

BRITISH MINING No.94

# COAL

## A CHRONOLOGY FOR BRITAIN

by

ALAN HILL



MONOGRAPH  
OF THE  
NORTHERN MINE RESEARCH SOCIETY  
NOVEMBER 2012

# CONTENTS

	Page
List of illustrations	4
Acknowledgements	5
Introduction	6
Coal and the Industrial Revolution	6
The Properties of Coal	7
The constituents of coal	7
Types of Coal	8
Calorific Value	10
Proximate and ultimate analysis	10
Classification of Coal	11
By-products of Coal	12
Weights and Measures used for Coal	15
The Geology of Coal	17
The Coalfields of Great Britain	20
Scotland	20
North East England	25
Cumbria	29
Yorkshire, Lancashire and Westmorland	31
Yorkshire, Derbyshire and Nottinghamshire	33
Lancashire and Cheshire	36
East Midlands	39
West Midlands	40
Shropshire	47
Somerset and Gloucester	50
Wales	53
Devonshire coalfield	57
Kent coalfield	57
A coal mining chronology	59
Appendix - Coal Output of Great Britain	248
Bibliography	253
Index	256

## LIST OF ILLUSTRATIONS

Figure	Page
1. Simplified Seyler coal chart for bituminous and anthracite coals.	12
2. The coalfields of England, Scotland and Wales.	19
3. The Scottish Coalfield between Ayr and Fife.	22
4. The Northumberland and Durham Coalfield.	27
5. The West Cumberland Coalfield showing coastal collieries.	30
6. Minor coalfields of the Askrigg Block and the Lancaster Basin.	32
7. The Yorkshire and Nottinghamshire Coalfield	34
8. The Lancashire and Cheshire Coalfield.	37
9. The Leicestershire and South Derbyshire Coalfields.	39
10. The Potteries Coalfield.	41
11. The Cannock Chase and South Staffordshire Coalfields.	43
12. The Warwickshire Coalfield.	46
13. The Shrewsbury, Coalbrookdale, Wyre Forest and Clee Hills Coalfields.	48
14. The Somerset and Gloucester Coalfield.	50
15. The Forest of Dean Coalfield.	52
16. The North Wales Coalfield.	53
17. The South Wales Coalfield.	55
18. The Kent Coalfield.	58
19. Tyne keel	63
20. Cog and rung gin.	75
21. Ventilating furnace used at Liège	77
22. Horse whim	80
23. Savery's mine pumping engine	82
24. Newcomen's atmospheric engine	85
25. Spedding's mill for illuminating mines	89
26. Fitzgerald's rotary motion converter	91
27. Smeaton's 'water gin' at Prosperous Pit, Long Benton.	99
28. Edward Bull's compact vertical direct-acting pumping engine.	106
29. Lever-type vertical winding engine at Bearpark Colliery, Durham	107
30. Example of bord and pillar panel working	116
31. Three early safety lamps	119
32. Coal staith at Seaham Harbour	126
33. Stephenson's reversing gear	131
34. Worthington direct-acting horizontal pump	133
35. The principle of the Struve ventilator	135
36. Bérard coal washer	137
37. Nixon ventilator at Aberdare Colliery, South Wales	144

38. Guibal fan	145
39. Lemielle fan	146
40. Donisthorpe, Firth & Ridley's 'Iron Man' coal cutter	148
41. Waddle fan with open exhaust casing	149
42. Schiele fan	151
43. Ormerod and King's detaching hooks.	155
44. Hayward Tyler 'Universal' piston pump	157
45. Gillott & Copley coal cutter	158
46. Walker's detaching hook	163
47. Horizontal Davey differential pumping engine	164
48. Principle of the Roots ventilating fan	167
49. Pulsometer pump	168
50. Principle of the Koepe winder	170
51. Capell fan.	172
52. Poetsch method of freezing a shaft during sinking .	174
53. Robinson coal washer.	176
54. Walker Indestructible fan	179
55. Stanley heading machine	181
56. Single compartment of a Baum jig.	184
57. Schiele fan under construction showing the V-shutter	186
58. Sirocco fan	189
59. Hurd bar-type coal cutter	191
60. Parsons turbo-exhauster fan driven by a steam turbine.	196
61. Principle of the Uniflow steam engine.	200
62. Two Yates & Thom tandem compound winding engines at Askern Main Colliery	202
63. Koepe tower with drive mounted over shaft	206
64. Nationalisation notice	217
65. Coal plough showing armoured face conveyor and roof support.	219
66. Wath Main Colliery	233
67. Coal cutter in the Barnsley Seam, Wistow Mine in the Selby Complex	242
68. Demolition of Newstead Mine, Nottinghamshire	245
69. Survivor - Kellingley Colliery (Yorkshire Coalfield)	246
70. Joy complete longwall mining system with Faceboss control	247

## **ACKNOWLEDGEMENTS**

The Author would like to thank Mike Gill for the support that he has given in the preparation of this book, particularly in reviewing the content and to Richard Smith and the Northern Mine Research Society for publishing this book.

The Editor wishes to thank Chris Allen, 'nottsexminer' and Shane Phillips who have provided photographs from their websites.

## INTRODUCTION

The following book is a compilation of notes and references which I have collected over many years. Some years ago I had the idea to collate the information into a chronology of coal mining events, people and technology. Since my primary interest is in the technological aspects of coal mining there is a strong bias towards technology. The result of this work was that in 1991 '*Coal Mining – a Technological Chronology 1700-1950*' was published as a British Mining Supplement.<sup>2</sup> The current chronology is a revised and much expanded version of the original and covers the period from Roman times until 2010. The chronology also includes a small number of references to metal mining technology, where these have a bearing on the technology employed in coal mining and other allied activities such as the electricity supply industry.

The chronology has been compiled from a wide variety of sources such as; the Colliery Guardian, Mining Journal, The Iron and Coal Trades Review, the transactions of the many regional mining institutes which abounded in the heyday of the industry in the latter half of the 19th century and the many text books which abound for what was such an important British industry. This has not been an easy task, not least from the point of sorting out the many concurrent claims that abound in the individual mining regions, as to who was the first to develop or introduce an idea or aspect of technology.

The primary function of the book from my point of view is as a reference document, and as such I have laid the book out with this in mind and provided a comprehensive index. I am sure the book will be expanded, corrected and further refined as the years progress, but as such will form the basis for much debate and thought amongst its readers.

Dr. E.F. Schumacher, who was Economic Advisor to the National Coal Board, for twenty years from 1950, as well as holding the positions of Director of Statistics and Head of Planning stated:

*'There are only two basic items in the world economy – food and fuel. All the rest are secondary.....there is no substitute for energy; the whole edifice of modern life is built upon it'.<sup>2</sup>*

## COAL AND THE INDUSTRIAL REVOLUTION

Coal has been used as fuel for more than a thousand years in Britain, though it was not until the 13th century that the use of coal became more widespread. Coal was the most important mineral mined in Britain, from the period running up to the start of the Industrial Revolution around 1760, until the late 20th century. In the 'latent phase' from 1690 to 1760, leading up to the start of the Industrial Revolution, there was a shift to a coal-based economy. Britain produced more than 80% of world production in the 18th century and the availability of indigenous cheap and plentiful coal was one of the main facilitators of the Industrial Revolution. The use of coal enabled Britain to become the first industrial country in the world and the world's major political and economic power. During the principal period of the Industrial Revolution, from 1760 to 1830, the shortage of wood & timber, the basic fuel and structural building material of all previous ages, forced the development of the use of coal and cast-iron structures.

A rapid concentration of industry developed on the coalfields together with a move of the iron industry from forest areas (based on the use of charcoal) to the coalfields. The increasing use of the steam engine to provide 'limitless' power and the domestic needs of a growing population provided new markets for an expanding coal industry. The availability of cheap coal in turn encouraged the development and expansion of energy-intensive industries, such as those of sugar, soap, paper, iron and pottery. In the later period of the Industrial Revolution, from 1830 to 1870, often referred to as the 'heyday of capitalism', radical new forms of transport were developed. Railways linked the centres of industry and population and steamships collected raw materials and distributed products far and wide. Both forms of transport consumed large quantities of coal, as well as distributing and exporting coal. In the 19th century the chemical industry, based on coal and its by-products, expanded rapidly.

The use of coal was a major facilitator of the Industrial Revolution enabling Britain to develop industry on a considerable scale and to support an increasing population and a rising standard of living. Britain could truly claim to be the 'Workshop of the World'. Coal 'fired' the Industrial Revolution and maintained the lifelines of a vast empire, which stretched around the world. For more than a century, coal had sped the Royal Navy around the world and filled the bunkers of a huge merchant navy. Coal was indeed the foundation of British overseas trade and in its own right was an important export commodity.

The death knell for the British coal industry came just before the First World War, with the introduction of ships powered by oil and with the relentless shrinking of her massive coal export trade, as emerging industrial nations developed their own indigenous coal industries. However, it was not until the 1980s that large numbers of mines were closed as the country turned to oil, gas and imported coal for fuel.

## THE PROPERTIES OF COAL

### THE CONSTITUENTS OF COAL

Ordinary 'household' or bituminous coal is a type of coal called '*humic*'. It was formed from plant-matter which was principally wood, leaves and bark and has a banded structure characteristic of sedimentary deposits. During bacterial decay, much of the plant cellulose disappears; the remainder, together with most of the lignin is transformed into '*ulmin*' compounds which are soluble in alkalis. The resistant plant tissues, resins and waxes and the waterproof protective tissues of the plants are mixed with the ulmins in varying amounts and give rise to layers within the coal which have differences in appearance and microstructure. The degree of coalification of the ulmins is related to the elementary composition and properties of the coal.

The layers along which the coal fractures are composed of an extremely friable, charcoal-like substance known as '*fusain*', which soils the fingers and in which woody fragments which have resisted bacterial decay can be clearly seen. It does not swell on heating, has a high carbon content and usually high ash. *Durain* is a matt, dull, hard material composed of mixed plant debris. The volatile content is similar to *clairain* but it is non-swelling. '*Vitrain*', which is the most altered form of coal is shiny, bright and swells on

heating, has less volatile matter and can exist in bands of up to one inch thick. 'Clairain' is of similar composition and appearance to vitrain but has a higher volatile content and swells more; it is intermediate in character between vitrain and durain.

A further group of coals, called 'sapropelic' coals, are less abundant. These comprise the non-woody 'cannel' and 'boghead' coals.<sup>3,4</sup>

## TYPES OF COAL

Solid fuels range from wood and peat to anthracite; their carbon content increases and their hydrogen and oxygen contents decrease according to the extent of geological metamorphosis. The carbon content of common solid fuels is: wood 49%, peat 59%, lignite 72%, cannel coal 80%, bituminous coal 86%, semi-bituminous coal 91% and anthracite (or stone coal) 92.5%. The calorific value of the fuel increases with its carbon content. Non-combustible ash decreases this to a disproportionate extent and may melt to form clinker which greatly impairs the value of the coal as a fuel.

Table 1. Chemical composition and calorific value of solid fuels.<sup>5</sup>

Fuel	Carbon (%)	Hydrogen (%)	Calorific value (Calories/gram)
Wood	50	6	5,000
Peat	55	6	5,500
Brown Coal	73	5	6,500
Coal	85	5	8,200
Anthracite	93	3	8,700

**Lignite** – is found in the UK at Bovey Tracey, in Devonshire. Some varieties show distinct woody texture, while others are structureless. They contain a large proportion of water, burn with a disagreeable odour, and are brown in colour. Lignite coal contains about 67% of carbon and 26% of oxygen. A subdivision of the class is sometimes made, called brown coal, which contains a larger proportion of carbon and less oxygen than the true lignite. It occurs in large quantities in continental Europe and in some of our ex-colonies; an analysis of brown coal from New Zealand shows: carbon 72.2%, oxygen 22.4%, hydrogen 5.4%.<sup>6</sup>

**Bituminous coal** – is common or pit coal and includes the following forms: caking coal, splint or hard coal, cherry or soft coal and cannel or parrot coal. The proportion of carbon in this class varies from 75 to 90% and the oxygen from 6-19%. The coals burn with a more or less smoky flame and are largely used for household and industrial purposes. As the proportion of oxygen decreases, the coal gets blacker and less sonorous and the friability increases.<sup>6</sup>

Bituminous coals may be further sub-divided into caking and non-caking varieties; the latter when burnt, split into fragments, while the former soften on the fire and swell up, the particles bind together and to form a pasty mass. This property is an extremely



## THE COALFIELDS OF GREAT BRITAIN

The coalfields of Great Britain are, with a few exceptions, contained in a series of rocks known as the Carboniferous Formation which was deposited in three phases:

*Coal Measures (Westphalian)* – by far the most economically important rocks of Great Britain, providing 95% of the country's coal, together with ironstone, fireclay and other minerals. Coal seams vary from thin streaks, of no economic importance, to seams of 8-10 ft in thickness, or as in the case of the Thick Coal of South Staffordshire and Warwickshire, a thickness of 30 ft or more. Seams of 18 in thickness, or less, have occasionally been worked (a sometimes quoted figure of 11 in has been regarded as a minimum economic workable thickness) in some coalfields but in general a minimum workable thickness is considered to be 2 ft.

*Millstone grit (Namurian)*

*Carboniferous Limestone (Visean)* – the lowest level, the Great Scar Limestone, is typically 3,000 ft thick.

The Coal Measures were originally deposited in five main basins on the mainland of Great Britain, of which the Devon and Cornwall basin was only worked on a small scale, probably for local consumption. The lignite beds of Bovey Tracey, in Devon, are unique in that they are the only coal to be found in this country which is not of Carboniferous date.

Coalfields in which the Coal Measures lie at the surface are called 'exposed coalfields', to distinguish them from 'concealed coalfields', in which the Coal Measures are covered by newer rocks. These are principally Permian and Triassic deposits, which were laid down immediately after the Coal Measures.

The maximum depth at which coal can be economically mined is commonly accepted to be a depth of 4,000 ft and when coal reserve figures are given they usually relate to seams lying within 4,000 ft of the surface and at least 12 in (or 18 in) in thickness. A minimum seam thickness of two ft is also often quoted.

### References

Gibson W., 1920, '*Coal in Great Britain*', Arnold, London, pp. 311.

Trueman A., 1954, '*The coalfields of Great Britain*', Clay, Bungay, Suffolk, pp. 396.

### SCOTLAND

The Scottish coalfields were formed by three main coal basins; the Ayrshire, Central Coalfield and Fife and Midlothians basins. The Midlothians basin is further sub-divided, by the Firth of Forth into two coal-producing areas. The Scottish coalfields differ in two important aspects from those in England and Wales:

- The workable coal seams occur, not only in the Coal Measures (which in Scotland are distinguished by the name Productive Coal Measures) but also in the Carboniferous Limestone, where about 45% of the coal output of Scotland was obtained. The seams in the Carboniferous Limestone occur at intervals throughout but are most persistent and important near the middle. These coals are normally bituminous coals, with some seams yielding the best coking coals produced in Scotland.
- In certain localities, some of the coal seams have been greatly altered by heat from nearby igneous intrusions.



The Scottish coalfields lie within a band, south-west from the Firth of Forth across to Ayrshire. The band is 95 miles long and up to 30 miles wide. Coals occur in all the subdivisions of the Scottish Carboniferous Formation but the seams of economic importance are confined to the Limestone Coal Group and the Productive Coal Measures. Most of the seams occur in the Upper and Lower Carboniferous Series. However, those found in the Lower Carboniferous tended to be thin. A peculiar feature of these seams is the large number of intruded dykes of igneous rock that cut the coal measures. These dykes were forced in as molten lava and on contacting the coal turned it into coke and also anthracite. This latter coal commanded a higher price on the market. The main coalfields occur as a series of more or less isolated coal basins, varying in breadth and depth, strung along the Midland Valley. The individual coal seams are less continuous than in the English coalfields and, coupled with areas altered by igneous rocks, made coal mining more uncertain than in England.

The coals from both coal series are highly bituminous. Coking and gas-producing coals are also common. The Lesmahagow Gas Coal of the Auchenheath district was of exceptional quality and has been used as a standard gas coal. The Torbanehill Gas Coal of the Armadale district was rich in kerosene and was a good oil-producer. Steam coals were very limited both in number and extent and were second-class.

