

CLAMPING MECHANISM FOR FUEL CELL IITM Technology Available for Licensing

Problem Statement

- In present era, there is a need for long-lasting portable power sources, & discussing the solutions like high power portable applications employ stacks of Direct methanol fuel cell (DMFCs) with forced airflow on the cathode side & forced methanol flow on the anode side.
- However, such DMFC do not meet the requirements for **low power battery replacement applications**. Further ABDMFC face major problem of **reactant leakage** which ultimately affect the cell performance.
- Hence, there is a need to address the issues.

Technology Category/ Market

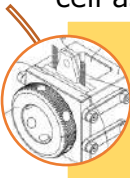
Technology: Clamping Mechanism for fuel cell;

Industry & Application: Energy, Portable Power Sources in portable consumer electronics;

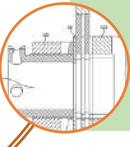
Market: The global **fuel cell** market is projected at a **CAGR of 21.7%** during 2024-2028)

Technology

- Present invention describes a passive air breathing direct methanol **fuel cell** (ABDMFC) that has a central clamping cylinder to clamp membrane electrode assembly(MEA) layers to a reservoir.
- Said **fuel cell** comprising a **housing** including a **1st** chamber forming a **liquid reservoir** configured to hold a **liquid fuel**, & a **2nd** chamber configured to **accommodate** a removable **electrode holder assembly**, including associated parts & a multiple fuel cell assembly shown in smart chart.



2nd Chamber having **1st sidewall** with an opening to allow liquid access from the reservoir to the electrode holder, & **2nd sidewall** having a centralized threaded opening;



A **multiple fuel cell** is fabricated by **stacking two or more fuel cells** that share a common liquid fuel **reservoir**.

- In the fuel cell, the **threaded opening** is configured to receive a single hollow screw configured to hold the electrode holder against the first sidewall to provide a **leak-tight joint** at the first sidewall.
- Moreover, the **multiple-cell assembly** comprises a **reservoir of liquid fuel** with a **wall** having **two or more openings** therein & wherein each opening is configured to provide **access** to one or more cells.
- The exploded view of the AB-DMFC single cell depicting the various components is shown hereinbelow:

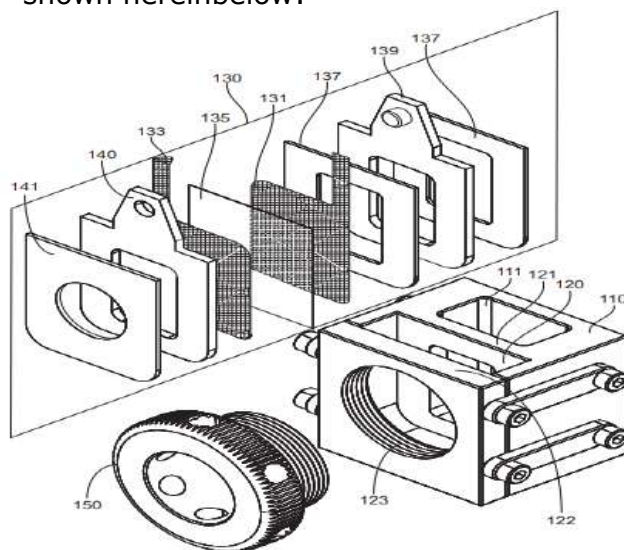


Fig. 1: Exploded view of the AB-DMFC single cell

Intellectual Property

IITM IDF Ref. 1932; Patent No:460466;

TRL (Technology Readiness Level)

TRL-4, Proof of concept tested in Lab;

Research Lab

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Key Features / Value Proposition

❖ Technical Perspective:

- ❖ Provides **simple, compact, high performance** passive air breathing direct methanol fuel cell.
- ❖ Facilitates a **facile clamping mechanism** to **prevent leakage** & **reduce** the contact resistance between the **cell components**.
- ❖ **Liquid Fuel:** Said liquid fuel consists of **methanol, ethanol, isopropanol or formic acid**. Further, the fuel cell or the multiple fuel cell assembly is configured to **operate with any liquid fuel**.
- ❖ **Fuel Cell Assembly:** Said assembly consists of one or more gaskets configured to provide sealing between the electrode assembly and the wall of the reservoir.
- ❖ **Electrode Holder Assembly:** First electrode holder & second electrode holders are configured to **mechanically interlock** with each other to form an **integral unit**.
- ❖ **1st electrode holder** is configured to **allow liquid fuel access** to the anode,
- ❖ **2nd electrode holder** is configured to **allow air access to the cathode** through openings therein, and
- ❖ **End plate** configured to receive a bearing surface of the hollow screw & to convey pressure to the electrode holder assembly against the wall of the reservoir when the screw is tightened.
- ❖ **Efficiency:** The cell is operated at **room temperature or higher** than room temperature in efficiently.

❖ Industrial Perspective:

- ❖ **Cost-effective Plug & play solution.**
- ❖ **Applicable** as portable power sources in portable consumer electronics like **smartphones, tablets** & other handheld devices that may need power for a long-time.

Image

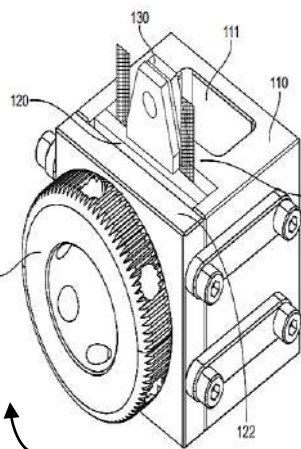


FIG 2: Illustrates a schematic configuration of the planar AB-DMFC single cell.

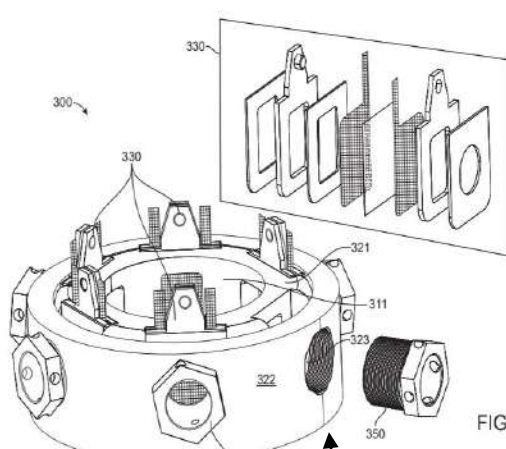


FIG 3 : Illustrates schematic configuration of a 6-cell planar AB-DMFC

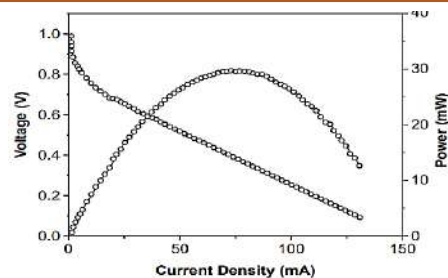


Fig.4:Shows performance of the 2-cell AB-DMFC;

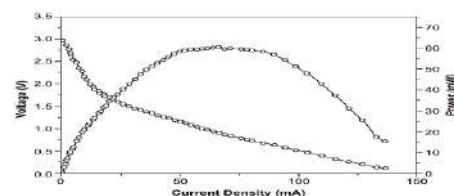


Fig.5:Shows performance of the 6-cell AB-DMFC;

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