

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
30 August 2001 (30.08.2001)

PCT

(10) International Publication Number
WO 01/63274 A3

(51) International Patent Classification⁷: **G01F 23/296**

(21) International Application Number: PCT/US01/05587

(22) International Filing Date: 21 February 2001 (21.02.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09/511,419 22 February 2000 (22.02.2000) US

(71) Applicant: **SIMMONDS PRECISION PRODUCTS, INC.** [US/US]; 3 Coliseum Centre, 2550 West Tyvola Road, Charlotte, NC 28217 (US).

(72) Inventors: **DURKEE, Scott, R.**; Lime Kiln Road, P.O. Box 89, New Haven, VT 05472 (US). **EID, Bradley, F.**; 5419 Cody Lane, Greenwood, IN 46142 (US).

(74) Agent: **ZITELLI, William, E.**; Calfee, Halter & Griswold LLP, 1400 McDonald Investment Center, 800 Superior Avenue, Cleveland, Ohio 44114 (US).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

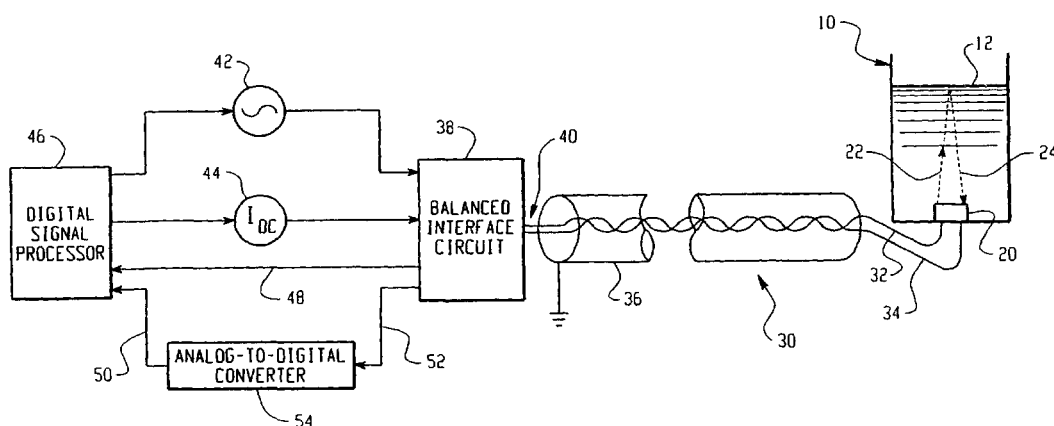
Published:

— with international search report

(88) Date of publication of the international search report:
30 May 2002

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: **ULTRASONIC LIQUID LEVEL MEASUREMENT WITH LIGHT-WEIGHT CABLING**



(57) Abstract: A liquid measurement system including interface apparatus for sharing the excitation and signal processing of an ultrasonic transducer and temperature measuring device remotely located at a liquid container is disclosed. The interface apparatus includes a common conduction path coupled to both of the ultrasonic transducer and the temperature device for conducting first excitation signals to the ultrasonic transducer and the corresponding echo signals therefrom, and for conducting second excitation signals to the temperature measuring device and the response signals therefrom, and an interface circuit for governing the conduction of the first and second excitation signals over the common conduction path from their generating sources and for providing a balanced interface for receiving both of the echo signals and response signals from the common conduction path. In one embodiment, the liquid measurement signal includes a processor that is coupled to the interface circuit for receiving the echo signals and the response signals therefrom for determining liquid level in the container based on the received signals.