Refractory fireclays were also worked. Oil-shale was also mined and was the chief raw material of the British oil industry in the early 20th century. Limestone has been quarried and sometimes mined, in the Midland Valley since the mid-18th century. The clayband and blackband ironstones were the foundation of a great iron-making industry which began with the building of the Carron Ironworks in 1759. The output of iron ore reached a peak of a little over 2½ million tons in 1880 but declined thereafter, falling to 600,000 tons in 1913.

### **Lanarkshire (or Central) Coalfield**

The Central, or Lanarkshire, Coalfield was the largest and most important in Scotland. It covers a triangular-shaped area of some 1,700 square miles, with Dumbarton, Paisley and Glasgow in the west, Coatbridge and Airdrie towards the centre and Linlithgow and Bathgate in the east. More than 60% of Scottish output was obtained from the Central Coalfield. The annual output was over 17,000,000 tons, or twice that produced by Fifeshire the next largest coal-producing county. Here, the Carboniferous succession comprises:

- Upper Carboniferous which contains the Productive Coal Measures and the Middle Coal Measures.
- Lower Carboniferous which contains the Coal & Ironstone Group, where the bulk of the important coals are to be found, together with Blackband ironstones.

Most of this coalfield consists of Upper Carboniferous measures; seams exist from Glasgow along the valley of the Clyde, almost to the town of Lanark. The Lower Carboniferous Limestone Series rise to the outcrop on most sides of the Lanarkshire Basin and to the north west of Glasgow; these have been extensively worked and are exhausted. These seams also occur in Renfrewshire and have been worked, even though they are much thinner and of poor quality. On the east of the Lanarkshire Basin from Bathgate to Wilsontown, the Limestone Series of coals are well developed and have also been extensively worked.

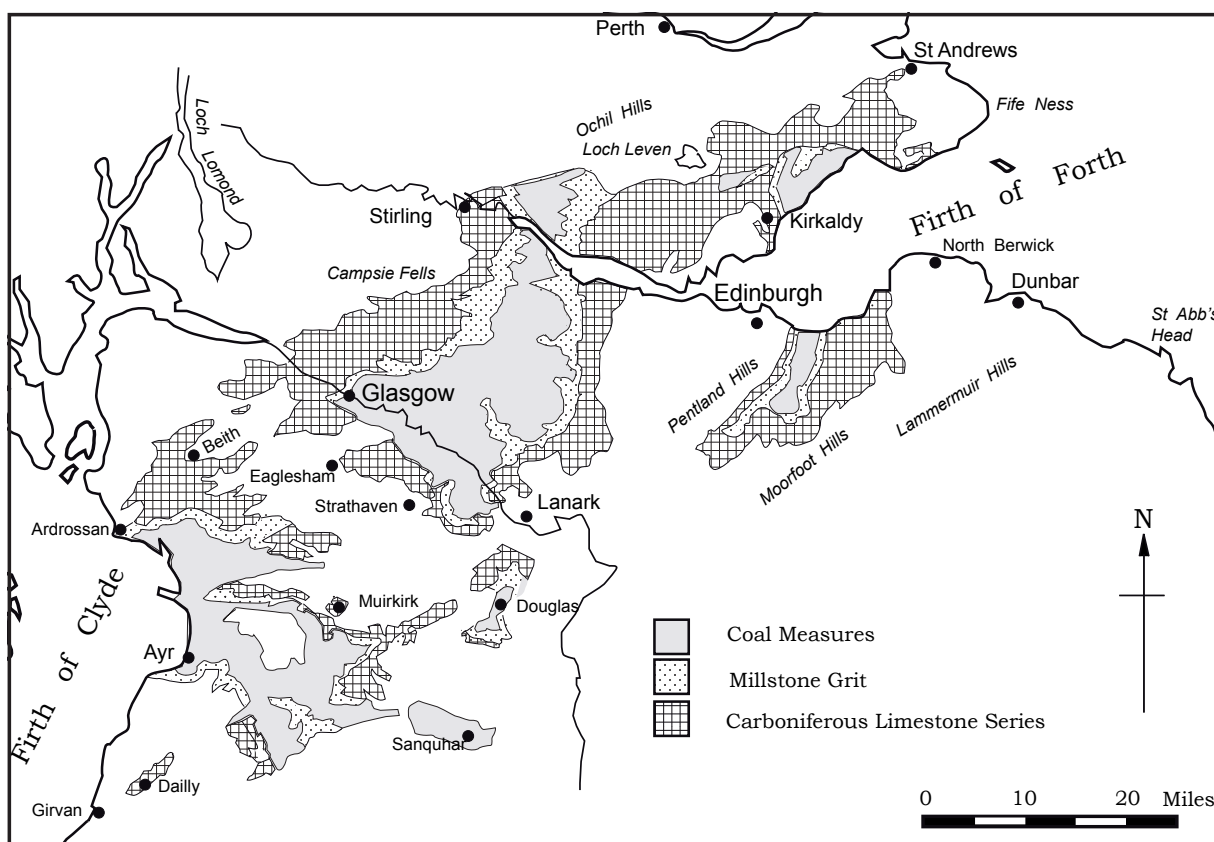


Figure 3. The Scottish Coalfield between Ayr and Fife.

In some areas both the Carboniferous Limestone and Productive Coal Measures have been affected by igneous intrusions, which have produced steam coals, semi-anthracites and anthracites. The anthracites have a low arsenic content and were much in demand by the brewery industry for malting. The coalfield also produced house coal, including the high-quality Bannockburn Main Coal, coking and gas-making coals, including the famous Lesmahagow Gas Coal. In addition the coalfield produced Blackband ironstones and fireclays and at one time the Productive Coal Measures produced coal which was extensively used for Scottish blast furnaces. In 1902 the output of this coalfield was 21,758,748 tons and in 1912 it totalled 22,506,984 tons.

### Fife Coalfield

The Fife Coalfield extends roughly parallel to the Firth of Forth for nearly 32 miles and has an average width of about 5½ miles. It covers an area of approximately 170 square miles, of which a triangular-shaped area of 20 square miles, between Dysart and Leven, is occupied by the productive Middle Coal Measures and contains the well-known Dysart Main Coal, which attains a thickness of 23 ft. The general succession is the same as in the Central Coalfield but the Limestone Coal Group is richer in coal and the Upper Limestone Group also contains some workable coal seams. Within this coalfield the complete Carboniferous series of measures were found, with seams of a workable thickness over large areas. The Upper Series or Coal Measures occur in the north end of a large basin along the Fife coast from Dysart to Largo. This elongated, north to south, basin is continuous under the Firth of Forth with the Lothian Coalfield. Coal was worked for several miles under the sea. Coal also outcropped on the seashore and for 2-3 miles inland, having been worked in the area for many centuries.

The Carboniferous Limestone Series occupies a far larger area, from Elie westwards, north of Largo, through Markinch and Lochgelly, past Dunfermline to Cidross. It occupies a widespread area of which Dunfermline is very nearly the centre. The Limestone Series is thinnest near the coast at Kirkcaldy but thickens as it is followed inland, attaining a maximum thickness at Lochgelly, where the 16 seams have a total thickness from 57-70 ft. This coalfield of the Limestone Series is from 15-18 miles from east to west and 4-5 miles broad. West of Dunfermline the seams become thinner continuing to the border of the Clackmannan Coalfield, where the limestone dips west and north-west under the Millstone Grits. The latter passes under the Upper Series of Clackmannan, which is geologically continuous with the Lanarkshire Basin. From this it is apparent that the Fife and Lanarkshire Coalfields are continuous throughout the Limestone Series; the coals produced were chiefly bituminous. The Dunfermline Splint Coal was celebrated in Scotland as a steam coal. Output in 1902 was 6,206,519 tons and in 1912 was 8,435,516 tons. The last deep mine in Scotland, the Longannet Complex, which produced two million tonnes per annum, closed in 2002.

### **Clackmannan Coalfield**

This coalfield, on the Fife border, comprises an area of Lower Coal Measures some 6 miles long and 4 miles wide around Alloa and Clackmannan, the Ochill Hills forming its northern boundary. The coal seams in the Carboniferous Limestone are thinner than in Fife. Over much of the coalfield the higher seams were exhausted first, leaving the deeper coal to be worked later. The coalfield principally produced household and manufacturing coals; cannel coals having been extensively mined for gas-making. Bunker coals and coals for general steam-raising are very limited in this coalfield. Fireclays have also been mined and used in the iron and steel industry and in zinc furnaces, as well as for special purposes.

### **Ayrshire Coalfield**

This important coalfield lies on the east shore of the Firth of Clyde, covering an area of 330 square miles. The Productive Coal Measures occupy the greater part of the coalfield and the Carboniferous Limestone seams are of little economic importance. The coal-bearing Carboniferous strata extend from the borders of Renfrewshire in the north, through Kilwinning to Dalmellington in the south, a distance of 25 miles. The coalfield stretches inland from the coast at Ayr to Sorn, a distance of 14 miles. Of this large area some 60 square miles, which contain most of the valuable coal seams, has been spoilt (burnt) by igneous rocks. Coal seams occur in both the Upper and Lower Carboniferous Groups and are generally bituminous with a high percentage of volatile matter and were widely used in the domestic market, as well as for gas-making. The seams are few but thick enough to be workable in localised areas. The quality tended to be average with a number of igneous intrusions making mining conditions difficult, while turning the coal into either steam coal or anthracite. Output in 1902 was 4,044,876 tons and in 1912 was 3,935,949 tons.

### **Dailly Coalfield**

The Dailly Coalfield forms an important part of the Ayrshire coalfields. The north-western margin of the coalfield is defined by the Kerse Loch Fault and the south-eastern margin by the Headmark Fault. The Limestone Coal Group is important with seven seams, varying from 2½ to 7½ ft in thickness. The Maxwell and Killochan Collieries

on the coalfield, survived the nationalisation of the coal industry and finally closed in 1973 and 1967 respectively. Killochan Colliery worked the Main, Hartley, Craigie and Parrot Seams, producing steam coal. Maxwell Colliery worked the Main, Hartley, Craigie, Coral and Parrot Seams and also produced steam coal.

### **Lothian Coalfield**

This coalfield is geologically the southern end of the Fife and Forth Basin and was economically the most important in Scotland with regards to output and reserves. The sub-divisions of the coalfield are:

- Productive Coal Measures - these cover an area in the centre of the Midlothian Basin of some 9 miles in length and breadth of up to 3½ miles and attain a maximum thickness of nearly 1,500 ft. There are 12 or 13 principal coal seams.
- Carboniferous Limestone Series - contains the Upper Limestone Group, Limestone Coal Group and the Lower Limestone Group which contains two or three seams which attain a workable thickness. The Upper Limestone Group contains the South Parrot Coal which attains a workable thickness on the west side of the coalfield. The Limestone Coal Group contains at least 8 and as many as 20 workable seams.
- Calciferous Sandstone Group - contains the Oil-Shale Group.

The seams are nearly horizontal in the centre of the coalfield, where the Upper Series measures are exposed but are highly inclined at the margins, particularly on the west side, where the Limestone Series come to the surface. The seams of the Limestone Series average 100 ft in thickness in the north but deteriorate rapidly in thickness and quality the further south they are found. They usually contain bands of cannel coal, one of these in the Great Seam reaching a thickness of two ft. Cannel was a highly bituminous coal much in demand for gas making. A notable feature of the Lothians Coalfield is the almost complete absence of igneous intrusions. Probably the seams of this coalfield were the earliest to be worked. Output in 1902 was 1,945,559 tons and in 1912 it was 4,115,573 tons.

### **Brora Coalfield**

Along the sea coast at Brora in Sutherland occurs a small coalfield of Jurassic age. The coalfield has been worked intermittently since the sixteenth century, the earliest workings from shallow pits on the south side of the River Brora, near the shore, where salt-pans were also in operation. There are two seams, the Main Coal, which has been worked for a long time and the Parrot Coal lying below it. The latter is a poor shaley coal, of little value but often 6 ft thick. The Main Coal is lustrous and rather friable, with a varying content of pyrites, which combined with a relatively high ash-content, has in the past mitigated against its use as a general-purpose coal. It is possible that the coal seams extend over an area of about three or four square miles and may contain a million tons of coal in seams of 24 in or more. Output in 1902 was 5,042 tons.

### **Canonbie Coalfield**

On the Dumfries-Cumberland border, north of Carlisle, a small area of coal measures appears at the surface from under the Triassic deposits of the Carlisle Basin. For many years the Canonbie Colliery obtained coal from this small coalfield. The area of exposed productive coal measures amounted to about 1½ square miles. The coalfield is

and about 16 square miles in South Derbyshire. The Coal Measures at the surface occupy an area of about 24 square miles, centred on Ashby-de-la-Zouch.

The Coal Measures are divided into three groups;

- Upper Coal Measures, which contain the Etruria Marls.
- Middle Coal Measures which contain the productive coal seams.
- Lower Coal Measures or Unproductive Series.

There are 33 seams ranging in thickness from one to 16 ft with a total thickness of 94 ft. Records of workings go back to at least 1204. The coals of Leicestershire and South Derbyshire have similar properties; the majority are bright coals with low ash and high volatiles contents and are principally used for household and industrial purposes. Some of the coals were also suitable for locomotive and steam-raising. Refractory clays were worked in the South Derbyshire Coalfield. Output in 1912 was 2,765,103 tons.

## WEST MIDLANDS

### North Staffordshire Coalfield

This is the largest of the Midland coalfields, triangular in shape and covering an area of about 110 square miles. The detached Cheadle Basin, increases the area of the coalfield to 128 square miles. The coalfield is in essence four coalfields: Goldsitch Moss, Shaffalong, Cheadle and the Potteries. The first three coalfields cover a combined area of less than 30 square miles, with the Potteries Coalfield more than three times as large as the other areas combined and having an area of about 100 square miles. A number of large faults traverse the field, creating areas of inclined seams that approach the vertical. These are known as 'rearer' workings. There are 36 seams of one foot and over, with a total thickness of 144 ft of coal. Most of the coal worked is concentrated in seams of six ft and over. The Cheadle portion of the coalfield contains 17 seams and a thickness of 65 ft of coal.

The field is divided into the Lower, Middle and Upper Coal Measures and the principal seams are:

Lower Coal Measures	Middle Coal Measures	Upper Coal Measures
Banbury (=Little Dilhorne)	Yard,Ragman Rough Seven Ft	Peacock
Cockshead (=Dilhorne)	Hams	Spencroft
Bullhurst (=Alcos)	Ten Ft (=Two Yard)	Great Row
King (=Woodhead)	Bowling Alley (=Half Yard)	Cannel Row
	Holly Lane (=Yard)	Winghay
	Hard Mine (=Littley)	Rowhurst
	New Moss(=Four Ft)	Moss

Seams in brackets are the equivalent names used in the Cheadle Coalfield

Geological experts noted that the coalfield had the most complete known sections of the Carboniferous System and was remarkable for the variety and quality of its coals (only anthracite and dry steam coals were missing) serving a wide variety of purposes: the Great



Row was used in the production of pottery and in manufacturing, the Bowling Alley for smelting and for railway fuel, the Holly Lane was a high quality house coal and the Crabtree (or Four Foot Mine) was used for coke making. Coal, potter's clay and high grade ironstone have largely determined the character of North Staffordshire's economic development.

One of the most striking characteristics of the coals of North Staffordshire is their remarkably wide variation in properties from area to area. A coal, which was strongly coking and suitable for the production of gas, in one area of the coalfield, could become weakly coking and suited to household purposes in another area.

