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Boucher et al.

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(45) **Date of Patent:** **Jun. 14, 2005**

(54) **MULTI-FUNCTIONAL MARINE SENSING INSTRUMENT**

5,719,824 A 2/1998 Boucher
5,838,635 A 11/1998 Masreliez

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FOREIGN PATENT DOCUMENTS
DE 44 12 964 A1 10/1994
DE 100 09 644 A1 9/2001
EP 0 973 150 A2 1/2000

(73) Assignee: **Airmar Technology Corporation**, Milford, NH (US)

OTHER PUBLICATIONS

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

Transom Mount. Airmar Technology Corporation. [online], 2000 #17-1205, [retrieved on Mar. 31, 2004]. Retrieved from the Internet, <URL:http://www.airmar.com/pdfs/cat/marine/transom_mount/transom.pdf>.

* cited by examiner

(21) Appl. No.: **10/630,625**

(22) Filed: **Jul. 30, 2003**

(65) **Prior Publication Data**

US 2004/0074294 A1 Apr. 22, 2004

Related U.S. Application Data

(60) Provisional application No. 60/429,514, filed on Nov. 26, 2002, and provisional application No. 60/402,493, filed on Aug. 8, 2002.

(51) **Int. Cl.**⁷ **G01P 13/00**

(52) **U.S. Cl.** **73/170.02**

(58) **Field of Search** 73/170.02, 170.03, 73/170.11, 170.13, 181, 185, 187, 861.78, 861.79, 861.81

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,455,503 A 6/1984 Nakatani
4,836,020 A 6/1989 Boucher
5,182,952 A 2/1993 Pyzik
5,235,557 A 8/1993 Masreliez
5,581,025 A * 12/1996 Boucher et al. 73/187

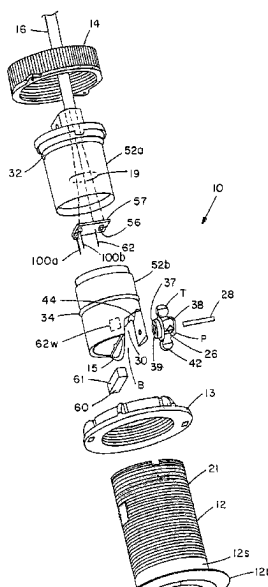
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(57) **ABSTRACT**

A marine sensor device mounts in a single opening in a hull of a marine vessel. The sensor includes a housing secured in the opening. Positioned within the housing is a body containing at least two sensors. The body is removable from the housing. A magnetized paddlewheel can be disposed in a first cavity formed on a first half of the body, the paddlewheel has a plurality of paddles extending from a circular central hub and rotatably mounted on an axle extending transverse a fore and aft direction of travel of the vessel. A magnetic sensor can be located adjacent the paddles, the magnetic sensor senses the rotation of the paddles and provides speed indications. The magnetic sensor can be a Hall-effect device. A sonic transducer for depth detection can be disposed within a second cavity formed on a second half of the body. A thermal sensor for sensing water temperature can be disposed in a well formed in the body.

