

PONTHENRY, Llanelly, Glamorganshire, 3rd. September, 1924.

The colliery was the property of the Ponthenry Coal Company, Limited and five men lost their lives due to a sudden outburst of gas from a blower in a part of the workings known as 19 East in the Pumpquart Seam of the Glynhyr slant. Mr. George Roblings was the agent and certificated manager of the colliery.

The men who lost their lives were-
Samuel Pascoe,
Isaac James,
Timothy Jones,
William David, and
Peter Williams.

There had been a number of blowers at the colliery. On February 20th, a man was killed and two men lost their lives in March in the No.18 East and a man named Morris had lost his life while blasting in No. 19 East.

At the inquest into the disaster, Mr. John Harris, fireman, who was the sole survivor of the men in the slant and had survived two previous accidents at the colliery, said he was in charge of the bottom workings including Nos. 24 to 27 West Headings, No.19 East Headings and the Main Slant. He was in charge of the afternoon shift of forty five men who were working in the slant.

He had met the undermanager underground and had received no special instructions about firing shots. He had made an examination between 1.30 and 2.30 p. m. and found a slight blower in No.25 West Heading, forty yards from the slant and six yards from the face. He put up a brattice to dilute the blower at source. At 3.15 p.m. he found no gas at all and fired shots in No. 19 East at 3.45 p.m. and later some other shots at 6.15 p.m. at the furthest end of the No.25 cross-heading.

When he was just setting off to go to the pit bank, he heard a rumbling noise and detected gas when he arrived at the Main Slant, which was ventilated by compressed air. He remembered going thirty yards before he became unconscious. The oil lamps of the men with him had gone put but they had light from some electric lamps which some of the men carried.

Frank Overfield, a labourer, had just finished emptying a tub of rubbish when he heard a noise like thunder and a great wind which blew the shovel out of his hand. Th The next he knew he was in the drift, forty yards away. He had worked in the colliery for only nine days and something like this had happened the previous week. He said there was a lot of noise in the coal which lasted for about five minutes but there was no blast of wind. It was said that the coal was soft and here were pockets of gas contained in it which was the cause of the blowers in the seam.

The colliery under manger, Rees Morgan, said that on the day of the disaster he was in charge oft the pit as the manager was away. he went to the Glynhyr Slant about 2 p.m. and everything was in order. At about 6.45 p.m. He heard something at the bottom of the slant between 21 and 23 and he found gas which forced him to crawl on his hands and knees to 17 East where he found some men who were attending a ladder, delirious. they were sent to the surface at once. At the 24th. he found some men attending W.D. Jenkins and administering artificial respiration. He searched the workings to make sure that no one was left.

The jury brought in the verdict that-

“The five men died due to suffocation by gas. If other fatal accidents of this nature are not to occur, then boring in the soft coal should be straight through to the pockets that held gas and the gas released. We also suggest that longwall working should be carried out as far as is practicable.”

LLAY MAIN. Wrexham, Denbighshire. 5th. December, 1924.

The Llay Main Colliery was one of the largest and the most modern colliery in the North Wales coalfield. sinking had begun in December 1914 and completed in the summer of 1916. It employed 2,600 men at the time and produced 10,000 tons of coal a week. At the time of the explosion, which occurred in the early hours of Friday morning, 416 men were working in the mine. The flame travelled only a short distance and killed nine men and boys, the other 406 escaped from the mine.

Firedamp had not been reported in the North Two Yard District since 26th. November and previously on 16th November and in both cases it was found on the right or higher side of the No.17 against the shaft pillar. At the inquiry into the disaster, the firemen, John C. Williams, who was the brother of a man who was killed in the disaster and Charles Richardson were emphatic that there had been no gas in the district on the two shifts before the explosion.

Compressed air was used to drive the haulage engines and the exhaust air was used to ventilate a break near the shaft pillar. It was an easy way of overcoming a difficulty but no brattice was erected to supply extra air to the break.

The permitted explosives used at the Colliery was Penrhyn Powder and it was taken into the mine in locked canisters for which only the fireman had a key. William Ernest Williams, the fireman on the shift, drew the canister containing one pound of explosive and it was taken underground by one of the workmen. He was issued with twenty No.7 low tension detonators in the locked detonator box.

The lamps used in the mine were of the 'Oldham' electric safety lamps and the 'Prestwich Patent Protector' type. More of the electric type were used. The mine was well stone dusted and the firemen were provided with tins which they carried stone dust for use in shotfiring operations.

At about 1.15 a.m., two men were working on the face about 200 yards on the return side of the No.17 gateway, when they heard a slight noise and felt a difference in air pressure which was followed by a cloud of dust. Another party of men, working on a roadway, about 300 yards from the sight of the explosion, had a similar experience and made their way towards the shaft. Immediately after the explosion great bravery was shown by three officials. They went to the explosion area and recovered several of the bodies without respirators.

After passing the end of the No.17 road they met others coming inbye, and Samuel Challinor, along with others retraced their steps and went along the No.17 road. They found nothing disturbed until they came to a small fall of roof at the end of an old gate, two girders had been displaced, about fifty yards from the site of the explosion. Seven or eight yards further on they came upon the bodies of Isaac Evans and John Williams. They were close to a compressed air hauling engine and both were badly burnt. Close to the bodies were two electric safety lamps lying on the floor. Both were still working but a flame safety lamp that was hanging nearby was extinguished. Having seen that there was no hope for the two men, the party went back.

Help soon arrived and they returned. Twenty yards past the first two bodies discovered they found the bodies of William Ernest Williams, a fireman and John Humphreys. The fireman's lamp was found two yards further up and was not lit. Close to him there was a low tension firing battery and the end of a shot cable, two yards away. The battery key and a detonator box containing seventeen detonators was found close to the bodies. The cable was afterwards found to extend about twenty yards to the No.17 face where one or more shots had been fired in the ripping, five yards back from the coal. Williams had probably been sheltering in a slight recess next to a chock while he fired the fatal shot and he had been able to move a short distance after the explosion.

Rescue parties were rushed from the North Wales Rescue Station at Wrexham, led by Sergeant-Major Herbert and from neighbouring collieries. Fortunately the ventilation restored itself quickly and the rescuers who went forward without beating apparatus all returned safely. The Rescue Teams found the remaining bodies about fifteen yards further on and the last body was recovered the next morning. It had been under a very heavy fall which had exposed the Powell Coal, twelve feet above the Two Yard Seam. The fall had taken place after the explosions burying the man and had not furnished the gas which caused the explosion.

The agent and manager of the colliery, Mr. F.A. Hughes, gave a statement to the press-

“The range of the explosion was extraordinarily limited, but I attribute this to the fact that we have been in the habit of stone dusting very profusely in this new mine, and you can take it as fact that the stone dusting has saved the pit. The flame has not travelled very far, not more than 20 to 30 yards in any one direction from the seat of the explosion. The shift had been down since 10 o'clock on Thursday night. It included 416 men, but in this particular district were probably not more than 20 men working. Of them, only nine were within the range of the explosion, and these have all been killed. The others working in the same district were a considerable distance away. These survivors state that they felt the air propulsion, and it was immediately followed by a cloud of mixed coal dust and stone dust. It was these men who gave the first warning of what had occurred and subsequent enquiries have shown that nobody else working in the pit knew anything at all about it.

The three officials came part of the way out and then turned back and went on right up to the phone where the explosion had occurred and there they came across the first bodies, three in number. These bodies were not buried, nor were five others who have since been recovered. Only one man was buried. It is fortunate for these men who turned back to see if they could be of help to the injured that the ventilation restored itself so quickly as it did. Otherwise they would have been caught in afterdamp but the ventilation restored itself at once and that saved them. It is an undoubted fact that the fireman in charge of the district now dead (W.E. Williams) was in the act of firing a shot and if that is so, that would be the means of igniting a pocket of gas. It need have been only a small pocket of gas in one of the numerous breaks in the roof which the act of shot firing would liberate.

The whole of the bodies were lying within a short distance of 20 to 30 yards and were probably blown to the places where they were found from the spot at which they were grouped. In my opinion, they were taking their 'snap' and were sitting down while the shot was fired.”

During the day the colliery was visited by Mr. A.D. Nicholson, the Chief Inspector of Mines for Lancashire and North Wales and Mr. D.H.F. Matthews the District Inspector and the managers of other collieries offered all the assistance they could to the Llay Main officials.

During the Friday morning there were large crowds of workmen at the pit head and a deep note of sorrow everywhere in the district.

Eight of the bodies had been brought to the surface before 9 a.m. on that Friday morning but the ninth was buried under a fall and was not recovered until Saturday morning after the rescue parties had been working for many hours. Edward German was found sitting at his haulage engine with his hand on the lever. He was much liked by his workmates and in the words of one who knew him- 'he seemed to have died with a smile on his lips.'

Those who lost their lives-

Isaac Evans aged 19 years of 45, Garden Place, Mold. His left leg was badly smashed and his right shoulder smashed and dislocated. He also had head injuries and burns to the head and neck,

John William Hughes aged 22 years of 35, Shone's Lanes, Llay. He had severe burns to the head body and neck and a scalp wound on the left side of the head,

William Ernest Williams aged 41 years of Fourth Avenue, Llay. He was the fireman of the district and was married with seven children from 20 to 2 years old. He had severe burns,

John Humphries aged 53 years of Maeshafan, Lanferres, near Mold. He had severe burns to the head, neck and body,

Joseph Reginald Evans aged 53 years of The Cottage, Abermorddu who was married with two children. He had severe burns,

Edward Henry German aged 15 years, a haulage hand of 14, Springfield Terrace, Rhosddu. He had severe burns,

Henry Jones aged 36 years of 6, Oak Tree Avenue, Llay who was married with a child. He had severe burns,

Thomas Charles Fletcher aged 45 years of Bridge Inn, Mold. He had severe burns and

Robert Percival Evans aged 32 years of Oak Mount, Cefn-y-bedd who was Reginald Evans brother.

The local clergy did what they could to comfort the bereaved families and visited them in their homes. The Reverend Bransby Jones, Church of England, Reverend J., Lewis Evans, Presbyterian and Reverend R. Lewis Jenkins, Primitive Methodist made the visits.

The inquest into the deaths of the men was held on 22nd. and 23rd. December before Mr. Llewellyn Kenrick, Coroner for East Denbighshire. The proceedings were opened on Saturday afternoon when the evidence of identification was taken.

After a full hearing the jury returned the following verdict-

"We, as the jury, came to the conclusion that, firstly, we believe and find that the death was caused by carbon monoxide poisoning, together with shock due to the explosion.

Secondly: We advise the Colliery Company in future to have an adequate supply of clay in a convenient place in each district.

Thirdly: We advise that the ordinary system of ventilation be used wherever applicable, and that brattice cloths used in future to prevent the short-circuiting of air.

Fourthly We advise that the man in charge of each set of men be responsible for the bringing in and the taking out of explosives during each shift."

Arthur Nicholson, at the end of his report into the causes and circumstances of the disaster, commented-

"With regard to these recommendations. I agree with the first and third. as regards the second, it was the usual practice to send clay from the surface to each district, but apparently the firemen did not always use it. On this occasion clay had been sent to the district two days prior to the accident, and was within 100 yards of the site of the accident.

The fourth recommendation, as to the issue of explosives, has no bearing on this disaster, but might usefully be adopted, although the canisters are locked when given put, and only the fireman possess the key."

The Mayor of Wrexham, Councillor Owen. E. Rickman, opened a Relief Fund with #50 and hoped to raise a four figure sum by Christmas. Arrangements were made for the banks in Wrexham and the Borough Treasurer's Office to collect the donations

The official into the explosion, 'Report on the Causes and of the Circumstances attending the Explosion which occurred at the Llay Main Colliery, Wrexham, Denbighshire on the 5th. December 1924', was made by Arthur D. Nicholson, H.M.

Divisional Inspector of Mines and presented to Parliament as Command Document 2365 in 1925.

Mr. Nicholson was critical of the ventilation system which used the exhaust air from a haulage engine. He said, in the report-

“I am satisfied that if a brattice sheet had been erected at No.6 gate and another at No.17 gate, the ventilation of the high side where the roof break existed would have been much more adequate. The canvas doors or sheets in the Nos. 46 and 48 gates should have been doubled. The fast side corner at the face of No.17 was the highest point in the whole district, and if gas was to be found in the district, this would have been the most likely place to find it.”

The firing of shots was a critical area that the inquiry examined. From the quantity of explosive that the fireman took down the mine and the quantity that was found in the canister after the explosion it was found that he had fired three shots and if he had followed the usual practice, it was probable that he fired a 2 ounce shot in the ‘blind’ coal and 12 ounces of explosive for the two shots in the stone. There was no evidence to show the direction or position of the shotholes drilled. The Inspector thought the roof had been broken by the second shot and the third was fired in the roof on the left side of the gateway. This shot had little to do as the roof was broken by the second shot.

It was obvious that there was gas present when the third shot was fired and there was no time for the gas to accumulate in the cavity left by the firing of the second shot. The inference must be that the gas already existed in quantity on the high side of No.17 along the breaks against the shaft pillar. During the recovery of the bodies and for a few days after gas was detected on the high side of No.17. The position of the bodies of the fireman and four other persons indicated that they were taking cover while a shot was being fired and it was reasonable to assume that this was the cause of the accident.

MONTAGU. Scotswood, Northumberland. 30th. March, 1925.

The Montagu Colliery was in the Parish of Sugley about three and a half miles west of the General Post Office in Newcastle-on-Tyne and had two shafts known as the ‘Caroline’ and the ‘View’ pits. The Caroline Pit worked the Beaumont, Tilley, Five Quarter and Brockwell seams and the View Pit worked the Tilley and the Brockwell seams and it was in the Brockwell seam that the disaster occurred.

The lessees were William Benson and Son, Limited. The leasehold of the Company was immediately next to that of William Cochran Carr, Limited and both were in the Benwell Estate and held by the same landlord and the Brockwell seam extended through both leases.

From 1821 the royalty was not divided and to 1848 the Brockwell seam was worked by Mr. Matthew Liddell from a shaft on the leasehold of William Cochran Carr. Over a period it was known as the Paradise, Beaumont or West Benwell pit and was a mile and a quarter to the east of the View pit. The working extended on both sides of the boundary line which divided the leaseholds in 1925. The workings were abandoned in 1848 when the coal became unsaleable and flooded.

After transactions in 1876 and 1877 the mineral field was divided and came into existence in 1881 and from 31st. December 1883, Thomas Walter Benson, William Robert Benson and Walter Benson leased an area of 750 acres. These Bensons were all dead in 1925 but they were the founders of Benson and Son Limited. The late William Cochran Carr became the lessee of minerals, including the Brockwell seam, to the east of the same line under a lease dated 23rd, October 1884. Both these old leases made no mention of the old workings.