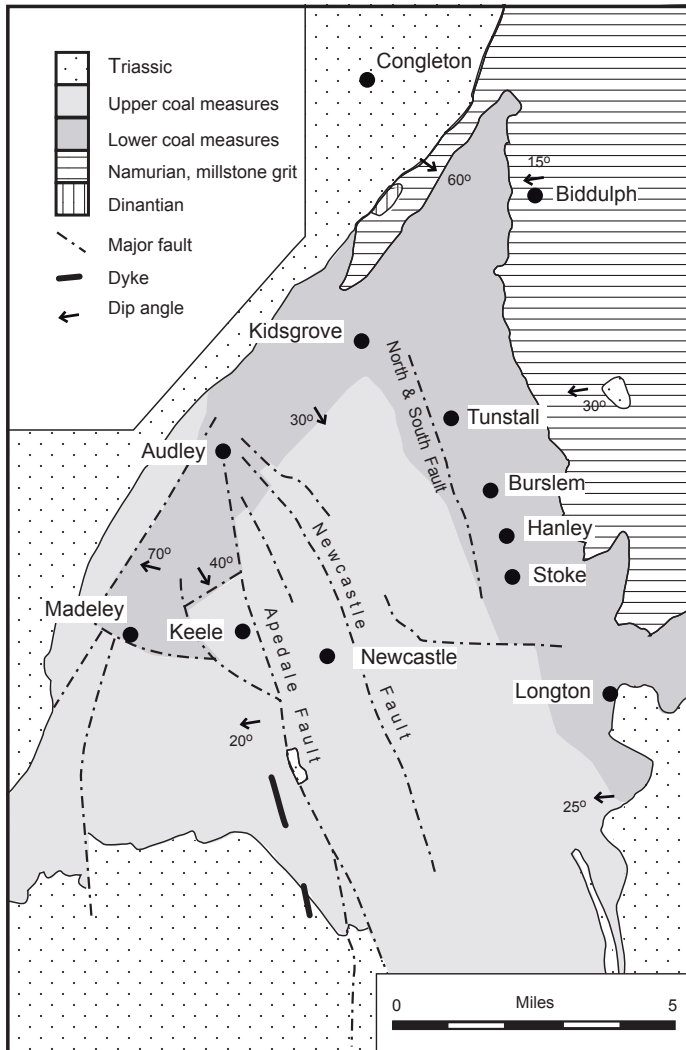


Figure 10. The Potteries Coalfield.

become weakly coking and suited to household purposes in another area. In 1862 it was noted that the total thickness of workable coal seams in the Potteries Coalfield was some 147 ft, 25 ft more than any other British coalfield. Steeply pitched seams and considerable faulting made mining hazardous and expensive. The Goldsitch Moss Coalfield was of no economic consequence.

The first large scale investigation of the coal resources of North Staffordshire took place following the chance discovery of a rich coal seam during the excavation of a section of James Brindley's Trent & Mersey Canal between Chatterley and Harecastle. Previously there had been small scale mining where the coal seams outcropped and mining on a commercial scale probably started in the 17th century. Great quantities of coal were required in the area, for the expanding pottery industry. Other raw materials, such as marls, sandstones and ironstones were tapped during coal mining;

these were used in building and iron-making and led to the rise of other industries. Many of the collieries of the 20th century were initially sunk to work the ironstone deposits and were later deepened or adapted for coal working.

### Cannock Chase Coalfield

The Cannock Chase Coalfield is separated from the South Staffordshire Coalfield by the belt of Bentley Faults, which run east-west, from north of Walsall to north of Wolverhampton. The Middle Coal Measures, which were extensively worked in the 19th century, outcropped in a triangular belt extending from the Bentley Faults in the south

## A COAL MINING CHRONOLOGY

- 43-410 AD Coal was in use in Roman Britain as evident from the remains found at stations along the Roman Wall, from the Tyne to the Solway Firth. Coal was also used to feed the sacred flame in the temple of Minerva at Bath. The principal use for coal at this time was probably as ballast in the empty grain ships returning from Tyneside to the Fens. Some writers say that the Romans used coal for salt-making, however, there is no evidence to support this claim.
- 852 The Saxon Chronicles of the Abbey of Peterborough, record the payment for twelve loads of fossil, or pit, coal to the abbey in 852 AD.
- 1085 In the Domesday Book there is no mention of coal mining in England, although there is detailed information about other trades and industries.
- 1180 One of the earliest references to the working of coal in the northern coalfield appears in the Boldon Book, in which a grant of land was made to a collier to provide coal for a cart-smith at Coundon. A similar grant was made to the smith of Sedgfield and the smith of Bishopwearmouth had 12 acres for the iron work of the carts and found his own coal (*carbonem*).
- ca. 1200 The records of Newbattle & Holyrood Abbeys show that coal began to be dug on the south shore of the Firth of Forth, at Carriden in Linlithgow and at Preston in East Lothian before the end of the reign of William Lionheart in about 1200.
- C12th By the late 12th century coal was being used by smiths and lime burners.
- C13th By the 13th century the coal produced rarely exceeded 15,000 tons/yr.
- The first evidence for the use of coal for salt-making dates to the 13th century. The Priory of St Bees, in Cumbria, operated a saltworks probably at either Whitehaven Harbour or the site of the later Saltom Pit. However it is unlikely that the fully fledged panhouse salt-making process took off until the 15th century and then probably in Scotland before England.
- 1228 By this date, sea coal was being shipped to London, as shown by a lane in London which went by the name of 'Sacole Lane', and was later changed to 'Secole Lane' in 1253.
- The earliest workings of 'sea coal' were situated on the coasts of Northumberland, Durham and the Firth of Forth estuary.
- ca. 1235 One of the first references to coal in a document was in a grant of land on the coast by Adam de Camhous to the monks of Newbattle Abbey in Scotland. The grant included the right to build a road to the shore for the



were however associated with the reclamation of relatively small amounts of high value mineral from a much larger quantity of valueless rock and shale. The principles and benefits of ‘wet’ separation methods were widely known at the time. Agricola also mentions that trough washers were in use, prior to 1556, for metallic ore separation.

1560 The estimated annual production of the principal coal mining districts in the decade 1551-1560:

Durham and Northumberland	65,000 tons
Scotland	40,000
Wales	20,000
Midlands *	65,000
Cumberland	6,000
Kingswood	6,000
Somerset	4,000
Forest-of-Dean	3,000
Devon & Ireland	1,000
Total	210,000 tons

\*includes Yorkshire, Lancashire, Cheshire, Derbyshire, Shropshire, Staffordshire, Nottinghamshire, Warwickshire, Leicestershire and Worcestershire. (Nef J.U., *‘Rise of the British Coal Industry’*.)

1563 The ninth Parliament of Mary Queen of Scots forbade coal exports under pain of confiscation of ship and cargo: ‘...*quhilk is now becummin the common ballast of emptie shippes, and gives occasion of most exorbitant “dearth and scantness of fewall.”*’ Rewards were offered in 1579 to the ‘*reveiler and apprehender of the contravenors of the Acte.*’ And in 1597 King James VI enacted a ban on the export of large coals: ‘*the great burne coals are commonly transported forth of this realm*’.

1566 In a letter to Cecil, dated 1566, coal is recorded as being dug near Bristol.

1573 The earliest mention of a ‘sough’ (a tunnel driven into a hillside to drain coal mine workings) in the Wigan area of the Lancashire Coalfield, dates from 1573, when an agreement was made between James Worsley and Edmund Winstanley to construct a sough to drain their respective coal mines near Orrell.

ca. 1578 The County of Durham became the largest regional producer of coal, a position which it held for 300 years. The early development of large-scale deep mining in Durham and the expertise gained, made the area the training centre for mining engineers in the British Isles and all over the world. (‘The Newcastle Coal trade II’, *Colliery Guardian*, 204, p.338.

1578 A petition to the Government by London brewers, dated 1578, shows that coal was used by them. Anxious not to offend Queen Elizabeth I they offered to burn wood only in the brew-houses close to Westminster Palace, as they understood, ‘*her majesty findeth hersealfe greatly greved and annoyed with the taste and smoke of the sea-cooles.*’ Though an owner

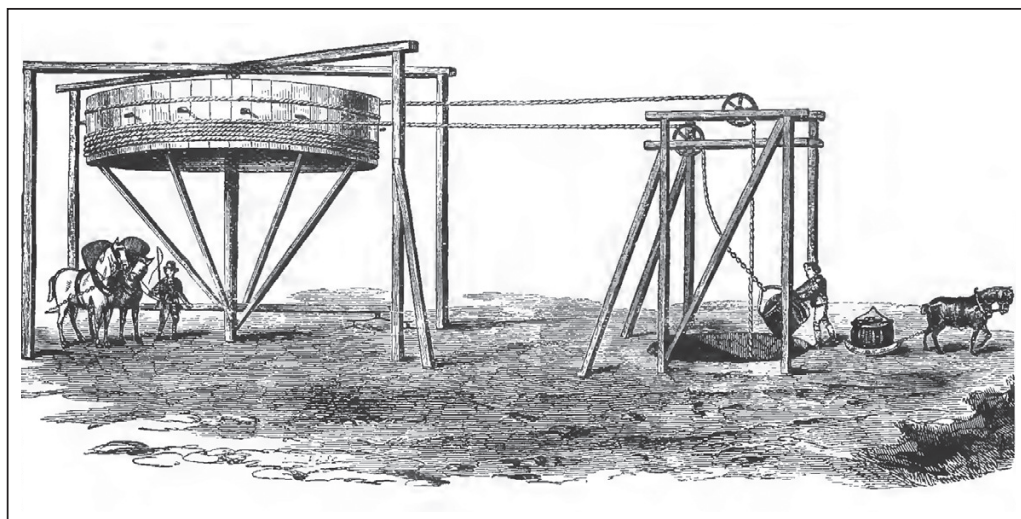


Figure 22. Horse whim in operation at a coal mine - note, the shaft is outside the horse track. [from: Boyd R.N., 1892, 'Coal Pits and Pitmen', Whittaker, London].

pit coal. This was the forerunner of the coal-tar distillation industry. Patents were also taken out in 1697.

1680s The national output of coal was estimated at about 300,000 tons. (Nef J.U., 'Rise of the British Coal Industry'.)

1685 About 300,000 chaldrons of coal were exported to London each year.

The growing importance of coal is shown by the exclamation of the Archbishop of York in 1685, 'God bless Yorkshire and preserve the coal pits.'

1686 Dr. Plot, writing in 1686, said that Beaudesert Colliery on Cannock Chase was the deepest in Britain at a depth of 234 ft. Cannel coal, which could be carved like stone, was mined there. The floor of Lichfield Cathedral choir was floored with alabaster and cannel coal from Beaudesert, in alternate black and white squares.

Dr. Plot went on to report that there were 12 to 14 collieries at work and twice as many out of work within ten miles of Wednesbury. These collieries typically produced 2,000 tons/yr and some up to 5,000 tons. Plot reported that a feature of mining in South Staffordshire and Worcestershire were the numerous underground fires; at Wednesbury eleven acres of coal were on fire. Writing about spontaneous combustion in the coal mines of Staffordshire and Warwickshire, Plot is reported to have said '...that some cole-pits may and doe fire of them-selves... '.

A 'fire lamp' (or brazier) was in use, hanging in a shaft at a Colliery at Cheadle in North Staffordshire, for the purpose of inducing ventilation. (Plot R., 1686, 'History of Stafford-shire', Oxford.)

In 1787, the vend (sale) of coal from the Tyne amounted to 480,000 chaldrons or 1,272,000 tons. (Royal Coal Commission iii, p.23.)

1788 Dr. Ure spoke of several attempts to reduce iron (from iron ore) using coked coal.

In 1788 there were 121 pits on the Forest of Dean Coalfield, 90 of which were working and producing a total of about 94,000 tons/yr. (Nicholls H.G., 1858, *Forest of Dean*, Murray, London.)

The earliest firm evidence of the use of flanged cast-iron plate rails at the surface of a mine, dates from about 1788. These were employed by a Joseph Butler in connection with an ironstone mine.

James Watt was the first to apply a governor to control a steam engine, when he fitted one to regulate the 'lap' rotary-beam engine in December 1788. (Dickinson H.W., 1935, *James Watt*, University Press, Cambridge, p.126).

1789 The steam-driven, endless-chain system of winding was introduced into collieries in Lancashire and Cheshire. There would be many 'chain pits' in Lancashire. This method of coal winding was successfully used at collieries up to a depth of 300 ft and was particularly common at the shallow collieries in and around Burnley in North East Lancashire. Endless-chain winding declined after 1865 but continued in North West Lancashire into the early twentieth century, one installation still operating in 1927. (Percy C.M., 1905, *The mechanical equipment of collieries*, James Collins & Kingston, London, pp.604-5).

In 1789, Brand mentioned three types of gin in use for winding: common or cog and rung gins, whim gins and 'macaroni' gins. Nothing further is known about this last type of gin, except that one of the Shiremoor Colliery pits was known as the Macaroni Pit. Brand also wrote of wheeled trams in use for conveying coal underground.

In 1789, William Jessop used fish-bellied, cast-iron edge rails and flanged wheels on a horse-drawn railway for coal wagons at Loughborough in Leicestershire. The following year (1790) Jessop went into partnership with Benjamin Outram and others to establish what was to become the Butterley Iron Works in Derbyshire, which went on to produce iron rails.

Pilkington, in *A View of the Present State of Derbyshire*, noted the use of firebaskets, hung in upcast shafts, for the purpose of assisting ventilation, at collieries in Derbyshire.

In 1789 Mr. Beaumont reported that the quantities of coal exported from

In 1866, London received 6,013,265 tons of coal; of which 3,033,193 tons (50.4%) were shipped by sea in colliers and 2,980,072 tons (49.6%) was transported by rail and canal. Of this total some 3 to 4 million tons were used for domestic purposes and the balance for steam vessels leaving London and for use on southern counties railways.

On 12 December 1866, the worst mining disaster of the 19th Century occurred at the Oaks Colliery, Barnsley in Yorkshire. In the underground explosions which occurred, a total of 344 men and boys were killed. On the following day a further 27 men, from the rescue team which went underground, were also killed, increasing the total to 371 deaths.

Accident statistics for 1866 showed that there was one death for every 216 men and boys employed and one life lost for every 68,484 tons mined in the British coalfields.

In 1866, a hydraulically-powered coal cutting machine was installed at Kippax Colliery near Leeds. The machine was powered by a cylinder, which obtained its hydraulic pressure from the shaft pumping column. Previously coal-cutting machines had been powered by compressed air.

1867

In the Seaton Delaval Colliery system the haulage engine and its boilers were located underground.

In 1867, Dutton introduced a cylindrical coal screen with two, or more, concentric cylinders revolving within each other.

John King patented his detaching hook on 18 October 1867. In 1873, it was successfully tried out for the first time at Sleights (Pinxton) No.1 Colliery, in Derbyshire, where he was the enginewright. The detaching hook was a safety device which was designed to detach the winding rope from the cage in the event of an overwind. (Griffin A.R., 1971, *Mining in the East Midlands 1550-1947*, Frank Cass, London, p.11).

Henry Johnson was principally responsible for setting up the South Staffordshire & East Worcestershire Institute of Mining Engineers in 1867.

Edward Ormerod (1834-1894) of Atherton in Lancashire, patented a successful detaching hook on 15 August 1867. It was first tried out at Gibfield Colliery, in Lancashire, in 1867. Ormerod's three-plate detaching hook was first manufactured commercially in 1868. A further patent followed in 1875, the same year in which Ormerod was awarded a medal. By this time some 700 of Ormerod's detaching hooks were in use. (Metcalf B.L., 'A century of engineering progress in British coal mines 1851-1951', *Inst. Mech. Engrs.*, June 1951, p.9).

In September 1867, a comprehensive report was submitted to the North

The total 'engine-power' employed in British coalmines (for winding coal, haulage, ventilation, pumping water, and sundry ancillary operations) was estimated as 2,293,256 hp. (Parsons R.H., 1936, *The development of the Parsons steam turbine*, Constable, London, pp. 319-321)

ca. 1908 A 4 miles long aerial ropeway was constructed between Rockingham Colliery and Smithywood Colliery, in South Yorkshire. (Bennett A., *Rockingham Colliery through the Ages*.)

1908 The Coal Mines Regulation Act (1908) reduced the working day for coalminers and made important contributions to the welfare of the mining community.

