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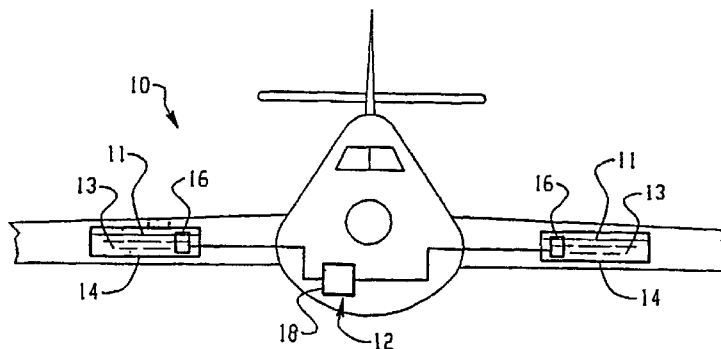
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(54) Title: A FAULT TOLERANT LIQUID MEASUREMENT SYSTEM USING MULTIPLE-MODEL STATE ESTIMATORS



(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.



WO 02/035185 A3