The old pre-1848 workings in the Brockwell seam from the Paradise pit were never reopened and remained waterlogged. Their existence was known to William Cochran and barred off on a line drawn on a working plan and the Brockwell seam was worked on

another part of the lease from Charlotte pit which was some distance to the north of the Paradise pit.

On the western lease, the Montagu colliery from 1884 onwards, worked the Brockwell seam extensively from the View pit and at the time of the accident the workings to the east had approached to within 94 yards of their neighbours leasehold. They were required to leave a barrier of 40 yards on their side of the boundary and so they had 54 yards to work.

For some time before the accident, bord and pillar work had been in progress in the Brockwell seam from the View pit in an easterly direction in a district known as Robson's Bord Flat. On the night of Friday 27th March two men Fenton and Perkins had been working for two or three weeks in this flat and were hewing coal 1689 yards from the pit bottom if the roadways were followed. They stopped working at 11 p.m. and went to the surface and no work was done in this heading until the following Monday morning when the disaster occurred.

On the right hand side of the working place there was a 'jud' or a projection of unworked coal about six feet wide and three and a half feet deep which was the next piece to be worked. It had been left by the two men of Friday night. The place was reasonably dry and the small quantities of water that gathered were tubbed away and here had been no complaints about wet conditions from the men. Neither Fenton nor Perkins had any inclination of the danger ahead.

At midnight on Sunday 29th March, Joseph Robson, the deputy in charge of the district went down the View pit about 3.30 a.m. and made his inspection about 4.45 a.m. to make his inspection before the morning shift descended. Small quantities of water had accumulated over the weekend and he gave orders that it should be removed in the usual way. There was no water at the face and Robson returned on the 'Kist' on the Irish ropeway and wrote his report which was recovered eight months later and although it had been in water all that time it was still legible. It read-

"Noxious and inflammable gasses. None.

State of ventilation. Good.

Condition of roof and sides All right.

Supply of timber

a). Working places Good.

b). Pass-byes, sidings, etc."

Other matters affecting safety and remarks. Satisfactory."

Felton and Perkins and the rest of the men came into the pit and two other men, Matthew Errington and W. Guthrie obtained the deputy's permission to work with them. There were 107 men and 41 boys working in the Brockwell seam that morning. When Errington and Guthrie started work they found that the piece of coal already mentioned had been drilled with two shot holes about a yard deep and a shot hole had been drilled in the face on the left of the projection. About 9.30 a.m. Robson charged these three shots and they did their work bringing down six or seven tubs of coal and roughly straightening the line of the face. Robson then left the place and at about 9.45 a.m. received a message from Errington by a putter, James Tracy to the effect that Errington thought he had 'holed'. going back to the face he found a little trickle of water coming through the middle of the seam between two shots in the 'jud'. There appeared to be no pressure behind it but it had an unpleasant smell and he knew it was not 'virgin coal water'. He went out a little at and told his son, the water leader James Robson to go and fetch one of the overmen.

Just after the boy left they heard a bang. He told his son and Tracy to run, Robson turned into the bord but after going about five yards he saw the water rushing towards him and completely filling the tunnel. His lamp went out and he ran after his son who coupled up some tubs and found two drivers on the road and they were drawn to the main road by a pony.

The drivers, James Robson and Tracy were taken out but Robson went into the workings of the Dip Hitch Flat and brought out five men. The eight that remained in 'Robson's Bord Flat', were working close to the inrush and drowned in a very short time.

As the water came in, it began to rush across the Irish ropeway and the travelling road parallel to it into the lower workings where men were working. As it went into the Irish ropeway it was seen by some lads who were able to warn some of the men. Unfortunately the water began to fill a depression, called the 'swelly', which ran across the ropeway. This resulted in the ropeway being filled to the roof before the water got to the inner workings. The majority of the men who escaped had to wade through several feet of water but seventeen were trapped. Their bodies were found together at the flat in the 4th. Headway lying in attitudes which suggested they had been suffocated by blackdamp before the water reached them. The remaining thirteen bodies were recovered from the lower districts where the victims drowned in the early stages of the disaster.

The back overman, Sam Evans lost his life going back through the 'swelly' when it was filling to get at the missing men. He was unable to return as the water rose so fast.

Those who lost their lives were:-

William Halliday of 2, Swinburn Terrace, Bell's Close.

John Murthwaite of 65, Aline Street, Benwell.

John Martin snr. of 16, Ridley Terrace, Scotswood

Matther Erington, the Pit Yard, Delaval.

James Nixon, 25, Giuehouse Lane, Elswick.

Jospeh Nixon, 9, Danskin Place, Scotswood.

Robert Hislop, Pumping Engine, Scotswood.

Charles Simpson, 43, Providence Terrace, Scotswood.

Isaac Both, 898, Scotswood Road, Scotswood.

Robert Thompson, 77, St Margaret's Road, Scotswood.

John Thompson, 69, Deval Road, Benwell.

Alfred Dent, 232, Whitfield Road, Scotswood.

George Hetherington, 2 Front Street, Bells Close.

Matt Hetherington, St George Terrace, Bells Close.

Christopher Batey, 9, Providece Terrace, Scotswood.

Thomas Batey, 24, Prospect Terrace, Scotswood.

Ralph Carr 2, Chapel Terrace, Scotswood.

Robert Havelock, 10, Suntet Street, Delaval.

William Trewicks, 18 Boah House Street., Deleval.

John Thoms Trewicks, 9 Cabbon Street Elswick.

William Fowler, 5, Prospect Terrace, Scotswood.

Edward Jackson, 15 Norwch Street, Delaval.

John Lea, 45, Blckett Terrace, Scotswood.

Sam Evans, Pumping Engine, Scotswod.

William Thompson, 80, Shaftoe Street, Scotswood.

William Lyons, 39, Norwich Street, Delaval.

Alex Learmouth, 55, Norwich Street, Delaval.

James Steel, Pumping Engine, Scotswood.

Richard Rodgers, 212, Whitfield Road, Scotswood.

William Guthrie, Chapel Terrace, Scotswood.

Thomas Letcham jnr. 100, Norwich Street, Delaval.

John Salmon, 26, High Street, Benwell.

D.G. Dixon, 58. Joan Street, Benwell.

John Fitzpatrick, 71, Norwicj Street, Delaval.

Charles Gray, 38, Aline Street, Benwell.

The inquiry into the disaster was held at the Assize Court at the Moot Hall, Newcastle-on-Tyne and the 26th. and 27th. January 1926 by the Right Honourable Hugh Pattison Macmillan, K.C. with the assistance of Henry Walker, C.B.E., H.M. Chief Inspector of Mines as the technical assessor. Representing the Mines Department were Mr. T. Greenland Davies, H.M. Divisional Inspector of Mines and Mr. H.T. Foster, H.M. Senior Inspector of Mines, for Messrs. William Benson and Son Ltd., who were the lessees of the colliery, Mr. E.A. Mitchell-Innes, K.C., C.B.E. and for the Royalty owners, Mr. W.W. Gibson. Colonel W.C. Blackett, C.B.E., represented the Institution of Mining Engineers, Mr. Herbert Smith and Mr. W.P. Richardson represented the Miners' Federation of Great Britain and Mr. W. Stanker for the Northumberland Miners' Mutual Confident Association. Mr. Coulthard and Mr. Johnson for the General Federation of Fireman's, Examiners' and Deputies' Associations of Great Britain, Mr. R. Nuttall for the Northern Colliery Officials' Mutual Aid Association and Mr. John Mackay for the Montagu Miners' Lodge.

The inquiry established beyond doubt that the cause of the accident was the breaking of the 'jud' by the two shots causing the barrier between the old workings to break. It was estimated that the water pressure was 80 pounds per square inch and that after the shots had been fired, there was six inches of coal holding it back. This slender barrier held the water for about half an hour.

It was also established that no one in the mine knew of the danger. There was a general knowledge of the waterlogged workings of the old, disused Paradise pit. Mr. Carr said that his father, who was the dead, had once casually observed in conversation that borings should be done in that part of the workings but the inquiry did not put much store in this hearsay evidence.

Mr. Macmillan was concerned about the information that was available on old coal workings. Old documents were found after the disaster in the private desk of the late Mr. Thomas Walter Benson and correspondence between him and the late Mr. William Armstrong who was a mining engineer who was acting for both parties and who was a check viewer for the Benwell Royalty since 1841. The letters mainly concerned royalty payments and the disappointing quality of the coal in the Brockwell seam and quite incidentally the workings of the old Paradise pit came up.

On the 30th. August 1887, Mr. Armstrong wrote to Mr. Benson-

"I am sorry to hear your account of the Brockwell - you are entitled to concession under the circumstances - but certainly the seam is better in the Pit worked by Mr. Matt Liddell some years ago. (this refers to the disused workings in the Brockwell seam in the old Paradise pit from which the water broke through) Did I not send you sections of the seam as ascertained by myself? and the copy of the workings I then made I cannot find and I may possibly have sent to you. I shall see you shortly on the subject."

On the next day, 31st. August 1887, Mr. Armstrong wrote a further letter to Mr. Benson as follows-

"I send you my Copy Notes from my Pit Book, notes made by myself on the Brockwell seam, when I examined the pit with Matthew Liddell. I have a copy of the Working plan at the date, but I cannot put my hands at present upon it if you think it would be of assistance to you I will look over my library once more. I have an idea that I forwarded you a copy of this Plan - or probably the Plan itself. as to the extent of the workings when the Seam was abandoned, I cannot say the Plan is complete, but you may know when the seam was abandoned and you can judge from the date of the Notes what further extension there would be from memory. I should say that not much more was done, but you must not place any reliance upon this."

To these letters, Mr. Benson replied in 1st. September 1887-

"I am obliged for yours of the 30th and 31st inst. also for the copy of the notes you kindly have sent me. I expect they refer to the 'West' or Beaumont Pit near

Paradise which is some distance East of my boundary, and is I believe the only pit down to the Brockwell.

With regard to the working plan mentioned in yours of the 31st. inst. I have never seen it and am pretty sure you did not send it to me. In any case as I believe all the workings in the Brockwell from the Paradise Pit are some distance outside our tract of the Royalty, I think you need not take much trouble to find it, at the same time I am obliged for the offer. From what I can gather from some of the old men who worked at the Paradise Pit, the coal there must have been a great deal better and easier to work than anything we have come across as I think the total cost of Pit Bill, mentioned in your notes, would hardly pay the hewers now.

I shall be glad to confer with you on the matter if you will kindly give me an appointment some time shortly."

Some later letters relating to the re-adjustment of the royalty scale carried the following paragraph at the end of a letter dated 27th. December 1887 fro Mr. Armstrong to Mr. Benson-

"I think I forwarded you some time ago a tracing I took from Liddell's plan a short time before working was abandoned. Have you this or any other such tracing? for these workings must be filled with water and you should arrange precautionary boreholes."

After this the workings do not appear in any correspondence but in 1911 the workings in the Charlotte Pit on the eastern leasehold, came into contact with water on the northern boundary and Mr. Cochran Carr was aware that there were waterlogged workings to the south, decided to mark his working plan. He had an old tracing of the workings but was unsure of it's accuracy and contacted Messrs. William Armstrong and Sons, mining engineers and wrote on 13th March 1911-

"We should be glad if you could give us some information as to the extent of the workings in the Brockwell Seam south of the Charlotte Pit. We believe that the coal from this seam was worked from the Beaumont Pit near to the river previous to 1848, and we think you have a record. We shall be obliged if you can show us the plan and allow us to take a copy."

Mr. William Armstrong, Junior sent a tracing of the workings to Mr. A.S. Dinning, Land and Mining surveyor, Newcastle-on-Tyne with the following instructions-

"Dear Sir,

Mr. Cochran has asked us to forward the enclosed tracing to make a copy of the workings south of the Charlotte Pit within the pencilled line. Will you kindly proceed with this, forwarding your copy and charges to Mr. Carr and returning the original to us.

Yours faithfully,

William Armstrong and Son,

p.p. J.M.T."

The plan was returned with additions by Mr. Dinning and was used as a working plan up to 1913 but as the workings in the Brockwell seam from the Charlotte Pit the plan was not large enough to show them and a new plan was made showing the workings in the seam from the Paradise Pit only up to the boundary.

On the afternoon of the disaster, Mr. Young who was employed by William Cochran Carr, Limited went to the office of William Benson and Son, Limited and produced Mr. Dinning's plan. A day or two later Mr. Young brought the tracing showing the whole of the workings in the Brockwell Seam on both sides of the boundary. On studying these plans there was no doubt where the water came from.

The facts were that the knowledge of the old workings were in existence at the time of the accident, in the hands of the lessor's mining engineers and the lessees of the adjoining colliery but were not in the possession of the lessees of the Montagu Colliery.

There were lessons to be learned from the disaster. There was provision made by The Coal Mines Regulation Act, 1872 to preserve plans of abandoned mines and further legislation followed in 1887 and 1896 but the legislation made the plans accessible only to the Inspectors and persons who the Department had given a licence and the point in this disaster was that neither the lessors nor the lessees of the Montagu colliery had access to the plans.

Mr. Hugh Macmillan's report made the following recommendations_

"1. That there should be imposed by Statute on the respective owners or lessees of adjoining going mines a mutual duty to give notice to each other whenever their respective workings approach within a prescribed distance of the mutual boundary.

2. That the respective owners or lessees of adjoining mines should have the mutual right and duty to examine and copy such parts

a) of each other's working plans

b) of any plans in their respective possession of abandoning workings, as lie within 100 yards of their mutual boundary.

3. That a statutory duty should be imposed upon the owners and the lessees of every working mine to ascertain whether any plans of abandoned workings within the area of such amine or within reasonable surrounding margin are in the possession of

a) the owners or lessees of the adjoining mineral areas

b) the Mines Department.

and if such plans are found to exist to examine the same and to make copies of such portion thereof as relates to the area of their own mine and to be a reasonable surrounding margin.

4. That the lessors of every mine should be bound to disclose and make available for copying to their lessees all plans in their possession of abandoned workings within the area let and a reasonable surrounding margin.

5. That the current working plan of every mine directed to be kept under the Coal Mines Act 1911, should be required to show, as far as is practicable, in addition to the boundaries of the mine, all workings, whether going or abandoned as ascertained under the foregoing rights and duties.

6. That the Department should vigorously continue their efforts by transmission either voluntarily as complete a recovery as possible of all plans or copies of plans of workings abandoned before the Act of 1872 came into operation.

7. That the plans of all abandoned workings received by the Department by transmission either voluntarily or under statute should be registered, catalogued and classified geologically as to be readily accessible.

8. That access to such plans in the hands of the Department should be available immediately after deposit not only to all persons upon whom a statutory duty of inspections may be imposed in terms of my preceding recommendations, but also to give persons who can satisfy the Department that they have a legitimate interest to inspect them."

The recommendations ended the inquiry into the Montagu Colliery disaster.

PENDLETON. Pendleton, Lancashire. 4th. November, 1925.

