

Lighting and Lamps in the Mines

Creating light to work by in the mines was, until the discovery of how to make use of electricity, was always a problem. The trouble was that gasses which could burn or explode, called by the miners 'firedamp', often came from within the coal. A flame could, and often did, set off an explosion of the firedamp.

Two hundred years ago, when children worked in the mines, there were no batteries – they had not been invented. So there were no battery torches. There was no mains electricity as electricity generators had not been invented. In fact, light bulbs would not be invented until over a hundred years after the beginning of the industrial revolution and the boom in coal mining.

The little lighting that was available underground usually came from either candles, or lamps which used paraffin. Paraffin was often called lamp oil, so these were called oil lamps. But candles and oil lamps had naked flames, and often caused explosions by setting fire to firedamp gasses.

Fear of firedamp meant that many miners preferred to work in total darkness, rather than risk an explosion or a fire caused by the flame from a candle or from an oil lamp.

Sometimes the miners used rotting fish for light! Rotting fish often gives off a faint greenish glow (known as phosphorescence). But the light

from this was very poor and the smell must have taken some getting used to.

People thought and worried about how to make lighting which could be used in mines, but which would be safe and not risk explosions of the firedamp. In 1740 a mining engineer called Carlisle Spedding invented a machine which made sparks – similar to those made by sparklers sold for parties and fireworks nights.

Mr Spedding's machine was quite simple. The sparks were made by turning a metal wheel so that it rubbed against a particular type of rock called flint. When rubbed against metals such as steel, flint, which is an extremely hard rock, causes tiny bits of metal to fly off in white hot sparks. Spedding called his machine a 'flint mill'. Although better than candles or oil lamps, flint mills were not entirely safe. The sparks could still sometimes set off the firedamp and cause an explosion, but this was rather rare. They were much safer than naked flames. However, the light they gave off remained very poor.

On the next page is a picture by the artist Michael Prenelle of a boy using a flint mill to make sparks to allow miners to see in the dark of the coal mine.



Some mines were not troubled by firedamp. In these mines it was safe to use naked flames for light. Candles were often used, usually inside metal casings with glass windows to stop them from being blown out by drafts. The picture on the left shows a typical candle lamp. The casing not only protected the candle from blowing out in a draft, but also acted as a reflector, sending more of the light from the flame forward to where it was most needed.





A better light than that given off by candles was made by small gas lamps called carbide lamps. These used a chemical (calcium carbide) which when water is dripped on it gives off a gas called acetylene (or ethyne) which burns with a very bright light. This is a picture of a carbide lamp. Carbide lamps were used from about 1890, but because they had a naked flame they could only be used in mines without any dangerous gas.

Because of the danger of firedamp explosions being set off by naked flames, people tried to make a lamp that would be safe. The first lamp of the sort now known as safety lamps was invented in 1813 by an Irish doctor called William Reid Clanny. Sir Humphrey Davy, a famous scientist, and George Stephenson, a famous engineer, both made improvements to Dr Clanny's lamp which they each showed to the public in 1816. Their lamps too had their problems. Davy's lamp would rust in the damp of the mines, while Stephenson's had a glass window which could be easily broken. In either case, they became dangerous as they got old or were damaged, and could then set off an explosion.



The picture on the left is an early safety lamp. It is an oil (paraffin) lamp with a flame surrounded by wire mesh (gauze). The flame cannot get through the gauze and set off an explosion because the metal of the gauze cools the flame down too much. This is like the types of safety lamp invented by Sir Humphrey Davy and George Stephenson. While they had their problems, these lamps were very much safer than the candles that went before them, and very much brighter than the sparks from the flint mills.

Safety lamps continued to be used in mines until very recently. Not for light, because electric lights are now used, but to detect firedamp. Today, in modern mines, safety lamps for detecting gas have been replaced by more sensitive and convenient electronic sensors.



Over the years improvements were made to safety lamps. The one pictured here dates from about the middle of the last century. As soon as miners started to use safety lamps it was discovered that they had another use other than merely giving out light. By the way that the flame in the lamp burned the miners could tell whether the explosive gas, firedamp, was actually present and dangerous.



About the year 1900 electric lighting became available and was introduced into the mines. For a long time this was just fixed lights, and miners still had to rely a lot of the time on their own safety lamps with a flame inside. Only in the 1930s were battery-powered torches introduced. On the right is a typical modern miner's battery-powered lamp.

Lamps of the kind pictured above are usually clipped onto the miner's helmet, although often the miners would find it more convenient to carry it in their hand. The batteries, in the pack to the left of the helmet shown here, clipped onto the miner's belt. A big improvement from

the days of the faint and smelly glow from rotting fish.

It is said that people from the north-east of England are called Geordies because the miners here used Geordie Stephenson's safety lamps, rather than Humphrey Davy's. The picture below shows modern miners in Easington Colliery, County Durham, shortly before it closed down. Note that each miner has a battery powered lamp attached to his helmet, the battery packs clipped to their belts at their backs. They are sitting upon a huge machine used for drilling out the coal.