A fire started at the bottom of the downcast shaft at Hamstead Colliery on the South Staffordshire Coalfield on 4 March 1908 and was rapidly fanned by the current of air drawn down the shaft. Smoke and fumes were drawn into the workings, killing all 25 men who were underground at the time. Fortunately, the colliery had temporarily ceased production in order to carry out necessary maintenance work, otherwise the death toll would have been much greater. Attempts to rescue the trapped men, using breathing apparatus failed and it was soon realised that the only way of clearing the mine of the smoke and fumes was to reverse the ventilation flow. Eventually, the ventilation was reversed and the fire was driven back into the already burnt out-section of the mine which put it out. The Hamstead disaster caused the Royal Commission on Mines to consider the need for the ventilation in all collieries to be capable of being reversed. The Royal Commission took evidence from James Allardice who had built an arrangement of doors into the Guibal fan at Auchenbegg Colliery in Scotland, which enabled the ventilation current to be reversed without changing the direction of rotation of the fan. The Coal Mines Act (1911) included new provisions to require collieries to provide the means for reversing their ventilation.

When Bentley Colliery in South Yorkshire was sunk (1902-8), it was well known that the Barnsley Seam was liable to both spontaneous combustion and the release of immense quantities of gas, which would have to be removed by adequate ventilation. Due consideration to these potential problems was reflected in the layout of the roadways and workings. The underground layout was divided into six self-contained districts of equal size. Each district had two intake and return roads and its own split from the ventilation and was capable of being sealed off from the rest of the mine in the event of an explosion or fire. Dividing the workings in this manner proved to be great foresight in later years, contributing to rapidly increasing output and when disaster finally came – of fulfilling its primary purpose. Bentley became universally accepted as the 'safest pit in the Doncaster district'.

The first electric winder of moderate capacity in Britain, was installed at the Maritime Pit of the Great Western Colliery Company in South Wales,



in or about coal mines and to promote mining education and research. An Act of 1926 augmented the fund by a royalties welfare levy. This act also required the Miners' Welfare Committee to secure the provision of pithead baths and facilities for drying clothes. The Safety in Mines Research Board was largely funded by the Welfare Fund when it was set up in 1921. The Welfare Fund greatly improved the social conditions of the miner and his family. In 1939 the Miners' Welfare Commission was established and operated until it was superseded by the Coal Industry Welfare Organisation in 1952.

The first Rheolaleur coal cleaning plant to operate in Britain, was installed at Ormonde Colliery, Derbyshire in 1920. Designed to handle 100 tonnes/hour of 0-8 mm size coal, the plant was an experimental facility. A Rheolaleur plant was commissioned at Llay Main Colliery in North Wales in 1921 and proved to be very reliable.

Hathorn Davey differential pumping engines were still being manufactured and employed at British mines in the 1920s. The Cardiff Hematite Iron Ore Company ordered a 37 in and 72 in diameter by 10 ft stroke, horizontal compound differential pumping engine for their Llanharry iron mine. This engine was started up on 11 January 1920. In the previous year a Hathorn Davey horizontal triple-expansion tandem differential pumping engine, had been delivered to the Florence iron mine at Egremont in Cumbria, on 31 July 1919.

1921      Underground stone dusting was introduced at British collieries and resulted in a great reduction in the severity of explosions.

1922      Tilmanstone Colliery on the Kent Coalfield is believed to have experimented with ten-ton battery locomotives for underground use in 1922.

The S.F. pit prop was introduced in 1922; this had a jib key which facilitated the safe removal of the prop by enabling it to collapse slightly. ('The S.F. patent pit prop', *Iron & Coal Trades Review*, 106, March 1923.)

1923      Following the success of the tower-mounted Koepe winder at Plenmeller Colliery, a second tower-mounted Koepe winder, was commissioned at Murton Colliery on the Durham Coalfield in December 1923. The Murton installation had a reinforced-concrete tower and a single locked coil winding rope driven by a 315 KW (420 hp) A.C. (2,000 v, 40 Hz) winding motor. This structure was operational when the colliery closed in November 1991.

Brodsworth Colliery became the largest colliery in Yorkshire and, following the sinking of the third shaft in 1922-23, became the highest output three-shaft colliery in Britain. By the early 1920s Brodsworth was claiming the world record for coal drawing with a record daily output of 6,027 tons in February 1924 and a weekly output of 30,246 tons in December 1923.



*Figure 68. Demolition of Newstead Colliery, Nottinghamshire [Photograph courtesy of Shane Phillips © Creative Commons licence 2.0].*

and technical problems which had stopped production.

In 1995, the Selby Complex of mines was purchased by RJB Mining from British Coal. Later RJB Mining PLC was to become UK Coal.

- 1996 Point of Ayr Colliery, the last working colliery in the North Wales Coalfield, closed in August 1996; it had worked from 1873 to 1996.
- 1997 In 1997, the UK market for coal stood at 58 million tonnes/yr but by 1998 had dropped to 29 million tonnes/yr and looked set to decline further.
- 1998 Silverdale Colliery, the last colliery in the North Staffordshire Coalfield, closed in 1998. The colliery had worked from about 1870 until 1998.
- 1999 Britain's oldest colliery, the Annesley-Bentinck Colliery Combine at Ashfield on the Nottinghamshire Coalfield, closed in January 1999.
- 2004 The Selby Coalfield of the North Yorkshire Area closed, when the last working colliery at Riccall ceased production on Tuesday 26 October 2004. During the 21 year life of the complex, over 400 faces were worked. By 2001, the Selby complex had produced over 110 million tonnes of coal and at its peak in 1993-4 was producing over 12 million tonnes. During the life of the coalfield, the Barnsley Seam was the only seam to be worked, by a peak workforce of over 3,000 direct and over 1,000 indirect employees. In 1995, the complex was purchased by RJB Mining PLC. It was situated in an area of heavily-watered



# INDEX

- Aberfan tip disaster, 1966, 1969  
Accidents & disasters, 1243, 1658, 1836, 1839, 1853, 1862, 1879, 1866, 1883, 1886, 1906, 1913, 1934, 1937, 1940s, 1950, 1973  
Accidents, overwind, 1936  
Accidents, worst in Britain, 1913  
Adamtchik, M.T., 1933  
Admiralty steam trials, 1868, 1869, 1871, 1876  
Aerial ropeways, c1908, 1960s  
Age of collieries, 1984  
Agricola, Georgius, 1521, 1556  
Air compressor, 1909  
Airflow reversal, 1908  
Air pump, 1807, 1846  
Air splitting, 1806  
Air tube ventilator, 1756  
Airways, length of, 1880s, 1883  
Allardice, James, 1908  
Alley & MacLellan, 1909  
Altofts colliery experimental gallery, 1898  
Aluminium alloy, use of, 1927, 1940s, 1948  
Anderson-Boyes, 1951  
Anemometer, 1842  
Annual output of coal, 13th century, 1550s, 1560, 1600, 1660, 1680s, 1690, 1700, 1750, 1770, 1780, 1785, 1790, 1795, 1800, 1816, 1839, 1845, 1850s, 1851, 1854, 1855, 1860, 1865, 1866, 1870, 1875, 1880, 1885, 1890, 1895, early 20th century, 1900, 1910, 1913, 1923, 1933, 1945, 1950, 1956  
Anthracite, mechanical reduction, 1886  
Anti-vibration shutter (or 'swallow-tail'), 1885, 1894  
Arab-Israeli War, 1974  
Armstrong, Sir William G., 1860s  
Atkinson, J., 1856  
Atkinson, Llewellyn, 1887  
Atmospheric steam engine, 1678  
Automatic expansion gear, 1876  
Auxiliary underground fans, see Ventilators, underground auxiliary booster fans.  
Aytoun, Robert, 1865  
Babcock & Wilcox, 1882, 1883  
Bailey & Company, W.H, 1879  
Baird & Company (Coatbridge), William, 1864  
Bankwork system of working coal, see Yorkshire longwall bankwork system of working coal.  
Barnes (Viewer), Thomas, 1795, 1797, 1801  
Barnsley Area of NCB, 1974  
Barrows, to transport coal to the shaft bottom, c1492  
Barry Docks (Cardiff), 1889  
Batchelor, T.C., 1884  
Baths, see Pithead baths.  
Beam winding engine, 1935  
Beaumont coal seam, 1605, 1618  
Beaumont, Huntington, 1603, 1605, 1618, 1649  
Beaumont, John, 1778  
Becher & Searle, 1681  
Bedlington Ironworks, 1820, 1825  
Bee-hive coke oven, 1620  
Beighton, Henry, 1718  
Belliss & Morcom (Birmingham), 1890, 1909  
Belliss & Morcom steam engine, 1890  
Bell, William, 1817  
Belt conveyor, 1930s  
Bennett, S.G., 1908  
Bernard, 1851  
Berwick-on-Tweed, coal imported into, 1265  
Bessemer steel, 1856  
Bettington dust burning facility, 1910  
Bickford safety fuse, 1831  
Bio-cylindro-conical winding drum, 1896, 1908, 1927  
Biram, Benjamin, c1836, 1842, 1853  
Birkenshaw, John, 1820  
Black Death (Bubonic Plague), 1665  
Black, G.A., 1936  
Black, G.J.F., 1909, 1929  
Black, Hawthorn & Company (Gateshead), 1863  
Black's torque controller, 1948  
Blenkinsop's locomotive, 1812  
Blewstone, Dr., 1677  
Blücher (steam locomotive), 1814  
Bobgin, 1725  
Boiler pressures, 1840  
Boilers, 1863  
Boilers, egg-ended, 1800, 1863, 1930  
Boilers, water-tube, 1882, 1926  
Boilers, methane-fired, 1950, 1952  
Boilers, oil-fired, 1907  
Boilers, pulverised fuel fired, 1903, 1910, 1926  
Boilers, use of low grade fuels, early 20th century  
Boilers, water-tube, 1883  
Boldon Book, 1180  
Bondage, Scotland, 1606, 1775.  
Booster fans, see Ventilators.  
Bord & pillar working, late 17th century, 1761  
Boring for coal, 1639, 1649, 1804  
Boring tools, 1613, 1618  
Boulton & Watt, rotative double-acting engine, 1784  
Boulton & Watt, first steam engine, 1776  
Boulton & Watt, winding engine in Cornwall, 1784

Boulton & Watt partnership, 1775, 1776, 1778, 1792, 1798, 1801  
 Boulton & Watt (Soho Works), 1795, 1798  
 Bowlker, 1878  
 Bradley & Craven, 1928  
 Brain, W.Blanch, 1881  
 , 1787, 1789  
 Brandling, C, 1755  
 Bratticing, early 19th century  
 Breathing apparatus, see Self-contained breathing apparatus.  
 Breby, see British Mining Research Establishment.  
 Bridgewater canal, 1761  
 Bridgewater, Duke of, c1760, 1761  
 Briquettes of coal (see also, Patent fuel), 1594, 1799, 1843, 1844, 1864  
 Bristol coalfield, 1566, 1949  
 Bristol coalfield, export of coal from, 1617  
 British Coal Corporation, 1987  
 British Coal Opencast, 1990  
 British Mining Research Establishment, 1947  
 British Railways Modernisation Plan, 1955  
 British Steel Corporation, 1979, 1980s  
 Brown, W., 1770, 1778  
 Brownrigg, Dr., Late 18th C  
 Brunton, William, 1819  
 Buddle, John, 1796, 1807, 1810, 1811, 1844  
 Bucket pump, 1869  
 Bull, Edward, 1792  
 Bull pumping engine, 1792, 1829, 1848, 1884  
 'Bumps' in the Thick Coal of South Staffs, 1893  
 Bumstead & Chandler (Hednesford), 1887  
 Burrows, 1855, 1856  
 Butterley Ironworks, 1789  
 By-products 1602, 1681, 1711, 1781, 1792, 1885  
 Cage safety device, 1847  
 Cage & shaft guide system, 1834  
 Calder Hall Power Station (Windscale), 1956  
 Cameron pump, 1868, 1871  
 Cannel coal, 1686, 1848  
 Cannock Chase coalfield, 1955, 1960, 1993  
 Cannock Chase Miner's, etc Association, 1887  
 Capel, white metal, 1884  
 Capell, Rev. G.M., 1882, c1891  
 Cardiff coal docks, 1839  
 Cardiff, export of coal from, 1830, 1839  
 Cardiff Haematite Iron Ore Company, 1920  
 Cast iron (engine) cylinders, 1721  
 Cast iron pit props, 1802, 1830  
 Cast iron rails, 1790, 1797  
 Cast iron shaft tubbing, 1795, 1832  
 Causey Arch, 1727  
 Celtic Energy, 1994  
 Cementation Company, 1926  
 Central coal preparation plants:  
     -Cynheidre, 1955  
     -Hawthorn, 1955  
 -Lynemouth, 1955  
     -Maesteg, 1955  
     -Manvers, 1955  
 Central Electricity Generating Board, 1926, 1979, 1980s  
 Centralised pumping (drainage) schemes, 1950s  
 'Chain' pits, 1789  
 Chain pumps, (see also, Rag & chain pumps) 1670  
 Chaldron, 1306, 1421, 1655, 1670, 1695, 1776  
 Chaldron wagons (black wagons), 1338  
 Chapman, W., 1800, 1810, 1812, 1815  
 Charcoal, 16th century  
 Charters giving license to dig coal, 1272, 1305  
 Charters related to coal, 1600  
 Cheshire coalfield, 1858  
 Chesterfield & Derbyshire Institute of Mining, Civil & Mechanical Engineers, 1852  
 Chimney 1251, 1306, 16th century, early C18th  
 Chimney tax, early C18th  
 Chorographia (survey of Newcastle), 1618, 1619  
 Clanny, Dr., 1811  
 Clayton, Son & Howlett, 1874  
 Clean Air Acts, 1306, 1969  
 Clean Air Act (1956), 1955  
 Cleaning of coal (see also, Washeries and hand cleaning), 1850s, 1927, 1978  
 Cleaning of coal, Birtley S.J. Separator, 1919  
 Cleaning of coal, dry methods, 1869  
 Cleaning of coal, pneumatic separator, 1919  
 Clee Hills Shropshire, coal mining in, 1260-3  
 Clerk, Sir John, 1724  
 Coal as an article of commerce, 1327  
 Coal Authority, 1952, 1994  
 Coalbrookdale, 1709, 1721, 1740, 1763, 1767, 1776  
 Coal cutting machines: 1761, 1862, 1894, 1899, 1912, 1913, 1924, 1939, 1944  
     -Anderson Boyes (disk-type), 1900  
     -Anderson Boyes trepanner, 1954  
     -Arcwall coal cutter, 1923  
     -Bower Blackburn (electric bar-type), 1885  
     -Chain type, 1864  
     -Coal plough, 1947  
     -Compressed air powered, 1870  
     -Cowlishaw Walker & Company, 1900  
     -Diamond (disk-type), 1894  
     -Disk type, 1852, 1870  
     -Electric powered, 1891, 1895  
     -First (Donisthorpe, Firth & Ridley), 1862