The colliery was the property of Messrs. Andrew Knowles and Sons, Limited and had two shafts each 510 yards deep to the Rams Seam. Coal had been brought from these shafts for more than 75 years at the date of the accident and the distance to the working faces to the dip stood at more than 3,000 yards. There was one main engine brow which started in the seam near the bottom of the downcast shaft and continued to the full dip for a distance of a mile. Near this point, two levels were turned, one to the East and the other to the West. From points 40 to 50 yards along the East and West Levels, known as

No.12 East and No. 12 West Levels, slants had been driven to the dip. That from No. 12 West Level was known as the West Slant and was 475 yards long and that from the East Level, the East Slant was 640 yards long. No.14 West level had been driven off the West Slant and it was working the dip side of this level. It was here that the accident occurred on the 4th. November, 1925. There was a brow known as Morris's Brow which extended from No.14 West Level to the dip for a distance of 60 yards and two levels were driven off this brow, known as Morris's Level and Bramwell's Level which turned away and had a face of 30 to 40 yards. It was bounded on the other side by a downthrow fault and was being worked in an easterly direction. The seam at this face was 6 feet thick and 3,550 feet from the surface.

On the day of the accident the mine was generally idle but a shift of 17 men was working in or about No.14 West level. This shift consisted of a fireman, Thomas Barnes, three repairers, seven colliers, a filler and five haulage hands.

The district had been inspected by the night fireman prior to the men commencing work and the day fireman. Barnes, made an inspection of the levels and faces in Morris's Brow about 8.30 a.m. when he found everything in good condition. he stated:-

"The timber was set right there was no gas anywhere the ventilation was going all right and the roof and sides were safe."

When Barnes was in the No.14 West Level about 10 a.m. and returning towards Morris's brow from Clement's brow where he had left three men to do repairs, the accident occurred. Barnes said'-

"I heard a loud report then I felt the dust and a sudden gush of air."

Two men, David Seabridge and George Hassell who were at work when the upheaval occurred gave evidences as follows:-

"I David Seabridge was on Bramwell's Level about 5 yards fro the coal face, when without warning, there was aloud report and I was thrown several yards in an outbye direction along the level, My body was hit by several small pieces of dirt. The floor lifted and I saw a big red flash. All the lamps went out."

Hassell said:-

"I was in the act of putting a tally on a tub which was standing on the plate at the face of Morris's Level when the upheaval occurred. I was standing on the outbye side of the tub and would be about 2 yards from the coal face, with one arm over the end of the tub. Everything was quite quiet when suddenly I was picked off my feet just as though you were stood on a plank and someone snatched the plank from under you."

The accident consisted of the upheaval of the floor along the whole length of the face from the downthrow fault at the dip end to the level airway at the rise end and was confined to the area between the coal face and the goaf except at the inner end of Bramwell's level. Firedamp was given off and found by fireman Barnes on No.14 Level about 70 yards in the inbye side of Morris's Brow. His lamp was extinguished but he was able to continue on his way and dilute the gas by breaking a pipe supplying compressed air to a small haulage engine at the top of Morris's Brow and allowed the air to flow freely. Later, a lamp that was still alight, was found near the bottom of Morris's Brow. This proved that the gas that had been given off had not been present in any quantity in the neighbourhood of the lower level.

Mr. David Coatesworth, H.M. Inspector of Mines, who had made 15 visits to the colliery between 25th. January and 30th. September, 1925, had found no firedamp on any of these occasions. There had been similar accidents at the colliery though there had been no loss of life. Mr. J.T. Browne, General Manger of Messrs. Andrew Knowles and Sons Limited gave the inquiry details of these previous accidents.

The natural conditions and methods of working the Rams Seam at Pendleton Colliery were as follows. The Rams Seam was 6 feet thick and several crumps had been experienced at a depth of over 3,000 feet and at 3,550 feet where the crump of

November, 1925, occurred. The strata immediately overlying the Rams Seam consisted of a tough shale 35 to 50 feet thick which was interspersed with bands of ironstone. The floor beneath the seam was of warrant or shale about 3 feet thick with streaks of coal near the base which lay of the Little Rams Seam, 2 feet 6 inches thick. Under the Little Rams Seam was a floor of very hard grey sandstone rock.

Small faults, generally with southerly downthrow were frequently met in the workings. They ran roughly parallel with the strike and so roughly parallel to the Level in the mine and at right angles to the Brows. The cleat, or main cleavage, to joint planes in the measures, ran approximately north west to south east. The coal was worked by driving of brows to the dip of which levels were turned off to the let and the right, the coal so opened out being worked to the rise. Coal had been worked at right angles to the strike, end-on, particularly below the No. 14 West and the No.15. East Levels. There was little gas in the working and the big red flash that was seen was not thought to have been caused by the ignition of gas.

When the Inspectors examined the face where the crump took place they found that the very hard rock below the Little Rams Seam was not broken and they came to the conclusion that the warrant underlying the Little Rams Seam were thrust violently upwards and this was responsible for the damage and the loss of life. The roof remained intact except for small fractures from which a small amount of gas escaped.

Those who lost their lives were-
Samuel Corbett,
Stephen Morris,
Edward Ditchfield,
Frank Bramwell,
Robert Hanrahan and
Radcliffe Holden.

BIRCHENWOOD. Kidsgrove, Staffordshire. 18th. December, 1925.

The colliery was in North Staffordshire near Kidsgrove and it had been worked for thirty years by the Birchenwood Colliery Company, Limited but in June 1925 it had been taken over by the Kidsgrove Collieries, Limited. It employed 1,126 people under ground and at the time of the explosion there were 374 below.

At the time of the explosion there were five shafts and one footrail in use for pumping, winding and ventilation. Two of these were upcast shafts and the another two and the footrail were downcast shafts. The main shaft was called the No.18 and it was the only shaft that was used to wind coal. It was a downcast shaft and wound about five to six thousand tons of coal a week.

Over the years, thirteen seams of coal had been worked at the colliery but at the time there were only three that were being worked. These were the Seventh Feet Banbury, the Eight Feet Banbury and the Bullhurst Seams. These were inclined throughout the mine and were generally steep, but in the part of the mine where the explosion took place they were inclined at about 45° and dipped to the south-east.

The No.18 Pit was sunk to the Silver Mine Seam at a depth of 440 yards and a cross measure drift, or crut, had been driven south east of the shaft and this passage intersected the Winpenny, Bullhurst, Eight Feet Banbury, Seven Foot Banbury, and other seams. In the Seven feet Banbury Seam, a breadth of coal was being developed by inclines driven in the seam to almost the full dip at 948 yards below the surface and from these dips the district known as Wakefield's dip, the distance from the bottom of the shaft to the start of Wakefield's dip was 1, 338 yards. The explosion took place in Wakefield's Dip District of the Seven Foot Banbury Seam.

Past experience had shown that the Seven Feet Seam as well as the Eight Feet Bullhurst Seam were subject to spontaneous heating. Records that had been kept over the previous twenty eight years showed that there had been no less than twenty one districts that had been sealed off because of spontaneous combustion. Four of these were in the Bullhurst, five in the Eight Feet and twelve in the Seven Feet but none of these incidents had caused loss of life.

The Seven Feet was ten feet thick with a strong roof but a weak floor that lifted, causing a disintegration of the coal which exposed a large area of coal to the oxidizing action of the air. The seam was gassy but with adequate ventilation there was no major problem from the gas.

The workings were dry and dusty and it had been worked by three methods. A modified longwall system, a breasting system and the heading and drifting or 'Rearer' system. At the time of the disaster the seam in Wakefield's Dip was worked on the latter system. It worked in two stages, the heading stage was called the 'Bottom Shunt' section and the drifting stage was the upper panel or the 'Top Shunt'. The heading stage consisted of driving out a pair of opening levels about 10 to 15 yards apart to the boundary, the lower one being the main level and the upper one to the air heading. From these roadways at distances varying from 80 to 120 yards, pairs of dippers were driven to a boundary, goaf, upper levels or a barrier to form panels of workings. By this means the panel was split into pillars for 10 to 12 yards thick which were worked by drifting starting at the top of the panel and worked downwards to the main level. The system of working highly inclined thick seams had been used for many years and was originally developed as a safe and economical way of extracting the coal.

As time went by and the seams started to be worked at greater depths and the problem of spontaneous combustion in the goaf became apparent. This was not a problem if an oxygen starved atmosphere could be maintained in the goaf. A further development in the 'Rearer' system of working to keep an inert atmosphere of firedamp in the goaf. To do this the dippers from which the pillars were formed were terminated at a distance from the lower level of the old panel above so that a substantial barrier of the coal was left on the rise side of a new panel. There were two roads into the new panel which were in the lowest outbye corner.

In Wakefield's Dip District there was variation of this system so that the 'Top Shunt' section was cut through by two old roadways which had been sealed by stoppings at the top right hand corner. The 'Rearer' system had an advantage, since if there was a fire, it could rapidly be isolated by two stoppings and only a single panel of coal would be lost and in the early stages of development openings were made for the stoppings and materials to complete the stoppings were constantly close at hand. The stoppings could be completed without delay when the coal in the panel was exhausted.

One of the two panels in Wakefield's Dip District, the 'Top Shunt' panel was near complete exhaustion. Only six small pillars remained to be worked above the air heading and three larger ones along the head side of the main level. A jig or self acting incline, which was known as Kelsall's Dip, was used in the output of the working places of which there were three and all came down from it. The stage of extracting the pillars had not been reached and there was a goaf covering five acres inbye and above the pillars that were being worked in Kelsall's Dip.

The explosion occurred on the afternoon shift at about 4.15 p.m. somewhere in the neighbourhood of Kelsall's Dip in the Top Shunt panel. There were five colliers at work in three places in the district at the time and two other colliers were repairing the air heading near to Wakefield's back dip.

During the morning there had been no indication of heating and the work had gone on normally but at about 1 p.m. towards the end of the shift, Gerrard Harris Forrester, an assistant surveyor, who had been working in another part of the pit in the morning, decided to go down the West Winpenny Back Slant before going to the surface to see

how some repair work was proceeding. On passing through the separation doors at the bottom of the No.18 Pit, he noticed an unusual smell in the air. He met Albert Hughes, a spare fireman who was temporarily working as a repairer in the slant, and together they went to make an examination of the airway at the top of Wakefield's District. They found no gas but there was still a smell.

The first official that they saw was George Wilcox who had been round the district on his morning inspection, including the back dip in Wakefield's district and had noticed no 'gob stink'. He received Forrester's report and told him to go and tell George William Lowe, the undermanager. Wilcox went to explore the return airway.

Forrester met Lowe at the top of the west slant and both went with Wilcox to the West Slant return. This was at about 2.05 p.m. and at the top they met the day shift with the day fireman just getting out of the train in which they had ridden up the incline. They had found nothing wrong on their journey and they had smelt nothing, The smell that alarmed Forrester and Hughes a little earlier had disappeared. They retraced their steps and noticed nothing to cause them any worry and when they reached the top of Wakefield's back dip, Forrester apologised for raising a false alarm. He was now convinced that there had been no smell.

There was now no reason why the afternoon shift could not be allowed to go to their work. The furnaceman Amos Whalley, was told of the inspections that had been made and went to look to see if there was anything wrong with the brattice cloths or with the ventilation. The explosion occurred two and a half to three hours later.

At the moment of the explosion, Amos Whalley, the fireman, was in Ball's place, which was a heading that was being widened with the object of removing the pillar on the rise side of it. At the inquiry he gave a detailed account of the events that followed-

"While I was there, I should be there two or three minutes, I tested for gas and found none. I got on the load and got right into the top and tested for gas and found none. During that time I examined the face and drew his attention that he wanted a post set. He said: 'We will have some coal out first.' I said: 'See you get one up'."

I examined his face. we heard a fall of rock in the gob, accompanied by a rush of air, and Ball said: "What is that?" I said: "A fall of rock." It went down the waste and beyond Ball's place rolling and slipping over one another like great sheets. Ball, as he stood close to me, shouted 'Fire'. Somebody shouted 'Fire' and the job then occurred. We were all put in the dark. I do not think I lost consciousness. We gathered ourselves up, after being blown down a time or two, and got on the landing. I called to Grocott, but could get no answer. I also called to Owens but got no answer. Bell was in the dip. he fell just like this. i had to drag him along and get him down as well as i could. I delivered him to Enoch Winkle and Charlie Armit and asked them to give him a hand up."

The fireman and ball had great difficulty in finding their way down Kelsall's Dip to the level but the six people who were in the workings on the return side of Ball's place were killed. One of them, Caton, who was repairing the air heading with another man was blown through the air door in the thirling in to the 'Top Shunt' level. The other bodies were not recovered for several months, and Ball who was suffering from severe burns finally died from his injuries.

Four youths in the main level were slightly injured and none of the fifteen people working in the bottom shunt level suffered at all except some were affected by afterdamp.

A rescue party was quickly organised, but by the time it reached the bottom of Kelsall's dip all further hope of rescue had evaporated for there the party found a fire. A tub of coal which was standing at the bottom of the dip was alight and the fire had spread up the side of the dip igniting the timber and coal. Strenuous efforts were made through the night and on into the morning by the Rescue Brigades and later by relays of helpers. They tried to put out the fire but without any marked success and after a consultation

with the owners and the Inspector of Mines, it was decided to seal the working by stoppings in the intake and the return dips. There was no hope for the men left behind and there was great danger to the men who were down the pit fighting the fire. Temporary stoppings were rapidly erected in the two dips and the work was completed early in the afternoon of the same day.

Five bodies remained in the explosion area when the place was sealed off. The stoppings were started at 10.45 a.m. on the day after the disaster and were completed by 2 p.m. by men wearing rescue apparatus. All the persons were then withdrawn and it was decided not to approach the stoppings for 30 hours.

An inspection of the stoppings was made at 8 p.m. on Sunday when they were found intact and there was only a slight smell of burning timber at the return dip stopping. The dip stoppings were strengthened with brick work and sand. Another inspection was made the following day and it was found that the mine was safe for the workmen to return and coal drawing was resumed on Tuesday morning.

In the meantime plans had been made to explore the explosion area to recover the bodies. The operations started on the 4th. January 1926 by three colliery Rescue Brigades working inside an airlock. This was installed in the West level between the tops of the intake and return dips and later advanced to the air heading which was originally the return from Kelsall's Dip. The operations were completed by April 1st. 1926.

The recovery work to be performed was probably the most hazardous and arduous recorded in the annals of mining in this country, but it was carried through persistently and methodically in the face of great difficulty without a hitch or accident. Great credit was due to the rescue brigade, Mr. Allott, the agent of the colliery and his staff and officials.

The men who lost their lives were-
Body recovered 18th. March 1925-
Leonard Caton.

