



TECHNOLOGY READINESS LEVEL: 5

KEY ELEMENTS HAVE BEEN DEMONSTRATED IN RELEVANT ENVIRONMENTS.

US PATENT # 8,006,776

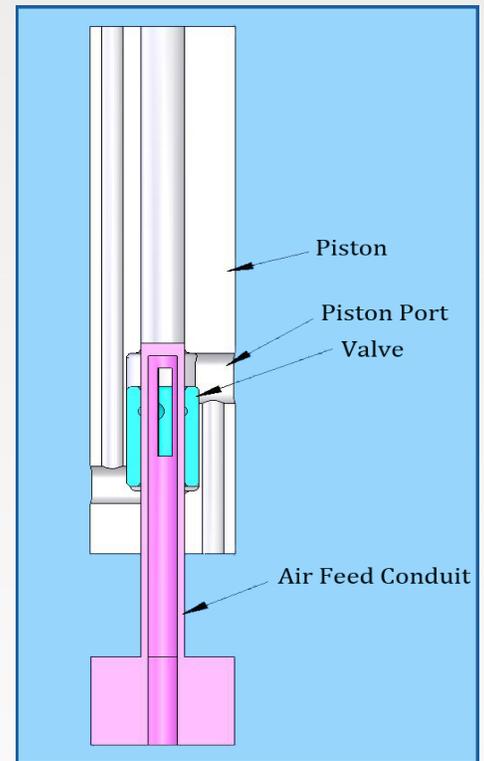
US PATENT # 8,176,995

TECHNOLOGY SUMMARY

Sandia National Laboratories has developed a sliding feed tube pressure control valve for reciprocating hammer drills that is more efficient and produces more drilling power. In the current valveless designs, the reciprocation of the piston is accomplished by inputting high pressure air into either the power chamber or the return chamber of the case. There are existing designs that attempt to regulate the air flow, however they do not use the total air energy that is available due to inefficiencies in the design. The SNL design greatly reduces these inefficiencies.

The present invention uses a novel valved hammer configuration. The presence of the valve in the new design has several benefits, which include:

- The ability to make the timing of air flow to the drill chamber balanced with respect to the power and return stroke of the piston.
- The ability to control the point during the power stroke at which air flow from the feed tube to the power is terminated, which provides the ability to pressurize the power chamber over a longer extent of the overall stroke, improving overall efficiency.
- The ability to control the point during the stroke at which air flow from the feed tube to the power chamber is initiated during the return stroke, creating a power chamber pressurization point that is farther from the piston impact point, which allows for a greater overall piston stroke.
- The ability to control the point during the stroke at which air flow from the feed tube to the return chamber is initiated during the power stroke, creating an initiation point that is closer to the piston impact point, which delays the pressurization of the return chamber prior to piston impact. This causes the piston to decelerate, which reduces the energy transmitted during impact.
- The ability to control the point during the stroke at which air flow from the feed tube to the return chamber is supplied during the return stroke, allowing for a pressure supply point that is farther from the piston impact point, which can produce a longer overall piston stroke.



POTENTIAL APPLICATIONS

- Oil and Gas
- Mining
- Exploratory Drilling

TECHNOLOGICAL BENEFITS

- Higher Overall Efficiency
- Asymmetric timing of both the power chamber and the return chamber
- Provides for a hammer exhaust hole cleaning mode, which prevents damage to the hammer

TECHNOLOGY INQUIRY?

For more information or licensing opportunities contact us at

[**ip@sandia.gov**](mailto:ip@sandia.gov)

Refer to SD # 10955

OR

[**https://ip.sandia.gov**](https://ip.sandia.gov)