- Gartsherrie chain coal cutter, 1864
- Gillot & Copley's, 1868
- Goolden (bar-type), 1888, c1891
- Hurd chain coal cutter, 1869
- Hydraulically powered, 1866
- Johnson & Dixon (bar-type), 1856
- Lock & Warrington's hydraulic type, 1864
- Mavor & Coulson, 1897
- Sampson (chain-type), 1926
- Sutcliffe (disk-type), 1892, 1894
- Trepanner coal cutter, 1951
- Universal, 1918
- Walker (disk-type), 1869
- Waring's coal saw, 1852
- Willie Brown's Iron Man, 1768
- Coal drawing (raising in the shaft):
  - From a single shaft, 1897, 1910
  - Record outputs, 1923, 1957, 1965
- Coal drops, 1338, 1800, 1808, 1810, 1812, 1823
- Coal, early references to in a document, c1235
- Coal Exchange (London), 1805, 1831
- Coal-fired power station, see Power station.
- Coal, fixing price of, 1666
- Coal for the future, 1977
- Coal for the Royal Navy, 1871
- Coal gas (see town gas), 1792, 1798
- Coal Industry Act (1987), 1987
- Coal Industry Act (1994), 1994 (see Coal Authority)
- Coal Industry Nationalisation Act (1946), 1945, 1946
- Coal in place, 1979
- Coal Investments, 1994
- Coal, licenses granted to work, 1239
- Coal Miners' Apprentice Course, 1938
- Coal Mines Act (1911), 1887, 1908, 1909, 1911
- Coal Mines Act (1930), 1930
- Coal Mines Act (1938), 1938
- Coal Mines General Regulations, 1937
- Coal Mines Inspection Act, 1872
- Coal Mines Regulation Act, 1872, 1879, 1887, 1896, 1900, 1908
- Coal mining, early references to, 1180, c1235, 1243
- Coal Nationalisation Act, 1938
- Coal preparation plants (see also, Centralised coal preparation plants), 1955, 1956
- Coal seam, first mention of workings, 1243
- Coal seams, most dangerous to work, 1883
- Coal screening, see screening of coal.
- Coal, share of energy market, 1969
- Coal shipments:
  - from British ports, 1791, 1820
  - from the Northern coalfield, 1810, 1820, 1830, 1840, 1850, 1860
  - to London, 1228, 1257
- Coal sorting plant, 1886
- Coal spouts, 1338
- Coal staithes, 1338
- 'Coals to Newcastle', 1538
- Coal Strike (1984-5), 1984
- Coal tax, 1379
- Coal, use of as a fuel, 12th century, 14th century, 15th century, 1506, 1550s, 1603, 1625, 1627, late 17th century
- Coal, use of for brewing, 1578
- Coal Utilisation Research Laboratory, 1969
- Coal Viewer & Engine Builder's Practical Companion, The, (by John Curr), 1797
- Coal wagons, 1952, 1959
- Coal washing, see Cleaning, Washing plant.
- Coal wedging machines, Jones & Bidder's, 1868
- Cochrane, William, 1877
- Cockson, Charles, 1882
- Cog & rung gin, c1650, 1680, 1746, 1765
- Coke: 1527, 1900
  - Used to dry malt, 1600, 1640
- Coke ovens: 1763, 1765
  - By-product recovery, 1882, 1883
  - Retort, 1870
  - Simon-Carves, 1882
  - By-product recovery, 1883
- Colishaw & Company, 1883
- Colliers (coal carrying ships): 1338, 1550s, 1596, 1600, 1615, 1660s, 1676, 1705, 1764, 1798, 1818, 1830, 1835
  - Convoy system to protect, 1596
  - Steam colliers, 1842, 1844, 1852, 1854
- Collieries:
  - Abercanaid, 1891, 1894
  - Aberpergwn, 1984, 1995
  - Abram, 1885
  - Ackton Hall, 1895, early 20th century, 1900
  - Adair (Dunraven pit), 1827
  - Adelaide, 1871
  - Albion, 1897
  - Allens Flat, 1693
  - Allerton Main, 1888
  - Alloa, early 18th century, 1774, 1785
  - Altofts, 1886, 1892, 1898
  - Annesley, 1999
  - Apedale, 1836
  - Arley, 1914-18
  - Asfordby, 1990
  - Ashington, 1903, 1926
  - Ashton Moss, 1876, 1881, 1885
  - Ashton Vale, 1865
  - Askern Main, 1912

- Astley (Duckinfield), 1858, 1876, 1885
- Astley Green, 1912
- Auchenbegg, 1908
- Auckland, 1769
- Auckland Park, 1885
- Avon, 1880, 1883
- Baddesley, 1906
- Baggeridge, 1874, 1968
- Bagworth, 1976, 1991
- Bank (Fitzwilliam), 1871
- Bargoed, 1909
- Barnburgh Main, 1949, 1950, 1955
- Barrow, 1962
- Beamish, 1777
- Beaudesert, 1686
- Bebside, 1605, c1860
- Bedlington Collieries, 1605, 1939
- Beechtree, 1968
- Bent, 1883
- Bentinck, 1976, 1999
- Bentley, early C20th, 1908, 1910, 1928, 1934, 1939
- Benton, 1769
- Benwell, 1769, 1797, 1800
- Berry Hill, 1883
- Bestwood, 1880
- Betteshanger, 1989
- Bevercotes, 1963, 1967
- Bewicke Main (or Urpeth), 1808, 1812
- Bickershaw, 1885, 1938
- Bigges Main, 1795
- Binchester, 1885
- Black Boy, 1831, 1885
- Black Close, 1769
- Black fell, 1769
- Blaenhirwaun, 1955
- Bloomfield, 1776
- Blue Ball, 1830
- Bold, 1953
- Boldon, 1873
- Bolsover, 1897
- Bonville's Court, 1863
- Borrostowness, 1769
- Bothwell, 1885
- Bowburn, 1926
- Bradford, 1883, 1954
- Brereton, 1900
- Bridge (Wigan), 1863
- Britannia, 1913
- Broadoak, 1935
- Brodsworth, early C20th, 1923, 1957, 1960, 1971, 1976
- Bryn, 1955
- Bullcroft, early 20th century
- Bunker's Hill, 1891
- Bushblades, 1769
- Byker, 1714, 1740, 1769, 1778
- Caerau, 1955
- Cambois, 1872
- Cannock Chase No.2, 1883
- Cannock & Huntingdon, 1877
- Caphouse, 1970
- Carberry, 1880
- Castle Pit (Crawshay's), 1928
- Chanters, 1912
- Chartershaugh, 1732, 1738, 1753, 1769
- Chester Burn, 1769
- Chilton, 1877
- Chirton, 1769
- Choppington, 1769
- Chopwell, 1808
- Clansthal (metal mine, Hartz), 1834
- Clara Vale, 1896
- Clay Cross, 1870s, 1939
- Clipstone, 1954
- Clydach Vale No.3, 1889
- Coalpit Heath, 1949
- Coegnant, 1955
- Colsterdale, 1690, 1706
- Contess Pit (Whitehaven), early 19th century
- Conygre, 1712
- Cotgrave, 1976
- Cowpen, 1605, 1872
- Craghead, 1890
- Croft, 1894
- Crosshands, 1955
- Culross, c1590, 1600, 1618
- Cwm, 1914, 1956
- Cwmgwrach, 1995
- Cwmsaerbren, 1849
- Cwmamman no.1 pit, 1869, 1918
- Cwmllynfel, 1820
- Cynheidre, 1955
- Dairy Pit, Wigan, 1883
- Darfield Main, 1874
- Dawdon, 1976
- Daw Mill, 1975, 1976, 2010
- Deep Duffryn, 1859, 1879
- Deep Navigation, see Harris Deep Navigation.
- Denaby Main, 1897, early 20th century
- Dinnington, early 20th century
- Dodworth, 1936
- Dowlais-Merthyr, 1869
- Duckinfield, 1795, 1815
- Duckmanton, 1825

- Duddingston, 1769
- Dudley, 1933
- Duke Pit (Whitehaven), 1841
- Duke's Pit, Tredegar, 1806
- Eaglebush, 1849
- Earnock, 1882
- East Denton, 1769
- East Hetton, 1874
- Easthouses, 1954
- Eccleston, 1829
- Elemore, 1955
- Elemore (George & Isabella Pits), 1800
- Ellington, 1955, 1976, 1979, 1983, 1994, 2005
- Elliot, 1928
- Ellistown, 1976, 1991
- Elsecar (or Fitzwilliam Elsecar), 1830, c1836, 1853
- Elswick, 1714, 1769, 1863
- Emley Moor, 1903
- Emma Pit (Stella Coal Company), 1850s
- Eppleton, 1873, 1955
- Eshott, 1769
- Exhall, 1848
- Fatfield, 1708, 1732, 1754, 1769
- Felkington, 1769
- Fencehouses, 1878
- Fenton Park, 1818
- Ferry Moor, 1969
- Ferry Moor/Riddings Drift, 1969, 1976
- Firbeck Main, early 20th century
- Fire engine, early 20th century
- Flockton, 1892
- Florence, 1907
- Framwell, 1856
- Friar's Goose (pumping pit), 1778, 1830, 1861
- Frickley, early 20th century
- Galla Flat, 1658
- Gannow, c1847
- Garswood Park, 1894
- Gascoigne Wood (Selby), 1981, 1983
- Gateshead Fell, 1769
- Gateshead Park, 1714
- Gellygaer, 1849
- Gibfield, 1867, 1912
- Glasshoughton, 1906
- Glebe Pits, 1885
- Goldthorpe, 1976, 1988
- Goldwick, 1839
- Gosforth, 1769, 1829
- Govan, 1849
- Grange, 1926, 1928
- Granville, 1979
- Great Mountain, 1955
- Greenside, 1808
- Gresford, 1934, 1948
- Grey Southern, 1769
- Griff, 1714, 1774, 1791, 1880
- Grimethorpe, 1927, 1935, 1958, 1969, 1974, 1980, 1984,
- Gwaen-Cae-Gurwen, 1847, 1886
- Haig, 1942, 1952, 1982
- Haigh, 1950s, 1856
- Hamilton Palace, 1882, 1883
- Hamstead, 1874, 1885, 1893, 1908, 1968
- Hanley Deep, 1872
- Hanover No.1 (Rühr, Germany), 1877
- Hapton Valley, c1847
- Harraton, 1708, 1871
- Harris Deep Navigation, 1878, 1885, 1928
- Harry Stoke Drift, 1949
- Hartley, 1762, 1763, 1769, 1862, 1869
- Harton (St. Hilda Pit), 1839, 1871, 1908
- Harworth Main, early 20th century, 2010
- Hatfield Main, 1911, 1971
- Hawkesbury, 1674, 1776
- Hawthorn Complex, 1976
- Haydock, 1834
- Hazzlerigg, 1909
- Heaton, 1676, 1769, 1807, 1810, 1812, 1815
- Hebburn, 1794, 1798, 1807, 1811, 1816, 1869
- Hebburn 'A', 1792
- Hebburn 'B', 1796, 1868
- Hemingfield, c1836
- Hemsworth, 1979
- Hendreforgan, 1828
- Herrington, 1984
- Hetton, 1795, 1810, 1834, 1835
- Heworth, 1769
- Hickleton Main, 1910
- Highgate, 1976
- High Royd, 1862
- Hirwaun, 1862
- Holmes, 1871
- Houghton, 1832
- Howbridge, 1912
- Howden, 1796
- Howgill, 1781, 1790, 1801, 1803
- Howgill (Kells Pit), 1790
- Howgill (Thwaite & King Pits), 1801
- Hucknall, 1873
- Hucknall Torkard, 1905
- Hutton Henry, 1880
- Ince, 1849, 1868
- Jarrow, 1796, 1803, 1815, 1816, 1820

- Jesmond, 1676, 1769
- Johnstone Castle, 1827
- Kellingly, 1976, 2010
- Kibblesworth, 1884
- Killingworth, 1812, 1814
- Kilmersdon, 1973
- Kilnhurst, 1949, 1955
- Kingshill, 1935
- Kingswood, 1862
- Kinsley Drift, 1979
- Kippax, 1864, 1866
- Kirkby, 1968
- Knockshinnoch Castle, 1950
- Ladies Lane, 1869
- Ladyshore, 1884
- Lambton, 1769, 1878
- Langley Park, 1903
- Lawson Main, 1797
- Lea Hall, 11960, 1965, 1976
- Lemington, 1769
- Lens No.10 shaft, Belgium, 1883
- Lightmoor, 1930
- Littleton, 1993
- Llanover, 1932
- Llay Main, 1920
- Lockwood, 1864
- Lodge, 1951
- Lofthouse, 1973
- Longannet Complex, 1976, 1994
- Long Benton, 1749, 1774, 1777, 1780
- Lower Elsecar, 1852
- Lumley, 1676
- Lynemouth, 1955, 1983
- Mainband Drift, 1982
- Mainsforth, 1904
- Maltby, 1882, early C20th century
- Manvers Main, 1949, 1955
- Mardy, 1990
- Marine, 1901
- Maritime, 1908
- Markham, 1973, 1976, 1993
- Markham Main, early 20th century
- Marsden, 1877
- Merthyr Vale, 1859, 1879, 1966
- Middle Duffryn, 1846
- Middleton, 1812, 1969
- Monk Bretton, 1961
- Monkton Hall, 1976, 1992
- Moorhouseclose, 1486-7
- Morrison Busty, 1947
- Morton Hill, 1769
- Mosley common, 1954
- Moss pit, c1882, 1885
- Mostyn, 1848
- Murton, 1867, 1894, 1923, 1955
- Netherton, 1808
- Newbiggin, 1769, 1955
- Newbottle, 1769, 1878
- Newburn, 1769
- New Copley, 1880
- New Hawne, 1870
- New Hucknall, 1947
- New Moss, 1892
- Newstead, 1963
- New Tredegar, 1876
- North Biddick, 1756, 1769, 1884, 1885
- Northern United, 1965
- North Gawber, 1950s
- North Hetton, 1867
- North Seaton, 1872
- North Selby (Selby), 1983
- Norwood, 1714, 1769
- Nostell, 1883
- Nottingham, 1769
- Nuneaton, 1880
- Nunnery, 1891
- Oaks, 1862, 1866
- Oakthorpe, 1790
- Ollerton, 1946
- Ormonde, 1920, 1954, 1963
- Osmondethorpe, 1837
- Ouston, 1769, 1816
- Outwood, 1910
- Ovington's pit, 1776
- Oxclose, 1714
- Page Bank, 1860, 1863
- Parkside, 1993
- Parton, 1769
- Pease's West, 1882
- Pelaw Main, 1812
- Pelton, 1898, 1902, 1926
- Pemberton, 1852
- Penalta, 1910
- Pendleton, 1876
- Pensher Tempest, 1769
- Percy Main, 1796, 1799, 1810, 1815
- Pilsley, 1908
- Pinxton, 1867, 1934
- Platt Lane, 1870
- Plenmeller, 1916, 1923
- Pleasley, 1901
- Plessey, 1769



- Point of Ayr, 1950, 1996
- Powell Duffryn, 1869
- Prestonpans, 1907
- Pye Hill, 1976
- Radstock, 1782, 1825, 1949
- Ramcroft, 1946
- Ravensworth, 1671, 1769
- Rawdon, 1869, 1984
- Riccall (Selby), 1983, 2004
- Riddings Drift, 1969
- Risca, 1878
- Rise Moor, 1769
- Rockingham, 1878, c1908
- Rosebridge, 1860, 1876, 1885
- Rosebridge (Caroline pit), 1869
- Rossington, early C20th, 1939, 1971
- Rothwell, 1983
- Rowley, c1847
- Royston Drift, 1976
- Rufford, 1943
- Ryhope, 1855, c1891, 1956
- Rylands Main, 1888
- St. Anthony's, 1790
- St. John's (Maesteg), 1955
- St. John's (Normanton), 1887, 1899
- Salt Meadows, 1769
- Saltom, C13th, 1729, 1776
- Sandhole, 1943
- Sandwell Park, 1874, 1968
- Seaham, 1867, 1926
- Seaton Delaval, 1848, 1849, 1867
- Selby, 1979, 1981, 1983, 1989, 1995, 2004
- Senghenydd, 1913
- Sheffield, 1776
- Sheffield Park, 1783
- Sherdley, 1869
- Sherwood, 1976
- Shilbottle, 1769
- Shipley, 1869
- Shirebrooke, 1976
- Shiremoor (Macaroni pit), 1789
- Silkstone, 1876
- Silksworth, 1882, 1897
- Silverdale, 1976, 1998
- Silverwood, 1909
- Simonwood pits, c1836
- Smithywood, c1908
- Sneyd No.3, 1884
- Snowdown, 1954
- South Biddick, 1769
- South Durham, 1877
- South Hetton, 1835, 1860s
- South Kirkby, 1969, 1974
- South Moor, 1769
- South Moor (William Pit), 1923
- South Normanton, 1956
- South Shields, 1796
- Stillingfleet (Selby), 1983, 2004
- Stone, 1715
- Stoney Flat, 1705
- Sutton Manor, 1887
- Tankersley, 1902
- Tarbrax, 1904
- Thoresby, 1965, 1976, 2010
- Thorne, early C20th, 1926
- Thornley, 1835
- Thorpe Hesley, 1902
- Thrislington, 1868
- Throckley, 1756, 1769, 1886
- Thurcroft, early C20th
- Tilmanstone, 1922
- Tirpentwys, 1928
- Tower, 1994, 1995
- Townley, 1800
- Townley 'A' pit, 1808
- Trafalgar, 1881
- Tredegar, 1907
- Treeton, 1990
- Tursdale, 1859, 1911
- Tyne Main, 1778, 1830
- Tynemouth Moor, 1769
- Tynewydd, 1806
- Union Pit (Workington), 1814
- Unthank, 1769
- Upton, early 20th century
- Urpeth, 1828
- Usworth, 1847, 1871
- Walbottle, 1794
- Waleswood, 1882, 1941
- Walker, 1758, 1763, 1765, 1769, 1784, 1795, 1796, 1797, 1815
- Wallsend, 1778, 1785, 1787, early C20th, 1815, 1835, 1843
- Wallsend 'B', 1785-6
- Wallsend 'C' (Village Pit), c1835
- Wallsend 'G' pit, 1810
- Wallsend 'H', 1894
- Walsall Wood, 1889, 1891, 1955
- Washington, 1769, 1816, 1902
- Water Haigh, 1907
- Wath Main, 1928, 1949, 1955, 1970
- Wearmouth, 1826, 1846, 1873, 1883, 1951, 1957, 1976, 1993
- Welbeck, 1976, 2010
- Wellington, 1894