Bodies recovered 31st. March 1926-

Thomas ?? .,

Frederick Lowndes,

J. Owen,

William Owen,

Daniel Swingewood's body was recovered 23rd. February 1926 and

I. Ball who was rescued alive from the mine but died from his injuries 27th. December 1925.

The inquiry into the causes of the disaster was made by Mr. F.W. Wynne, H.M. Chief Inspector of Mines who began his report-

"My Inquiry having been postponed pending a settlement of the coal stoppage and, I regret to say, further delayed by personal ill health, was held, by arrangement with Hugh Worthington Adams. Esq., H.M. Coroner for the North-West District of Staffordshire, jointly with the adjourned inquest in the Victoria Hall, Kids Grove, on the 20th., 21st. and 22nd. April 1927."

The inquest into the men's deaths brought in the following verdict-

"The cause of the explosion is apparently spontaneous combustion. We do consider that provisions of the Coal Mines Act, 1911, and the Regulations made thereunder have been duly carried out. We have no suggestions to offer with a view to obviating a similar disaster."

The evidence of Amos Whalley, the fireman and Edgar Threadgold, the hooker-on established that the seat of the explosion was somewhere in the goaf beyond the pillars

on the left had side of Kelasall's Dip. Just how far beyond was impossible to say but it was probably some yards beyond the area over which the ventilating current passed.

The source of ignition could be from blasting, friction from brake wheels or defective lamps. The first two possibilities were ruled out and the lamps were tested and were found to be a very unlikely source of ignition. The possibilities were narrowed down to three. Matches in the waste, frictional sparking from falling rock and heat due to spontaneous combustion. Matches were dismissed as a source of ignition and the possibility of sparks from falling rocks was considered possible. There was evidence that men had seen sparks when there were falls of a hard rock in the Seven Foot Banbury Seam and there was evidence for the work of Professor Wheeler that this was possible. The inquiry thought that this was unlikely in this explosion.

The possibility of coal dust contributing to the disaster was looked into and dismissed so that left spontaneous heating as a source of ignition. Mr. Wheeler thought this to be the case and since there were usually indications that heating was taking place, he looked to see if there had been any negligence in this case. he found there was not and as much had been done by the men and officials in the main as could be expected.

He was critical of the 'Rearer' system, of working and said-

"I am unable to condemn it out and out but clearly it is a method which leaves much to chance, and the time has come, I think, when possibilities of other or modified methods of working should be further explored, methods in which operations can be carried on with a greater degree of certainty as to the condition of the atmosphere in the goaf.

I am glad to be able to report that in reply to the questions as to the alternative methods of working, the Agent, Mr. J.R.L. Allott stated that the matter is being considered and he had in fact visited mines in Germany, where similar difficulties are encountered, with a view to studying the methods of working in vogue there and to see if any of them could be adopted to suit the conditions at Birchenwood."

THORNE. Doncaster, Yorkshire. 15th. March, 1926.

The mine was 11 miles to the north east of Doncaster and was the property of Messrs. Pease and Partners Limited. Developments were started in 1909 and on the 22nd. February 1926 sinking operations were completed on the No.2 shaft which was 21 feet in diameter and sunk to 964 yards to the Barnsley seam. at 863 yards there was an inset at the Kent's Thick or Haigh Hazel seam in which there was a connection to the No.1 shaft. at the time of the accident there was water in the No.2 shaft to a depth of 11 feet. The cement lining of the shaft had been completed and the sinking scaffold was last in use at 919 yards to remove some temporary steel sheet which was lining the inside of the shaft.

The position of the scaffold at the time of the accident which was caused by the breaking of the capstan engine which sent the scaffold and the its supporting ropes to the bottom of the shaft, was not known exactly but it was last seen by Knox, an engineer and Carter, the foreman sinker at 10 a.m. on the day of the accident 919 yards from the surface. The chargeman, Thornley had been directed by Carter that the next work to be done from the scaffold was at a point about 15 yards below the Hazel inset and the scaffold was moving to this position when the accident occurred. If the distances that the scaffold moved as estimated by the engine driver, Ingham the scaffold was about 74 yards above the bottom of the shaft when it fell.

The scaffold weighed 6 tons and was supported by two lock coil ropes and a double drum capstan engine fixed 74 feet 6 inches from the shaft. The ropes led off the top sides of the drums at an angle of thirty eight degrees to the horizontal and passed over pulleys fixed at a height of 60 feet 6 inches from ground level. The ropes were made by Messrs. Latch and Batchelor and were bought in February and put into use on the 24th.

July 1910. They were each of 1,035 yards long and five and a half inches in circumference. They weighed 10 tons 5 cwt and had a breaking strain of 172 tons.

The capstan was manufactured by the Uskside Engineering Company of Newport, Monmouth and was erected at the same time. It was designed to lift 25 tons on each drum or 50 tons on one drum. The drums each weight 9 tons and were driven by worms which, in turn, were driven by spur gearing from a twin high pressure reversible steam engine with 14 inch cylinders fitted with slide valves. The drums were mounted axially in line and were fitted with band brakes at the outside ends. The worms operated underneath the inside ends which had ratchets where pawls could engage under certain circumstances. The pawls pivoted on pins fixed on the shaft side of the capstan and at a level well below the drum axles. When raising the scaffold the pawls were held into their work by weighted levers and would engage in the event of the drum moving in the reverse direction. When lowering the scaffold the pawls were held free from their engaging positions by raising the weighted levers. To effect this, wore rope attachments were provided. The rope passed under the drums and ended in metal handles on the driver's side of the capstan. The handles could be put in two positions over fixed vertical iron pins corresponding to 'lowering' and 'raising' operations.

Steam was supplied at a pressure of 150 lbs. per square inch and was controlled by a stop valve and throttle which, along with the reversing lever were used to control the engine when operating the capstan. The reversing lever was approximately in the vertical position with a catch pin fitted which could be lifted by a small spring-controlled lever on the handle or it would engage in one of three slots on a metal sector. The slots corresponded to the 'raise', 'neutral' and 'lower' positions on the lever.

The left hand drum from the driver's position was known as the north drum and the other the south drum. When operating the engine the driver faced the south drum and the shaft, with his right hand on the throttle and his left hand on the reversing lever. To put the engine in motion, the reversing lever would be first paced in the desired position before steam was admitted through the throttle valve. To stop the engine, the lever would be centred and the throttle closed. The stop valve was closed only when the engine had to stop for a considerable time.

At the time of the accident there were approximately two thirds of one complete rope lap on each drum and the ropes were coiling towards the inside cheeks of the drum. In order to ensure that the coils of the first lay fitting closely, 2 inch metal pipes, held by six men, three per drum were used as guides.

Six men were on the scaffold and the banksman gave an account of what happened. His son was one of those who lost their lives. He said-

"I was on duty at the time of the accident and had started at 6 a.m. I had to transmit the scaffold moving signals. The scaffold had been raised just before 7 a.m. about the depth of a ring (2 feet). about 12.05 and 12.10 p.m. I got the signal '7' followed by a '5'. The scaffold was then lowered to allow the ropes to be properly re-coiled on the drum. Ingram, the capstan driver, told me that he had seen George Carter, the foreman sinker, about lowering the scaffold. I saw Thorley before he went down and arranged about the lowering. Ingram came and told me when I had lowered enough, and I signalled '4' to Thorley and got '4' back again and passed the signal to the driver. He raised again and stopped on his own account. The capstan stood two or three minutes and the started again. I was watching the ropes in the shaft which were raised two or three yards. The capstan stopped again for two or three minutes and the next time the engine started up it gave one cough of the exhaust, and the ropes went down. The ropes did not raise of the last occasion, but just eased a little. Both ropes seemed to go down together."

Albert Ingram, the engine driver, gave his description of the occurrence-

"The engine had always been satisfactory, and I was fully acquainted with it's working. It had been frequently used. I started work at 6 a.m. and the scaffold had

to be moved several times on the shift. Just prior to the accident I had lowered the scaffold some 12 yards in response to signals. I then raised it 40 yards and stopped to allow the guides for the ropes going on to the capstan drum to be adjusted. It was when I started away that the accident happened. The engine gave a jar, then I saw the far drum lift. I reversed, the centred, and screwed up the brake on the near drum. The pawls were in. They had been put when lowering but had not been put in before raising commenced. I am sure I did not put steam in before raising commenced. To raise, the lever had to be put forward, to lower, backwards. The engine just seemed to stick. I had no signal to raise at the moment of the accident. The ropes were leading off the drums nearer the worm sides than the other.”

Almost immediately after the accident the gent, Mr. Hoyle, went down the shaft to the level of the water but nothing could be seen. Apart from some marks on the side of the shaft below the point where the scaffold fell and no damage to the shaft had been done..

The water was removed and parts of the guide ropes in the shaft bottom had to be cut by oxy-acetylene burners before the bodies were recovered. He first was recovered on Wednesday and the last on Friday. One man was pinned by the scaffold and the others were found above it but it had turned over completely. The shaft bottom was cleared by the 25th. March. Only two loose rope ends were found and these were devoid of their outer layers.

The men who died were-

Edmund Thorley aged 33 years, 1st. chageman,
John Hansbury aged 34 years, 2nd. chageman,
John William Barley aged 51 years, sinker,
Charles H. Walton aged 33 years, sinker,
Ernest Clark aged 26 years, sinker and
John A. Reed aged 21 years, sinker.

The inquiry into the causes and circumstances attending the shaft accident which occurred at the No.2 shaft Thorne Colliery, Thorne, Yorkshire on the 15th. March 1926 by Major H.M. Hudspeth, D.S.O., M.C., M.Sc., H.M. Divisional Inspector of Mines and presented to Parliament on the 30th. March, 1926.

After a detailed inspection of the capstan after the accident, evidence was presented to the Inspector. The capstan suffered the breaking of each of the inside drum shaft pedestal bearings in two places. The material was cast iron and the fractured surface showed no flaws. About the drums he said-

“The drums were raised at their inside ends to such an extent that the north drum was quite clear of the worm, and the south drum almost so. The inside cheek of the north drum had been revolving on the pawl. The rim edge of the south drum worm wheel had scoured the worm. The inside cheeks of both drums had a piece broken out at the points where the pawls undoubtedly engaged.

It is beyond dispute 1) that the pawls had engaged when the drums were moving in such a direction as corresponded with the lowering of the scaffold

2) that the pawls had been forced inwards and under the drums

3) that the inside ends of the drums were clear of the worms when the drum lifted four and a half inches necessary to force the pawls inwards.”

The Inspector came to the conclusion that the pawls were so fitted that in the event of the engine driven against them, the disaster would result. He recommended that pawls should not be fitted of worm-driven capstan engines unless they could be arranged so that they could avoid this. He added that the difficulty in doing this pawls should not be used.

BILSTHORPE. Bilsthorpe, Nottinghamshire. 1st. March, 1927. This was a sinking accident and the site of the new shaft was about seven and a half miles due east of Mansfield. Two shafts of 20 feet 2 inches diameter were being sunk within a lining and the work was started in July 1925. The coal had not been reached at the time of the disaster. The arrangements at both shafts was the same and on the 1st. March the No.1 shaft had reached 278 yards, 20 yards deeper than the No.2, and was lined with concrete to 253 yards. Below this lining the side of the shaft were supported by 4 inches of 1 inch iron rings about 4 feet apart with backing sheets of corrugated iron behind held tight by wedges. The lowest ring was about five feet from the bottom of the shaft.

Water had been encountered at 63 feet and below this point cement was injected into the surrounding strata to keep out as much water as possible. As sinking proceeded the shaft was lined with concrete 16 inches thick at the top gradually increasing to 25 inches at the last length that was completed. A steam pump dealt with water to a depth of 150 feet and then that was replaced by a Sulzer electrically driven centrifugal pump which was designed to deliver 1,000 gallons per minute against a head of 1,040 feet. It was driven by a three phase motor developing 500 h.p. The combined motor and pump weighed 14 tons and was suspended in the shaft by a steel rope fixed at one end of the headgear, passed down the shaft and under a pulley on the pump unit and from there back up to the drum of a capstan engine by which the whole was raised or lowered as required. The electrical cable which supplied power to the pump passed through another hole at one side of each pipe clamp and was held there by special clamps.

At the time of the accident the total weight of the pump unit, rising main full of water, clamps, cables and suspension ropes was 40.29 tons. The suspension rope was 7 inches circumference and was made of the best acid grade steel wire with a breaking strain of 161 tons. The walling scaffold was suspended on two other ropes attached to separate capstan drums which were 79 feet above the shaft bottom at the time of the accident.

At about 7 p.m. on the 28th. February a round of sumping shots had been fired and so far as could be judged they had done their work. From then on the work was to fill out the ground broken by the shots and the pump which had been raised the usual 18 to 20 feet out of the way while the shots were fired, was lowered back into its normal position. The amount of water to be dealt with at the time was about 12 to 15,000 gallons per hour. The pump was lowered a few inches at a time as the debris was cleared from the bottom and the last time it was lowered before the accident was at 1.30 a.m. on the 1st. March.

There were 21 men working in the shaft and at about 2 a.m. they began to go to the surface in relays for their snap. When the third batch of men including the pump attendant left the shaft bottom everything seemed to be in good order but before they reached the top the pump 'jacked' (began to draw air) and on the signal from the bottom the current was cut off at the surface. On arriving at the top the pumpman decided to go back to restart the pump and went down in the hoppit with men who had finished their snap. The hoppit had been lowered to the 'steady' a point about 18 feet from the bottom when it stopped until a further signal was given before it was lowered right to the bottom. At this point the men at the surface heard a crash and the greater part of the rising main, from the surface to about 169 yards down the shaft, collapsed into the bottom of the sinking pit. At the same time the electric cable drum was jerked from its foundation and pulled over towards the shaft, the cable itself being damaged about 150 to 160 yards down the shaft but it was not broken. The pump suspension rope was not damaged. The engineman felt a jerk on the winding rope and tried to raise the hoppit but found it was held down by the debris.

Since the hoppit was trapped at the bottom of the shaft, the winding rope was cut at the surface, recapped and a new hoppit fitted. This was lowered down the shaft until it

came to the lower part of the rising main which was found to be standing but was leaning across the shaft and prevented the hoppit making any progress.

Shouts could be heard from the shaft bottom and another rope was lowered from the hoppit with a safety belt on the end. Three men were still alive at the pit bottom, Frederick Williams, George Edward Chappell and John Smith. Williams was on the pump ladder when the accident happened and was stuck by falling material but managed to hold on to the ladder and eventually took shelter behind the pump. The two others were in the hoppit. After debris had stopped falling, Williams got to the hoppit which was at the side of the pump and he found that Chappell and Smith were alone but injured. Chappell was able, with assistance, to get up the ladder to the walling scaffold but Smith could not move and to prevent him falling into the shaft bottom which was filling with water, Williams got him to the pump landing and tied him with a muffler and a handkerchief to the pump.

