

High Speed Production of Large Coal, to Facilitate Easier and More Effective Cleaning

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Abstract: Most modern underground mining equipment extracts coal using drum-mounted picks that are rotated as they are forced into the coal seam, thus grinding the coal from the solid. Once it is broken free the machine loads it onto an adjacent conveyor that is the first in a series that then carry the coal away from the mining face, and ultimately out of the mine. This mining process produces coal that is quite small in average size and generates significant quantities of dust during the actual removal of the coal from the solid. The presence of fine dust, and the potential for sparks, should a pick strike any sandstone or similar rock embedded in the coal, can ignite methane emitted from the coal, and this can cause explosions with injuries and fatalities.

Finely ground coal is also more expensive to collect and process to remove contained contaminants. Where a series of high-pressure waterjets are used to profile the edge of the cut being made by the machine, much of the force required for mining is removed. In addition these water jets have been shown to provide a product that is larger in size, while concomitantly eliminating the generation of dust and sparks. The jets can cut into the coal to a depth of over a foot ahead of the leading edge of the machine, giving a high leverage to the advancing force, and this breaks the defined web of coal, without the need for picks to fragment the block into smaller pieces. Because the water infuses the coal as it is cut, there is no dust generated, and the coal block breaks into transportable pieces that are larger than conventional mining produces, and thus easier to clean of the major inclusions of rock that are often found embedded in the coal.

Two different mining machines are described, one for use on longwall faces and one in room and pillar mines, and the stages of their development are discussed.

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