IMPROVED SAFETY FOR GROUND SUPPORT INSTALLATION IN NARROW VEIN MINE CONDITIONS WITH A MECHANIZED BOLTER

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ISSUES ASSOCIATED WITH HAND DRILLING/JACKLEGS

In coal mines, hand held air, electric, and hydraulic powered drills are used along belt conveyors, in single entry development, in entries where there are obstructions, and in long wall recovering bolting. In hard rock mines pneumatically powered "jack leg" drills are typically used in narrow vein mining. Drilling and bolting in narrow confines has traditionally been performed with pneumatically or hydraulically powered hand-held drills or newer electrically powered hand held hammer due to their low cost, simplicity of operation, and extreme flexibility due to their small size. Mechanized equipment has typically been too large, too expensive, inefficient due to the confined space, and too restrictive due to lack of flexibility for use in narrow confines.

Although the hand-held equipment is effective, it requires operator exposure to certain inherent hazardous conditions in use. These include falling rock from the roof, rib, and face; tripping hazards; bending twisting lifting hazards; high noise levels; and chemical fumes from the pneumatic exhaust. The operation of the hand held equipment can adversely affect the long-term health of the operator – continual jackleg operation frequently results in long term damage to hearing, shoulders, arm and wrist joints, and back injuries. This results in a reduction in life style for the operator and higher personnel turnover rates for the mining company.

Hand held drills also typically have limited thrust and torque capability which limits their ability to push long resin bolts, inadequate torque to properly install resin bolts, or to properly torque mechanical or tensioned rebar bolts. Hand held drills do not offer any type of protection for the operator from roof or rib falls. They do not offer any means for handling roof or rib mesh. Since the operator stands on the ground the maximum safe drilling height without use of a ladder or "riding the drill" is limited to 8' (2.44M).

FLETCHER PROVIDES SOLUTION WITH NARROW BOLTER

Purpose built mechanized equipment with adequate flexibility has the possibility to improve workplace safety, reduce operator exposure compared to hand-held equipment, and provide improvements to the health of the underground miners in coal and metal / non-metal mines. Fletcher began developing a new generation of narrow machines in 2012 with the intent to improve safety for workers installing ground support in narrow vein operations and also in confined areas in coal such as along belt conveyors, in single entry development, or in tailgate areas where existing supplemental support may prevent use of a wider machine.

Fletcher developed and has proven in field trials, a narrow (4'6" – 1.37M wide) rubber tired, articulated chassis, lifting boom type, "man up" roof bolter for installing ground support in entry widths down to 6.5' (1.98M) wide and up to 14.5' (4.4M) high. With the machine being rubber tired and having a tram speed in excess of 4 MPH (6.4 Km/Hr.) it can quickly tram relatively long distances and also provide an efficient means of installing supplemental support in haulage and transportation entries. This machine compliments an existing 4' (1.22M) wide machine which uses crawlers for tram.

Three machines of this type were built in 2013 and operated over a 1 year period in Platinum and gold mines and a 4th is now being built for use in a nickel mine. Although these machines were originally developed for specific hard rock applications, they also have a variety of applications in coal mines including supplemental and cable bolting.

Figure 1. Hand held drill, or "jack leg"drill.

OPTIONAL EQUIPMENT

The machine can be equipped with a rotary or rotary percussive drill head. It can be equipped with water flushing or a vacuum type dry dust collection system. The drill mast (feed) can be made in various lengths. Currently it utilizes a very short rotary percussive hydraulic hammer (20.25" - .51M tall) on a double telescopic feed frame