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**Published:**

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22 September 2016

(54) **Title:** MARKING TANK OBSTRUCTIONS USING AN ELECTRONIC LEVEL GAUGE

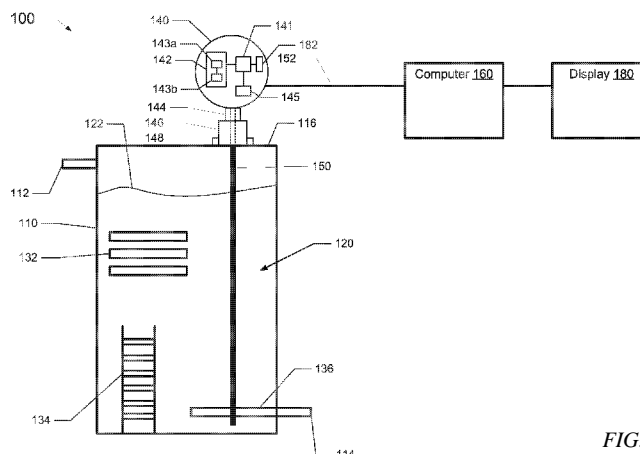


FIG. 1

(57) **Abstract:** An obstruction marking method (600) includes generating (608) a first echo curve (510) using an electronic level gauge (ELG) (140) coupled to a tank (110) from a first reflected signal (echo signal) received when a material (120) in the tank is at a first level. The ELG includes a radar-based obstruction detection algorithm (143a) stored in a memory (142) coupled thereto. A processor (141) implementing the obstruction detection algorithm identifies at least a first feature in the first echo curve to provide at least one suspected obstruction (410) along with its position (first feature position) (546). A second echo curve (540) is generated (612) from a second reflected signal when the material is at a second level. A third echo curve (530) is generated (614) from a third reflected signal when the material is at a third level. The suspected obstruction at the first feature position is stored (616) in the memory as a verified obstruction (346) with its first feature position.

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## INTERNATIONAL SEARCH REPORT

International application No.  
**PCT/US2016/016684****A. CLASSIFICATION OF SUBJECT MATTER****G01S 17/06(2006.01)i, G01F 23/00(2006.01)i**

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)  
GOIS 17/06; GOIF 23/284; GOIF 23/00; GOIN 29/44; GOIF 23/296; GOIF 23/28; GOIF 1/32Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
Korean utility models and applications for utility models  
Japanese utility models and applications for utility modelsElectronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
eKOMPASS(KIPO internal) & Keywords: tank, obstruction, level, gauge, echo curve**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category <sup>a</sup>	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2014-0214361 A1 (AVISHAI BARTOV et al.) 31 July 2014 See abstract and claims 9,17.	1-12
Y	US 2012-0035867 A1 (ROLAND WELLE et al.) 09 February 2012 See paragraphs [0012],[0058],[0066] and claims 1,6,8.	1-12
A	US 2013-0035880 A1 (CHRISTIAN HOFERER et al.) 07 February 2013 See abstract, claims 1,11 and figures 8-9.	1-12
A	US 7284425 B2 (TOMAS WENNERBERG et al.) 23 October 2007 See abstract and claims 1-5.	1-12
A	US 2006-0169055 A1 (URI AGAM et al.) 03 August 2006 See claims 1-5.	1-12

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

\* Special categories of cited documents:

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Date of the actual completion of the international search

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## INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

**PCT/US2016/016684**

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2014-0214361 AI	31/07/2014	None	
US 2012-0035867 AI	09/02/2012	CN 102192772 A EP 2366983 AI US 8655605 B2	21/09/2011 21/09/2011 18/02/2014
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