

# **BLACK DIAMOND**

## A Pictorial History of Coal

By

John Dorian Evans



John Dorian Evans (above) is a former miner from Ammanford. While working in local coal mines he obtained his Degree, Masters Degree and PhD. He is currently a County Councillor for Carmarthenshire County Council in South Wales.

# Contents

1	Preface
2	Some basic facts about the coal industry
3	Energy in the mines
4	Water and coal mines
5	Coal extraction on hand fill and machine cut coal faces
6	Winding Gear
7	Coal Extraction Methods.
8	Roadway construction machines
9	Boring machines
10	Underground transportation
11	Roof supports
12	Communication Systems in The Coal Industry
14	Methane gas
15	First Aid
16	Other Tools used Underground
17	Coal preparation
18	Shot firing
20	Art in the industry
21	The Colliery Surface
22	How a Collier Dressed.
23	Mining museums
24	Poems

# Poems

## **The Price Of Coal**

God gave us coal from the earth.  
The questions is, what is it worth?  
In life and limb it is a hard price to pay.  
To the miner, it is a job at the end of the day.  
Technology brought us this industry  
To extract the coal that was once vegetation from a tree.  
The industry has all but gone.  
At Betws Colliery the sun once shone.  
To the men that worked there it is an accolade  
And the end of the shift is a message once more obeyed.

## **When Mother Earth Limbers**

The creaking roof the cracking timbers.  
These are the sounds when mother earth limbers.  
Such noises are commonplace  
But to the miner they wipe a smile off his face.  
The rumble of rock in the gob  
Is a sign to the miner of less pressure from above.  
When the shift is done and on the Spake we do go  
We are grateful to God that he has spared us once more.

## **When The Pit Closes**

We all marched to the Colliery gates.  
This may be the last time we see our best mates.  
We fought hard to keep the pit open  
But to no avail, the pit will not re-open.  
We went through the lamp room on that day  
Subdued and broken, like a strand of Hay.  
Men had tears in their eyes  
As we went to our cars we said our last goodbyes.  
Down to the dole office we did go  
But for some of us too old we will work no more.  
King Coal someday will come back  
But for some of us we will not come out of the sack.

## Glossary

<i>Mandrel or Pick Tool</i>	Used to hack out Coal.
<i>Shovel or Banjo Tool</i>	Used to fill Coal.
<i>Sylvester or Puller</i>	Used for pulling heavy equipment.
<i>Bow saw</i>	Used to cut wood.
<i>Measuring stick</i>	Used to measure timber.
<i>Hatchet</i>	A tool used to notch wood.
<i>Jigger</i>	Used to cut Coal and rock.
<i>Dowty</i>	Used as a roof support.
<i>Fish plates</i>	Used to hitch steel arches or rails.
<i>Pair of timbers or Post and Sling</i>	A form of roof support.
<i>Chocks</i>	Wooden square roof supports.
<i>Blue Boy</i>	Nickname for methane gas.
<i>Arch or Ring</i>	Used as a roof support.
<i>Strut</i>	Used to secure steel arches.
<i>Conveyor</i>	Used to convey coal to the surface by belt.
<i>Spake</i>	Used to convey men underground.
<i>Haulage</i>	Used to drive men and supplies underground.
<i>Roof Bolts</i>	Used to secure roofs

## Acknowledgments

Anna Nowak for her help with the pictures.  
Dolacothi Gold Mines Museum  
Big Pit Blaenavon Museum  
Lewis Merthyr Museum  
Cefen Coed Museum  
U.K. Mining Museum  
Afan Argoed Museum  
Kidwelly Industrial Museum  
U.K.Mining  
Ammanford Mining Heritage Centre  
Roy Coleman for his help with the pictures  
Vernon Phillips for his assistance with the layout.  
Glanamman Library Glanamman Carmarthenshire  
Swansea Industrial and Maritime Museum.

I dedicate this book to my wife who has showed great patience in the compilation of the document. We look back now on the research phase with nostalgia, in that this task involved visiting the museums of coal mining that are cited in the acknowledgments.

# 1 Preface

Having worked in the coal industry from leaving school this book has been compiled as a reminder to future generations of the role of coal in the industry of the U.K. An attempt has been made to provide information on the coal industry in a manner that can be understood by a wide range of readership. The book draws on images from the coal industry and documentary evidence on facts relating to the industry. The reader should be made aware that different terms may apply to certain images in different parts of the U.K. Moreover, the book is not a definitive work on the coal industry; it attempts to capture the flavour of how coal has been produced.

John Dorian Evans B.A., B.A. Hons, M.A., M.Ed, PHD., P.G.C.E.

The Author Working At Betws Colliery



## 2 Some Basic Facts About The Coal Industry

### What is coal?

At first this seems an irrelevant question to ask but the book attempts to assume that the reader has no knowledge of what it is. Coal is compressed vegetation and this process has taken millions of years to evolve. The first stage is peat, which is a brown fibrous substance produced by the decay of vegetation found in bogs. It is the first transformation of vegetable matter into coal and contains high levels of water.

The next stage in the development of coal is lignite and is of wood-like appearance.

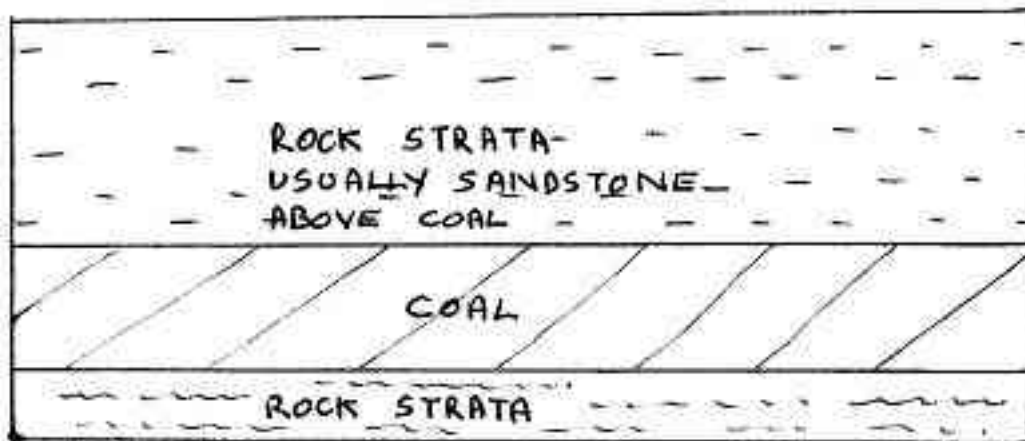
The third stage is bituminous and this is coal that shines. It has a higher carbon content than lignite but lower than anthracite coal. It is used as coking coal and gas can be made of it. It is used as steam coal as well.

Anthracite coal is shining black coal and is considered to be the coal of the highest rank. It contains the lowest proportion of water and volatile matter and the highest fixed carbon content. This kind of coal is to be found in West Wales mainly in the Amman and Gwendraeth Valleys.

### The Formation Of Coal

There are different kinds of coal and of different seam thickness

#### The formation of coal



NB: there are different kinds of coal seams and of different thickness. At Betws colliery there were 14 different kinds of coal seams

Some of the uses that can be made of coal include:

Domestic heating

Gas

Coal is used to drive the generators to create electricity

Filtrate for filter beds

Oil  
Soap

## **The industry since the Second World War**

The coal industry in the U.K. at one time was the major industry due to the fact that coal was the main source of energy for industry. It provided a source of energy for domestic heating and was a major export product for the economy. In fact, coal production reached its peak in 1913 when 287 million tons were produced from 3,024 mines in the U.K.

These pits were small and privately owned and had poor working conditions. In 1926 an act of parliament was passed that encouraged the amalgamation of these pits and this culminated in the nationalisation of the mines in January 1947. The process was slow but for our purposes it is important to ask the question of why the industry was taken into public ownership.

The first reason was that it formed part of the philosophy of the Labour Party and the National Union of Mineworkers. Under private ownership working conditions were unsatisfactory and there were long and bitter industrial disputes. The wages of workers were cut when there was a fall in demand for coal. The Labour Party, which is part of the labour movement, saw the public ownership of coal as a means of harnessing public support through common ownership of the industry and it formed part of its political manifesto after the second world war.

The second main reason of why the industry was taken into public ownership in the late 1940s was that coal was of strategic importance in terms of the energy needs of the country. The U.K. was rebuilding after the devastation of caused by the second world war and an abundant source of energy was needed in that the economy had full employment. Coal was needed to make steel, run the rail network, run ships, domestic heating, and it was a main source of exports. Within this context, coupled with the fact that the industry had been starved of investment before and during the second world war, to make the industry viable meant state intervention.