- West Ardsley, 1862
- West Denton, 1769
- West Cannock, 1956
- Westminster (Wrexham), 1868
- Wharnccliffe Silkstone, 1888, 1890, 1892, 1902, 1962
- Wharnccliffe Woodmoor Nos.4 & 5, 1947
- Whickham, 1492-3
- Whingill (Davy pit), 1790
- Whingill (George pit), 1787
- Whingill (Lady pit), 1790
- Whitburn, 1877
- Whitehaven, 1738, 1769, 1781
- Whitemoor (Selby), 1983, 2004
- Whittle, 1976
- Whitwood, 1862, 1878
- William pit, Whitehaven, 1875, 1894
- Willington, 1770, 1778, 1780, 1815
- Wingate Grange (Lord & Lady Pits), 1800, 1844, 1890
- Wistow (Selby), 1981, 1983, 1989, 1995, 2004
- Witton Park, 1825
- Woodhouse, 1869
  - Woodside, Glebe pit, 1834
  - Woolley, 1950s, 1962, 1965, 1974
  - Workington, 1769
  - Worsley, c1760
  - Writhlington, 1973
  - Wylam, 1769, 1813
  - Wyndham, 1837
  - Yorkshire Main, early 20th century, 1985
- Collieries, number at work in the UK, 1853
- Colliery baths, 1902, 1925
- Colliery reconstruction programmes, 1974
- Colliery statistics, 1976, 1984, 1992, 1994, 1999
- Combined mines, see Manvers Central Scheme.
- ‘Complete Collier, The’, 1708
- Compound steam engine, 1798
- Compound steam winder, 1909
- Compressed air, 1830, 1849, 1856, 1857, 1862, 1869, 1870, 1871, 1874, 1909
- Compressors (air), 1890, early C20th
- Concealed coalfields, 1810
- Conical winding drum, c1760, 1778, 1865, 1875, 1896, 1908
- Consumption statistics, international, 1866
- Consumption statistics, UK, 1903
- Contraction of the British coal industry, 1960s, 1960, 1965, 1980s, 1980, 1984
- Conveyors: 1868, 1903, 1940s, 1960s
  - Armoured face conveyor (Panzer) AFC, 1947
  - Belt type, 1906, 1930s
  - Blacket scraper, 1903
  - Combined gate-end loader & face conveyor, 1907
  - Electric motor driven, 1907
  - Shaker, 1908
- Cook (mining engineer), John, 1868
- Cooper, W. Reed, 1930
- Corf, see Corves.
- Corliss valve, 1850
- Cornish boiler, 1808, 1812
- Cornish double-beat equilibrium drop valve, 1800
- Cornish (beam) pumping engine, 1812, 1868, 1894
- Cornwall as a market for coal, 1741
- Cornwall, first Watt (pumping) engine, 1777
- Cornwall, first Watt winding engine, 1784
- Cort, Henry, 1784
- Corves, c1520, 1784, 1787, 1816, 1875
- Cory & Sons, William, 1854, 1857
- Cost of coal mining, c1460, 1789, 1830
- Cost of production, 1723, 1731, 1769, 1789, 1980, 1988
- Counterbalance systems:
  - Chain system, 1778
  - Tail rope, 1856, 1877
- Counterweight tippler, 1870
- Coursing air, c1760
- Cowlishaw Walker & Company, 1900
- Crank, 1780
- Cross compound winding engines, 1880s
- Crowther, Phineas, 1800, 1812
- Cumberland Coalfield, 1617, early C18th, 1715, 1982
- Cumberland coast ports, coal shipped from, 1800
- Curr, John, 1776, 1787, 1790, 1797, 1783, 1798, 1805, 1825
- Daglish & Company (St. Helens), 1860, 1876, 1892
- Darby, Abraham, 1709, 1721
- Davidson & Company (Belfast), 1902, 1933
- Davidson, Samuel, 1898
- D.C.turbo-generator, 1895
- Deane direct acting pump, 1884
- Deane differential sinking pump, 1886
- Deepest colliery, 1686, 1826, 1836
- Delsaux, 1854, 1859
- Dennett, J., 1824
- Department of Energy, 1977
- Derbyshire coalfield, 1836, 1993
- De Re Metallica, 1556
- Desaguiliers, Dr., 1727
- Detaching hook (overwind prevention): 1859, 1908
  - Cage retention in the headgear, 1908
  - Humble, 1897
  - King’s, 1867, 1970
  - Ormerod’s, 1867, 1970
  - Walker’s, 1873
  - West’s simplex, 1891
- Detonation, electric, 1856
- Diamond Coal Cutter Company (Wakefield), 1903

Diesel locomotives, underground, 1935, 1939, 1960  
 Disasters in coal mines, first large scale, 1705  
     -Oaks, 1866  
     -Seaham, 1854  
     -Worst in Britain, 1913  
 Disk brakes, fitted to winding engines, 1956  
 Distillation of coal, 1681, 1711, 1792  
 Domesday Book, 1085  
 Donisthorpe, Firth & Ridley, 1862  
 Double beat valve, see Cornish valve.  
 Dowty, 1946, 1953, 1960  
 Dowty hydraulic prop, 1946, 1953  
 Drainage 'ditches' (watergates, or soughs), mid-C14th century, 1354, 1407, 1660, 1807  
 Drainage of mines, c1590, 1600, 1690, 1698, 1702, 1708, 1712, 1714, 1725, 1758, 1815  
 Drainage, mechanical, c1590  
 Drainage soughs, 1573, 1807  
 Drift mines, 1806, 1947, 1960s, 1969, 1974, 1976, 1979, 1983, 1995  
 Dud Dudley, 1619, 1665, 1709  
 Duffryn Steamship Company, 1914  
 Duke of Norfolk's collieries, 1790  
 Dunn, Mathias, 1732, 1738, 1790, 1820, 1848  
 Duplex pump, 1860  
 Durham coalfield, c1578, 1632, 1810, 1900, 1993  
 Durham Miners Association, 1872  
 Dust suppression, 1940s  
 Dutton, 1867  
 Duty (tax) paid on coal, 1306, 1667, 1670  
 Dynamite, 1870s  
 Egyptian wheel, c1590, 1670  
 Eimco rocker shovel, 1939  
 Electric Coal Cutting Corporation, c1891  
 Electricity grid system, 1926, 1935  
 Electricity in coal mines: 1900, 1913, 1974  
     -First all-electric colliery in the world, 1913  
     -First major use of (Ackton Hall), 1895  
     -First use underground, 1881  
     -Rules for the Installation & Use of Electricity, 1902  
     -Used to detonate explosives, 1856, 1860  
 Electricity Supply Act (1919), 1919  
 Electricity Supply Act (1926), 1926  
 Electricity Vesting Day, 1948  
 Electric (safety) lamps, 1910  
 Electric lighting underground, 1882, 1883  
 Electric locomotives, 1908  
 Electric motors (enclosed type), 1887  
 Electrical power, early C20th, 1902, 1912, 1932  
 Electric pumping installation, 1887  
 Electric shock, underground fatality, 1894  
 Electric winders, 1891, 1899, 1904, 1905, 1906, 1908, 1914, 1927, 1947, 1950, 1954  
 Electronic micro-processor safety system, 1975  
 Elliot, 1828  
 Elmore vacuum floatation plant, 1934  
 Endless chain winding, 1789  
 Energy demand met by coal, 1965, 1980s, 1993  
 Engine power (total) in British coalmines, 1907  
 Engines for draining mines, 1634, 1663  
 Exhaust steam turbine, see steam turbine  
 Expansion gear, automatic variable, 1876  
 Experimental gallery, see Altofts gallery  
 Explosives use of in mines, 1600, 1617, 1690, early C18th, 1706, 1730, 1856, 1870s, 1896  
 Export of coal, cok, patent fuel., 1845, 1900  
 Export of coal from UK, 1789, 1890, 1919, 1923, 1930  
 Export of coal S. Wales, 1830, 1857, 1886, 1889, 1912  
 Export of coal from the North East coalfields, 1325  
 Fairbairn & Hetherington, 1844  
 Farey, 1776, 1807, 1811  
 Federated Institution of Mining Engineers, 1852  
 Ferro-concrete, use of in mining, 1910  
 Finlay & Royle, 1939  
 Firebasket used for ventilation, 1677  
 Firedamp, see Methane.  
 Firedamp drainage, see Methane drainage.  
 Fire engine, (see also, Newcomen engine), early C20th, 1712, 1714, 1715, 1758, 1769  
 Firelamp (brazier, firebasket or coal lamp) ventilation, 1686, 1732, 1740, 1789, 1836  
 Firemen, 1677  
 Fire setting, 1556, 1600, 1706  
 Firewood, decline of around London, 1625  
 Firth of Forth, working of coal, c1200  
 Fitzgerald, Keane, 1758  
 Fitzwilliam, Earl, c1836, 1850, 1853, 1871  
 Fitzwilliam Elsecar collieries, 1830s  
 Flat winding rope, 1790, 1798, 1800, 1840s  
 Flat winding chain, 1840s  
 Fletcher, H., 1884  
 Fleuss, Henry A., 1879, 1907  
 Flint mill, c1750  
 Fluidised bed combustion, 1969, 1980, 1981  
 Flywheel, applied to the steam engine, 1779  
 Forced lubrication, 1890  
 Force pump, see plunger pump.  
 Forest of Dean Coalfield, 1628, 1668, early C18th, 1788, 1965  
 Forest of Dean miners, use in military sieges, C14th  
 Fourdrinier, Edward, 1847  
 Fourness, William, 1837  
 Fowler & Company (Leeds), 1878  
 Fowler's hydraulic cage loader & unloader, 1873  
 Frazer & Chalmers, 1928  
 Free drainage, working of coal beneath the level of, 1486-7, 1600, 1714, 1806

Friction winder (see also, Koepe winder), 1865  
Furnace ventilation, 1521, 1585-6, 1665, 1724, 1749, 1756, 1815, 1828, 1890  
Garforth, Sir William E., 1886, 1894, 1898  
Gas Industry Vesting Day, 1949  
Gas lighting: 1792, 1798, 1803, 1810, 1823, 1859  
-Use of underground, 1850s  
German collieries:  
-Archibald Pit, Douglas Colliery, 1883  
-Emscher Colliery, 1901  
-Gluckhild Colliery, 1867  
-Hanover No.1, 1877  
-New Zoollem II Colliery, 1899  
-Thiederhall Colliery, 1899  
Gillot & Copley, 1868  
Glamorgan Canal, 1798  
Glass making, using coal, 1619  
Governor, engine speed:  
-Barclay, 1854  
-Black's variable fulcrum, 1929  
-Inertia type, 1936  
Graigola Fuel Works, 1864  
Grand Lease, the, 1577, 1582  
Grange Ironworks, 1878, 1882  
Great Fire of London, 1666  
Great Northern Coalfield: c1492, c1632, 1875  
-Shipments of coal from, 1810, 1820, 1830, 1840, 1850, 1858, 1860  
Grid, National, see Electricity grid system.  
Grit arrestor plant, 1928  
Guibal, Professor, 1854, 1859  
Gullick Dobson hydraulic burster, 1929  
Gullick Limited, 1954  
Gunpowder, 1600, 1617, 1690, early C18th, 1706, 1730, 1776  
Gurney, Goldsworthy, 1822, 1834  
Hall, James, 1800  
Hall, T.Y., 1831, 1833, 1834, 1836  
Hand cleaning of coal, 1978  
Hann, H.M., 1896, 1909  
Hardy Patent Pick Company, 1894  
Harecastle Tunnel (Trent & Mersey Canal), 1777  
Harrison & Sons, George A., 1914  
Hartlepool Dock & Harbour, 1835  
Hartley Colliery Disaster, 1862  
Hartop, 1850  
Harvey & Company (Hayle), 1894  
Hathorn Davey differential pumping engine, 1871, 1874, 1877, 1885, 1886, 1902, 1920, 1932  
Hathorn Davey tandem triple-expansion engine, 1904  
Haulage systems: 1846, 1867, 1880s, 1950s  
-Compressed air powered, 1856  
-Electric main & tail, 1894  
-Endless chain, c1847  
-Endless rope, 1844  
-Hydraulic powered, 1860s, 1879  
-Oil engine powered, 1891  
-Over-rope type, 1863  
-Pit ponies, 1765, 1924, 1994  
-Stationary, 1805  
-Steam, 1954  
-Underground, 1812, 1863, 1867, 1891, 1850s  
-Underground compressed air, 1849, 1880s  
-Underground electric, 1891  
-Underground electric loco, 1890  
-Underground endless DC haulage, 1883  
-Underground steam powered, 1825, 1840s  
Haulage planes, 1750, 1761, 1797, 1800, 1805, 1808, 1860s  
Hayle Foundry Company (Cornwall), 1868  
Hayward & Tyler, 1869  
Headgear, 1862, 1865, 1901, 1970  
Head Wrightson & Company, 1906  
Health & Safety in Mines, 1842, 1855, 1860, 1872, 1875, 1887, 1906, 1908, 1911, 1920, 1926, 1954  
Hedley, William (Viewer), 1813  
Heslop, Adam, 1790  
Hodgson, Charles, 1868  
Homfray, Alfred, 1869  
Hooke, Robert, 1678  
Horizon mining, 1777  
Horizontal winders, 1870s  
Hornblower, Jonathan, 1782, 1798, 1800  
Horse gin, geared, 1765  
Horses, see Pit ponies.  
Howden, James, 1949, 1979  
Hoyois, Meon (Belgian mining engineer), 1926  
Hull, Prof. E., 1859  
Hurd, Frederick W., 1869, 1897  
Hydraulic engine, see water pressure engine.  
Hydraulic (water) powered systems, 1877  
Hydrostatic drive unit, 1960  
Immisch & Company (London), 1887  
Import of coal into Britain, 1987  
Inclined plane, self-acting, 1797, 1800, 1805, 1808  
Insole, George, 1830  
Institute of Mining Engineers, 1852  
Inverted vertical steam winding engine, 1928  
Iron smelting, 1677, 1709, 1784, 1788  
Iron smelting using coal, 1612, 1619, 1677, 1709  
Iron wire rope (see also, wire rope), 1834  
Jars, M., visit to England, 1765  
Jessop, William, 1789  
John Bowes (iron screw collier), 1852  
Johnson, Henry, 1867, 1874  
Johnson, W. O., 1861

