

HIGH TEMPERATURE DOWNHOLE MOTOR

U.S. Patent App. No. 15/090,282 Modular Fluid Powered Linear Piston Motors with Harmonic Coupling
Technology Readiness Level:4

Basic technological components are integrated to establish that the pieces will work together

HIGH TEMPERATURE DOWNHOLE MOTOR FOR GEOTHERMAL WELLS

Drilling costs amount to over half of the total cost of geothermal energy production. To address the high cost of well construction, Sandia engineers are developing a high temperature downhole motor that provides a high-power downhole rotation solution for directional drilling. Commercially available downhole motors, such as Positive Displacement Motors (PDM), rely on elastomeric material, limiting operations to approximately 350°F or less, making them unreliable for extended use in geothermal wells. Sandia's downhole motor is designed using proprietary advanced materials to withstand prolonged exposure to high temperature and pressure. Unlike conventional drilling motors, this motor allows for downhole directional control when drilling high temperature formations, resulting in preferential targeting of geothermal resources.

Sandia's downhole motor works by converting longitudinal oscillatory motion of a piston into uniform rotational motion, in turn powering the attached drill bit. High pressure fluid (gas or liquid) is pumped from the surface downhole to the piston, causing the piston to cycle. The axial motion of the piston is then converted into rotational motion in a rotor. All rotor components remain on the centerline, ensuring no dysfunctional lateral vibrations are introduced into the drillstring.

This novel downhole motor has the ability to produce wells with multilateral completions resulting in improved geothermal resource recovery and well construction economics, thus making geothermal a more affordable alternative energy source. Additional applications for high-torque linear motors have also been conceived.



TECHNICAL BENEFITS:

- Reliable access to deep, hot geothermal resources
- Cost-efficient, durable
- Directional control during drilling
- Geothermal wells with multilateral completions
- Decreased environmental impact
- Reduced lateral vibrations

ADDITIONAL APPLICATIONS:

- Mobile hydraulics (construction equipment)
- Oil & Gas
- Auto Industry
- Aerospace

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