Following nationalisation in 1947 the National Coal Board constructed 30 new collieries and undertook development in a further 140 pits. Around 80 were merged with others. Around 250 were expected to close due to exhaustion of reserves, or because they were un-economic.

The overall effect of these changes towards the late 1950s was that coal production was concentrated into larger units that had increased technology. The impact of new technology, it has been argued, led to the de-skilling of work in the industry. There was also an increased emphasis on shift work, in that at many pits coal production took place over three shifts as opposed to one.

Technological change also meant a changed ratio between craft and mining personnel and this resulted in a changed political structure of the unions.

More important was the change of emphasis by the unions on investment in the industry in that technology needs injections of finance to make it viable. If such investment was not forthcoming then jobs could have been placed in peril.

For most of the 1950s, 60s and 70s there was a declining product market for coal as other sources of energy became available. This, coupled with a concentration of production in larger units, saw output per man shift increase but at the cost of a declining employment base within the industry.

For its part, central government during this period subsidised the industry heavily until the mid 1980s and 90s when the coal industry was deprived of such financial support. This led to the coal miners' strike of the mid 1980s and the eventual privatisation of the industry in the 1990s.

By 2002 coal production in the U.K. was around 30 million tons. Of this figure 13.10 million tons were deep mined coal with the remainder 28.7 million tons coming from opencast mining and imported coal. Electricity generation accounting for 75% of the coal consumed.

The production of coal is a dangerous task and a fact that needs to be drawn to the attention of the reader is the high price that has had to be paid. Between 1880 and 1920 in the U.K. a man would lose his life every 6 hours in the industry, i.e. 4 every day on average. Between 1890 and 1920 there were 27 major disasters. A major disaster comprised 100 or more deaths. Of the 27 disasters 13 were in Wales.

In 1886 a Royal Commission recommended the establishment of a mines rescue service for the industry but it was not until 1902 that such a service was created in Yorkshire followed by two in Wales in 1908.

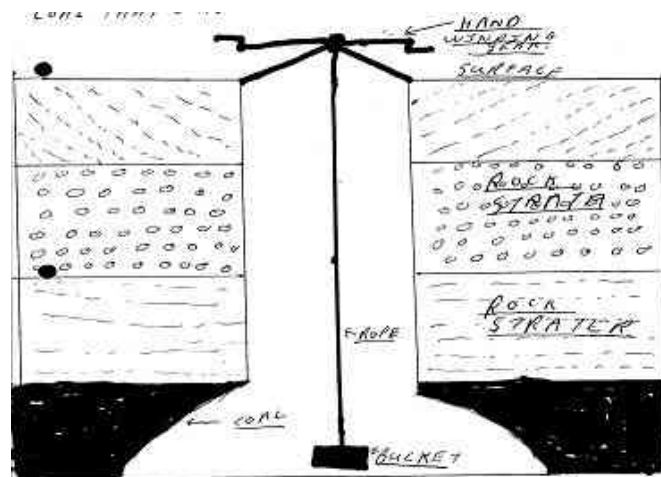
What is significant is that while these disasters are documented, many more miners have lost their lives due to roof falls, transportation accidents etc. These figures are often forgotten within the history of the coal industry.

## **How Is Coal Extracted From The Ground?**

The earliest system of coal extraction was the Bell Pit. Men and women were lowered in a bucket to the coal seam and the coal was loaded into the bucket and raised to the surface. Winding the bucket was by means of two persons winching the bucket attached to a rope from underground. The coal was not far from the surface. This form of mining was limited in that when there was a possibility of roof collapse the shaft had to be abandoned. They were called bell pits because of their shape. When there was an accumulation of water underground these pits had to be abandoned due to flooding.



## A Bell Pit

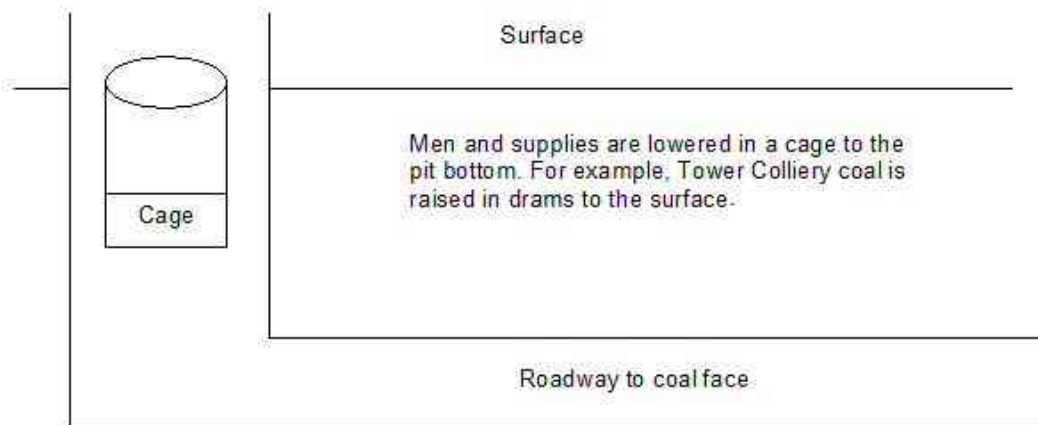


Later developments in coal extraction involved the sinking of either a shaft or a drift

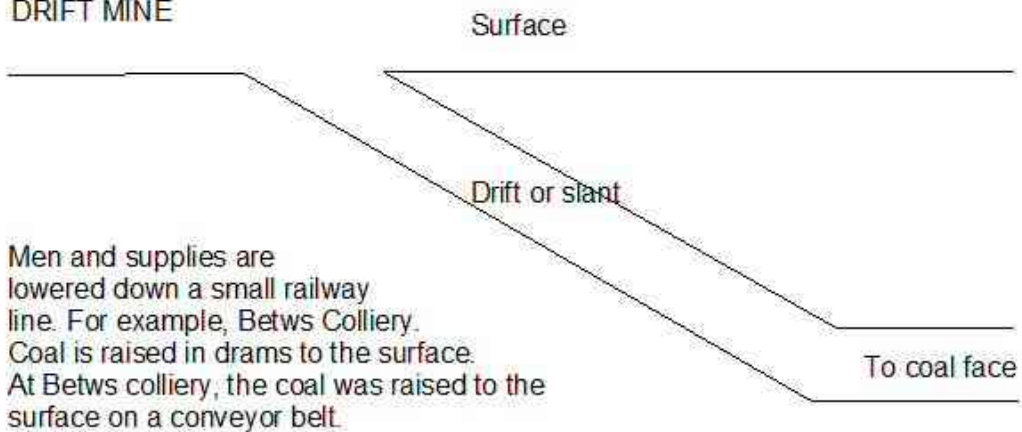
### HOW COAL IS EXTRACTED FROM THE GROUND

Two systems are used to extract coal from underground: the shaft and drift mines.

#### SHAFT MINE



#### DRIFT MINE



Men and supplies were lowered on a small railway line and coal was raised in a dram, but in modern mines the coal was carried to the surface on a conveyor or belt. Both systems involved the use of steel ropes to raise or lower their load. Furthermore both systems required a system of energy to carry out the task. This was achieved either by steam, compressed air or in later years by electricity.

### 3 Energy In The Coal Mines

The advent of compressed air to provide energy in coal mines originated in France in around 1845, this form of energy being safe in that, different to electricity, no arcing can take place, this being dangerous in an environment where there is methane gas. Compressed air was used in British coal mines from the 1950s onwards to power various machines such as winding gear, boring machines, Emcos etc. In fact even now where there is a high incidence of gas machines can be powered by compressed air. The creation of the national electricity grid in the late 1940s resulted in the use of electrically propelled machines into the coal industry.. Before this, electricity in the mines was essentially small power stations generating electricity at the pit head. What saw the augmentation of electricity in the mines was that improved systems of eliminating methane gas were introduced via the construction of better roadways, electrical cables that could withstand the penetration of water and damage, and switchgear that were intrinsically safe. Underground lighting was also introduced. All this culminated in electrical motors being used to power winding gear, coal cutters, pumps, conveyors etc., making the extraction of coal easier. In fact, coal eventually could be mined at the coal face and conveyed to the surface solely by electrical power.

The use of electricity underground also enabled the use of cap lamps to be used and this made better lighting available for miners in the workplace.