Joicey, J. & G. (Forth Bank Foundry, Newcastle), 1800  
 Jukes, John, 1841  
 Keels, 1338, 1401, 1658, early C18th, 1817  
 Keelmen (or keelers), 1378, 1539, 1810  
 Kent coalfield, 1989  
 Kent Coalfields Syndicate, 1886  
 Kind Chaudron sinking, 1877  
 Knowles, Andrew, 1829  
 Koepe, Herr Carl Frederich, 1877  
 Koepe winder (see also, Friction winder), 1865, 1877, 1880, 1884, 1916, 1923, 1954, 1956, 1957  
 Koepe multi-rope winder, 1956, 1957, 1960, 1980  
 Korting injector, 1926  
 Lancashire boiler, 1844, 1910, 1950  
 Lancashire coalfield, 1296, 1815, c1847, 1890, 1993  
 Lancaster, John (Wigan), 1848  
 Lang's lay rope, 1879  
 Lean, 1801  
 Leases, colliery, 1850  
 Leeds Hydraulic & Engineering Co., 1800, 1890  
 Leicestershire Coalfield, 1840s, 1991  
 Licenses to work coal, 1351, 1358  
 Lilleshall Iron Company, 1869  
 Lime burning, use of coal for, 1273  
 Liverpool & Manchester Railway, 1829  
 Lloyd, John, 1869  
 Load cell weighing of coal, 1962  
 Locked coil ropes, 1884, 1923  
 Locomotion, 1825  
 Locomotives:  
 -demise of steam locomotives, 1955  
 -electric pantograph, 1908  
 -flameproof diesel locomotives, 1939  
 -fireless, 1878  
 -steam, 1804, 1812, 1813, 1814  
 -underground, c1860  
 -underground battery, 1922  
 -underground diesel, 1935  
 Lofthouse Colliery Disaster, 1973  
 London:  
 -Duty on coal entering, 1306  
 -Freight charge to, 1731  
 London & Westminster Gas Light & Coke Co., 1810  
 London Bridge, 1306  
 London Hydraulic Power Company, 1883  
 London, smoke pollution in, 1306  
 Longwall working of coal, 1770, 1794, 1954  
 Lowther, c1760  
 Lowther, Sir James, 1729, 1733  
 Lowther, Sir John, 1660  
 Lupton, Professor Arnold, 1888  
 Lyll, Edward, 1889  
 Mackworth, 1855  
 Mackworth, Sir Humphrey, pre-1698  
 Malleable iron rails, 1794, 1808, 1825  
 Man engines, 1865, 1919  
 Man lift, Otis, 1979  
 Manvers Central Scheme, 1949  
 Market for coal in the UK, 1997  
 Markham & Company (Chesterfield), 1927, 1935  
 Markham Colliery (Overwind) Accident, 1973  
 Master Seacole (Shakespeare), 1578  
 Mavor & Coulson, 1897, 1923, 1926  
 Meacham, F.G., 1893  
 Measurement & regulation of coal, 1357, 1655, 1695  
 Mechanical stoker, 1819  
 Mechanical Ventilators Committee, 1888  
 Mechanisation at collieries, 1962  
 Meco-Moore power loader, 1934, 1943  
 Menzies, Michael, 1750, 1761  
 Merry-go-round system, 1959, 1965, 1990  
 Mersey Tunnel (Liverpool), 1887  
 Merthyr-Cardiff Canal, 1804  
 Metal mines:  
 -Fallowfield (lead mine), 1769  
 -Florence iron mine, 1920  
 -Great Laxey (Isle of Man), 1919  
 -Levant, 1919  
 -Llanharry iron mine, 1920  
 -Lofthouse Ironstone Mine, 1868, 1872  
 -Modderfontein gold mine (South Africa), 1887  
 -Upleatham ironstone mine, 1872  
 'Metallum Martis' (Dud Dudley), 1709  
 Methane, late 18th century, c1835  
 Methane drainage (gas-extraction), 1729, 1808, 1952  
 Methane-fired boilers, 1863, 1952  
 Methanometer, 1928  
 Methods of working coal, 1794, 1795  
 Metropolitan & District Underground Railway (London), 1885  
 Metropolitan Vickers, 1927, 1954  
 Middlesbrough Dock, 1831  
 Middleton Colliery Railway, 1755, 1969  
 Minerals raised in Great Britain, 1890, 1895  
 Mineral wealth of England, 1881  
 Miners Association of Great Britain & Ireland, 1841  
 Miners Federation of Great Britain, 1841, 1888  
 Miner's friend (Thomas Savery), 1698, 1702  
 Mines Act (1860), 1860  
 Mines & Quarries Act, 1954  
 Mines & Quarries (Tips) Act (1969), 1969  
 Mines Inspection, 1850, 1906  
 Mines rescue station, 1902, 1906, 1911, 1913  
 Mining co-operatives, 1992, 1995

Mining Industry Act (1920), 1920  
 Mining Institute of Scotland, 1852  
 Mining Legislation, 1842  
 Mining Record Office, 1840  
 Mining records, 1797, 1815  
 Mining (Scotland), 1994  
 Ministry of Fuel & Power, 1938, 1941, 1942, 1944, 1952  
 Mixed pressure steam turbines, see Steam turbines.  
 Monkwearmouth Monastery, 1506  
 Mono pump, 1939  
 Moorland, Sir Samuel, 1663, 1675  
 Murdock, William, 1792, 1798  
 Murray & Company (Chester-le-Street), 1800, 1855  
 Naptha (mineral spirit), 1857  
 Nasmyth, James, 1850  
 National Coal Board (NCB), 1941, 1946, 1947, 1952, 1954, 1967, 1979, 1987  
 National Coal Board Divisions, 1947  
 Nationalisation of the coal industry, 1947  
 National Policy for the Use of Fuel & Power Resources, Report, 1952  
 National Union of Mineworkers, see NUM.  
 Natural gas, 1965, 1967  
 Navy Coal Experiments (see also, Admiralty), 1869  
 Navy, steam coal for, 1871, 1876  
 Neilson, Walter, 1862  
 Newall's wire rope making machine, 1834  
 Newcastle-upon-Tyne:  
     -Coal shipped from, 1829  
     -Vend (sale) of coal from, 1602, 1624, 1630, 1660  
 Newcastle roads, 1338  
 Newcomen pumping engine, 1712, 1714, 1715, 1720, 1721, 1734, 1740, 1753, 1763, 1769, 1774, 1777, 1781  
 Newcomen engine, 1754, c1760, 1812  
 Newcomen pumping engines:  
     -Griff Colliery, 1714  
     -Benwell Colliery, 1769  
     -Harraton Row, 1871  
     -Walker Colliery, 1763  
 Newcomen engine applied to winding coal, 1763  
 Nixon, C., 1794  
 Nixon, John, 1859, 1879  
 North of England Inst. Mining & Mech Engrs, 1852  
 North Sea oil, 1969  
 North Staffordshire Coalfield, 1765, 1777, 1811, 1854, 1872, 1998  
 North Staffordshire Inst Mining & Mech Engrs, 1852  
 North Staffordshire Inst Mining Engrs, 1872  
 North Staffordshire Miners' Federation, 1869  
 Northumberland & Durham, shipment of coal, 1860  
 North Wales coalfield, 1358, 1996  
 Notice of Accidents Act (1906), 1906  
 Nottinghamshire coalfield, 1990, 1999  
 Nuclear power, 1947, 1954, 1956, 1967  
 NUM (National Union of Mineworkers), 1945  
 Numbers employed in the coal industry, 1792  
 Oaks Colliery Disaster, 1866  
 Oil Burning Programme (Government policy), 1954  
 Oil crisis, 1974  
 Oil-firing in the Royal Navy, 1914  
 Organisation of Petroleum Exporting Countries, 1960  
 Omerod, Edward, 1867  
 One-horse pump, 1862  
 Opencast Executive (of the NCB), 1952  
 Opencast (surface) mining of coal, 1600, 1941, 1944, 1945, 1952, 1958, 1988, 1990  
 Output comparisons of collieries, 1956  
 Output of a colliery, late C17th  
 Output of British coalfields, 1875  
 Output (average) of UK collieries, 1889, 1930s, 1956  
 Output of the largest UK collieries, 1866  
 Output of coal, European, 1970  
 Output of coal per man, 1876, 1880s, 1885, 1891  
 Output of coal, record, 1965  
 Output of coal, see Annual output of coal.  
 Outram, Benjamin, c1650  
 Overwind & overspeed engine governor:  
     -Automatic, 1839  
     -Barclay's, 1854  
     -Black's profile overwinder, 1909  
     -Black's torque controller, 1948  
     -Whitworth, 1904  
     -Worsley Mesnes, 1909  
 Oxley, J., 1762, 1763  
 Panel system of working coal, 1795, 1810  
 Parallel motion (James Watt), 1774  
 Parsons & Company, C.A., 1896, 1900, 1902, 1907, 1909  
 Parsons, Charles A., 1884  
 Parson's steam turbine, 1907  
 Patent fuel briquettes (see also, Briquettes), 1919  
 Patents related to mining & mining machinery, 1634, 1663, 1698, 1749, 1761, 1767, 1787, 1798, 1802, 1813, c1836, 1837, 1852, 1853, 1855, 1856, 1862, 1867, 1868, 1869, 1879, 1885, 1887, 1888, 1903  
 Patents related to the use of coal, 1589, 1590, 1612, 1627, 1632, 1681, 1844  
 Patent Rolls, 1257  
 Patents, Guibal, 1862  
 Pennant, 1772  
 Pentreguinea Fuel Works (1864), 1864  
 Penydarran Ironworks (South Wales), 1804  
 Pickard, James, 1780  
 Pickering, W.H. (H.M. Inspector of Mines), 1887  
 Picking belts, 1860s



Pillar & stall working, 1994

Pit, earliest use of the term, 1240

Pitman, 1338

Pithead baths & canteens, 1902, 1912, 1925

Pithead power stations, 1953, 1958

Pit ponies, 1765, 1913, 1924, 1960s, 1970, 1994

Pit props: 1850, 1861, 1896, 1914-18, 1930s

- Automated roof support, 1965
- Collision adjustable screw roof prop, 1896
- Dowty hydraulic prop, 1946, 1953
- Seaman powered support system, 1954
- Self advancing powered supports, 1954
- S.F. pit prop, 1922
- Timber, 1914, 1920, 1930s, 1933

Plague, see Black Death.

Plan for Coal (1970), 1967

Plan for Coal (1974), 1974

Plate rails, cast iron, 1788

Plot, Dr, 1686

Plug rod (plug tree) valve gear (Beighton), 1718

Plunger pump, 1675, 1801

Pneumatic conveyance of coal, 1926

Poetsch (shaft sinking) freezing process, 1883, 1902

Poole, Professor, c1492

Powell Duffryn Steam Coal Co., 1864, 1900, 1910, 1913

Output, 1890, 1900, 1910, 1913

Power generation, 1980s

Power loader, A.B. Meco-Moore, 1943

Power loader, Meco-Moore, 1934

Power stations:

- Calder Hall 'A' (nuclear), 1956
- Coal-fired, 1926, 1965, 1983
- Forth banks, first public power station, 1890
- High Marnham, 1959
- Longannet, 1970
- Newman Spinney (underground coal gasification), 1958
- Nuclear, 1956
- Oil-fired, 1954
- Pithead, 1953, 1958
- Rugeley 'A', 1960
- Wilsden, 1903

Power stations, accelerated closure programme, 1976

Priestman oil engine, 1891

Prince Regent (steam locomotive), 1812

Proto self-contained breathing apparatus, 1907, 1950

Public Health Act (1875), 1875

Public Health Act (1936), 1936

Public Health (London) Act, 1891

Public Health (Smoke Abatement) Act (1926), 1926

Puddling, iron, 1784

Pulsometer Engineering Company, 1878, 1884

Pulsometer pump, 1872, 1878

Pulverised fuel fired boilers, 1926

Pumping & raising water in mines (see also, engines for draining mines), 1486-7, 1492-3, 1630, 1663, 1772, 1776, 1815, 1862, 1886, 1887, 1894, 1932, 1934, 1950s

Pumping machinery:

- Boulton & Watt double-acting, 1790, 1796
- Compressed air pumping, 1849
- Cornish, 1868, 1894
- Hathorn Davey differential, 1871, 1874, 1877, 1885, 1886, 1902, 1920
- Mono pump, 1939
- Pulsometer pump, 1872
- Single acting high pressure, 1815
- Steam turbine powered, 1907
- Submersible, 1930, 1943
- Universal pump, 1869
- Water pressure (hydraulic), 1880
- World's oldest working steam pump, 1934
- Worthington direct acting, 1844

Pumping underground using electricity, 1881

QED (steam collier), 1844

Queen Elizabeth, super-Dreadnought battleship, 1914

Rag and chain pumps, 1556, 1674, 1676

Rails, cast iron, 1776, 1789, 1790

Railway Act, Britain's first, 1758

Railway Mania, 1843, 1846

Rainhill Trials, 1829

Rapid loading bunkers, 1965, 1971

Reinforced ferro-concrete used in coal mining, 1910

Rescue apparatus, 1854

Reserves of coal, 1859, 1904, 1942, 1979, 1982

Retreat mining, 1969, 1976

Reversal of ventilation, 1908

Reynolds, Richard, 1767

Rhondda Valley, 1907, 1914-18, 1914, 1990

Richmond Shilling, 1831

Riddles (screening), rotary coal, 1844

Rig & Brotherhood hydraulic engine, 1872

Rigg, James, 1870, 1881

Riley's Memorials (London), 1257

Ringrose firedamp detector lamp, 1928

R.J.B. Mining, 1994, 1995, 2004

Robens, Lord, 1960

Robinson, Henry, 1868

Rocket, 1829

Roof supports (or chocks), see also, Pit props:

- Self-advancing powered supports, 1954
- Hydraulic pit props, 1946, 1953, 1954

Roof supports, see Pit props.

R.O.L.F. (Remotely Operated Longwall face), 1963, 1965

Roman Britain, use of coal in, 43-410AD

Rope, use for coal winding, 1325

Rope:

- Iron wire, 1832, 1834, 1840, 1840s, 1844, 1846, 1856
- Hemp, 1840s
- Steel wire rope, 1870, 1879

Ropeways, 1857, 1868

Royal Commission (1879), 1879

Royal Commission on Coal Supplies, 1904

Royal Commission on Mines (1906), 1906

Royal Commission on Safety in Coal Mines, 1954

Royal School of Mines, 1846

Ryan, J., 1804, 1808

Safety fuse, 1831, 1860

Safety helmet, 1930

Safety in mines, see Health & Safety in Mines.

Safety lamps: 1811, 1816, 1835, 1839, 1847, 1857

- Clanny 'blast' lamp, 1813, 1840
- Biram, 1849
- Davy (or gauze lamp), 1815, 1816, 1822, 1834
- Mackworth (lockable), 1852
- Muesler, 1840
- Stephenson's, 1815
- Upton & Roberts, 1827, 1834, 1835

Sale of coal from north east ports, 1800

Salt-making, use of coal for, 13th century, 1506

Samuel Laing (iron screw collier), 1854

Savery, Captain Thomas, 1698, 1702

Saxon Britain, use of coal in, 852

Schiele, Christian, 1863

Scotland, bondage system, 1606, 1775.

Schwann, Professor, 1853, 1854

Screening of coal, 1770, 1833, 1844, 1867, 1870

Screening plant:

- Shaker screen, 1889, 1906
- Walker-Coles, 1873

Scroll winding drum, 1855, 1873

Seaborne coal trade of the world, 1906, 1912

Sea coal, c1228, 1236, 1240, 1243, 1246, 1257, 1295, 1307, 1550s, 1590

Seaham Colliery Disaster, 1879

Seaham Harbour, 1338, 1828, 1831

Seamen employed in the coal trade, 1630

Segmental tubbing, 1796

Selby coalfield, 1976

Self-acting haulage plane, 1750, 1797, 1800

Self advancing powered supports, 1954

Self-contained breathing apparatus, 1853, 1854, 1879, 1907, 1950

Separate condenser (James Watt), 1769, 1792

Sergeant, H.C., 1890

Shaft guides (or conductors), 1787, 1825, 1834, 1862

Shafts: early C18th

- Colliery shafts over 100 years old, 1961, 1983
- Clydach Vale No.3, 1889
- Deep/deepest, 1729, 1799, 1801, 1803, 1806, 1826, 1827, 1834, 1836, 1858, 1869, 1872, 1876, 1881, 1885, early C20th
- Depth & dimensions of, early C18th, 1709, 1799, late 18th century, early C19th, 1818, 1819, 1835, 1881-2, 1885, 1889, 1891, 1900
- Sinking, 1706, 1883
- Sinking in difficult conditions, 1926
- Sinking records, 1912
- Tubbing, pre-1698, 1708, 1795, 1796

Shale oil, 1848, 1858, 1913

Sheppard, Charles, 1875, 1885

Shibden Hall Estate, Halifax, early 18th century

Shipment of coal from Northumberland & Durham, 1860

Shotfiring, see Detonation.

