

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
2 May 2002 (02.05.2002)

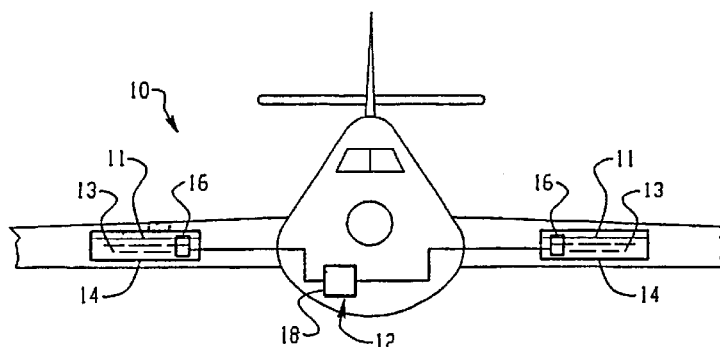
PCT

(10) International Publication Number
WO 02/35185 A2

- (51) International Patent Classification⁷: **G01F**
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- (21) International Application Number: PCT/US01/42780
- (22) International Filing Date: 16 October 2001 (16.10.2001)
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, 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.
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
09/697,674 26 October 2000 (26.10.2000) US
- (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, GQ, GW, ML, MR, NE, SN, TD, TG).
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- Published:**
— *without international search report and to be republished upon receipt of that report*

[Continued on next page]

(54) Title: A FAULT TOLERANT LIQUID MEASUREMENT SYSTEM USING MULTIPLE-MODEL STATE ESTIMATORS



(57) Abstract: A fault tolerant liquid measurement system is disclosed comprising a plurality of sensors for measuring parameters of a liquid in a container; each sensor generating a measurement signal representative of the liquid parameter measured thereby. The sensors are grouped into a number of sets, each set including some sensors of another set. The measurement signals of each set of sensors are processed in a processor to determine for each set of sensors a first estimate signal representative of a likelihood of measurement signal validity for the measurement signals of the corresponding set, and a second estimate signal representative of liquid quantity in the container based on the measurement signals of the corresponding set. The processor further determines a third estimate signal of liquid quantity in the container based on a function of the first and second estimate signals. In one embodiment, the system groups a number M of sensors into M+1 subsets, one subset including all M sensors and said other M subsets each including all of the M sensors except one and said missing sensor in each of said other M subsets is a different sensor of said M sensors, and the measurement signals of each subset of sensors are processed with a respectively corresponding algorithm based on a state estimation model to determine for each subset of sensors the first and second estimate signals. In another embodiment, the system detects a faulty measurement signal by processing the measurement signals of each set of sensors to determine for each set of sensors a signal representative of a likelihood that at least one of said measurement signals of the corresponding set is a faulty measurement signal, determines the faulty measurement signal based on a function of said likelihood signals.



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