

Humphry Davy and the ‘murder’ lamp

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The miners’ safety lamp is an icon of the industrial revolution every bit as powerful and symbolic as Stephenson’s *Rocket* or the Iron Bridge at Coalbrookdale. It’s a beautiful object: polished brass and glass cylinder, magnetic lock, and the little naphthalene flame lit by a flint and wheel. You can still buy them new. That’s because even today every pit deputy must carry one despite the universal use of electricity for lighting collieries. The reason for this is that the safety lamp is first and foremost a methane detector; the colour and shape of the flame tells an experienced eye how much methane or ‘fire-damp’ is present in the atmosphere. That some concentrations of firedamp are more deadly than others has been known for two hundred years and more, since long before Sir Humphry Davy developed the lamp that bears his name.

The truth is, though, that the lamp designed by Davy was a very different thing from today’s version; it had no glass for one thing; the flame shone weakly through a wire gauze; there was no lock, either, to prevent injudicious hands from opening it. Those of us brought up on the legend of the Davy lamp might also be surprised to learn that Davy was not the inventor of the safety lamp, and that his lamp was not actually safe. In the decades after its invention deaths in mine explosions actually increased. Like the industrial revolution itself, the real history of the miners’ lamp is complex, quirky and surprising.

Before 1812 miners used candles, or steel mills that created a stream of sparks. Mine ventilation was frequently inadequate to deal with unexpected pockets of gas, so explosions were commonplace; major incidents alone accounted for 558 deaths in Northumberland and Durham between 1786 and 1815 – minor explosions where only one or two men or boys were killed or maimed often went unreported. On May 25th 1812 a quite exceptional explosion occurred at Felling colliery near Jarrow on the south bank of the River Tyne. Ninety-two men and boys were killed in a tremendous blast that was felt miles away. It was several weeks before rescuers were able to reach the majority of the bodies. Prompted by this disaster a group of men founded the Society for Preventing Accidents in Mines, at Sunderland in 1813. The Society resolved to write to the most eminent scientist of the day, Sir Humphry Davy – pioneering chemist and secretary of the Royal Society. Could he apply his talents to the problem?

At that time Davy was travelling and lecturing on the Continent, but when he returned in 1815 he visited the north-east coalfields, conducted a number of experiments with fire-damp, and found that a flame protected by wire gauze from the gas-laden atmosphere would not ignite it. It was a great discovery. The size of the mesh was crucial, the subject of debate and experiment for decades afterwards. Indeed, the full complexity of the chemistry involved has only been established very recently.

Davy wrote to the Society and lectured on the principle of the gauze, to great acclaim. In January 1816 his first lamp was tried at Hebburn colliery near Jarrow, and pronounced a success. Davy

seems to have been delighted to contribute to the future welfare of miners, and refused to patent the lamp or receive remuneration for it. Thus far the story is straightforward. But Davy was not the only person who had been experimenting with lamps. The first to be built and introduced had been designed by a local Newcastle doctor, William Reid Clanny, whose lamp – which included a glass and a water reservoir through which air was pumped to isolate it – had been introduced in 1813 and won him an award from the Society of Arts. But it was a cumbersome thing, and required the employment of a pit-boy to operate it. Another lamp had been designed by none other than George Stephenson, who had just built his first locomotive at Killingworth colliery. Stephenson's lamp, introduced in 1815, utilised elements of both Davy's theory and Clanny's lamp, but was neither as robust as Clanny's nor as safe as Davy's until he made several modifications. Ever since, arguments have rumbled on about the primacy of the three basic lamp types, all of which saw use in mines across Europe: the Davy, the Clanny and the Geordie.

It matters little now. What does matter is that these lamps were responsible for more deaths in explosions. Some were caused by accidents – a lamp clumsily dropped breaking and exposing the naked flame; the gauze burning through and not being repaired properly; but, more ludicrously, others were caused by miners opening their lamps to light a candle or a pipe! Who knew if a pit might swallow up those who dared to enter its infernal depths? No wonder Grand Duke Nicholas of Russia, on being invited to descend the pit at Wallsend in 1816, shrank back from the edge of the shaft crying, "My God, it is like the mouth of hell!"

Since none of the three mass-produced early lamps embodied the later features that made these lamps truly 'safe', the debate about whose was better might be passed off as merely academic. That is, if one excludes a fourth lamp invented in about 1818. This was the brainchild of a celebrated local inventor and eccentric William Martin – champion swordsman, denouncer of Isaac Newton and other 'false prophets', and designer of the first spring balance and pneumatic life jacket. Martin, whose extraordinary family included the apocalyptic biblical painter John, and incendiary of York Minster Jonathan, took the view that none of the safety lamps he had seen were any good; indeed, he published tracts and lectured upon the subject of Davy and his 'murder' lamp. So he designed his own.

After a few modifications he had it tested at Willington colliery near Wallsend, where a group of pitmen signed an affidavit to the effect that this lamp was the best of the lot: it burned clearer and longer, and it was more robust than the others. They added, however, that they would stand to lose their jobs if they lobbied for its use; contracts benefiting both manufacturers and colliery 'viewers' being highly lucrative, the views of a small group of miners were of little consequence.

So despite much lobbying by Martin, and his brothers on his behalf, William Martin's lamp was effectively suppressed and never went into production. The only example appears to have been lost, though the drawings survive. It was a source of great bitterness throughout his life. More importantly, a corporate scandal that rings familiar bells two hundred years on led to the deaths of hundreds more miners. It was not until the mid-1830s that a government-appointed committee of inquiry investigated the causes of explosions in pits and Parliament began to seriously consider legislating on mine safety. And it was not until 1860, forty-eight years after the Felling disaster, that a law was passed regulating the design and use of the safety lamp in mines.