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(54) **SYSTEMS, DEVICES AND METHODS DELIVERING ENERGY USING AN UNCREWED AUTONOMOUS VEHICLE**

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CPC ***G05D 1/00*** (2013.01); ***B60L 11/1816*** (2013.01); ***B60L 11/1822*** (2013.01); ***B60L 11/1846*** (2013.01); ***B67D 7/08*** (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2006/0089800	A1*	4/2006	Svendsen et al.	701/301
2007/0168118	A1*	7/2007	Lappe et al.	701/207
2009/0103722	A1*	4/2009	Anderson	H04L 9/0841 380/44
2010/0211340	A1*	8/2010	Lowenthal et al.	702/63
2011/0025267	A1*	2/2011	Kamen et al.	320/109
2013/0229153	A1*	9/2013	Sarkar	B60L 11/1809 320/130
2014/0088804	A1*	3/2014	Hyde et al.	701/22

* cited by examiner

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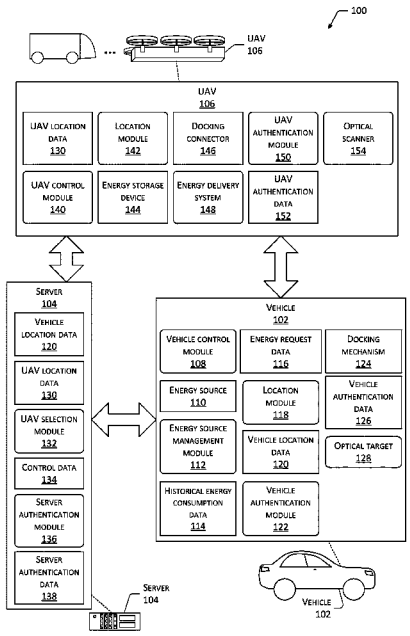
(57) **ABSTRACT**

Devices such as vehicles, remote sensors, and so forth consume energy during operation. Described herein are systems, devices, and methods for transferring energy from an uncrewed autonomous vehicle to a vehicle such as a car. The uncrewed autonomous vehicle may locate the vehicle at a rendezvous location, and connect with the vehicle while the vehicle moves. Once the uncrewed autonomous vehicle connects to the vehicle, the uncrewed autonomous vehicle may transfer the energy to the vehicle.

20 Claims, 10 Drawing Sheets