#### Surface Electrical Switchgear



## Electrical Transformer



## Underground Switchgear



## Underground Motor



## Underground cap lamps and Battery Charging Equipment



## 4 Water and Coal Mines

One of the most hazardous elements in the coal industry is water and in particular if it results in flooding. Some rock strata such as New Red Sandstone are like a sponge and water finds its way through the rock strata.

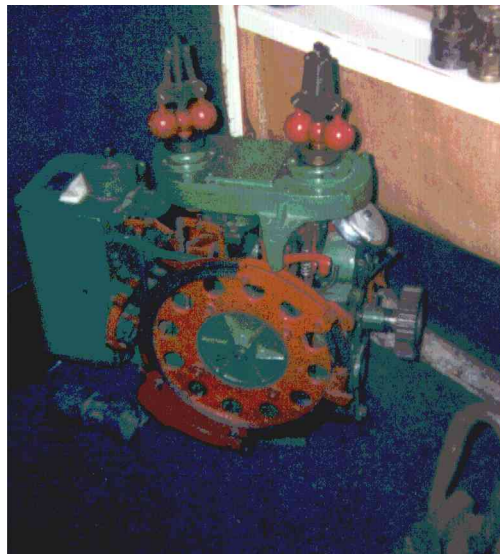
As mines became deeper and longer distances were encountered from the surface there was a need to eliminate the accumulation of water from coal mines. This was achieved through the development of water pumps. Such pumps were also often used to pump water for dust suppression at coalfaces and headings.

Even though the earlier forms of water pumping were reasonably successful it was not until 1943 that fully submersible pumps that were electrically driven were used. This pump automatically activated and de-activated itself depending on the water level.

### Wooden Water Pipe



### Water Pump



## Underground Water Pump



## 5 Coal Extraction on hand-fill and machine coal Faces

The production of coal in early days meant hacking the coal out with a pick and clearing it with a shovel. This system existed up until the 1950s in that even when machines were introduced onto coal faces it still meant that the coal had to be filled in many instances by shovel.

The mechanisation of the industry from the 1950s onwards has seen coal cut and loaded onto conveyors and this has meant that the hard slog of shovelling big tonnages of coal has been reduced. It is still the case though that in some mines hand fill coal faces using a shovel are still operational, mainly in small mines.

What follows are some of the tools and machinery that have been and still are used at coal mines. It is by no means exhaustive but will provide the reader with a sense of how things have progressed over time.

### Mandrel



## **Shovel**



## **Coal Cutting Machine**





## **An Example of an Early Coal Cutting machine**



## **Siskol Electrically Powered Coal Cutter 1900**



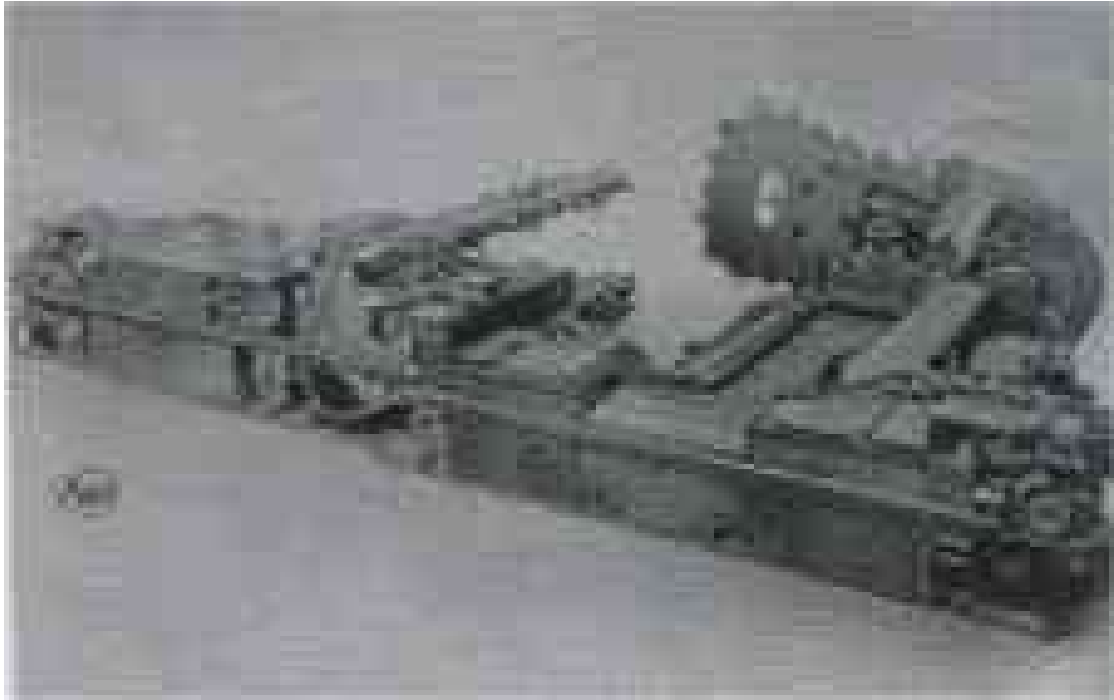
**Joy Sullivan Short Wall Coal Cutter 1920**



