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# United States Patent [19]

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[54] **DIGITAL LIQUID LEVEL SENSING APPARATUS**

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[\*] Notice: This patent is subject to a terminal disclaimer.

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[21] Appl. No.: **09/044,419**

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[22] Filed: **Mar. 19, 1998**

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### Related U.S. Application Data

[63] Continuation-in-part of application No. 08/824,046, Mar. 21, 1997, which is a continuation of application No. 08/328,679, Oct. 25, 1994, abandoned, which is a continuation-in-part of application No. 08/143,834, Oct. 27, 1993, Pat. No. 5,406,843.

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[51] Int. Cl.<sup>7</sup> ..... **G01F 23/26**  
 [52] U.S. Cl. .... **73/304 C; 324/658; 702/55**  
 [58] Field of Search ..... **73/304 C; 324/658, 324/665; 340/618, 620; 702/52, 55**

### [57] ABSTRACT

A digital liquid level sensing apparatus for detecting variations in the dielectric of a substance being sensed, to thereby provide a signal indicative of the level of the liquid being sensed in relation to a known full level. The apparatus includes a reservoir having an output plate and an input plate assembly associated therewith. The input plate assembly includes a plurality of independently electrically excitable input plates which transmit a signal through the liquid being sensed to the output plate. The signals from the output plate are processed and a determination is made as to the level of liquid in the reservoir relative to a known full level. If the input plate assembly is located against the exterior surface of one wall of the reservoir, then both of the interior and exterior portions of that particular wall should be devoid of any metallic surface. In an alternative embodiment, a discardable interior reservoir is provided which fits nestably within the reservoir of the sensor. The interior reservoir is particularly useful for measuring water-based bodily fluids such as urine, where it may be desirable to discard just the reservoir after use.

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12 Claims, 7 Drawing Sheets