During the hours that passed before they could be rescued, Williams went up and down the ladder shouting for help from the top and calming Smith. When the safety belt came down Chappell put it round Smith and guided him through the scaffold to safety. Smith was terrified and reluctant to make the journey. Shortly afterwards two more ropes were lowered and Williams and Chappell were both drawn to the top and safety. Chappell and Williams deserved the highest commendation for their courage and presence of mind during the eight hours it took to get the three out of the pit.

Williams had examined the men in the hoppit and found that they were dead and a careful inspection of the shaft was made by Mr. Todd, the Agent, Mr. Linley, the Manager, Mr. J.R. Felton and Mr. W.E.T. Hartley, both H.M. Inspectors of Mines. Mr. A. Gee, the contractor and Mr. J.T. Brown, master sinker. The lower part of the rising main was dismantled and this work was complete at 3 a.m. on 2nd. March when the walling scaffold was reached and the body of John Robinson recovered. Access to the other bodies was delayed by the rising water in the bottom of the shaft and the necessity to replace the rings and backing sheets which had been knocked out.

The water in the shaft was lowered to within 33 feet of the bottom by means of a large water barrel but owing to obstructions in the shaft, this was the lowest to which the water could be reduced. There was a feeder coming into the shaft and 26 tons of cement were injected and the feeder was reduced to 3,000 gallons per hour. After this steady progress was made and the remaining thirteen bodies recovered, the last of the 15th. March

Those who died were-

13 Dead. LIST REQUIRED.

The inquiry into the disaster was held in the 22nd. and 23rd, June 1927 in the Guildhall, Nottingham, by Mr. Henry Walker, C.B.E., H.M. Chief Inspector of Mines and presented to Colonel the Right Honourable E.R. Lane Fox, M.P. Secretary for Mine on 25th. July 1927. All interested parties were represented.

The possible causes of the accident were-

- 1). A broken clamp on the rising main.
- 2). A defective joint on the rising main.
- 3). A fall from the side of the shaft striking the rising main or the pump.
- 4). The grounding of the suction pipe on the bottom of the shaft.

There was no evidence of a defective joint or a fall from the side of the shaft. The key witness was Frederick Williams and he gave an account of the accident as follows-

“Q. Now Mr. Williams just tell us what did happen at that point?

A Something came from above, struck me on the back of the head and the shoulders, and took my feet off the ladder, from under me, but I happened to have a good hold with my hands, and I scrambled out as best I could.

Q. It is rather important for us to know what did happen. Did you hear a noise at all?

A. The noise came with the crash. It all came at the same moment.

Q. Did the pump swing at all at that time?

A. As the crash came she swung but she was perfectly still before.

Q. Can you give us any idea of how long this crashing was going on?

A. Well the main crash did not last long, but the stuff was falling up to the time I came from there. That was from the sides around. But the main crash itself did not last very many minutes.

Q. Was that main crash, as you call it, above or below you?

A. It came from above me.

Q. Did you, before that, hear anything below?

A. Everything was as quiet as it could be. Because they were all quiet owing to waiting for me to shout for the chargeman to start the pump.

Q. The men in the bottom were not working, were they?

A. Every man was stood keeping quiet, until the signal.

Q. So that the shaft at the time was particularly quiet?

A. Yes.

Q. If there had been any movement in the bottom would you have heard it, do you think?

A. Oh yes, at that time because the pump was not working. It was as quiet as the grave, as you might say."

It may have been that the blow which stunned Williams was the result of a clamp breaking high up on the rising main but the evidence of Professor S.M. Dixon of the Civil Engineering, City and Guilds Engineering College, London who examined the clamps thought they were excellent and in good order and F.C. Lea, Professor of Mechanical Engineering and Head of the Faculty of Engineering at Sheffield University agreed with Professor Dixon.

A sinker, Norman Mason, who lost his brother in the disaster said that the following the firing of the shots the pump was lowered too far and bumped the shaft bottom and Horace Hunt, a pump fitter, had complained about one of the joints leaking. Professor Dixon said that if joints were weakened, the long term effect would be that the pipe would eventually collapse.

Henry Walker came to the following conclusions-

"I regret that I am not able to state the cause of this accident but I am clearly of the opinion that the occurrence of a similar accident can be prevented.

In the system followed at Bilsthorpe and elsewhere, the pipes forming the rising main column are supported merely by standing one upon another, the clamps serving only to keep the column vertical. The failure of one pipe involves the collapse of the whole range above it. To obviate this, further support is necessary and in future it should be of such a character as to ensure that each pipe is separately and distinctly supported.

There are several ways in which this can be done, and I am quite certain that those in charge of sinkings will have no difficulty in finding that method which is best suited to their needs. The provision of flexible suction pipes would also appear to be desirable."

MARINE. Cwm, Monmouthshire. 1st. March, 1927.

The Marine Colliery was about three miles from Ebbw Vale and was owned by the Ebbw Vale Steel, Iron and Coal Company. There were two shafts at the colliery which were sunk to the Old Coal Seam at 404 yards. The seams that were worked at the colliery were the Old Coal and the Black Vein from the No.1 shaft which was the upcast and the Threequarter, Elled and Big Vein from the No.2 shaft which was the downcast.

The explosion occurred in the Black Vein Seam at 350 yards down. it was reached by means of cross measure drifts, one of which was the intake from the Old Coal Seam and the other from the Meadow Vein which was the return. The Black Vein Seam, was about five feet thick with a strong roof above which was a bed of sandstone. At the time of the explosion the seam was worked by three long faces and the coal was transported by jiggling conveyors to the trams on the levels. The conveyors were operated by compressed air engines.

The personnel at the colliery were as follows, Mr. H. McVicar was the general manager of all the collieries of the Company with Mr. W.H. John as the agent. Mr. E.J. Gay was the certificated manager with Mr. D.J. Michael and Mr. W. Wakely as certificated undermanagers. There were nine overmen, two assistant overmen and twenty five firemen employed at the colliery. In the Black Vein District there was one overman and one fireman on the morning shift from 7 a.m. to 3 p.m., one overman and one fireman on the afternoon shift from 3.20 p.m. to 11.20 p.m. and on the night shift which was from 10.30 p.m. to 6.30 a.m., there was one fireman with the overman in charge of all the No.1 Pit workings during this shift. The inspection that was required by the Coal Mines Act 1911, was made within two hours of the commencement of work and the report made by the fireman of the preceding shift. The total number of men employed at the colliery on the three shifts was 1,385 of whom thirty two were in the Black Vein and twenty seven in the Old Coal at the time of the disaster.

Mr. McVicar went underground from time to time and he last inspected the Black Vein workings on 14th, February. He was accompanied by Mr. John and Mr. Gay. Mr. John again inspected the workings on 25th, February with Mr. Gay. Mr. Michael's duties were confined to the workings of the No.1 Pit and he visited the Black Vein District about four times a week while Mr. Wakely attended to the workings of the No.2 Pit.

The ventilation of the colliery was by a Walker Indestructible fan at the top of the No.1 shaft. It was capable of circulation 350,000 cubic feet of air per minute at 6-inch water gauge but at the time of the explosion it was producing 240,000 cubic feet per minute at 5-inch water gauge. Following the long stoppage of work during 1926, the return airway was in need of repairs some of which had been completed and other work was nearing completion. at the time of the explosion the smallest airway measured seven feet by four and a half feet. In the Black Vein District, flame safety lamps were used by the officials and firemen and the workmen were provided with electric safety lamps.

The compressed air haulage engines were placed in the intake cross measure drift, at the top of the No.2 heading, half way along the 'B' level and done rather more than half way along the 'A' level. the signals for the engines were given by electric bells powered by Leclanche cells and other than this, there was no electricity in the mine.

There was no shottfiring in the seam and as a precaution against coal dust, the roads were stone dusted and ten tons of stone dust were sent down the pit each week. The men were searched at the pit bottom at the beginning of each shift. The person appointed to search the men on the night shift was William Matthews who was the overman. About a fortnight before the disaster, a match had been found in the small pocket of the overcoat of a workman and there was some debate as to whether it was advisable to search underground and not on the surface at the inquiry.

The explosion occurred at 12.50 a.m. and the manager was sent for at once by a man who had ascended the No.1 shaft. He arrived at the colliery at 1.05. a.m. when he was told that there had been an explosion by two men who had been working at the bottom of the No.1 shaft. They said-

"They were suddenly knocked down and, on rising, saw clouds of smoke coming from the East."

They had at once signalled to the banksman and were wound up the pit. the undermanager of the No.2 Pit, Mr. Wakely, arrived and after a consultation with the banksman, they both went to test the return air in the fan drift and found that it was

undamaged. They had thought they smelt smoke which indicated an underground fire but fortunately this proved not to be so.

Mr. McVicar, the general manager and Mr. John, the agent were summoned to the colliery. The Rescue Station at Crumlin was alerted and the ambulance store attached to the colliery and local Doctors were called. The manager signalled down the pit but there was no reply. he gave orders for the cages to run and the cage arrived at the surface with two badly injured men. The cage was raised and lowered but no one else came up the pit.

Evan evans, an overman had arrived at the pit and he, McVicar and Gay descended the No.2 Pit leaving Wakely in charge at the surface.

When they arrived at the pit bottom they decided to make their way along the intake airway in the Elled seam to the top of a staple pit. This was known as the Spiral Staircase and was found to be damaged but they managed to descend fifteen yards to the Threequarter Seam. They went down the cross measure drift to the Black Vein along Enoch Wood's road to the No1 Heading. They could go no further because of gas but they followed the intake air which was short circuiting and found Robert Pester and Robert Button alive but badly injured. They later died from their injuries.

There ws a heavy fall and they could go no further. By this time the agent, Mr. John, had arrived at the pit bottom with three workmen. At the No.1 heading they met the first party and explained to McVicar that the men wee ascending the No.1 Pit. The two injured men were left with three workmen and the remainder of the party went to the surface for help.

They arrived at the surface at 3.30 a.m. where they found the Managing Director, Mr. F.P. Hann and several doctors. One of the doctors, Dr. Florence O'Sullivan, descended at once with a squad of ambulance men to tend to the two injured men who had been found. It was also learned that seven men, who had been working in the Old Coal Seam, east district, had got out of the pit by the No.1 shaft after coming out through the return airway.

The story of how the seven escaped was given by Thomas Joseph Brown, a repairer who was at work with Harry Eversley and Bert Mitchell at 1.55 a.m. when the last two shouted that they could smell something. Albert Button, Sydney Hill, William Davies, William Pickford, Thomas Price and Samuel Gronow were coming down the face and they said that there was something the matter as the place was filled with smoke and gas from below. Brown told them not to get excited and gave Button a lamp and told him to go to look for a fireman. As he parted the sheets on the crosscut leading to Penny's Dip he saw two dead ponies and found the dip full of yellow smoke.he told the others what he had seen and they decided to leave by the return airway. they turned back and met Charles Rich, William Michael, John Clarke and Thomas Morris.

When they arrived at the East Level at the innermost door on the return side they found that some of them were missing. Michael thought he heard a door bang and on going through, he saw several lights in front of him. He shouted that no one could get through that way and by this time he was in difficulties and he was dragged through the door into the return.

There were four men ahead of them in the return, eversley, Mitchell, Brain and Archie Parsons and Brown and Michael were weak and shouted for help. Eversley, Mitchell and Brain came back and together with Rich tried to carry Davies but they had to leave him and they got to the No.1 shaft only with the greatest difficulty.

On the information that seven men had got out of the East Old Coal District, two parties went down to try to get into the Black Vein workings. A message was sent to the men working in the West side, which had not been affected by the explosion, to get out of the mine. A part Led by McVicar tried to get into the workings and another led by Gay tried to get into the Old Coal workings.

Both parties travelled along the Main East Level to a point where the intake cross measures branched off to the Black Vein. They found that their progress was barred by a heavy fall. McVicar's party then decided to try to go by the way of Griffith's Slant and the return airway and the other party went to the pit bottom tried to get into the East Old Coal workings by the route that the seven men who had escaped had taken. at 5 a.m. a party consisting of Mr. Gay, Mr. John, Mr. Hann, Mr. W.J. Oliver, the manager of Waun Llwyd Colliery, Mr. W.H. Leigh, agent of Arrail Griffin, Mr. A.T. Winborn, the superintendent of the Crumlin Rescue Station and four rescue men set off to the Old Coal workings. The party travelled along the 'Fault Level' and were affected by afterdamp. John was left in the airway and could not get out by himself and the other members of the party were not in a position to offer assistance. However, they did get out but Mr. Hann and Mr. John were severely affected and it was a little time before it was known for sure that they would recover fully. At the Inquiry. Henry Walker was very critical of their actions and commented-

"This attempt to go inbye by way of a return airway might easily have resulted in further loss of life. The part had with them neither a small bird or a mouse with which to test for carbon monoxide."

In the meantime, Mr. McVicar, Mr. Michael, the undermanager of the Colliery, Evan Evans, the overman, Mr. S.M. Collings, the manager of the Cwmtillery Collieries and Mr. Wilkinson, a Rescue man, who carried a canary made their way into the Black Vein cross measure drift, Griffith's slant and across the top of the falls. The cross measure drift was explored and a set of tools found but there was no sign of the men who had been working there. They returned to Enoch Wood's road and found that the rescue men had arrived with apparatus and two of them climbed over the fall and travelled up the No.2 Heading as far as the 'B' Level without finding any bodies. They reported that the heading was filled with gas. It was at this time, McVicar heard the news that Hann, John, Gay and others had tried to get into the Main East District by the return airway and had been gassed, John so badly that he had been left in the return.

McVicar went to the Fault Level by way of the Black Vein return where he found that John was receiving attention. He then went towards the place where Hann, Gay and John had been when John was gassed into the Old Coal District with Evan Evans, the overman and Albert Samuels, a rescue man. He told Collings and Michael, the undermanager to follow with a couple of men. The party found the body of William George Davies and on opening the doors across the Main East Level they found the bodies of Thomas John Morris and William Charles Pickford. Samuel George Gronow and Thomas John Price were found alive and Samuels, the rescue man gave them oxygen.

They could see other bodies further up and McVicar, Collings and Evan Evans went through another door to the top of Penny's Dip where Collings became exhausted and was left. McVicar and Evans went on and found the bodies of Richard Nation, Charles Henry Cox and Wilfred James Probert. They returned to the top of Penny's Dip and told Collings to tell Michael and Samuels to follow them down the dip where they found the bodies of Trevor and Herbert Matthews. They were joined by Samuels and Michael and they explored the whole of the Old Coal workings without finding any of the dead.

The party then returned to the Main East Level and travelled outbye where they found the bodies of John Rogers, Thomas Lewis, William Bryant, Henry Brain, William Warren, Charles Green, Frederick Trowbridge, William Crowley and Edwin Wilcox and were joined by Mr. O.L. Gibbon, the manager of the Elliot Colliery and Mr. Idris Williams, manager of the Prince of Wales Colliery. They tried to get directly to the shaft but found the way blocked by falls. They returned to Penny's Dip and McVicar gave orders for the bodies to be removed but these orders were not understood and only the two survivors, Gronow and Price were brought out.

