**PROVISIONAL PATENT APPLICATION -1**

**ASSIGNED TO MISSING LINK TECHNOLOGY, LLC**

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**Mud motor** (or Drilling Motor) refers to a [Progressive Cavity Positive Displacement Pump](http://en.wikipedia.org/wiki/Progressive_cavity_pump) placed in the [Drill string](http://en.wikipedia.org/wiki/Drill_string) to provide additional power to the bit while drilling. The PCPD Pump uses [Drilling Fluid](http://en.wikipedia.org/wiki/Drilling_Fluid) (commonly referred to as Drilling Mud, or just Mud) to create eccentric motion in the power section of the motor which is transferred as concentric power to the [drill bit (well)](http://en.wikipedia.org/wiki/Drill_bit_(well)). The Mud Motor uses different rotor and stator configurations to provide optimum performance for the desired drilling operation, typically increasing the number of lobes and length of power assembly for greater horsepower. In certain applications, compressed air, or other gas, can be used for Mud Motor input power. Normal rotation of the bit while using a Mud Motor can be from 60 rpm, to over 100 rpm.

**Normal construction**

Normal Mud Motor construction consists of a top sub, which connects the Mud Motor to the Drill String; the Power Section, which consists of the Rotor and Stator; the Transmission Section, where the eccentric power from the rotor is transmitted as concentric power to the bit; the Bearing Assembly which protects the tool from off bottom and on bottom pressures; and the bottom sub which connects the Mud Motor to the bit.

The use of Mud Motors is greatly dependent on financial efficiency. In straight vertical holes, the mud motor may be used solely for increased Rate of Penetration (ROP), or to minimize erosion and wear on the drill string, since the drill string does not need to be turned as fast.

The majority of Mud Motor use is in the drilling of Directional Holes. Although other methods may be used to steer the bit to the desired target zone, they are more time consuming which adds to the cost of the well. Mud Motors can be configured to have a bend in them using different settings on the motor itself. Typical Mud Motors can be modified from 0 degrees to 4 degrees with approximately six increments in deviation per degree of bend. The amount of bend is determined by rate of climb needed to reach the target zone. By using a Measurement While Drilling (MWD) Tool, a directional driller can steer the bit to the desired target zone.

**Major disadvantage in oilfield applications**

Drilling operations are being conducted at much deeper depths where the temperature and pressure is beyond the performance characteristics of the the PCPD stator. The temperature and pressure at these depths degrade the [elastomer](http://en.wikipedia.org/wiki/Elastomer) used in the stator portion of the PCPD pump. Most of PCPD pump failures are due to this elastomer part. Having said that, the operating conditions and environment should not degrade or induce mechanical failure of the elastomer part for the life of the equipment. Unfortunately, the industry to date does not have elastomers that can last longer, resisting abrasive fluids and solids, and withstand deflections in operating temperatures. The most common elastomer grades used for this application are the NBR (Nitrile or Acrylonitrile Butadiene Rubber) grades, which perform moderately well, but fail at temperatures exceeding 350 degF. It is the intention of this patent to result in the development of mud motors that will make it possible to drill at depths where temperatures are greater than 350 deg F and pressures exceed 10,000 psig.

Claims:

1. A PCPD pump comprised of a stator and a rotor having a unique combination of elastomer blends coated on the surface of each or both, where the coating is comprised of Polyamide, Polysulfone or Polyimide.
2. A stator being molded, extruded or machined of metal, having “rifling” twist of 1 twist per 7 inches up to 1 twist per 36 inches.
3. The said stator having a “rifling” consisting of a minimum of 3 lobes.
4. The said stator having an elastomeric material coating consisting of Polyamide, Polysulfone or Polyimide or any combination thereof coating on the inside surface of the stator, having a coating thickness from 0.02 mils to 1 inch.
5. The rotor being molded, extruded or machined having lobes of 1 less than that of the stator. i.e. rotor has 9 lobes; stator will have 8 lobes.
6. The said rotor having the twist equivalent to that of the stator
7. The said rotor having a diameter to fit inside the stator. The elastomeric material coating consisting of Polyamide, Polysulfone or Polyimide or any combination thereof shall have

A STATOR HAVING A COATING OF ELASOMERIC MATERIAL COMPRISED OF POLYSULFONE, POLYAMIDE OR POLYIMIDE OR A COMBINATION THEREOF.