18 Claims, 11 Drawing Sheets



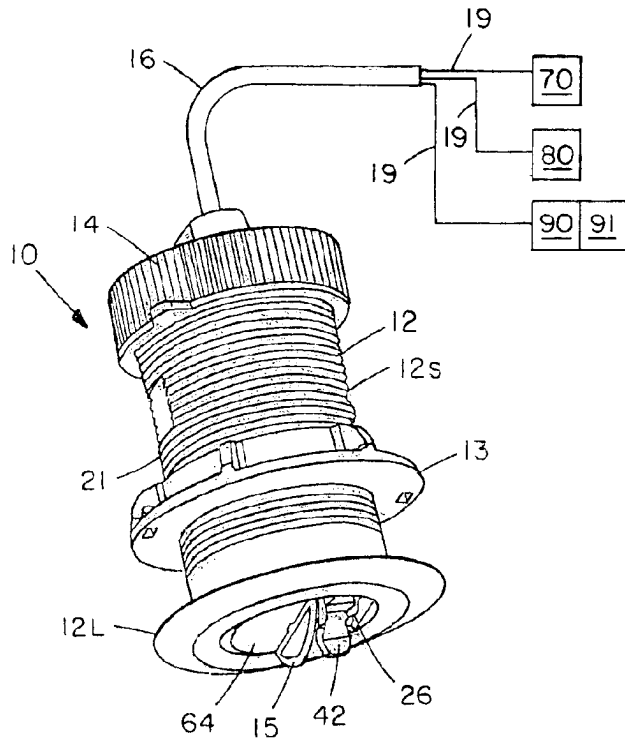


FIG. 1

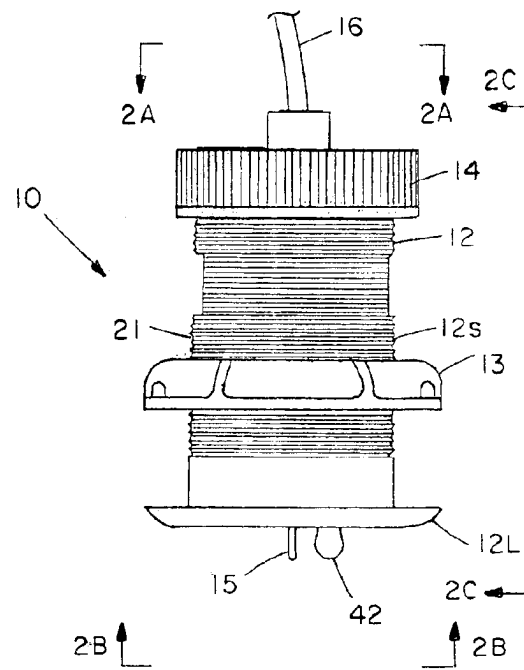


FIG. 2

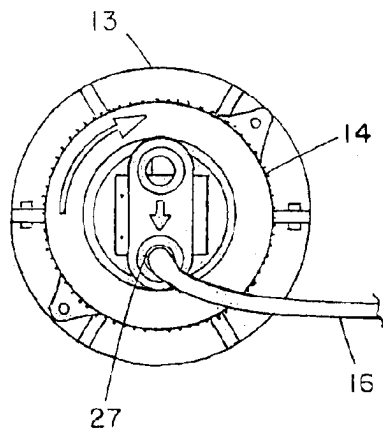


FIG. 2A

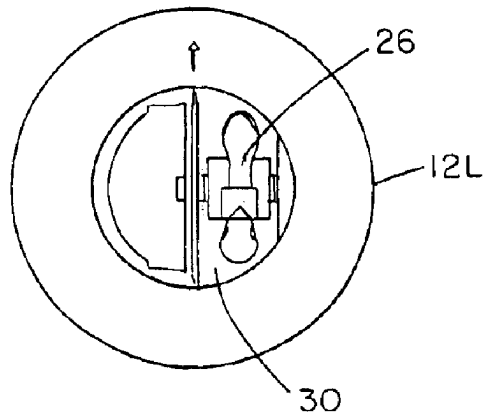


FIG. 2B

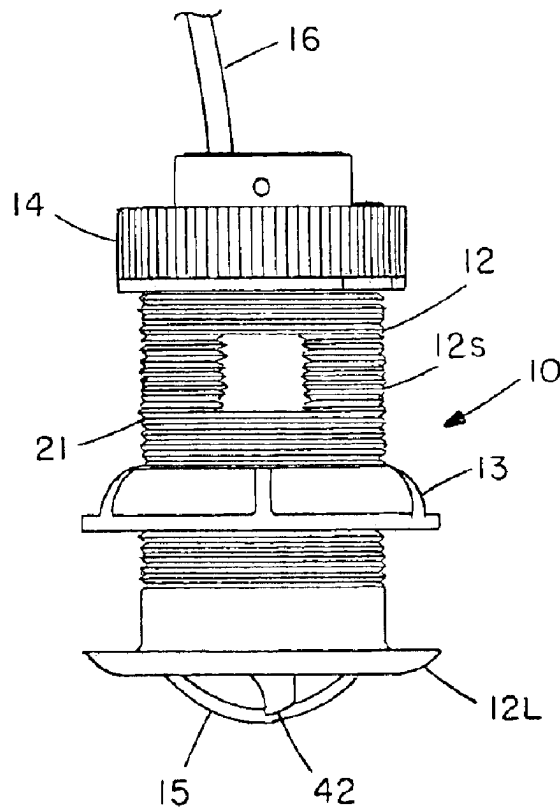


FIG. 2C

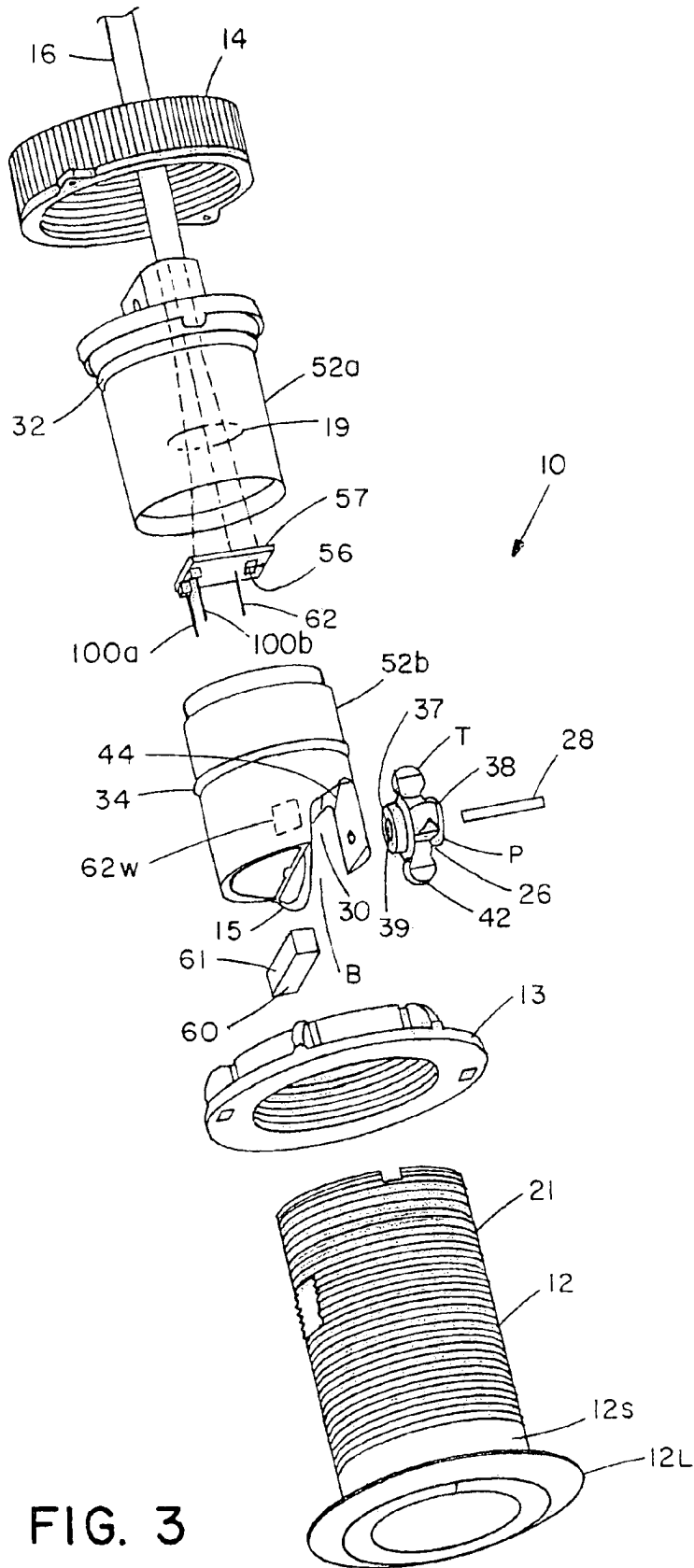


FIG. 3

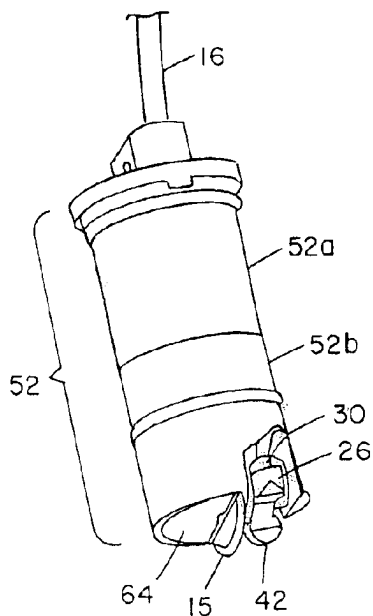