McVicar went to the surface and there was a meeting with Mr. J.M. Carey and Mr. P.T. Jenkins, H.M. Inspectors of Mines who were briefed on the situation. A party consisting of McVicar, Carey, Jenkins, J.R.N. Kirkwood agent of the New Tredegar Colliery, David Evans, agent of the Oakdale Colliery, J.H. Austin, agent of the Markham Colliery, H.E. Thomas, agent of the Mardy Colliery, David Griffiths, agent of the Britannia and Bargoed Collieries and a squad of rescue men went to explore the Black Vein Seam.

They erected a brattice stopping at the No.1 Heading on the low side of Enoch's road and the ventilation was partly restored so the party could travel up the No.1 Heading, across the No.2 Heading and down to the 'A' level. Further progress was not possible due to bad ventilation. The body of a haulier, Thomas Morris, was found in the crosscut between Nos. 1 and 2 Headings.

Nothing was done in the Black Vein the following day but the day after that a party which included W.D. Woolley, the managing director of the Tredegar Coal and Iron Company, D.L. Davies and Arthur Jenkins of the South Wales Miner's Federation entered the district after erecting a brattice in the Top Level and this level was explored as far as the fall. Beyond this point the level was explored by rescue men but no bodies were found and they got to within 15 yards of the face and later two rescue men David John Martin and Albert Trevor Borrows explored the face and found the bodies of David Evans, Richard and Thomas Monaghan, Albert Wright, Joseph Chapell, Edward Miles, and William Matthews.

Burrows and Martin then went to the 'B' Level where they located the bodies of Charles Lee, Alfred Griffiths, Harold Reed, Gordon Reddick, Arthur Medland and Thomas Gatehouse. The bodies of James vaughan, Ellis Williams, Llewellyn Jenkins and William Penny were seen in the 'A' Level. from this point onwards, there was steady progress and all the bodies were recovered by the 11th. March.

Those who lost their lives were-

David James Evans aged 33 years, a labourer who had burns to the face had blood oozing from his right ear. He also had a fractured skull and died from shock caused by burns and his injuries.

Richard Monaghan aged 21 years, a ripper. He had severe burns to the upper part of the body and his arms. He died from shock following the injuries and burns.

Albert Wright aged 35 years, a labourer. He had burns to the upper body, face and hands. He died of shock following the burns.

Joseph Chappell aged 26 years, a collier's assistant. He had burns to the head and died of shock due to the burns.

Thomas Charles Monaghan aged 28 years, a collier. He had severe burns to the upper body and a fractured skull. He died from his injuries and burns.

Edward Coleston John Miles aged 36 years, a collier. He was severely burnt and died from shock.

William Matthews aged 52 years, an overman. He had burns to the upper body and died from shock following the burns.

Charles George Lee aged 21 years, a labourer. He had burns to the upper body and died from shock following the burns.

Alfred Griffiths aged 57 years, a collier. He was badly mutilated with an arm off and a very bad head injury. He died from his injuries.

Harold Edward Reed aged 21 years, a fitter. He had a fractured skull and severe burns to the upper body, firearms and hands. He died from shock following his injuries.

Gordon Reddick aged 30 years, a labourer. He was severely burnt and had a fractured skull he died from his injuries and burns.

Arthur John Medland aged 18 years, a collier's assistant. He suffered a fractured skull and was burnt. He died from shock due to his injuries.

Thomas John Gatehouse aged 19 years, a labourer. He had burns to the upper body, a fractured skull and a broken neck. He died from his injuries.

Reginald Eric Davies aged 43 years, a repairer. He had a fractured skull and was burnt. He died from shock and his injuries.

James Samuel Vaughan aged 41 years, a repairer. He was mutilated about the head, burnt and had a fractured skull.

Ellis Williams aged 50 years, a fireman. He had severe burns to the upper body and fractured arms legs and skull.

Llewellyn Jenkins aged 29 years, a repairer. He had severe burns to his hands and face and upper body. He died of shock from his injuries.

Thomas John Morris aged 39 years, a haulier. He was severely burnt about the head and face.

Benjamin Stibbs aged 21 years, a collier's assistant. He suffered fractured ribs and pelvis and was burnt.

William Jones aged 30 years, a collier. He suffered fractured ribs and spine.

Walter Alexander Shelard aged 21 years, a collier. He had a broken leg and burns to the upper body.

John Collum Rogers aged 29 years, a ropeman. He had a fractured skull and burns to the upper body.

Thomas John Tarr aged 21 years, a labourer. He had a fractured spine and burns to the upper body.

Edwin George Mason aged 33 years, a labourer who had a fractured leg and burns to the head and legs.

John Henry Hobbs aged 45 years, a labourer who had a fractured leg and burns to the body and legs.

William Henry Penny aged 22 years, a labourer. He had a fractured pelvis and skull as well as burns.

William Mark Dudley aged 33 years, a labourer who had broken limbs and burns to the back.

Samuel Harbin aged 40 years, a labourer. He had a bad head injury and burns to the body.

Frederick George Green aged 47 years, a repairer who was very badly injured and burnt, Walter John Mathlin aged 33 years. He was very badly injured and burnt.

Robert Pester aged 39 years, a haulier who died from a fractured skull .

Robert Wilfred Button aged 19 years who was badly burnt and looked as if he had been scalded.

Many of the victims died from carbon monoxide poisoning-

John Rogers aged 50 years, a fireman.

Sidney Hill, aged 36 years, a repairer.

Charles Green, aged 57 years, a repairer.

William Bryant, aged 61 years, a repairer.

Edwin Harold Wilcox, aged 30 years, a ropeman.

Frederick Trowbridge, aged 22 years, a labourer.

Charles Henry Cox, aged 24 years, a haulier.

Richard Nation, aged 38 years, a haulier.

Henry Brain, aged 26 years, a labourer.

Wilfred James Probert, aged 22 years, a labourer.

Thomas Lewis, aged 70, and engineman.

William Henry Warren, aged 25 years, a collier's assistant.

John Clarke, aged 47 years, a collier.

Trevor Matthews, aged 28 years, a collier.

Herbert Matthews, aged 29 years, a collier.

Thomas John Morris, aged 26 years, a collier.
William Charles Pickford, aged 26 years, a collier's assistant.
Arthur Herbert Button, aged 35 years, a collier.
William George Davies, aged 35 years, a repairer .
William Crowley, aged 43 years, a repairer.

The inquest and the inquiry were held concurrently. With the permission of the Coroner, the witnesses were summoned and evidence taken. Mr. Henry Walker made the official report into the disaster.

The inquest into the men's deaths was held by Mr. W.R. Dauncey the Coroner for the Abergavenny district of Monmouthshire. The proceedings took place at the Town Hall, Tredegar on 12th July 1927 and was completed on 3rd. August and evidence was heard from seventy nine witnesses. The Coroner summed up by putting the following questions to the jury-

- “1. Was the explosion in its origination one of gas or coal dust and if of gas was it subsequently increased and carried on by the presence of coal dust?
2. Where did the gas come from?
3. Where was ignition produced?
4. By what means was ignition produced?
5. Was the explosion purely accidental?
6. Was the explosion the result of the negligent act or omission of anyone, and, if so, of whom and what was the act of omission?
7. If the answer to question No.6 is in the affirmative, was the degree of negligence a) Criminal b) Less than criminal c) A mere error of judgement?”

The answers of the jury to the first five questions were-

- “1. Yes. Gas carried on by coal dust.
2. C. Face and Top C. Level.
3. C, face.
4. we have not sufficient evidence to be definite but suggest that i) the missing lamp, and ii) the blast pipe may have caused ignition.
5. Yes.”

The following recommendations were made by the jury-

- “1. That 20 percent of the lamps used underground be oil lamps.
2. That reports of the Colliery Examiners include more details.
3. The Colliery Examiner's duties be confined to colliery examinations only.
4. That Colliery workmen be searched before descending the shaft.”

There was no general agreement on the cause of the explosion and the point at which it occurred. Mr. Michael thought that there had been fall on the 'A' face and that had released gas which was ignited by sparks from the falling material or, more likely, at sparks from the haulage engine. The manager, Mr. Gay, thought the gas came from the 'A' face and ignited at the haulage engine. He thought a fall had occurred but it was not close enough to the face to check the ventilating current.

The Miner's Agent, Mr. D.L. Davies, thought the explosion originated on the 'C' face from one of three possible causes, 1). the missing electric lamp. 2). sparks from the nozzle of the compressed air blower in the 'C' face, or 3). heat set up by the conveyor trays rubbing against props being absorbed by coal dust. This would have resulted in spontaneous combustion that could heat oil vapour from the exhaust of the conveyor engine.

Extensive experiments were made to try to find the exact cause but the evidence was not conclusive. With regard to the cause of ignition, Mr. Walker considered two possibilities, the missing lamp and stones falling on already fallen.

With regard to the lamps, of the seven bodies that were found at the inbye end of the 'C' level only six lamps were found. the missing lamp had the number 'E.L. 2147' and

was issued to Edward Mile but the lamp that was found near his body was lamp number 'E.L. 2019'. There had been an exchange of lamps for some reason but the reason was not known. Sparks from falling stones were known to have caused explosions and there was a large body of expert evidence to show that this was a possible source of ignition.

Mr. Walker concluded that the explosion occurred at the 'C' face. He said-

"I consider an explosive mixture of firedamp and air existed in the 'C' face and at the face by the 'C' Level that this explosive mixture was ignited either by stones falling on stones already fallen or at the bare glowing filament of an electric lamp and that the area of the explosion was increased and its volume magnified by the presence of coal dust."

On the recommendations of the jury, he commented-

"I should be in entire agreement with the recommendations if I were convinced that the workmen would make use of a flame safety lamp for testing for firedamp, but, until I am convinced, I feel that the possibility of accident is greater with flame safety lamps than it is with electric lamps. The only alternative, when electric lamps are generally on use, is to rely on the fireman and in such case his district should be small, and this is what was done here."

COOMBS WOOD. Halesowen, Worcestershire. 18th. March, 1929.

The Colliery was the property of the Combes Wood Collieries Limited and was in Halesowen about six miles south east of Birmingham at the extreme edge of the South Staffordshire coal field. There were two shafts at the colliery, an upcast and a downcast to the Thick Coal Seam. Both shafts were sunk in 1908 and met the seam at 290 yards. The downcast was the winding shaft and the upcast was used to wind water and a second outlet for the mine. Coal was raised on the day shift only and the colliery produced about 3,200 tons per week employing 380 persons below ground. The mine was ventilated by a Waddle fan and there were means to reverse the ventilation in the case of an emergency.

Inflammable gas was not unknown in the mine but none had been found for the previous nine years and naked lights were used in the mine except in those parts where safety lamps had to be used to comply with the Special Regulations that were established in 1925. The haulage roads were illuminated by fixed electric lights fed from a D.C. low voltage generator at 220 volts. Electricity was also used as the main motive power for the coal cutting machines and was supplied by a separate system at 550 volts from another D.C. generator. Separate cables were installed for the two systems.

The seam worked was, the South Staffordshire Thick Coal was commonly known as the Ten Yard Coal which normally consisted of 30 feet of practically clean coal but in the Combes Wood area it is bisected by a parting varying from 2 feet to 12 yards in thickness and the bottom section of the seam was further split by dirt bands from a few inches to 5 yards thick. The top section of the divided seam was worked on a modified longwall system in which the full thickness of 15 feet of coal was extracted in one cycle of operations. On the seams forming the bottom section, a layer of coal known as Slipper Coal had been worked by an advancing longwall, the holing being done by coalcutting machines in an underlying bed of fireclay. Where it was of value a seam known as the Benches Coal which occurred immediately below the fireclay was also taken.

The accident occurred in a district of Slipper Coal known as the South West Bottom Coal District and was about a quarter of a mile from the Combes Wood shafts. The district constituted of five stalls, 9 yards apart which gave the total length of the face of about 50 yards and was opened up to form a pair of headings 35 yards apart which were driven 11 yards to the west of the 'Manor Road' and formed a rib of that thickness to protect the roadway. The Manor Road was one of a pair of exploring levels which extended southwards for a total distance of 1,000 yards.

The face was ventilated by a shunt off the Manor Road. A stout sheet consisting of three layers or more of brattice cloth, locally known as a 'damp sheet' about 10 feet wide by 5.5 feet high was hung across the Manor Road just on the intake side of the first and intake heading. The air was diverted by this sheet into the South West Bottom Coal District, and having travelled round the face, returned to the Manor Road by the second and return heading, which was also the drawing road for the district. The air current then passed inbye along the Manor Road for 300 yards to an open crosscut and through the latter into the return and so to the upcast shaft.

The main haulage road from the shaft was about 10 feet wide with a double track for endless rope haulage and about 5 feet high throughout its length from the downcast shaft to the terminus inbye of the damp sheet and a few yards beyond the junction of the Manor Road with the drawing road from the South West Bottom Coal District. Beyond this the Manor road was under repair which had been completed for 60 yards. Further on and as far as the open crosscut, much of the timber was broken and the roof fallen in. The parallel return airway was also under repair and was in good condition for 50 yards only beyond the separation door. There two roadways formed part of the second outlet from the South West Bottom Coal District in which about 20 men would be at work on the normal day shift.

The mine was managed by an Agent Mr. H.J. Newey who took a very active part, a manager Mr. F. Perrins and an undermanager Mr. C. Thompson who was absent due to illness at the time of the accident. The manager and undermanager were assisted by Mr. Archer Cartwright who held a 2nd. Class Certificate of Competency.

At about 6.15 a.m. on the morning of the 18th. March and before the day shift which was coming to work at 87 a.m., a fireman, Harry Jones, accompanied by a workman, John Westwood stated their inspection under Section 64 (1) of the Coal Mines Act 1911 of the workings in the South West Bottom Coal District. They completed the inspection and returned to the fireman's meeting station which was at the junction of the drawing road with the Manor Road at 7.05.a.m. Nothing unusual was observed during the inspection.

At the meeting station Jones met two workmen Jabez Edwards and John Hargreaves, and passed them on to their work. A few minutes later a third workmen, Joseph Chance arrived and went in. The time was then about 7.10 a.m. Jones started to walk outbye along the Manor Road. Inbye of the damp sheet he met to more workmen, George Parkes and James Harris who also passed in. Jones went through the sheet and met Harry Edwards, Edwin Walter Dukes and Edwin Barnsley to whom he spoke and passed through the sheet. there was nothing wrong at this time but none of the nine men were seen alive again except Jabez Edwards.

About 60 yards outbye from the sheet there was sharp turn to the right where the Manor Road started and it was here that Jones met John Edward Forrest and Fred Hathaway to whom he also spoke and passed on. At the turn, Jones met another workman, David Hadley and was on the point of speaking to him when he heard a shout that the damp sheet was 'afire'. The sheet was on fire at the right side going inbye and was visibly burning from the floor to about half way up the sheet. In no more than five minutes the sheet became well alight and the road impassable. When they had seen the flames Forrest and Hathaway were about 20 yards from the sheet.