**Joy Sullivan Short Wall Cutter 1950**



## Coal Cutter



## Mavor and Coulson Coal Cutter 1930



**Anderson Boyes Over Cutter 1943**



**Anderson Boyes Coal Cutter 1943**



**Huwood Slicer Activated Plough**



**Anderson Boyes Long Wall Trepaner 1960s**



**B.J.D. Short Wall Cutter**



**B.J.D. Ace Long Wall Coal Cutter**



**Anderson Boyes Long Wall Trepaner Cutter 1960s**



**Coal Cutter (found at Big Pit Blaenavon)**



**Long Wall Coal Cutter (known in Wales as the widow maker)**

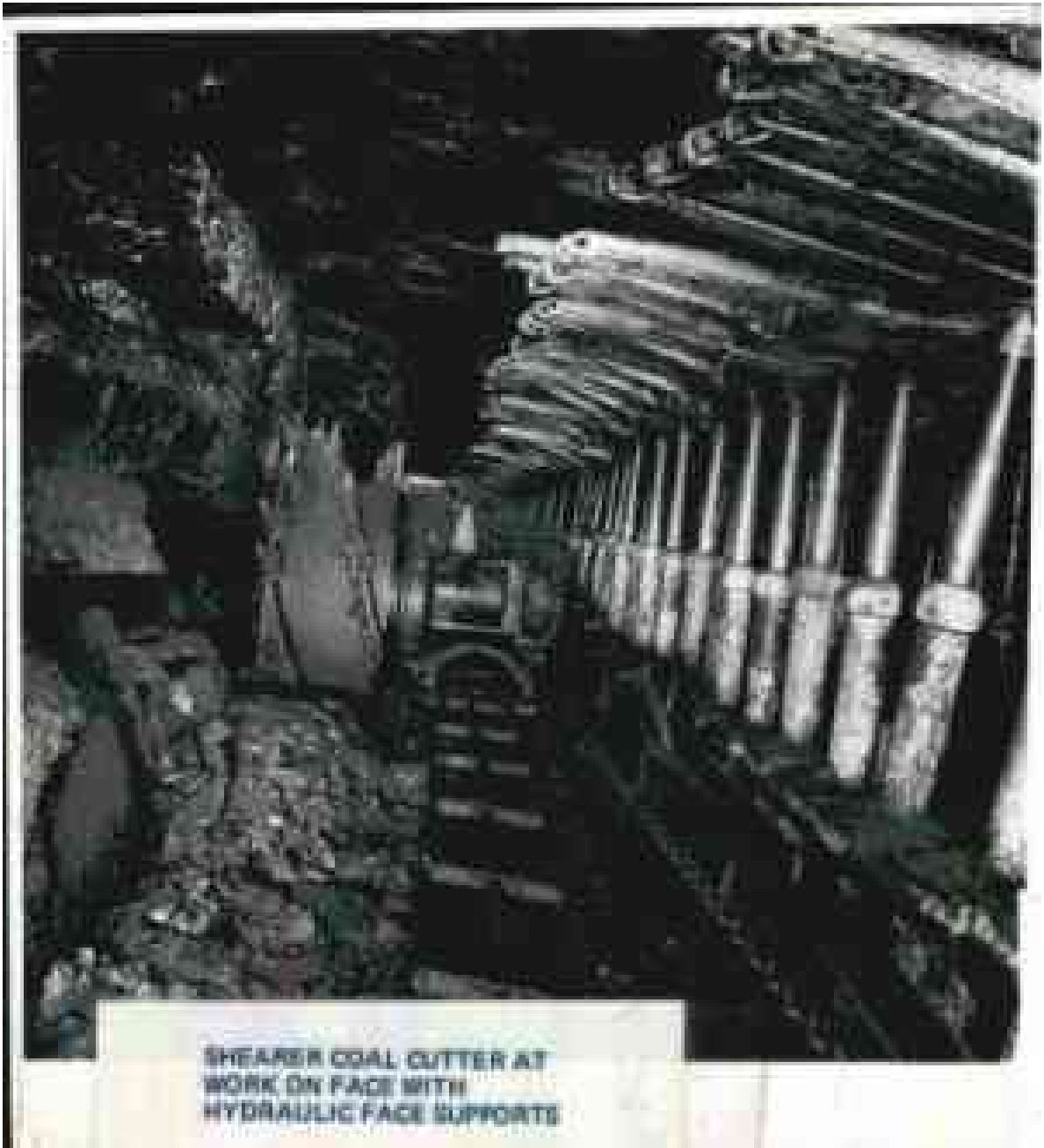


**Plough**





## Shearer Coal Cutter



## Jigger or Pneumatic Pic



## 6 Winding Gear

Conveying men, supplies and coal to the surface became more difficult as mines became deeper and the distances to the coal faces increased.. Water wheels and horse drawn systems were used to power from the surface to underground and vice versa. Around the 1850s winding engines were developed and the coal was carried to the surface in drams. The first electrically driven winding engines were developed in Germany in 1877 and they were called the Kope winding engines.

In the U.K. such winding systems were installed in the 1923 in Murton Colliery but it was not until the 1950s that they were extensively used as the main sources; up until then were steam. In fact many steam engines from ships were used in collieries. During the 1960s shafts were replaced with drifts wherever possible. Such winding systems that were to be found in shafts were a safer method of conveying coal to the surface. Initially the coal and supplies were conveyed in drams but eventually coal could be conveyed to the surface by conveyor belt in that the gradients of the drifts lent themselves to doing so.

The drifts were termed workable in that ,should it be necessary, men could walk to the surface, although the drifts had spakes to convey men from the surface to underground.. The drifts also enabled supplies to be conveyed underground easier and safer.

### **Water Balance to be found at Big Pit Blaenavon South Wales**



N.B. This water balance was first used in Rogers Pit, Rhymney, and dates back to the mid 19<sup>th</sup> century.

## Winding Gear



## Pit Cage



## Winding Drum



## Diesel Locomotive and Spake



## Spake



## 7 Coal Extraction Methods

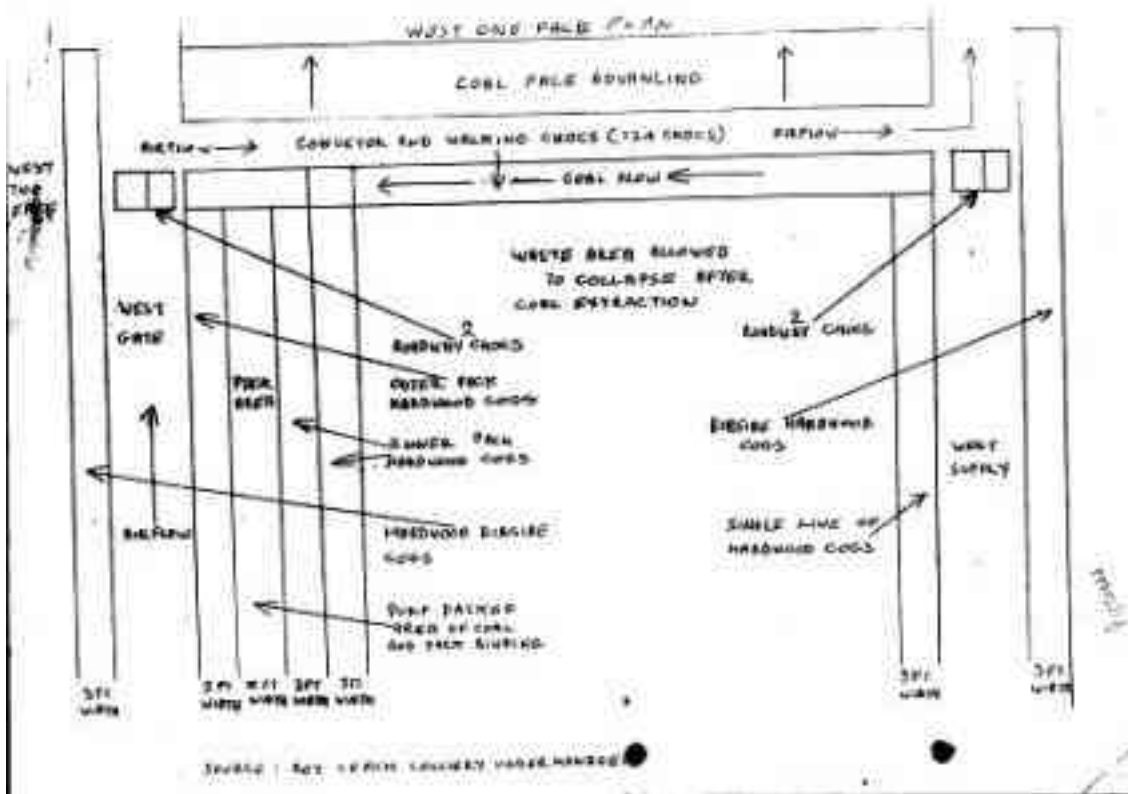
Coal extraction essentially uses two methods: Pillar and stall, and long-wall coal faces. The former is a narrow heading of coal and a pillar of coal is left to support the roof as well as roof supports. A long-wall coalface involves extracting a length or strip of coal. Modern long-wall coal faces take a strip of coal around 230 meters long with a take of around 1,000 meters.

However, the earliest system of coal extraction in practical terms meant hacking the coal with a mandrel or pick and loading it into drams by shovel. In the early days women and children had the task of carrying the coal onto drams using a curling box. The advent of conveyors made it possible for large tonnages of coal to be conveyed to drams.

In the early 1900s coal-cutting machines were introduced into the industry but their usage was dictated by the quality of ventilation due to methane gas. As ventilation improved and electricity underground became available so did the sophistication of coal-cutting machines.

After the 1940s the mechanization of coal extraction accelerated in that cutter- and cutter-loading machines became available.

## Diagram of A Long Wall Coal Face West 1 Plan





## 8 Roadway Construction Machines

Coal production involves the construction of roadways to convey men, supplies, coal and machinery. As coal production has become more sophisticated so did the process of construction roadways and the machinery to undertake the work.. These roadways also improved ventilation at mines, thus reducing the problem of methane gas.

The first roadways involved using hand boring machines using a stand and a ratchet to turn the drill. Around one foot of hole was bored before firing the rock or coal.

The material from firing was cleared by means of shovel but with the mechanization of the industry more efficient systems of clearing the material was introduced. What follows in this section is a brief pictorial history of these machines.

### The Emco

This machine ran either on compressed air or electricity. It was mainly used on hard rock headings where the cycle involved boring, firing, clearing the material that had been fired, and then erecting roof supports.



## **The Joy and Continuous Miner**

These machines were ideal for cutting and loading coal and were used in South Wales using a pillar and stall method of coal extraction. This machine cut the coal and loaded it onto the conveyor.



