Miner's Safety Lamp Encyclopedia Article

Miner's Safety Lamp

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Contents

Miner's Safety Lamp Encyclopedia Article.....1

Contents.....2

Miner's Safety Lamp.....3

Miner's Safety Lamp

Coal mining has never been a very safe job, but it is much less risky today, thanks to an invention called the miner's safety lamp. The first lamp of this kind was invented by Sir Humphry Davy, an English chemist, in 1815. At that time, the industrial revolution had begun to transform England, and the demand for coal sharply increased as railroads, steam engines and other new technologies dependent on the fuel were introduced. As coal mines became deeper and larger, hazards for miners increased--mainly the danger of explosions caused by a gas called "fire-damp," which seeps from coal seams. This flammable gas was ignited by the candles and lamps that miners carried to light their way. By 1812, explosions had become frequent and disastrous, killing hundreds of miners each year.

Davy was asked to help by a society that had been formed to prevent coal-mine accidents. After visiting mines, Davy analyzed the composition of fire-damp gas, which he confirmed was mainly methane, and determined its flammability limits, using the results of earlier studies by German chemist Theodor Grotthuss (1785-1822).

Within three months, Davy had invented the first safety lamp which enclosed an oil-burning flame within a wire gauze cylinder, topped by a double thickness of gauze. The finely meshed metal gauze dissipated the flame's heat, preventing the lamp from reaching a high enough temperature to ignite the flammable gas. Also, the lamp's flame grew higher in the presence of fire-damp, warning miners of the danger and giving them light to escape. At the time, this lamp was regarded as nothing short of miraculous.

Although Davy refused, as a humanitarian gesture, to patent his lamp, he grew jealous when George Stephenson claimed its invention. Davy's claim prevailed and he was made a baronet for his service to the mining industry. Many other scientists went on to improve the Davy lamp by using glass enclosures, perforated brass tops, and other variations. Since then, flammable gas detectors based on electricity and light have been invented, but modern versions of Davy's lamp are still used in coal mines today.