Immediately on hearing the alarm Jones quickly went back and helped Forrest, Hathaway and Hadley as they were trying to pull down the burning brattice cloth. The outer layer was pulled down although it was burning but the fire had such a hold on the outer layers that they were beaten back by the heat, smoke and flames. They then tried to put out the fire with dirt but that effort failed. Jones tried to get through the sheet but he failed in his attempt and suffered extensive burns to one of his arms. He tried to shout to the mine men he knew were on the other side of the sheet but he heard no reply. Realising that the position was serious, he sent a message to Archer Cartwright.

Cartwright reached the fire at 7.35 a.m. and found Jones partially overcome by the fumes but he was able to learn of the nine men behind the fire. Renewed efforts were made to raise the men by tapping on the rails and shouting. A supply of water was brought in druggans from the stables and efforts were made to throw it on the fire from buckets, but smoke prevented the men from getting near enough to be successful. To try to repel the smoke that was backing up down the road, a brattice cloth was run from one side to the middle of the road and continued ahead. This increased the velocity of the air and it momentarily achieved its objective and a little ground was gained. While this was being done, Jabez Edwards emerged from the smoke at about 8 a.m.

At the inquiry Edwards described what had happened to him, he had descended the pit at 7 a.m. and had gone straight to the South West Bottom Coal District where he met the fireman, Jones. He then went to his working place which was straight ahead along the Manor Road where he was re-timbering the return airway. At a point 20 yards inbye from the junction of the drawing road from the South West Bottom Coal District with the Manor Road, he started to take off his coat, waistcoat and braces. On looking back he saw fire in the roadway. He estimated the time of leaving the junction and seeing the fire at no more than two or three minutes. He came outbye and met John Westwood near the junction and told him what he had seen. They went to the sheet together and tried to knock it down with slabs of timber but with no success. The smoke drove them back. They collected the other men who had not yet reached their working places and they went to the crossgate through which they returned from the South West face.

After a discussion of the position, Edwards asked two of the, Hargreaves and Barnsley, to try to get out by the intake air. They found that the smoke was so bad in that direction that they were forced to retire. Further discussion followed and Edwards was in favour of another effort in the direction of the Manor Road. The others disagreed, and in spite of this he went on alone towards the sheet but the smoke was too strong and he could not face it. He returned to the crossgate and remained talking to the others for some time and feeling uneasy suggested another try. Apparently the other men had no conception of the danger and they were confident that all they had to do was to stay still and await rescue.

The atmosphere was getting gradually worse at the time but it was not too bad to cause the men anxiety, for, according to Edwards they said it was 'pretty fair' so that candles and even a safety lamp carried by John Westwood were burning brightly. Edwards did not share this view and he tried to the best of his ability to try to persuade the men to escape through the smoke. He made the attempt alone to the Manor Road where he found four empty tubs at the junction which stopped his way out. He pushed the tubs further inbye and with his cap in his mouth, crawled on hands and knees along the road past the site of the fire and out to safety. Edwards said that when he came through the fire had burned the sheet away completely and the fire was confined to the timber in the roof.

There was little doubt that after the sheet was consumed the conditions in the Manor Road would improve since more air could pass and by a lucky chance Edwards had made his attempt at precisely the correct time. The bodies were later found in the afternoon after the fire had been extinguished and it was clear that they had all died from the inhalation of carbon monoxide. Nothing was known of their movements after Edwards left them but it was apparent that some had collapsed where they sat at the crossgate but four had made a belated attempt to escape. The Inspector commented-

"The loss of eight lives is most lamentable, for it is clear from the fact that Edwards was able to get away almost unscathed that all of them might have escaped in the same way had they realised how serious was the danger they were in. That some of the more experienced of them failed to realise it, even after Edwards' warnings and example, is tragic and inexplicable. From the evidence given by Edwards, it is clear that the possibility of escaping by the return airway which involved travelling a

distance of about 800 yards, did not enter his head or the heads of the deceased. He stated that the matter was never mentioned by himself or by any of the others.”

The men who died were-
Edwin Barnsley aged 61 years,
Joseph Chance aged 66 years,
Edwin Walter Duked aged 27 years,
Harry Edwards aged 44 years,
John Hargreaves aged 32 years,
James Harris aged 58 years,
George Henry Parkes aged 45 years and
John Westwood aged 38 years.

The inquiry into the causes and circumstances attending the fire which occurred in the workings of the Combs Wood Colliery, on the 18th. March 1929, was conducted by Mr. F.H. Wynne, H.M. Deputy Chief Inspector of Mines and was held on the 24th. to the 26th. April, 1929 at the Police Court, Halesowen. The report was presented to Ben Turner Esq., M.P., Secretary for Mines on the 15th. July 1929.

There was little doubt that the fire originated at the ‘ damp’ sheet in the Manor Road and there were several possible causes of ignition. Arcing due to a breakdown of the electrical insulation was a possibility, friction of the haulage rope or moving tub against the metal or timber, the brattice cloth itself or the fire occurred spontaneously in the coal or carbonaceous shale in the roof above the timber or a naked light or cigarette end. The men went to work with naked candles and smoking was not prohibited in the mine. The Inspector came to the conclusion that the sheet was set on fire by a candle which the men carried through between 7 and 7.15 a.m. or a glowing cigarette was dropped near the sheet. The inspector commented-

“I fear that ignition is a comparatively easy matter when the cloth is slightly worn and had become frayed at the edges. No prolonged contact between a candle flame and the frayed ends if required to start the latter smouldering thereafter, fanned by the air current, the smouldering soon becomes actual flame. And flame once started spreads rapidly over the cloth, which is impregnated with a readily inflammable tarry compound.”

As to the steps taken to combat the fire, there was little that the men on the spot could do and when the first rescue brigade reached the spot at 9.25 a.m. It was almost two hours after the request for help had been made although the rescue station was only four miles away. This was due to several adverse circumstances that were beyond the control of the management of the mine. The morning was very foggy and the surface foreman was unable to raise the Rescue Station on the telephone and Mr. Perrins had to drive to the Station at Dudley and bring back the rescue apparatus as soon as possible. He returned and was with the first team that went down about 1.25 a.m. Mr. Perrins faced criticism that he had left the pit but the Inspector thought that he had acted correctly in the circumstances. The team had to withdraw because of the heat and the help of the local fire brigade was sought to pump water in hoses on the fire. These pipes were ready but a fall of roof occurred and put out the fire.

The inquiry thought that the easiest way to prevent a similar occurrence was to prohibit the use of naked lights in all mines. The Inspector went on-

“There is, however, much to be said in favour of the use of naked lights where there is no danger of firedamp that I am unable to recommend such a prohibition. In this connection it is only necessary perhaps to mention the freedom from nystagmus enjoyed by workmen using naked lights.”

The Inspector recommended that brattice cloth should be made of fireproof material and as to the outlet from the South West District and quoted the Coal Mines Act 1911, Section 36 (3) which said that -

“Every part of the mine in which ten or more persons are employed at the same time shall be provided with at least two ways affording means of egress to the surface, and so arranged that, in the event of either becoming impassable at any point, the other will afford means of egress to the surface.”

This section applied to the mine and more than 20 people were employed in the South West Bottom Coal District. The Manor Road had been under repair for several weeks before the accident and it could not be denied that it could be travelled as David Hadley had gone through on 16th. March, two days before the fire but only by crawling on his hands and knees for part of the way and so there was no breach of the Act.

The final matter raised in the report was the suggestion by Herbert Smith for the Miner's Federation of Great Britain that two sets of rescue apparatus should be kept at the pit for immediate use. The report of the Rescue Regulations Committee, 1926 expressed the opinion that these should be kept only at Rescue Stations and the Inspector saw no way, from the evidence that was brought forward that this should be changed. With these comments the inquiry closed.

MILFRAEN. Blaenavon, Monmouthshire. 10th. July, 1929.

The Milfraen shaft was owned by the Blaenavon Company, Limited and was three miles north west of the Blaenavon on Monmouthshire. The shaft was sunk to the Old Coal Seam nearest its outcrop in the north eastern extremity of the coalfield. It was 242 yards deep and the upcast for the workings that were developed in the Black Vein Seam which was the only seam that was in production at the time of the disaster. It was also the upcast for workings about a mile away that were reached by Kay's Slope, which formed the intake for both sets of workings. The Black Vein Seam at the colliery lay at a depth of about 182 yards and was reached by means of cross measure drifts from the Old Coal Seam which lay approximately 60 yards below. The colliery mined bituminous coal

The supervision at the colliery was carried out by Mr. J.H. Jones, the General Manager of the Company, Mr. F. Kemp Cartwright, the agent, Mr. M.W. Lewison, the certificated manager and Mr. H. Daniel, the overman. There were also three firemen. The Company owned steel works that had been idle for some years and Mr. Jones took no part in the active management of the collieries. Mr. Kemp Cartwright paid periodic visits to the underground workings and his last visit to the Black Vein workings prior to the explosion was on the 5th. July. The Kay's Slope and the Milfraen Pit constituted one mine under the Coal Mines Act, 1911 and were managed by Mr. Lewison. The Garn Slope was part of the mine and worked the Black Vein Seam. Mr. Daniel's duties were confined to the supervision of the morning shift in the workings of the Milfraen Pit and the three firemen that were employed were responsible for one of the three shifts that were worked.

The total number of people employed in the pit was 1,189 of which 113 were employed at the surface. Of this number, only 176 were at the Milfraen Pit and of these, 35 worked at the surface. The group of mines produced 10,150 tons of coal per week of which 1,150 were raised at the Milfraen Pit on two daily drawing shifts. The third shift was a repairing and coal cutting shift. the day shift worked from 7 a.m to 3 p.m., the afternoon shift from 3.30 p.m. to 11.30 p.m. and the night shift from 11.130 p.m. to 7.30 a.m. The inspection that was required under Section 64 (1) of the Coal Mines Act, 1911 had to be made within two hours of the commencement of any shift and it was made and reported on by the fireman of the preceding shift. The station required by the Act, was 150 yards from the bottom of the pit, inbye of a cross measure drift leading from the Old Coal Seam

to the Black Vein. The districts that were assigned to the firemen were such that he would have ample time to examine them. No officials, other than the firemen, were appointed for the afternoon and night shifts.

The ventilation of the workings was produced by a Schiele, double inlet fan, placed near the top of the Milfraen Pit and this was capable of producing 75,000 cubic feet of air per minute at a water gauge of 3 inches. At the time of the disaster the fan was running at 120 r.p.m. and was producing 56,000 cubic feet at a water gauge of 1 inch. There were means to reverse the air current as was required by the Act. The upcast pit head frame at the Milfraen Pit was enclosed by a wooden casing in which sliding doors were operated by the movement of the cages in their ascent and descent of the pit.

The electricity produced at the colliery, was supplied to a substation at the pit bank where 11,000 volts A.C. was transformed down to 3,000 volts A.C. and was again stepped down by an underground substation to 500 volts by two 100 K.V.A.. transformers. The power for these were used to drive a pump, haulage gears, coal cutting machines and face conveyors in the mine.

The workings from Kay's Slope were lit by naked lights but from the point in the return from these workings, open lights were prohibited. The workings of the Milfraen Pit were worked by locked safety flame lamps of the Davis (Derby) type and Oldham electric lamps. All the lamps in use in the Black Vein workings at the time of the explosion were accounted for and submitted for test by Captain Platt, Superintendent Testing Officer at the Mines Department Testing Station and his report dismissed any possibility of the lamps contributing to the explosion.

The main and subsidiary haulages were operated through gears driven by electric motors. there were two haulages at the pit and the movement of trams on the haulage roads were controlled by a system of bare wire electric signals with bells of an approved type. Each circuit was powered by a six, quart sized Leclanché cells but neither the bells or the signal wires were under suspicion of causing the explosion.

There was no shot firing in the Black Vein since the conditions did not render it necessary to fire shots. the roadways were generally damp and stone dusting was not necessary to dilute the comparative small quantities of combustible material that was produced. The searching for matches and smoking materials was carried out in the mine in a haphazard and negligent manner and no regular system, or a system approved by the Inspector was in operation at the colliery.

The Black Vein was first opened at the Milfraen Pit in 1926 and was worked on a longwall system and later a mixture of longwall and stall workings and it was when stalls were being used that the explosion occurred. The seam was five feet ten inches thick with a roof of Horn Coal and a floor of rock. On the 10th. July, two conveyors were in operation which were known as 'B' and 'C' and there were 17 stall roads. The conveyor face was 80 yards long and it was operated by a jigger conveyor driven by an electric motor which dumped the coal into trams at the face of the main dip district. On the East side of the main dip, there were a series of ten stall roads and the "B" conveyor was outbye of this. The 'B' conveyor face was 60 yards long and operated by an electric jigger conveyor which dumped the coal into trams on the 'B' level. Between the 'B' conveyor face and the return airway there were five stalls and a range of workings places known as 'Mapstones'. The haulage of the coal from these places was by a haulage gear situated on the main dip of the district which hauled the journeys on to a parting close by an another haulage gear further outbye which took them to the shaft siding.

According to the ventilation records of the air current measured on 11th. June, 1929, near the mouth of Kay's Slope was 13,579 cubic feet per minute. After passing round two districts in Kay's Slope and through a series of inclined air shafts to the Winch Heading, the air current entered the Milfraen workings by roadways known as the Siskol Heading and the Buller Road which was constricted. There were three airlocks between the intake and the return and that between the Winch Heading and the return consisted of one door

which was in a poor condition and two brattice sheets. The second was made of two doors and one brattice sheet and the third on the road known and the Crosscut was of one door, again in a poor condition. the result of these poor doors was that while the quantity of air entering the Winch Heading amounted to 12,896 cubic feet, the actual amount entering the workings was calculated to be 7,683 cubic feet per minute.

The night shift fireman, Jehu Morgan stated that he had to crawl through the Buller Road on his hands and knees on his second inspection before the explosion occurred. He also stated that he did not like to go over the fall because there were several ragged slabs and not enough room for him to get through safely, even though the ventilation was passing over the fall. The fireman on the day shift before the explosion, Edward Hobbs said it was not safe to pass over the fall on his inspection. There was also a fall on the 'B' conveyor face. Jehu Morgan stated that it was eight or nine yards long with a space of about nine inches at the top on the morning of the 10th July.

When Morgan made his full inspection before going off shift, he reported that everything was in good order for the following shift. The fall in the 'B' conveyor face was so large that the management had decided to leave it and head out in the coal in front of it. To do this the Hopkinson Coal Cutter and men were permitted by the firemen to work on beyond its allotted time and continued to do so until the time of the explosion when the current was shut off. The Coal Mines Act required that-

' an adequate amount of ventilation shall constantly be produced in every mine to dilute and render harmless inflammable and noxious gas to such an extent that all roads, levels, shafts, stables and workings of the mine shall be in a fit state for working and passing.'

