



US009410545B2

(12) **United States Patent**
Nirenberg

(10) **Patent No.:** **US 9,410,545 B2**

(45) **Date of Patent:** **Aug. 9, 2016**

(54) **SOLID STATE BILGE PUMP SWITCH**

USPC 307/118; 114/183 R
See application file for complete search history.

(75) Inventor: **David B. Nirenberg**, Bonita Springs,
CA (US)

(56) **References Cited**

(73) Assignee: **Lake Red Rock LLC**, Ankeny, IA (US)

U.S. PATENT DOCUMENTS

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 692 days.

- 4,766,329 A * 8/1988 Santiago G05D 9/12
307/116
- 6,218,948 B1 * 4/2001 Dana G01F 23/265
340/604
- 2004/0018094 A1 * 1/2004 Rossman F04D 15/0218
417/40
- 2006/0005622 A1 * 1/2006 Burdi F04D 15/0218
73/304 C

(21) Appl. No.: **13/486,475**

(22) Filed: **Jun. 1, 2012**

* cited by examiner

(65) **Prior Publication Data**

US 2013/0140912 A1 Jun. 6, 2013

Primary Examiner — Rexford Barnie

Assistant Examiner — Joseph Inge

Related U.S. Application Data

(60) Provisional application No. 61/492,622, filed on Jun.
2, 2011.

(57) **ABSTRACT**

A switch for a bilge pump of a boat includes a pair of probes for providing a probe signal indicating the presence of fluid at the probes, a current sensor for providing a sensor signal indicating electric current of the pump; and a controller programmed to energize the pump when a threshold level of the probe signal indicates the presence of fluid and to de-energize the pump when a threshold level of the sensor signal indicates that the pump is not pumping fluid. The controller can also be programmed to dynamically change the threshold level of the probe signal based on a prior probe signal that indicates changing probe conditions.

(51) **Int. Cl.**

H01H 45/00 (2006.01)

F04B 49/02 (2006.01)

(52) **U.S. Cl.**

CPC **F04B 49/02** (2013.01); **Y10T 307/779**
(2015.04)

(58) **Field of Classification Search**

CPC H01H 45/00; B63B 13/00; B63B 29/16;
B63B 4/00; B63B 3/00; B63B 3/44; G05D
9/12; G01F 23/265; F04D 15/128

11 Claims, 3 Drawing Sheets