**Dosco Roadhead Cutter**  
(Suitable for cutting hard rock but also used to cut coal)



**A modern version of the Dosco Road head Cutter**



## **The Joy Loader**

(Used to clear coal in pillar and stall headings, especially in South Wales)



## **Emco**

(Used to clear material resulting from floor pressure)



## **Dinter**

(Used to clear material from headings)



## The Latest Coal Cutting Machine Used By U.K. Coal

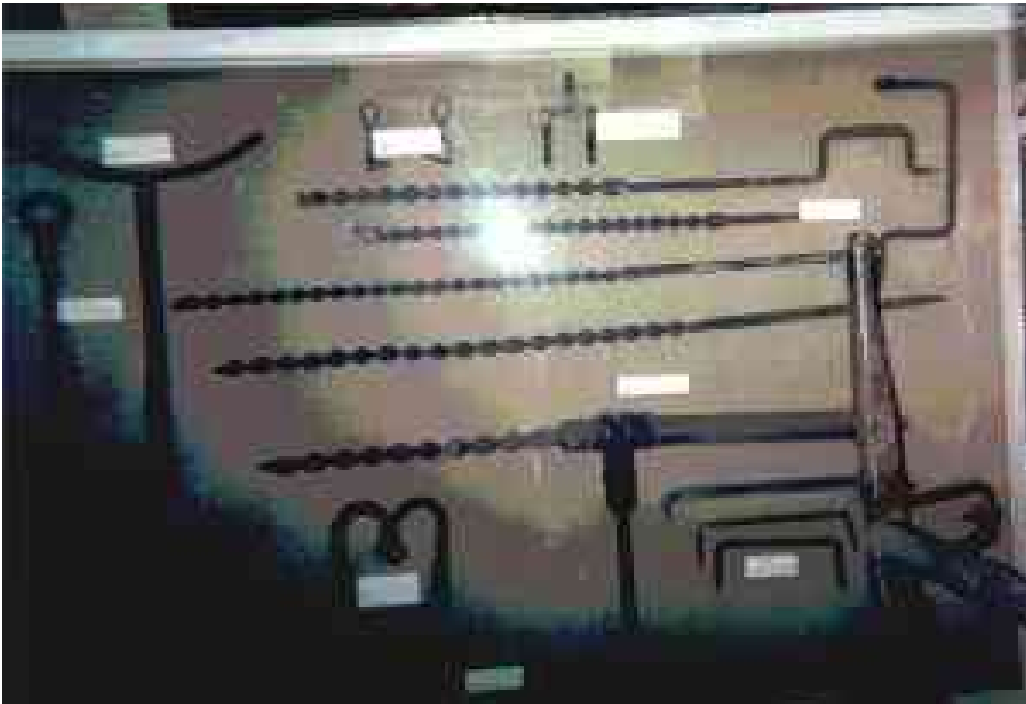


## 9 Boring Machines

Early boring machines or drilling machines were hand drills. They were placed on a stand and the drill was manually operated via a ratchet system before powder could be placed in the hole for firing. The introduction of compressed air into the coal mines saw the introduction of boring rigs that were driven by this source of energy and this meant that hard rock could be driven through for roadway construction easier.

Following the introduction of electricity into the mines electric drills were introduced and they were mainly used to drill in the coal.

### Hand Drills



### Compressed Air Drill With An Air Leg



## Compressed Air Hand Drill



## Electric Drill





**Methane Borer used to bore into the rock to reduce gas in the waste area**



**Roof Bolting Boring Machine**



## Gullick Pump

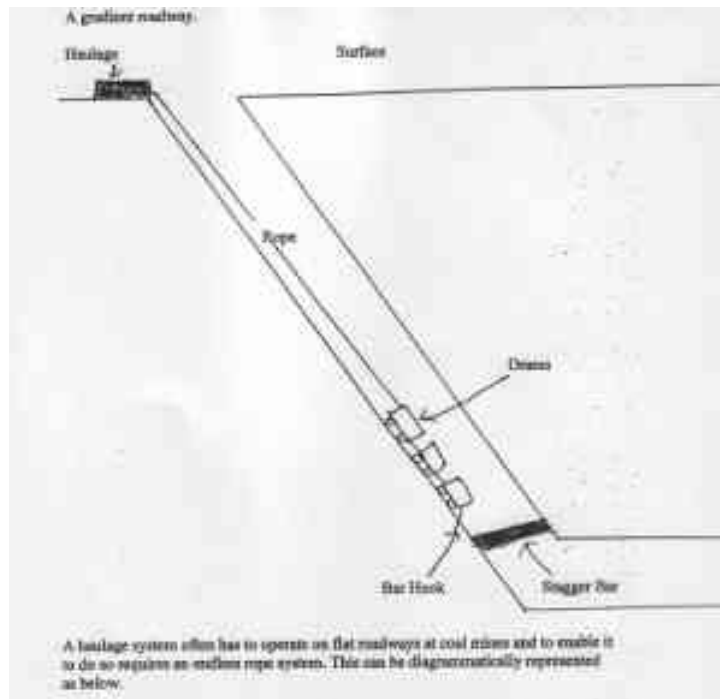


# 10 Underground Transportation

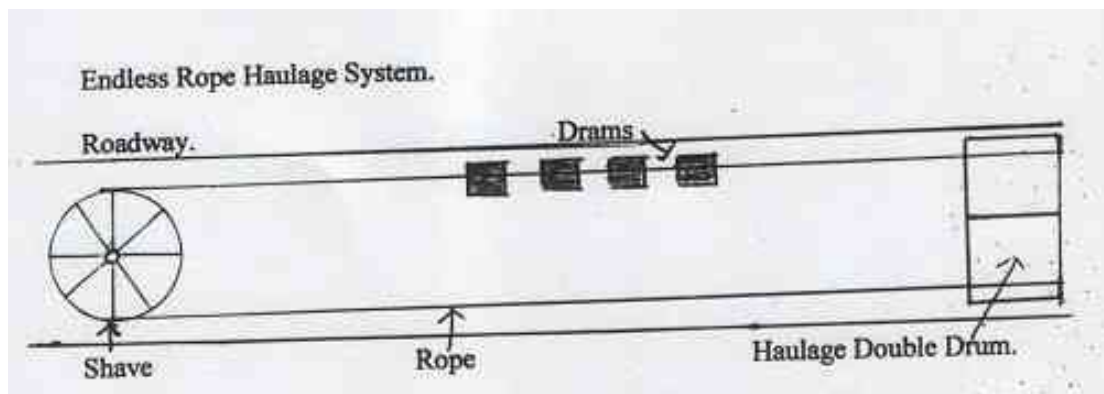
In its earlier form the conveying of coal to a dram underground was made by women and children to a dram. As technology progressed with compressed air and electricity this meant that steel ropes could be used attached to a dram and haulage system. This system could also be used to convey supplies to the coal face and other locations at a pit. What is significant is that should the rope or shackle break then this could cause damage to the roadway and, worse, cause death and injury to miners, thus the development of bar hooks and stagger posts on roadways.

The bar hook was a device to push the journey of drams off the roadway in the hope that it would be stopped by the side of the roadway. The stagger bar placed at the centre of the roadway was designed to stop the journey of drams. It was fixed in such a way that it would hit the roof of the roadway.

## A gradient roadway



A haulage system often has to operate on flat roadways at coal mines and to enable it to do so requires an endless rope system. This can be diagrammatically represented as below:



The advantage of an endless rope system is that it can convey drums in both directions. This system was also termed main and tail. Haulage systems were driven initially by compressed air but later by electricity.

A shaft is shown earlier in this book but essentially it is a haulage system from the surface to underground by means of a steel rope, in earlier years driven by steam, then electricity.

### **Early cart for dragging coal underground**



### **Curling Box**



## Wooden Dram



## Steel Dram



## Shackle to Link drams



## **Pit Pony**



## **Bar hook Top and Carriage Link Bottom**



## **Tippler device used to tip coal out of Drams**



## **Haulage Pickrose**



## Steel Ropes



## Carriage to convey wood





## **Explosives Carriage**



## **Device used to get drams back on rail tracks**



## Signalling Bell

The Haulage driver would be able to raise or lower the journey of drams by means of an electrical signal. The bell would ring, as well as show a light.