FIG. 4

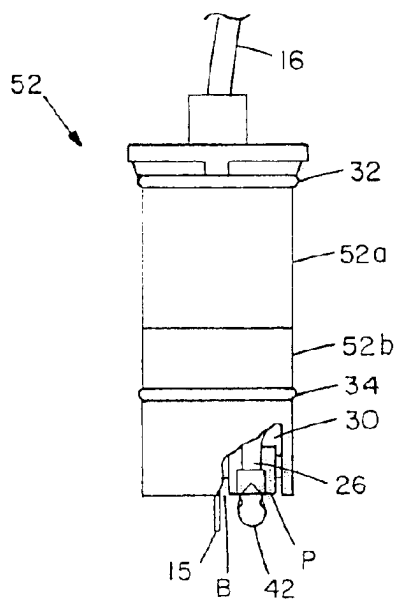


FIG. 5

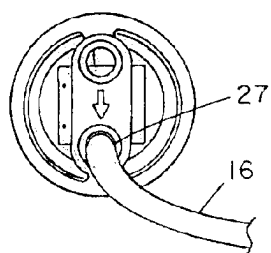


FIG. 5A

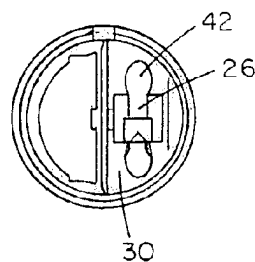


FIG. 5B

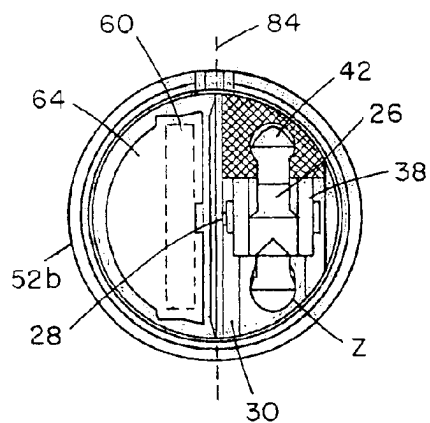


FIG. 5Ba

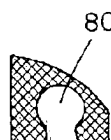


FIG. 5Bb

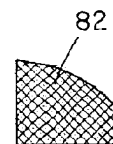


FIG. 5Bc

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