

of barrels in any selected sequence. Mud pressure interruption for cartridge firing control may be by a suitable mechanical hook-up which translates the mud pumping "start" and "stop" pressure signals to a fire or activation signals.

The various features and advantages of the invention are thought to be clear from the foregoing description. However, various other features and advantages not specifically enumerated will undoubtedly occur to those versed in the art, as likewise will many variations and modifications of the embodiments illustrated herein, all of which may be achieved without departing from the spirit and scope of the invention as defined by the appended claims.

We claim:

1. In a drilling apparatus utilizing drilling mud under pressure and comprising drill string and drill bit, and improvement comprising:

at least one barrel from which projectiles may be impelled;

at least one magazine for containing a plurality of said projectiles;

means responsive to drilling mud pressure for moving a projectile from said magazine into, through, and out of said barrel; and

means integral with said projectile for firing said projectile upon its exit from said barrel to impel said projectile into rock to be drilled.

2. An apparatus comprising:

drill string;

drill bit; and

projectile firing means for fracturing rock in the path of the drill bit, said projectile firing means comprising a barrel, tubular magazine means for storing projectiles, and revolvable means for receiving projectiles from said magazine means and for positioning them for chambering into said barrel.

3. The invention of claim 2 further comprising means for controlling said projectile firing means with mud pressure.

4. The invention of claim 3 wherein said revolvable means comprises mud gates which when closed direct mud flow to force a projectile through and out of said barrel.

5. The invention of claim 4 wherein said gates, when open, direct mud over the drill bit to lubricate it and to remove drilling debris from the vicinity thereof.

6. The invention of claim 5 wherein said revolvable means further comprises a piston assembly and means for biasing said piston assembly at the top of its stroke, said piston assembly comprising a chamber open to mud flow such that mud flow thereinto forces said piston assembly to the bottom of its stroke to revolve said rotatable means to open said mud gates.

* * * * *

35

40

45

50

55

60

65