

A Positive Displacement Pump and a Method of Fabrication Thereof IITM Technology Available for Licensing

PROBLEM STATEMENT

- In the present era, a centrifugal pump is a common example of non-positive displacement pump, & mainly used for low pressure and high-volume flow application however having issues related to not capable of achieving **high pressure**, therefore said pumps cannot be used in **fluid power Industries**.
- Further, the positive displacement pumps are more complex and difficult to maintain than centrifugal pumps. Positive displacement pumps are less able to handle **low viscosity fluids** than centrifugal pumps.
- Hence, there is a need to address the above issues in efficient manner.

INTELLECTUAL PROPERTY

IITM IDF Ref. 2347; IN Patent No:420151

TECHNOLOGY CATEGORY/ MARKET

Technology: Positive displacement Pump

Industry/Applications: Automobile Industries, Manufacturing Chemicals, Energy/Infrastructure;

Market: The global positive displacement pumps market is projected to grow at a **CAGR of 4.8%** during **2024-2030**.

TECHNOLOGY

- The present invention describes a **Positive displacement pump and a method of fabricating a positive displacement pump**. (Refer Fig.1)
- Said **positive displacement pump** comprising a **housing** characterized in that the housing comprises an **auxetic structure** of a predefined dimension and a **driving unit** configured to **compress and decompress the auxetic structure**, thereby resulting in **pumping of the fluid**.

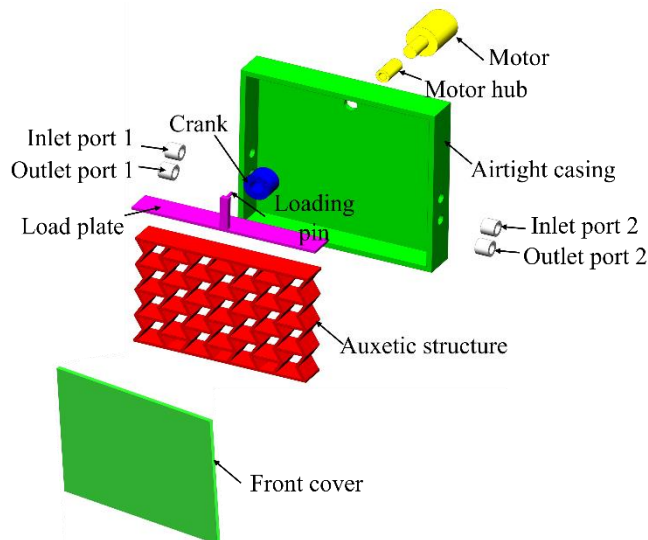


FIG.1

- Said auxetic structure material comprises **hyperelastic material** comprising at least one of thermoplastic polyurethane or rubber.
- In addition to this, said **driving unit** comprises a **motor, a crank and a load plate**.
- Further said method comprising a few steps mentioned hereunder:
- **Providing a housing** comprises of an auxetic structure and a driving unit;
- **Compressing** the auxetic structure by the driving unit in a lateral direction, **resulting in Fluid flow** into the housing via at least one inlet port; and
- **Decompressing** the auxetic structure to discharge the fluid out of the housing via outlet port;
- thereby **resulting in pumping of the fluid**.

TRL (TECHNOLOGY READINESS LEVEL)

TRL-2/3, Proof of Concept ready

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IMAGE

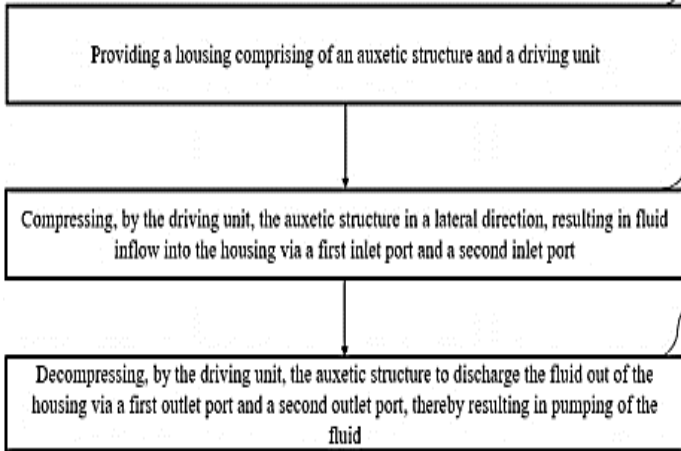


FIG.2(above): Illustrates a method for operating a positive displacement pump;

