A NON-INTRUSIVE MAGNETICALLY COUPLED SENSOR FOR MEASURING LIQUID LEVEL

IITM Technology Available for Licensing

Problem Statement

- Liquid level sensing is vital across various industries, but existing methods, including inductive systems, often require contact with the liquid or space above it, limiting their applicability, especially in sealed containers.
- Current inductive level measurement systems face challenges such as the need for free space above the liquid, wired connections, and limitations in measuring liquid levels in closed airtight containers, hindering their effectiveness and versatility.
- There's a demand for a non-intrusive liquid level sensor capable of accurately determining levels in sealed containers without requiring direct contact with the liquid or wired connections, addressing the limitations of existing methods and expanding applicability.

Intellectual Property

- IITM IDF Ref. **1980**
- **IN 491078 - Patent Granted**

Technology Category/ Market

Category - Sensor Technology
Applications- Non-intrusive inductive sensor for liquid level measurement.
Industry- Chemical and Petrochemical, Food and Beverage
Market - Global fluid sensors market size is expected to reach $22.22 Bn by 2028 at a rate of **8.7% CAGR**.

Research Lab

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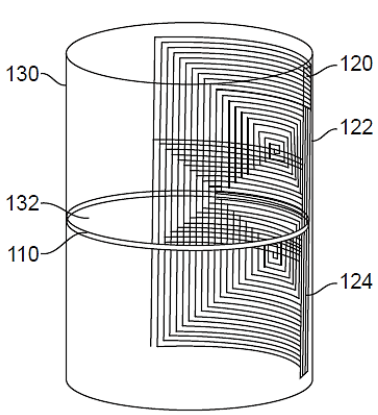

FIG. 1A

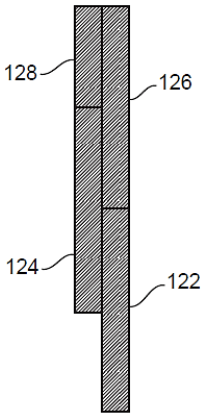

FIG. 1B

FIG. 1A illustrates a non-intrusive sensor apparatus for determining liquid level in a sealed container. FIG. 1B shows the read-out coil arrangement for more than two coils.

Technology

- The invention presents **a linear non-intrusive inductive sensor** for determining liquid level in sealed containers.

The sensor utilizes mutual inductance between the floating coil and planar coils of the read-out arrangement to determine liquid level. By measuring the mutual inductance at each planar coil with reference to the floating coil, the sensor calculates the liquid level as a ratiometric function of these mutual inductances.

A measurement circuit is integrated into the sensor, featuring components like capacitors and switches to measure and calculate mutual inductance values. An algorithm is employed to process these values and produce an output signal proportional to the liquid level, offering a resolution of 0.73 mm.

TRL (Technology Readiness Level)

TRL - 4: Technology validated in lab scale.

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Key Features / Value Proposition

1. **Non-Intrusive Liquid Level Sensing:**
   - Offers non-contact measurement within sealed containers, ensuring no disruption to the liquid's environment.

2. **Enhanced Accuracy with Mutual Inductance:**
   - Utilizes mutual inductance between floating and planar coils for precise and reliable liquid level determination.

3. **Versatile Deployment Options:**
   - Can be installed either externally or internally within containers, providing flexibility in application.

4. **Integrated Measurement Circuitry:**
   - Incorporates a measurement circuit to accurately assess mutual inductance values for real-time liquid level monitoring.

5. **Advanced Algorithm for Output Signal:**
   - Employs an algorithm to process data and generate output signals proportional to liquid level, enhancing measurement precision.

6. **High Resolution for Detailed Monitoring:**
   - Delivers a resolution of 0.73 mm, enabling fine-grained monitoring of liquid levels for various industrial applications.

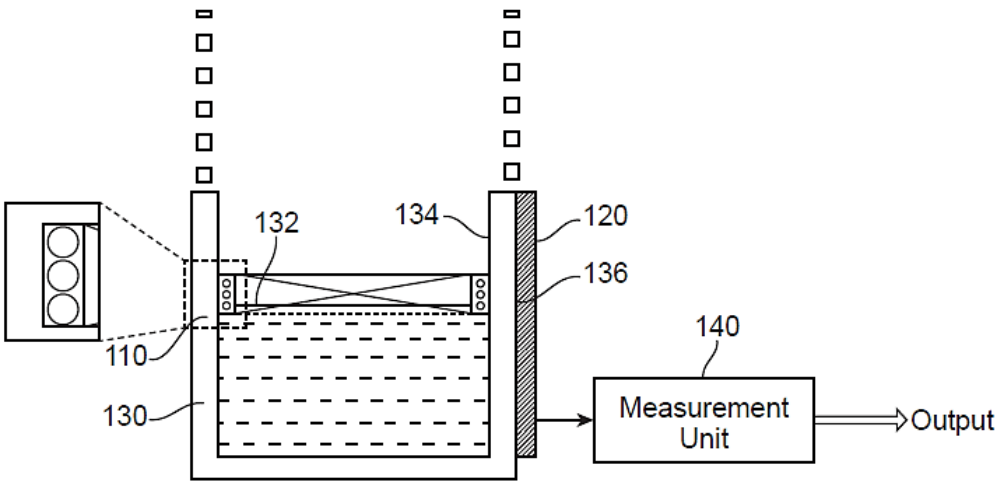

FIG. 1C

FIG. 1C illustrates a cross sectional view of the non-intrusive measurement setup with floating coil and readout coils in place.

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