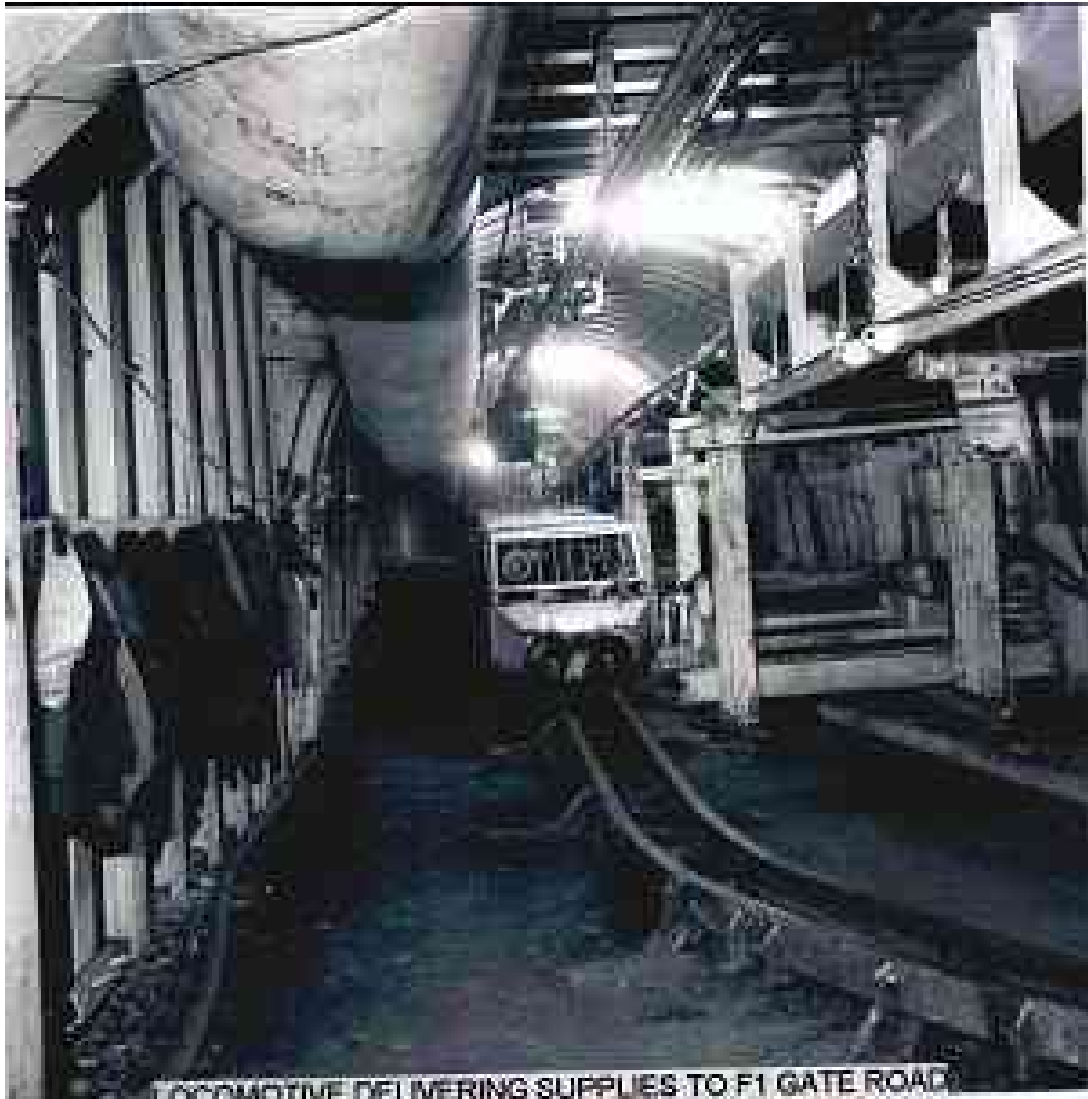
## Signalling Instructions



## Braking System Hydraulically Operated



**Diesel Locomotive To Convey Men And Supplies (centre)  
Conveyor Belt Headgear (right)**



# 11 Roof Supports

During coal extraction it is important to erect roof supports in that pressure from the ground above inevitably occurs. Regrettably, many miners have lost their lives due to roof falls of rock. This section examines some of the systems that have been devised to reduce the problem. An indication of the extent of roof pressure after coal extraction is shown below in that this supply road was at one time 7ft high but the squeeze from the roof has reduced the headroom to 3ft.

**One of the earliest systems of roof supports was the pair of timber or post and collar**



This system was used under conventional mining and it consisted of three notched pieces of wood to support the roof i.e. two upright supports with one across. This system gave warning to miners of an impending roof pressure in that the wood creaked. Wooden supports were later replaced by steel props. To measure the props miners sometimes used a measuring stick. The replacement of these props and the introduction of hydraulic roof supports led to the de-skilling of work, it was claimed by many of the older miners.

**A Pair Of Timber or Post and Collar  
Notched Wooden Timber**

**Side Wooden Roof Supports (Uprights)**

**Roof**



**Post and Lid or Temporary Post**



### **Dowty Post**

(Essentially a Dowty post was a hydraulic jack)



### **Wooden Lags**

(Lags were used to support the roof and sides of a roadway)



## Wooden Hardwood Cog



## Horse Heads

(Used to provide a temporary roof support until a permanent roof support could be erected.)





## Bars



## **Rings or Steel Arches**



## **Hydraulic Roof Supports**



To erect wooden roof supports involved the use of hand tools. To prepare a post and collar required the use of hatchet, saw, sledge and measuring stick.

### **Bow Saw**



### **Hatchet**



## Sledge



## Measuring Stick



## 12 Communication Systems In The Coal Industry

Longer distances to extract the coal at mines involved the development of more sophisticated means of communication. Possibly as far as haulage systems are concerned were two steel wires to electrify signalling to the haulage driver. The signalling was activated by rubbing a steel strip on the two parallel wires to activate a signal.

This system was replaced in later years by a pull cable and this system was safer in that signal boxes could be locked, de-activating the signal, thus preventing any movement of the haulage. This system was also used on face conveyers.

Improved communication systems also involved the use of underground telephones. Better communication resulted in a great deal of time saving and improved safety as potential hazards could be verbally conveyed easier.

### Early Telephone



### Later Telephone System



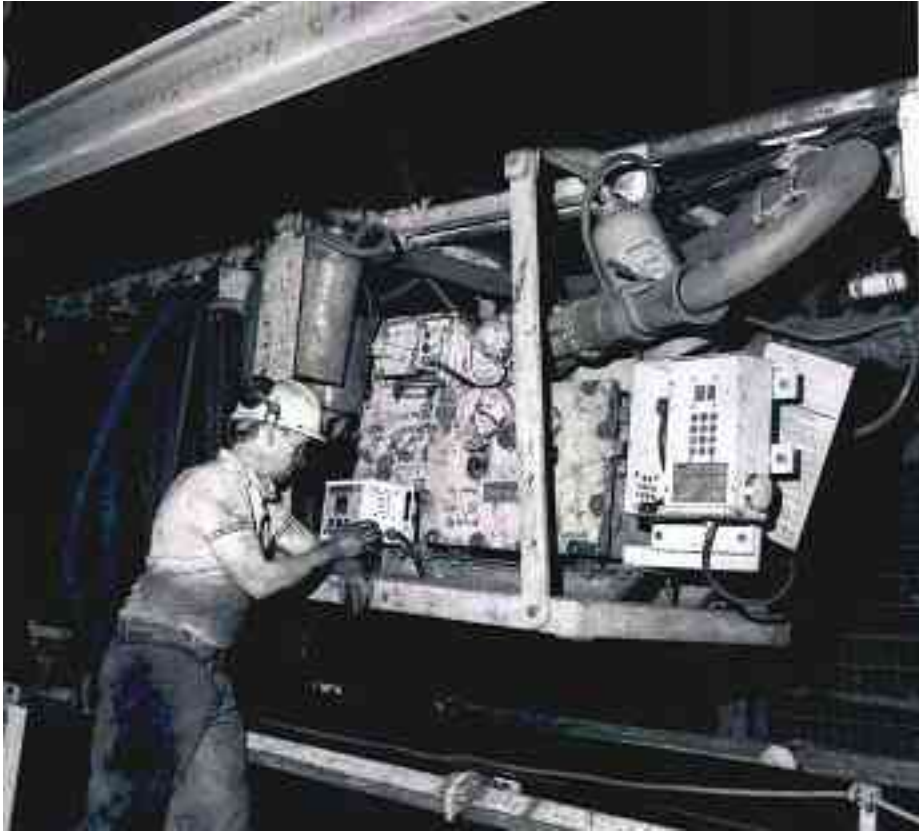
### Early Surface Telephone (1950s)