Shropshire coalfield, 1979

Shropshire, mention of coal, c1250

Siebe, Gorman & Company (London), 1879, 1907

Simon-Carves, 1882

Single cylinder vertical lever-type winding engine, 1800, 1826, 1850s, 1855, 1890

Single shaft collieries, early C19th, 1835, 1840s, 1862

Skip winding, 1824, 1836, 1936, 1938, 1940s, 1952, 1960, 1962

Skip winding, anti-breakage devices, 1940s

Smeaton, atmospheric engine, 1774

Smeaton, John, c1760, 1769, 1774, 1777

Smelting ores using coal, C16th 1526-8, late C17th, 1704

Smith, Edward, 1732, 1738

Smog, 1952, 1962

Smoke Abatement Act, 1853

Smokeless zone, 1951, 1955

Smoke pollution, 1316, 1661, 1843, 1847, 1853, 1875, 1955

Somerset coalfield, 1795, 1973

Somerset, Edward (Marquis of Worcester), 1663

Sorting of coal, early 19th century

Soughs, see Drainage "ditches".

South Derbyshire, coal mining in, 1295

South Shields Committee on Accidents in Mines, 1839

South Staffordshire & East Worcestershire Amalgamated Miners' Association, 1863

South Staffs & East Worcs Inst Mining Engrs, 1852, 1867

South Staffordshire Coalfield, 1300, 1600, 1665, 1686, early C18th, 1710, 1769, 1776, 1799, 1835, 1837, 1865, 1874, 1879, 1885, 1892, 1941, 1968

South Staffordshire Mines Drainage Act (1873), 1885

South Staffordshire Mines Drainage Commission, 1873, 1968

South Staffordshire Mines Drainage Scheme



(S.S.M.D.S.), 1885, 1892

South Wales Coalfield, 1305, 1315, 1541-2, 1600, 1798, 1841, 1864, 1891, 1904, 1914, 1995

South Wales Coalfield, output, 1828, 1913, 1920

South Wales Coalfield, reserves of coal, 1904

South Wales Institute of Engineers, 1852

South Yorkshire Mines Drainage Scheme, 1943

Spedding, c1750

Spedding, Carlisle, 1729, 1730

Spedding, J., c1760

Spedding's flint (steel) mill, c1750, 1785

Speed controller, 1935

Splitting (dividing) the air current, 1806

Spoil, colliery, 1850s, 1895, 1969

Spoil heaps, recovery of by-products from, 1885

Spontaneous combustion, 1879, 1908, 1934

Square work system of working coal, 1665

Stanley heading machine, 1888

Steam coal, 1907, 1913, 1914, 1918

Steam coal trials, 1868, 1871

Steam coal vs. oil-fired boilers, 1913, 1914

Steam engine, C18th, late C18th, 1800, 1801, 1804, 1838, 1862, 1907

Steam-jet ventilation, 1848

Steam winding & pumping engines, 1840s

Steam winding & pumping engines, Northumberland & Durham coalfields, 1862

Steam winding engines, 1780, 1795, 1811, 1840s, 1849, 1850s, 1855, 1860, 1870s, 1876, 1878, 1880s, c1882, 1882, 1900, 1909, 1912, 1928, 1935, 1943

Steam winding engine, largest at a UK colliery, 1912

Steam turbine: 1884, 1890, 1907

- Exhaust & mixed pressure turbine, 1905
- Powered pump, 1907
- Powered centrifugal air compressor, 1909

Stear, Dr. F.A., 1928

Steel mill, Spedding's, 1785, 1815, 1816

Steel sleepers, 1891

Stephenson, George, 1812, 1814, 1816, 1825, 1829, 1835

Stephenson's link, 1841

Stewart, William, 1828

Stockton & Darlington Railway, 1808, 1825

Stockton-on-Tees coal shipping port, 1622

Stoker, chain grate, 1841

Stone dusting, 1886, 1921

Stoppings (to improve ventilation), 1754

Strike, see Coal Strike.

Struve, William Price, 1846, 1849

Sturgeon, T., 1874

Sturtevant, Simon, 1612

Sulzer Brothers, 1932

Summerlee Iron Company, 1900

Summerlee Ironworks (Scotland), 1862

Sunderland as a coal exporting port, 1645, 1710

Sunderland, vend of coal from, 1700

Sunderland Society, 1813

Super-Dreadnought battleship, 1914

Surveys of the extent of coal reserves, 1624

Sutcliffe & Company, 1930s

Sutcliffe, Richard, 1892, 1894, 1906

"Swallow-tail" (or "V"-notch), see Anti-vibration shutter.

Systems of working coal, 1738, c1760

Taff Vale Railway, 1798, 1841

Tail Rope Committee, 1877

Tail rope counter-balance system, 1856, 1877

Tanfield Arch, see Causey Arch.

Tangye & Company (Birmingham), 1868

Tax on the mining of coal, 1379

Tax on exported coal, 1845

Telephone system underground, 1880

Temperature in underground workings, 1820

Thick Coal (of South Staffordshire), 1968

Thompson, Benjamin, 1810

Thornbrough, John, 1590

Thornwill & Warham, 1909

Three-shift system of mining, 1961, 1962

Timber, use as fuel etc, C16th, 1603, 1627

Timber, use of in coalmines, 1765, 1787, 1795, early 19th century, 1850, 1862, 1865, c1891, 1891, 1914-18, 1914, 1920, 1930s, 1933, 1970

Tipler, Rigg's counterweight, 1870

Town gas, 1810

Training, see Coal Miners' Apprentice Course.

Tramways, 1777, 1804

Transport of coal, 1600, 1675, 1752, 1758, 1769, 1791, 1798, 1817, 1830, 1843, 1852, 1913

Transport (shipping) of coal to London, 1269, 1600, 1650, 1660, 1670, 1685, 1699, 1800, 1834

Trevithick, Richard, 1798, 1800, 1803, 1804, 1808, 1812

Triewald, Sir Martin, 1722,

Tubbing, see Shaft tubbing.

Tub loading & unloading rams, 1873

Tubs, 1816, 1834

Turbo-alternators (3-phase), steam, 1900

Turbo-compressors, 1902

Turbo-generators, steam, 1884, 1895, 1900

Tyne Basin: c1650, 1745, 1758, early C19th, 1815, 1830

- Coal output of, 1622, 1659

Tyne Coal Drainage Scheme (1861), 1861

Tyne Dock, 1338

Tynemouth Priory, 1269, 1292, 1378, 1463

Tyne, River:

- Supply of coal to London, 1357
- Transport of coal to, c1650, 1651, 1764
- Tyne Valley, working of coal in, 1269
- UK Atomic Energy Authority (UKAEA), 1954
- UK Coal, 1995, 2005, 2010
- Underground electric staple winder, 1891
- Underground fires, 1871
- Underground haulage: 1850s
  - Steam powered, 1805
- Underground gasification of coal, 1958
- Underground steam pumping engines, 1772, 1776
- Underground steam engines, 1785
- Underground wagonways, 1783, 1790
- Underground wheeled trams, 1790
- Undersea coal, 1600, 1618, 1729, 1765, 1872, 1894, 1915, 1942, 1983
- Uniflow steam engine, 1911
- Union, Pitman's, 1826
- Universal steam pump, 1869
- Utilisation of coal in Great Britain, 1872
- Vale of Belvoir Coalfield, 1979, 1990
- Ventilation, 1556, 1677, 1686, 1724, 1732, 1749, 1754, 1762, 1806, 1827, 1828, 1835, 1836, 1860s, 1880s, 1890, 1894, early C20th
- Ventilation by burning methane, 1806
- Ventilation in South Wales, 1869, 1876, 1901
- Ventilation in the South Staffs Coalfield, 1879
- Ventilation, reversal of, 1908
- Ventilation systems comparison, 1870s
- Ventilators:
  - Air pump, 1727, 1807, 1834, 1846
  - Aerex fan, 1936
  - Aerex variable angle fan, 1955
  - Aerofoil bladed fan, 1949
  - Aeroto axial flow fan, 1933, 1936
  - Auto pitch axial fan, 1979
  - Axial flow fan, 1933
  - De Bay, 1883
  - Bellows, 1740, c1760
  - Biram, c1836, 1853, 1859
  - Brunton, 1849
  - Bumstead & Chandler, 1887
  - Capell, 1882, c1891
  - Chandler, 1887
  - Cockson ('silent' running Guibal), 1882, 1883
  - Cooke, 1868, 1872
  - Electrically driven, 1918
  - Fourness, 1837
  - Furnace, 1521, 1585-6, 1665, 1724, 1749, 1756, 1815, 1828, 1840s, 1849, 1852, 1859, 1890, 1911, 1955
  - Furnace, last underground furnace, 1955
  - Furnace, surface-sited, 1724
  - Guibal fan, geographical distribution of, 1871
  - Guibal, 1859, 1862, 1863, 1868, 1871, 1874, 1878, 1882, 1885, 1887, 1894, 1908
  - High speed types, 1890
  - Hopton, 1892
  - Leeds, 1874
    - Lemielle, 1860
    - Lloyd, 1869
    - Manually operated, 1827
    - Mechanical types, 1758, c1760, 1769, 1780, 1791, 1807, 1814, 1840s, 1840, 1852, 1854
    - Medium, 1888
    - Nasmyth, 1850
    - Natural ventilation, 1887
    - Nixon, 1859, 1879
    - Oxley, 1762
    - Propeller type, 1928, 1933
    - Rammel, 1869
    - Roots "blower", 1877
    - Rotary, 1758, 1769
    - Schiele, 1863, 1881
    - Sirocco, 1898, 1902, 1942
    - Steam (engine) driven, 1769, 1841, 1887
    - Steam jet ventilation, 1828, 1848, 1849, 1852
    - Stear axial, 1926
    - Stear-Walker, 1928
    - Struve air pump, 1846, 1849
    - Steam turbine driven, 1896, 1907
    - Underground, 1852
    - Underground auxilliary booster fan, 1876, c1891, 1942
    - Uniflow steam engine driven, 1911
    - Waddle, 1863, 1869, 1890
    - Walker Indestructible, 1887, 1885, 1890, 1894, 1918
    - Water trompe, 1763
    - White's air machine, 1791
- Vertical winding engines (see also, Single cylinder vertical lever-type winding engines), 1878
- 'Voyages Metallurgiques', (M. Jars), 1765
- Waddle Patent Fan & Engineering Co. (Llanelly), 1863
- Wages, payment of at collieries, 1872
- Wagonways (see also, Tramways), 1603, 1605, c1632, c1650, 1671, 1690, 1715, 1725, 1738, 1745, 1755, 1776, 1783, 1785, 1789, 1814
- Walker Brothers, 1873, 1885, 1887, 1936, 1954
- Walker Brothers Ironworks (Wigan), 1873
- Walker Ironworks (Gateshead), 1830
- Walker, J.S., 1869
- Walker 'V' shutter, 1885
- Walker, William, 1873
- Waring's coal saw, 1852
- Warner & son's 'one horsepower pump', 1862
- Washerries (see also, Coal cleaning plant, and Central

coal preparation plant), 1841, 1848, 1850, 1851, 1855, 1865, 1892, 1914  
 -Baum, 1892, 1901, 1956  
 -Bernard's 1865  
 -Blackett & Palmer (trough-type), 1895  
 -Elmore vacuum flotation, 1934  
 -Elliot, 1894  
 -Hoyois (trough-type), 1926  
 -Jig washer, 1849  
 -Lührig, 1867, 1879, 1892, 1895, 1962  
 -Mackworth, 1855, 1865  
 -Murton washer, 1894  
 -Rheolaleur (trough-type), 1912, 1920  
 -Robinson, 1885  
 -Sheppard washer, 1875, 1881, 1885  
 -Statistics, 1927  
 -Trough-type, 1856  
 Waste colliery land, use of, 1869  
 Water balance winders, 1806, 1820, 1830s  
 Water courses, see Drainage 'ditches'.  
 Watergate, see Drainage 'ditches'.  
 Water gauge, 1841  
 Water gin, see waterwheel winder.  
 Water pressure (hydraulic) engine, 1798, 1799, 1803, 1860s, 1872  
 Water pulling machine, 1753, c1760  
 Water trompe, 1763  
 Water-tube boiler, see Boilers.  
 Watergates, see Drainage 'ditches', 1848  
 Waterwheel, 1750, c1760  
 Waterwheel pumps, 1672, 1676, 1690, 1725, 1777, 1820  
 Waterwheel winders, 1556, early C18th, 1766, 1774, 1777, 1778, 1787, 1797, 1808  
 Watson, John, 1753  
 Watt engines:  
     -Watt double-acting engine, 1782, 1784, 1790, 1796  
     -Watt expansive engine, 1782  
 Watt engine governor, 1788  
 Watt, James, 1763, 1769, 1774, 1776, 1800  
 Watt parallel motion, 1784, 1800  
 Watt patents, 1769, 1781, 1800  
 Watt rotative steam engine, patent, 1784  
 Watt separate condenser, 1769, 1792  
 Watt vs. Newcomen engines, 1778  
 Way-leaves, 1676  
 Wear, export of coal from, 1395  
 Welfare, miners, 1911, 1920  
 'Wet' air compressors, 1849, 1857  
 'Wet' period of mining, 1600  
 Wet separation methods for minerals, 1556  
 Wet separation process (coal cleaning), 1830  
 Wheeled trams, 1790  
 Whim gin, c1680, 1770s  
 White Paper on Fuel Policy (1967), 1967  
 'Whole & walls' extraction of coal, 1753  
 Wigan area of the Lancashire coalfield, 1573  
 Wigan Coal Company, 1868  
 Wild, John, 1839  
 William Baird & Co, 1864  
 William Cory (steam collier), 1857  
 Willie Brown's Iron Man, 1768  
 Wilson, J., (Derby), 1834  
 Winding coal, 1789, 1812  
 Winding coal, greatest tonnage raised, 1897  
 Winding engines: 1905, 1880s, 1973, 1980  
     -Largest horizontal in England, 1882  
 Winding speeds, 1876  
 Window tax, early 18th century  
 Winning & Working of Collieries (M. Dunn), 1848  
 Winsor, Frederick, 1803  
 Winstanley, Robert, 1870  
 Wire rope: 1856  
     -Lang's lay, 1879  
     -Locked coil, 1884  
     -Steel, 1870  
 Wire rope trial, 1844  
 Women, in mines, 1581-2, 1705, 1708, 1842  
 Wood & Burnet, 1894  
 Wooden rails, c1632  
 Wooden railways, 1632  
 Wood, Nicholas, 1852  
 Wood, Sir Lindsey, 1876  
 Wood, use of as a fuel, C16th  
 Working of coal, early reference to, 1180  
 World Coal Study, 1980  
 World energy glut, 1979  
 World fuel requirement, 1952, 1968  
 World coal production, 1866, 1872, 1896, 1898, 1994  
 World record coal drawing, 1923, 1956  
 World record coalface productivity, 1976  
 World record tonnage raised in a single shaft, 1910  
 Worsley Mesnes Ironworks (Wigan), 1897, 1909, 1935, 1943  
 Worthington direct acting pump, 1844  
 Worthington, H.R., 1844  
 Wrought iron rails, 1794, 1808, 1820  
 Yates & Thom (Blackburn), 1912  
 Yearly bond, abolition of, 1872  
 Yorkshire coalfield, early 20th century, 1950s  
 Yorkshire Engine Company, 1890  
 Yorkshire longwall bankwork system, 1765  
 Young (chemist), Dr. James, 1848  
 Young's paraffin oil, 1847