US009410505B2

(12) **United States Patent**
Henry et al.

(10) **Patent No.: US 9,410,505 B2**
(45) **Date of Patent: Aug. 9, 2016**

(54) **METHOD FOR LOCAL BOILING PROTECTION OF A HEAT EXCHANGER**

(71) Applicant: **General Electric Company**, Schenectady, NY (US)

(72) Inventors: **Luke Henry**, Lawrence Park, PA (US); **Roshan Shekhar Kotian**, Lawrence Park, PA (US)

(73) Assignee: **General Electric Company**, Schenectady, NY (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 580 days.

(21) Appl. No.: **13/852,284**

(22) Filed: **Mar. 28, 2013**

(65) **Prior Publication Data**

US 2014/0290631 A1 Oct. 2, 2014

(51) **Int. Cl.**
F01P 7/14 (2006.01)
F02M 25/07 (2006.01)

(52) **U.S. Cl.**
CPC ***F02M 25/0738*** (2013.01); *Y02T 10/121* (2013.01)

(58) **Field of Classification Search**
CPC F02M 25/0738; F02M 25/0731; F02M 25/0702; F02M 25/0746; F02M 25/7054; F02M 25/0762; F01P 5/10; F01P 7/04; F01P 7/14; F01P 7/164; F01P 7/167; F01P 2007/168
USPC 123/568.12, 568.16, 41.01, 41.13, 123/41.57
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,128,948	A *	10/2000	Shi et al.	73/114.68
6,684,940	B1 *	2/2004	Chao	C09K 5/10 165/104.21
6,729,133	B1 *	5/2004	Sorter et al.	60/599
7,131,288	B2 *	11/2006	Toonen et al.	62/324.1
7,461,640	B1 *	12/2008	Agee et al.	123/568.12
7,528,088	B2	5/2009	Umeda et al.	
7,673,591	B2 *	3/2010	Vuk	123/41.02
8,342,141	B2 *	1/2013	Dahl et al.	123/41.1
9,109,518	B2 *	8/2015	Balestrino	F02D 21/08
2003/0089319	A1 *	5/2003	Duvinage et al.	123/41.02
2005/0113988	A1 *	5/2005	Nasr et al.	701/22
2006/0112701	A1 *	6/2006	Dykstra	62/132
2010/0043525	A1 *	2/2010	Recouvreur	F01N 11/002 73/23.31
2010/0107995	A1 *	5/2010	Kamiyama et al.	123/41.02
2011/0005474	A1 *	1/2011	Carlson et al.	123/41.1
2011/0048389	A1 *	3/2011	Hsia et al.	123/568.12
2011/0099989	A1 *	5/2011	Prior et al.	60/320
2011/0139133	A1 *	6/2011	Surnilla et al.	123/568.12
2011/0146244	A1 *	6/2011	Farman et al.	60/285
2012/0059543	A1 *	3/2012	Nakazono et al.	701/22
2012/0179320	A1 *	7/2012	Abe et al.	701/22
2012/0323465	A1 *	12/2012	Peters et al.	701/104

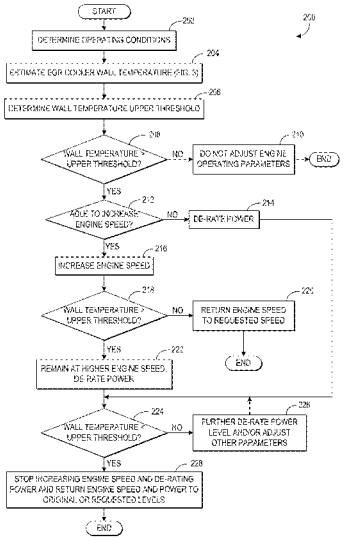
(Continued)

FOREIGN PATENT DOCUMENTS

WO WO 2013158082 A1 * 10/2013

Primary Examiner — Hung Q Nguyen
Assistant Examiner — George Jin
(74) *Attorney, Agent, or Firm* — GE Global Patent Operation

(57) **ABSTRACT**

Various methods and systems are provided for estimating a wall temperature in a heat exchanger and reducing the risk of boiling on a coolant side of the heat exchanger. In one embodiment, a method for an engine comprises estimating a wall temperature at a location in a heat exchanger and adjusting an engine operating parameter of an engine coupled to the heat exchanger based on the wall temperature.

18 Claims, 5 Drawing Sheets