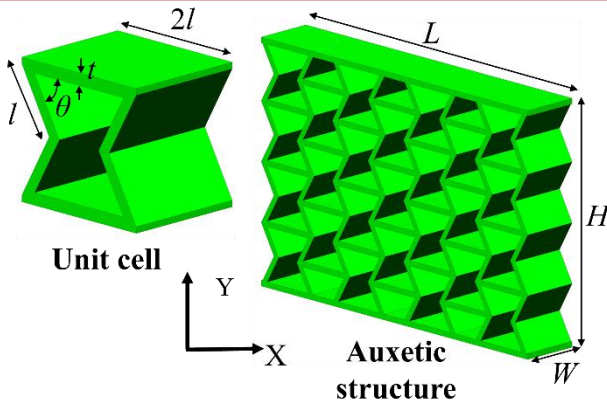


Fig. 3(above): Illustrates a unit cell and auxetic structures with dimensional parameters;

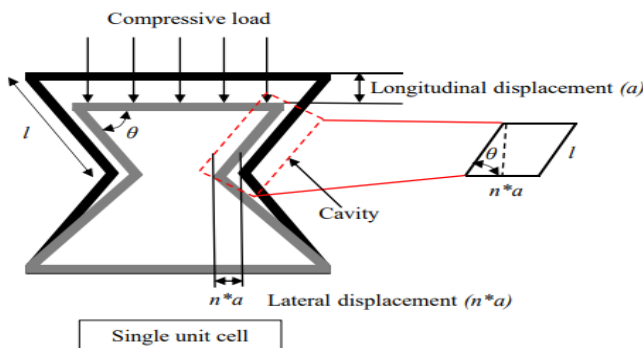


Fig.4 : Illustrates deformation behavior of the single unit cell (FIG. 3) of the auxetic structure;

RESULT

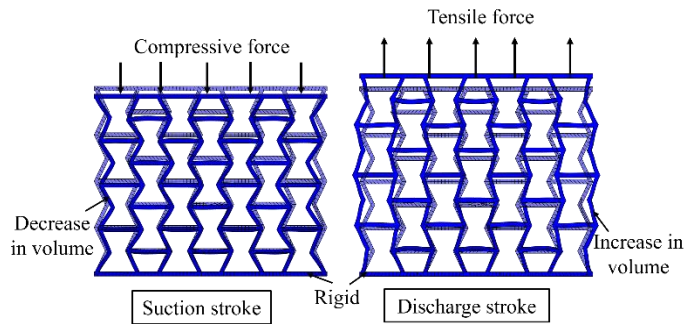


Fig. 5: Illustrates a unit cell and auxetic structures with dimensional parameters;

KEY FEATURES / VALUE PROPOSITION

❖ *Technical Perspective:*

- Claimed Patented technology provides an **auxetic structure** for pumping fluid.
- Further provides a pump for **transfer of fluid** with **low, medium, and high viscosity**.
- **Simple design**, and less rotating and reciprocating parts.
- The **flowrate changes** with change in **design parameters of the auxetic structure**, possible to **control** the flow rate from **milliliter/min to liter/min**.
- The material used in fabrication of **auxetic structure** is thermoplastic polyurethane (TPU), which is **chemically inactive**.
- Provides suitable reactive chemical transfer.

❖ *Industrial Perspective:*

- Provide fabrication of a **cost-effective pump** for **larger range of pressure and flowrate**.

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