 1-23, XP007904580, * Chapter 3.2.2 "Speed Supervision" - Chapter 3.2.4 "Curve Calculation Method"; page 10/23 - page 12/23 *	2-4	
Y	----- US 5 936 517 A (YEH SHOW-WAY [US]) 10 August 1999 (1999-08-10) * column 7, line 37 - line 42 * * column 8, line 9 - line 33 * * figures 7C,7D *	5,6	
Y	----- WO 2014/002077 A2 (CO EL DA SOFTWARE SRL [IT]) 3 January 2014 (2014-01-03) * page 9, line 29 - page 10, line 20 * * page 11, line 18 - line 28 * * page 12, line 15 - last line *	8	TECHNICAL FIELDS SEARCHED (IPC)  B61L
The present search report has been drawn up for all claims			
Place of search <b>Munich</b>		Date of completion of the search <b>31 March 2020</b>	Examiner <b>Janssen, Axel</b>
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)



## EUROPEAN SEARCH REPORT

Application Number  
EP 19 19 5002

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	ZHENG GUO XU ET AL: "Performance Degradation Monitoring for Onboard Speed Sensors of Trains", IEEE TRANSACTIONS ON INTELLIGENT TRANSPORTATION SYSTEMS, IEEE, PISCATAWAY, NJ, USA, vol. 13, no. 3, 1 September 2012 (2012-09-01), pages 1287-1297, XP011473266, ISSN: 1524-9050, DOI: 10.1109/TITS.2012.2188629 * page 1288, left-hand column, paragraph 2 * * page 1289, left-hand column, paragraph 39 * * page 1290, left-hand column, last paragraph - right-hand column, paragraph 1 * -----	10-15	
			TECHNICAL FIELDS SEARCHED (IPC)
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 31 March 2020	Examiner Janssen, Axel
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)



Application Number

EP 19 19 5002

**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

**LACK OF UNITY OF INVENTION**

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

**LACK OF UNITY OF INVENTION  
SHEET B**Application Number  
EP 19 19 5002

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-4, 7, 9

Onboard supervision of maximum vehicle speed

---

2. claims: 5, 6

Railway switch status detection

---

3. claim: 8

Automatic coupling

---

4. claims: 10-15

Sensor failure detection

---

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 19 19 5002

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

31-03-2020

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2012296562 A1	22-11-2012	US 2012296562 A1	22-11-2012
		US 2014229096 A1	14-08-2014
		WO 2012158906 A1	22-11-2012
US 5936517 A	10-08-1999	NONE	
WO 2014002077 A2	03-01-2014	AU 2013282700 A1	29-01-2015
		BR 112014032481 A2	27-06-2017
		CA 2877818 A1	03-01-2014
		CN 104583053 A	29-04-2015
		EP 2874861 A2	27-05-2015
		JP 6337894 B2	06-06-2018
		JP 2015530301 A	15-10-2015
		KR 20150036302 A	07-04-2015
		MX 340797 B	27-07-2016
		RU 2015102986 A	20-08-2016
		US 2015191186 A1	09-07-2015
		WO 2014002077 A2	03-01-2014