### Pull Cable Signalling System. Also Used on Face Conveyors



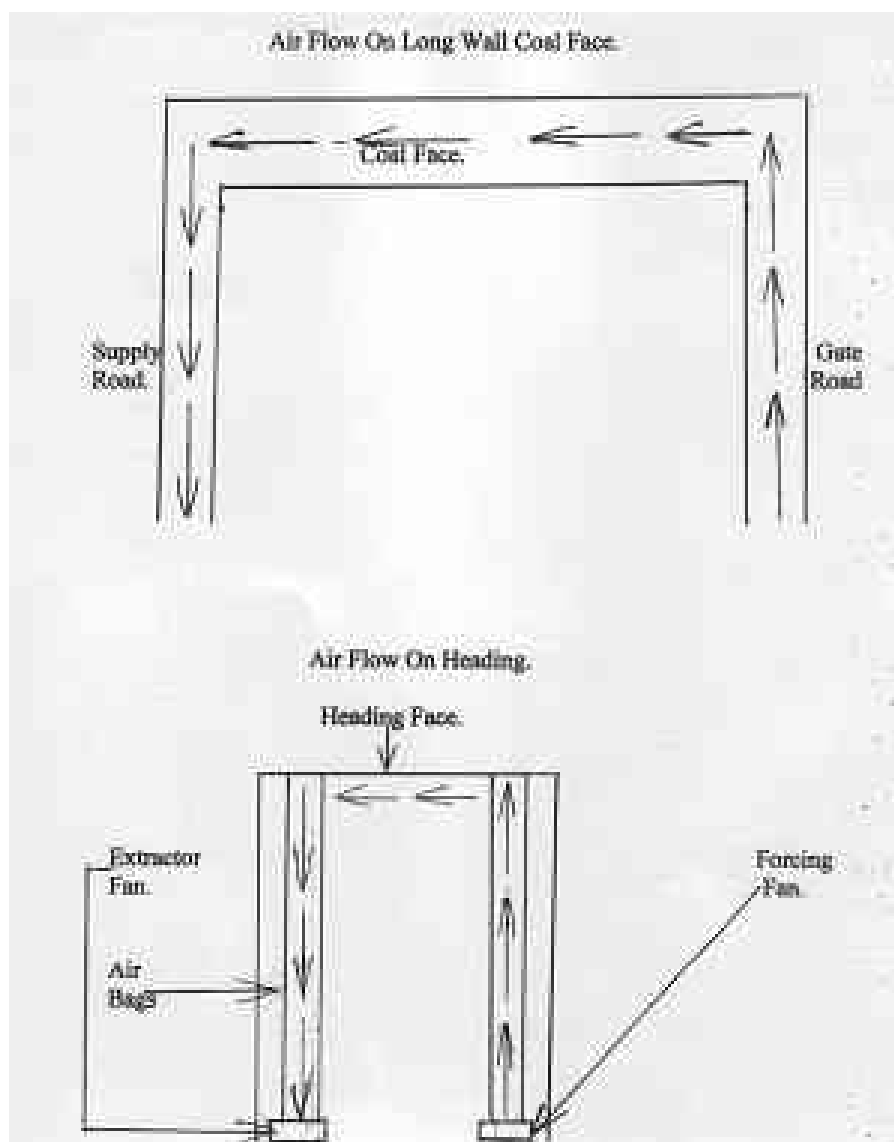
**Face Consul**



## 13 Methane Gas

During coal extraction there is an inevitable accumulation of methane gas and as mines became deeper and longer from the surface the problems of gas required more elaborate means of eliminating it. The need to eliminate gas lies in the fact that it is toxic and is a potential source for an explosion. The history of coal mining is one full of disasters where men have lost their lives and the worst was at Senghenydd in Wales when 439 men lost their lives at 8.00A.M. on the 14<sup>th</sup> of October 1913.

The problem can be reduced by good ventilation and what this means is to force fresh air into a coalface or heading and extracting the polluted air out to the surface. The gas is dangerous at between 5% and 15% in the atmosphere. The development of intake and return drifts and shafts as well as air lock doors went a long way to reducing the problem as well as forcing and extraction fans that were brought into mines in 1862. Bigger roadways also aided improved ventilation in that the air could be diluted.





Canaries were and still used to detect gas in that they are sensitive to methane gas but mine safety was improved by the development of the Davy Safety lamp in 1815.

It is the job of the fireman at a mine to test for gas and in the early days the fireman was clad in wet sacks and he crawled down the coal face igniting where there was a potential source of gas.

Gas detection nowadays involves the use of electronic equipment that gives a numerical reading of the levels. In modern mines if the gas level is too high then the machines, e.g. conveyor, will not start up and will only commence again when the gas level is reduced to a safe level.

Should a fire occur then each miner is equipped with a self rescuer to get to safety from carbon monoxide poisoning and these were introduced into the industry in the 1970s.

### **Diagram Indicating The Levels of Gas (blue flame)**



### **Safety Lamp To Detect Gas**



**Modern Gas Detector**



**Self Rescuer**



## Different Kinds of Safety Lamp



## Rescue Equipment



## Extractor Fan



## Canaries



## 14 First Aid

Injury and death are very frequently associated with the coal industry and while standards of safety did improve after nationalisation there was still a high incidence of accidents. After nationalisation every new entrant into the industry had to follow a first aid course and first aid facilities were located at each district underground.

### Early First Aid Trolley (Big Pit Blaenavon)



### First Aid Canister



# 15 Other Tools and Equipment Used Under Ground: Collier's Tool Bar



D. Links



## Clamp



## 16 Coal Preparation

Back in the history of the coal industry it was women and children that had the task of processing coal after it had reached the surface. However, with children been outlawed to work in the mines the task was very frequently left to women. These early screening plants were not efficient in that a great deal of what was raised went to the coal tips and was wasted. Modern screening plants avoid this problem and the waste is kept to a minimum..

In succinct terms coal can be processed due to the fact that coal is light and floats to the surface when emersed in water. The floating coal can then be skimmed off from water in a tank for grading. Even small particles of coal can be retrieved using this system.

### **Ariel View Of Screening Plant Betws Colliery South Wales**





## 17 Shot firing In The Coal Industry

An important system to extract coal and rock is shot firing using explosives and detonators. Early systems involved lighting a fuse to fire the powder but this was followed by the use of detonators. The system was perfected by delayed shot detonators which enabled a full face of coal or rock to be fired in one go, whereas before, each detonator had to be fired individually. The system involved the use of a detonator implanted in a stick of powder attached to a cable and then a battery sending an electrical impulse to charge the detonator, the powder stick being implanted in a hole that had been drilled by a boring machine. Ventilation had to be good or an explosion could occur.

### Powder and Detonators



### Plastic Stemming to Ram The Powder



**Shot Firing Battery**



**Spike to Poke a Hole in Powder**



**Detonators' Bag used to carry Detonators from the Surface**



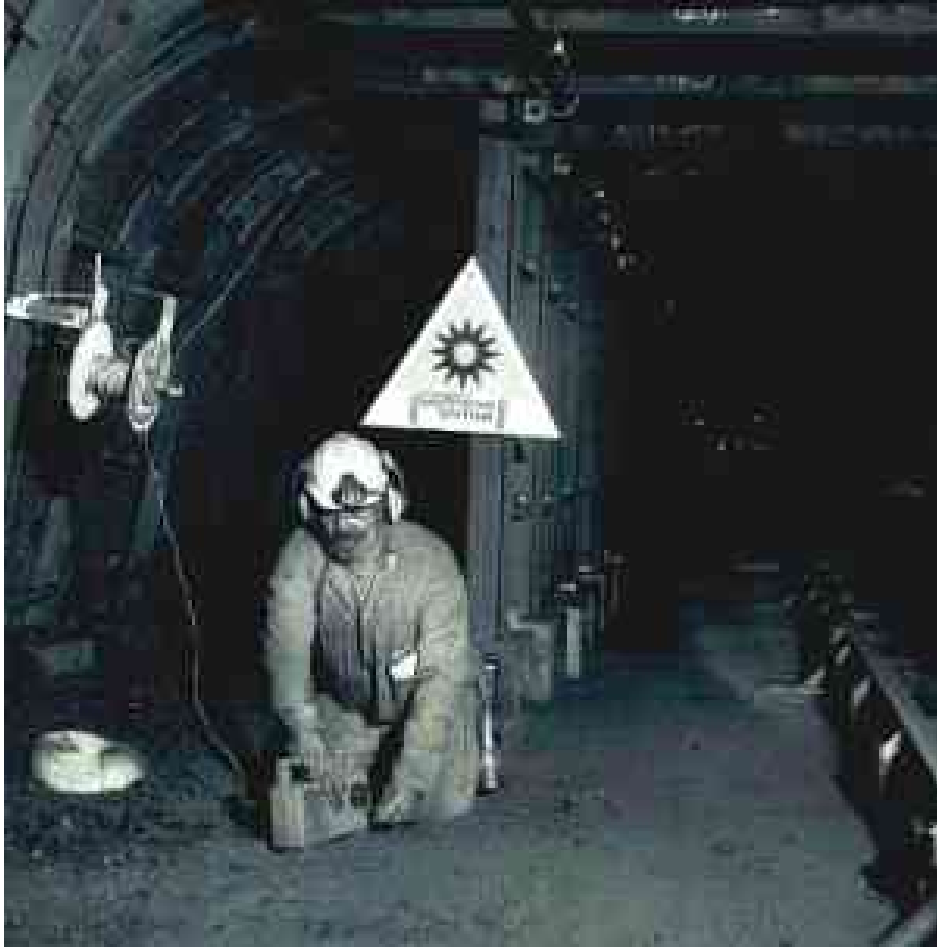
**Shot Firing Sign**



**Surface and Underground Magazine to Hold Powder**



**Shot Firing About To Take Place**





## 18 Art and Crafts on Coal Mining

To provide the reader with an exhaustive pictorial viewing of art and crafts that have emanated from the coal industry would be beyond this book. What follows is a short viewing of some of the work that has come to the fore. Many of the carvings are made out of coal and have involved hours of painstaking work. Most of what follows can be found in the coal mining museums in Wales and around the U.K.

