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(54) Title: TETHER GUIDE WITH TWO-SIDED OPEN TETHER CHANNEL

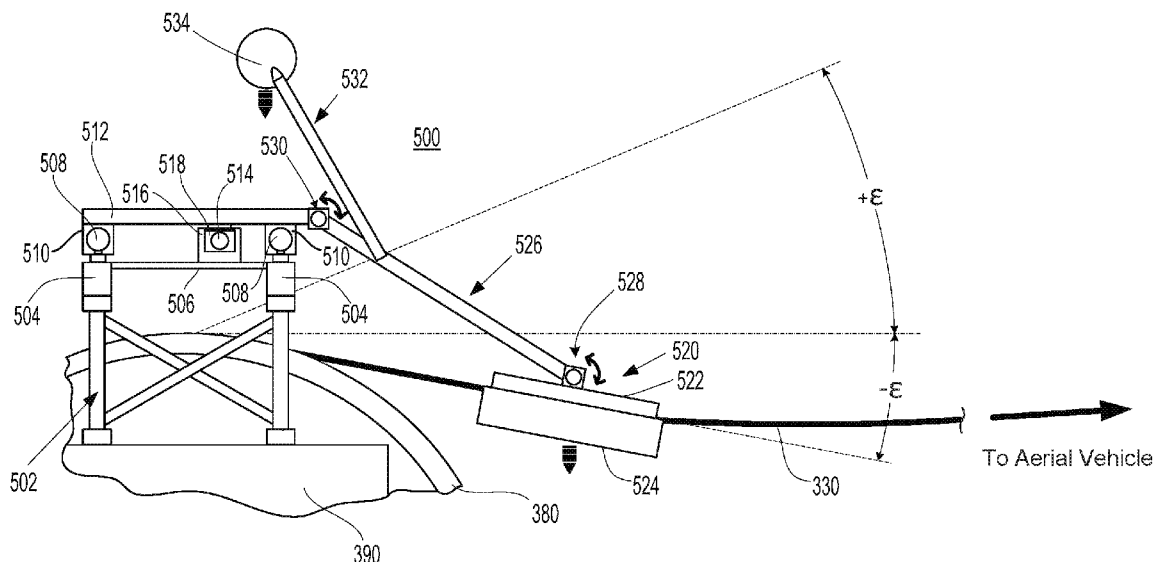


FIG. 5

(57) Abstract: A tether guide system operable through a wide range of tether/fleeting angles while causing minimal wear to the tether. The tether guide system may include a series of rollers arranged in a curved path. Also disclosed are tether guides with a sliding belt, a guide surface, or a guide wheel, all for use in the disclosed tether guide system.



MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
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A. CLASSIFICATION OF SUBJECT MATTER**B64F 3/00(2006.01)i, B64C 39/02(2006.01)i, B66D 1/38(2006.01)i, F03D 5/00(2006.01)i, F03D 9/25(2016.01)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)

B64F 3/00; B64C 39/02; B65H 1808; B65H 49/34; B65H 54/28; B65H 59/20; B66D 1/36; B66D 1/38; F03D 5/00; F03D 9/25

Documentation 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 models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: airborne wind turbine, tether, guide, drum, transverse, shuttle, drive, retaining, roller, channel, pivot

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2018-0155150 A1 (X DEVELOPMENT L.L.C.) 07 June 2018 See claims 4-5, 7-9, 11; and figures 5, 8, 11.	1-7
Y		8-19
Y	US 2005-0116079 A1 (STEVENS, DANIEL WINFRED) 02 June 2005 See paragraph [0020]; and figures 1-3.	8-12
Y	US 6811112 B1 (CURRIE et al.) 02 November 2004 See figure 2.	13-15
Y	US 2009-0224093 A1 (CHOI et al.) 10 September 2009 See figures 3-4.	16-19
A	US 2015-0158600 A1 (GOOGLE INC.) 11 June 2015 See paragraphs [0071]-[0083]; and figures 3A-3D.	1-19



Further documents are listed in the continuation of Box C.



See patent family annex.

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2018-0155150 A1	07/06/2018	US 2019-0031340 A1 WO 2018-102123 A1 WO 2019-070735 A2	31/01/2019 07/06/2018 11/04/2019
US 2005-0116079 A1	02/06/2005	US 7380742 B2	03/06/2008
US 6811112 B1	02/11/2004	None	
US 2009-0224093 A1	10/09/2009	KR 10-0867221 B1	06/11/2008
US 2015-0158600 A1	11/06/2015	US 9676496 B2 WO 2015-088971 A1	13/06/2017 18/06/2015