



Ferrofluid Piston for Compressors and Expanders

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Improving the Liquid Piston with Ferrofluid

The disadvantages of liquid pistons can be overcome by using a ferrofluid as the volume displacing liquid along with a magnetic field. The ferrofluid is stabilized by applying an appropriately oriented magnetic field. This stabilizing force helps to prevent splashing and droplets and allows the machine to be operated at frequencies an order of magnitude faster than the operation with a non-magnetic fluid. When combined with heat transfer material in the compression/expansion chamber, the result is a more efficient and more power dense machine than one with a comparably sized solid piston.

MN-IP Try and Buy

Try

- Trial Period: up to 24 months. \$6,000/6 months.
- Fee waived if MN-based company or if sponsoring \$50,000+ in research.
- No US patent costs during trial.

Buy

- \$50,000 conversion payment.
- 2% royalty after \$1 million of product sales, 1% for MN companies

Liquid Piston Disadvantages

Liquid pistons can be used in place of solid pistons in compressors and expanders in order to allow the chamber to take non-cylindrical shapes or to be filled with porous material. This can improve the thermal performance of the device, increasing its efficiency. Frequency of liquid piston operation is limited by the stability of the liquid. High velocities cause splashing and gas entrainment, adversely affecting efficiency, compression ratio, and transfer of the working gas.

BENEFITS AND FEATURES:

- Machine can operate at higher velocity, increasing power density
- Stable fluid allows working chambers to be designed to significantly increase the efficiency of compression/expansion cycles
- Improved performance allows redesign for smaller and more cost effective machines

APPLICATIONS:

- Compressors
- Expanders
- Heat engines

Phase of Development Limited Proof of Concept

Researchers

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