**Picture of a Miner Carved in Coal**



**Model of a Colliery Shaft**



**Clock Carved Out of Coal**



**Monument To Commemorate The Coal Industry (Ammanford South Wales)**



**Picture of a Colliery Shaft and National Coal Board Lorry  
(Glanaman Library, South Wales).**



**Brass Shaft, Dram and Collier.**





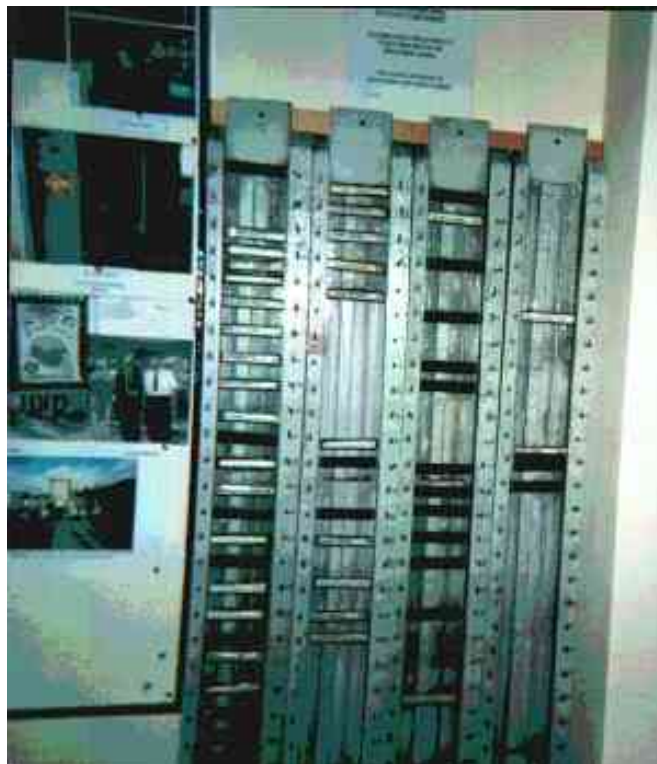
## 19 The Colliery Surface

What follows in this section is a brief flavour of a colliery surface.

### Colliery Banksman



### Deployment Board



## Output Board

The image shows a chalkboard with two main sections. The left section is titled 'OUR Output' and contains a table with several rows of data. The right section is titled 'PIT News' and contains a list of names and dates. Below the tables, there are two smaller sections with text.

OUR Output		PIT News	
DATE	TONS	DATE	NAME
10/1	1200	10/1	JOHN
10/2	1150	10/2	JACK
10/3	1250	10/3	JOHN
10/4	1180	10/4	JACK
10/5	1220	10/5	JOHN
10/6	1190	10/6	JACK
10/7	1210	10/7	JOHN
10/8	1170	10/8	JACK
10/9	1230	10/9	JOHN
10/10	1160	10/10	JACK
10/11	1240	10/11	JOHN
10/12	1180	10/12	JACK
10/13	1200	10/13	JOHN
10/14	1190	10/14	JACK
10/15	1210	10/15	JOHN
10/16	1170	10/16	JACK
10/17	1230	10/17	JOHN
10/18	1160	10/18	JACK
10/19	1240	10/19	JOHN
10/20	1180	10/20	JACK
10/21	1200	10/21	JOHN
10/22	1190	10/22	JACK
10/23	1210	10/23	JOHN
10/24	1170	10/24	JACK
10/25	1230	10/25	JOHN
10/26	1160	10/26	JACK
10/27	1240	10/27	JOHN
10/28	1180	10/28	JACK
10/29	1200	10/29	JOHN
10/30	1190	10/30	JACK
10/31	1210	10/31	JOHN

Below the tables, there are two smaller sections with text:

DATE	TONS
10/1	1200
10/2	1150
10/3	1250
10/4	1180
10/5	1220
10/6	1190
10/7	1210
10/8	1170
10/9	1230
10/10	1160
10/11	1240
10/12	1180
10/13	1200
10/14	1190
10/15	1210
10/16	1170
10/17	1230
10/18	1160
10/19	1240
10/20	1180
10/21	1200
10/22	1190
10/23	1210
10/24	1170
10/25	1230
10/26	1160
10/27	1240
10/28	1180
10/29	1200
10/30	1190
10/31	1210

## Colliery Lockers (clean clothes).



### Colliery Baths.



### Lamp Cleaning Machine.



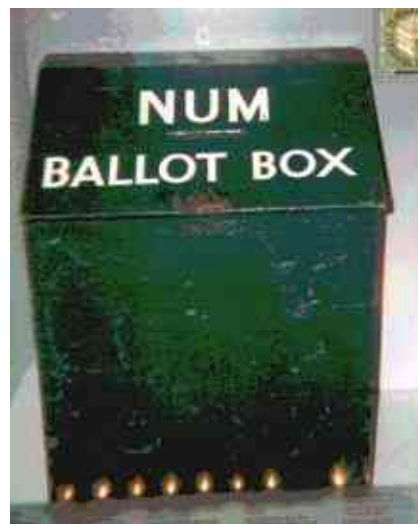
**Surface Rail Locomotive.**



**Wooden Coal Railway Wagon.**



**N.U.M. Ballot Box.**



**Pulley Blocks.**



**Jim Crow (used to bend rails)**



**Steel Drill.**



**Collier's Helmet.**



**Snuff Box**



**Watch Cover.**



**Food Box (Tommy Box)**



**Water Jack (early)**



**Water Jack.**





## 20 How A Collier Dressed

The dress of a collier was essentially that of a miner's helmet and cap lamp, a bag to hold his food, and clothes that were once worn as best. What is significant is that this form of dress remained until the late 1970s when the National Coal Board brought in orange work-wear that were washed. Before this the work-wear of the miner was done at home.

In fact it was not until nationalisation that colliery baths were introduced and the miner had to bath at home before that period, this making the work of women hard, especially if facilities such as a domestic heating system were not available in the home. In the 1940s and in some homes in the 1950s miners bathed in a washtub in front of the fire.

### How a Miner Dressed.



**Washtub in Front Of The Fire.**



## 21 Coal Mining Museums

Big Pit Blaenavon Blaenavon Torfaen NP4 9XP  
Telephone 01495790311.

Rhondda Heritage Park Lewis Merthyr Colliery  
Telephone 01447682036

Kidwelly Industrial Museum Broadford Kidwelly Carmarthenshire telephone Telephone  
01554891078.

South Wales Mining Museum Afan Argoed Countryside Centre Port Talbot Telephone  
01639850564.

Dolacothi Gold Mines Pumpsaint Lampeter Cardiganshire.

Swansea Industrial and Maritime Museum.

## 20 Poems

### The Price Of Coal

God gave us coal from the earth.  
The questions is, what is it worth?  
In life and limb it is a hard price to pay.  
To the miner, it is a job at the end of the day.  
Technology brought us this industry  
to extract the coal that was once vegetation from a tree.  
The industry has all but gone'  
At Betws Colliery the sun once shone.  
To the men that worked there it is an accolade  
And the end of the shift is a message once more obeyed.

### When Mother Earth Limbers

The creaking roof the cracking timbers.  
These are the sounds when mother earth limbers.  
Such noises are commonplace  
But to the miner they wipe a smile off his face.  
The rumble of rock in the gob  
Is a sign to the miner of less pressure from above.  
When the shift is done and on the Spake we do go  
We are grateful to God that he has spared us once more.

### When The Pit Closes

We all marched to the Colliery gates.  
This may be the last time we see our best mates.  
We fought hard to keep the pit open  
But to no avail, the pit will not re-open.  
We went through the lamp room on that day  
Subdued and broken, like a strand of Hay.  
Men had tears in their eyes  
As we went to our cars we said our last goodbyes.  
Down to the dole office we did go  
But for some of us to old we will work no more.  
King Coal someday will come back  
But for some of us we will not come out of the sack.