The Black Vein Seam was known to be a fiery seam and gas had been found twice before in that year when the overman, Daniels, had had to withdraw men from the 'B' face. The explosion occurred at 8.30 a.m. on Wednesday, 10th. July. The two morning officials, Daniels, the overman and Mathews the firemen, were in the workings at the time and immediately told the manager, Mr. Lewison who was at Kay's Slope, he was quickly on the scene and was soon joined by Mr. Kemp Cartwright, the agent.

Arrangements were made to get help and the Rescue Station at Crumlin was alerted. Before the Teams, under Superintendent, Mr. Wimbourne, arrived at the colliery, 51 of the 64 men employed in the pit, had come out themselves and it was realised that the only section affected by the disaster was Mapstone's where 13 men were known to be working.

On the nine who lost their lives, four, Howells and Edmunds were at the coal cutter and Holder and Ricketts were at the face of Mapstone's level. These men were killed outright. Parry, E. Williams, Barrel and A. Williams were found dead or dying some little distance out from their working places. Southcott made his own way out but died eight days later as a result of his injuries.

Due to the stagnant and foul air, the bodies were brought by rescue men wearing breathing apparatus and the last body was brought to the pit bank at 5 p.m.

Those who died were-

Evan Howells aged 40 years, coal cutting machine man,
Clifford Edmunds aged 20 years, collier's assistant,
Ernest Holder aged 57 years, collier,
David Ricketts aged 35 years, collier,
David John Parry aged 37 years, collier,
Evan James Williams aged 20 years, collier's assistant,
Albert James Williams aged 21 years, collier's assistant and
Ernest Southcott aged 20 years, collier's assistant.

The inquiry into the causes and circumstances of the explosion was conducted by J. Macleod Carey, H.M. Divisional Inspector of Mines and was conducted concurrently with the inquest into the men's deaths by arrangement with Mr. W.R. Dauncey, H.M. Coroner for the Abergavenny District of Monmouthshire at the Co-operative Hall, Blaenavon on the 19th. August and was completed on the 22nd.

The conditions in the district after the explosion were similar to those before with no signs of any great violence or material damage except at the entrance to Mapstones' Level where at ram was stripped over and its sides blown inwards. The doors and the brattice sheets had suffered no damage and appeared to function as they had before the disaster. There was a difference as far as the falls were concerned. A fall had occurred between Powell's and Gunter's stall roads. which, if it had happened prior to the explosion as was suggested by the manager, might have made a considerable difference to the ventilation current, Powell stated that there was no fall before the explosion. The rest of the air ways suffered no damage.

The inquiry came to the conclusion that the point of origin of the explosion was near the cavity containing firedamp on the 'B' conveyor face and that the surrounding atmosphere contained firedamp. The movement of the air carried the explosive mixture towards the workings of Mapstone's and past the electrical coal cutting machine. It could have been ignited by sparks from the machine or from a spark produced by a pick striking a rail and the state of the machine when examined after the event was regarded as the most likely source of the ignition.

The inquiry found that there had been a breach of the Coal Mines Act, 1911 and the General Regulations.

The Coroner summed up and submitted the following questions to the jury-

- “1) Was the explosion of gas or coal dust or both?
- 2) Where did the gas come from or accumulate?
- 3) By what means was ignition produced?
- 4) Was the explosion purely accidental?
- 5a) Was the explosion a result of the negligent acts or acts, omission or omissions of anyone?
- b) What was or where the acts of omission or omissions which conduced to the explosion?
- c) Who is responsible?
- 6) Do you wish to make any recommendation? If so specify them.”

The jury answered the first four questions as follows-

- “1) The explosion was one of gas.
- 2) The gas was given off and accumulated at the fall at the top of the 'B' conveyor.
- 3) The ignition of the gas was caused by a defective Hopkinson Coal Cutting machine.
- 4). The accumulation of gas was caused by the inadequate ventilation resulting from the falls of roof on 'B' and 'C' conveyor faces.”

The jury answered question 5 by extending question 4-

“That the inadequacy of the ventilation was known or should have been known to the responsible officials That the accumulation of gas should have ascertained by the fireman Jehu Morgan when he made his examination at or about 6.40 a.m. on the morning of the explosion

That on the morning in question the conditions in the said Mapstone section were such as they have rendered it unsafe for the men to be admitted to the working places therein.

That the condition of the said Hopkinson Coal Cutter machine was such the ' opening spark' within the meaning of the General Regulations as to the installation and use of electricity in the mine could not take place.

That No.123 (ii) and (v) of such General Regulations observance of which would, or might, have prevented the explosion was not complied with.”

The jury returned that the men met their deaths by misadventure and not otherwise and made the following recommendations to the Coroner-

“There should be a better system of packing the gobs.

There should be an oil lamp to every working place.

The coal cutter should be examined more often

There should be better searching of the men before they went to their working places.”

Those men who behaved heroically at the rescue attempt were O. Barson, timekeeper, Jesse Davies, mechanic, Herbert Daniel, fireman and D. Simmons, fitter.

WERNBWLL. Penclawdd, Glamorganshire. 28th. November, 1929.

Wernbwll Colliery was about 2 miles west of Gowerton in the Parish of Llanrhydian Higher and was owned at the time of the disaster by the new Berthlwyd Gas and Coal Company but by the time the inquiry was sitting, it had been formed into a Limited Liability Company and the owners were then the Berthlwyd Colliery Limited. Two seams of good quality coal were mined, the Penclawdd and the Penlan Seams, and were worked separately by slants driven from the surface.

The West District was reached by a series of three slants to the Penclawdd Seam, the lowest of which was known as the Main West Slant which had an inclination of 34 degrees. The total distance from the surface to the bottom of the Main West Slant at the date of the explosion was 1,450 yards and the thickness of cover at this point was about 1,500 feet. The Penclawdd Seam was about 4 feet 6 inches thick with a conglomerate sandstone roof and a fireclay floor. There was a second district in the Penclawdd Seam, which was known as the East District and was reached by the East Slant. The workings in this district were the same in extent as those in the West District.

The supervision was carried out by the following staff. Mr. D.D. Williams, owner and agent of the colliery and also of the Berthlwyd Colliery working the same seams about one mile from Wernbwll. . Mr. J. Phillips was the certificated manager of both collieries, Mr. W.J. Hughes, certificated undermanger, Mr. Llewellyn Thomas, overman and there were three foremen for each shift. The colliery employed 160 people underground on three shifts, 29 of whom were employed in the West District at the time of the explosion.

The coal was worked by pillar and stall which was known locally as the ‘ Tophole’ system in common with most of the mines working steep seams in the western area of the South Wales Coalfield. From slants driven to the full dip, levels 9 feet wide were sew away about 40 to 60 yards apart, of which top holes 14 yards apart and 9 feet wide were driven to the full rise. Crossings for ventilation purposes were driven 7 feet wide between the topholes. In the levels, about 3 feet 6 inches of floor cutting was taken up on the rise side and about 3 feet of ripping taken down on the dip side which made a road about 6 feet high and 9 feet wide. The seam was worked by hand and shots were fired. The coal from the topholes and crossings was thrown onto iron sheets, laid in the topholes and it slid down to the bottom of the topholes. There it was filled into trams by the trammers who took the full tubs to a double parting close to the slant.

The mine was ventilated by an electrically driven fan placed near the mouth of the return slant and it was capable of providing 35,000 cubic feet of air per minute at 3½ inches water gauge. According to the records the water gauge stood at 2.1 inches at the time of the explosion. Records in the Air Measurement Book showed that the quantity of air passing into the East and West District of the Penclawdd Seam was 15,000 cubic feet at the top of the No.3 slant. At the inquiry it was stated that these could not be a correct idea of the ventilation at the working face of the West District since the ventilation supplied by the fan was supplemented by the exhaust from two compressed air engines

in the Main West Slant, the discharge from compressed air pipes run into the faces of the slant and a 16 inch diameter Typhoon Turbine Fan driven by compressed air placed at a point midway in the ventilating district. At the time of the disaster the fan was installed at the top of a tophole in No.11 Level.

Firedamp had been found in the mine only in small quantities on four occasions over the past twelve months and as a result, naked lights, usually acetylene lamps but in some cases candles, were used throughout the mine until an explosion of firedamp on the 28th. September 1928 burned a collier who was at work in a tophole extracting a pillar in the East District. Following this Special Regulations were established and an exemption from the use of safety lamps was granted by the Board of Trade under Section 32 91) (b) of the Coal Mines Act 1911. As a result 14 flame safety lamps of an approved type were constantly in use in the Penclawdd Seam and were used at the face of the No.13 level in No.1 and 2 topholes.

No stone dusting had been done in the mine prior to the explosion. The roadways were described by the manager and undermanger as being ' naturally wet throughout.' Tests were made of the dust of the roof, floor and sides at intervals but bearing in mind the method of working where the coal was sent down chutes there must have been large quantities of dust in the mine. Mr. F.H. Wynne stated in the report-

"In the face of these facts I am not satisfied that the natural conditions in this mine were such as to make the application of stone dust or water necessary."

The explosion occurred in the No.13 level of the West District at about 7 p.m. on Thursday 28th. November. Up to this time, work had proceeded quite normally. The day fireman, John Henry Daniel, had examined the workings within two hours of the afternoon shift commencing work at 3 p.m. and had reported everything in good order. The afternoon fireman, Henry Rees had completed his first round of inspection of the West District at about 4.30 p.m. and had found nothing to concern him. The shotfirer, Stephen John, had been round the third district and had inspected the face in the No.13 level where he fired a shot at about 5.30 p.m. and he too found everything in good order.

The effects of the explosion were confined to a small area of the workings lying between Nos. 12 and 13 levels of the west District. Of the eight men employed in the No.13 level, of whom six were colliers and two were trammers, six were killed. the seventh man who was killed was Thomas Jones, a collier, whose working place was at the face of the of the main west slant but was in the No.13 level looking for timber when he was killed by the blast. The two men who escaped were Arthur Williams, one of the two trammers filling coal at the foot of the topholes and the face of the level and tramping it from there to the double parting at the slant, and David John Lewis, one of the colliers working at the face of the level. Lewis was very luck to escape the effects of the explosion because at the critical time he was away from his place of work.

Arthur Williams was standing in the double parting in the No.13 level about seven yards inbye from the slant and Lewis was in the slant a few yards above this level, at a valve in the compressed air main, when there was a "tremendous blast of wind" which put out their lights and knocked both of them over. Williams noticed a small flame over his head and he was burned on the back and shoulders. Lewis in the slant felt nothing but the blast.

The four persons working in the slant below No.13 level made their way out as soon as they recovered from the shock. Their lights were out and they had to grope their way up the dark incline. One of them, Arthur Gwyther, a filler, was injured by a fall in the slant when the blast struck him and required assistance. On reaching the No.13 level shouts were heard and one of the party, John Sambrook, went in to the parting and helped Arthur Williams out.

David John Lewis was in the slant a little higher up where he had gone to turn on more air at a stopcock which served the No. 13 level. He felt the blast and his light went out and he was thrown down. When Sambrook and the others reached him, he joined them

and the all proceeded up the slant and finally out without much difficulty and reached the No.11 level when they met the fireman, Henry Rees, who had come from the East District.

At the moment of the explosion a set of trams was being drawn up the slant in charge of Trevor Guy, rider, who was riding on the haulage rope at the front of the set. Guy said that the set had reached a point about 15 or 20 yards from the landing at the top of the slant and had stopped for want of pressure of the haulage engine, when he felt a gust of wind which put his light out. He heard a noise but he saw no flame. He relit his lamp and went back to see if anything had happened to the set. He found nothing wrong and walked up the slant to No.11 level when he met John William Hughes, haulier. They were talking when they saw lights down the slant and Guy and Hughes went down the slant at No.12 level where they met Sambrook and the others coming up.

The engineman who was in charge of the Main West Slant haulage engine, David Davies, said that the set had stopped short of the landing at the top of the slant and that the reason for this was shortage of air at the engine. He heard a noise which he thought was a fall and restarted the engine but stopped it almost immediately as he received the signal to do so. He waited some time for a signal but none came and he went to the engineroom to investigate. He found the door in the slant just below No.9 level open and concluded that the noise that he had heard was the door being blown open. He closed the door and returned to the engine. After a further wait he became anxious and was going down to the door again when he met Trevor Guy coming up the slant.

In the No.12 level, the effects of the explosion were less than in the lower parts of the district. The extinguishing of lights caused concern for a short time but after they were relit, the men proceeded to get their mid-shift meal and they only became alarmed when smoke appeared in the air. They immediately made their way out through the topoles to No.11 level and from there to the Main West Slant.

The fireman, Henry Rees, was the only official in the mine during the afternoon shift and at the moment of the explosion was on his way round the workings in the East District. He was with two colliers when he felt a peculiar sensation in his ears. At the inquiry he said, "My ears felt blocked". He remarked to the colliers that there must have been a fall in the rippings and he went out to see what had happened. He reached the No.11 level at the bottom of the No.2 slant where he met Andrew Gwyther. Further in No.11 West he met more men and was informed that something had happened in No.13 level and that the men in there had not come out. He proceeded and met Sambrook and others at the Main West Slant as they were putting Arthur Williams into a tram. He gave instructions for Williams to be looked after and sent a message to the surface.

He tried to go down the slant but the gas stopped him at the No.12 level. he returned to the top and tried to go along No.11 level to the fan, but again, bad air barred his progress. He came back to the slant and gave orders to telephone for the manager and a rescue party and some lamps. The Inspector, Mr. Wynne, commented in his report-

"It would have been better to have done this earlier and before attempting the exploration."

He then sent a party to put up a sheet in the East level so as to force as much intake air as possible into the West District. With two workmen, he then went up the slant to the No. 9 level and along to the topole which was in the return airway for the West district. The air was good so he returned to the slant and tried again to go down to the No.12 level but they could not do so. A further unsuccessful attempt was made to get to the fan in No.11 level.

On returning to the slant, he met the manager, Mr. Phillips and other helpers. with some difficulty the fan was reached and was found not to be working due to an obstruction to the motor. The obstruction was removed and the ventilation to the workings below No.11 level partially restored. A party, led by the manager, went down the slant to No.13 level where the bodies of two men were lying in the parting, were

recovered. Afterdamp was still hanging in the level and prevented further progress until the Rescue Brigade arrived. The Brigade, wearing breathing apparatus, soon recovered the remaining five bodies. All the victims had died from carbon monoxide poisoning.

Those who lost their lives were-
William Arnold Bennett aged 29 years,
David Davies aged 34 years,
Henry Griffiths aged 34 years,
Edwin Harry aged 61 years,
Thomas Henry Harry aged 33 years,
Thomas Luther Hughes aged 32 years and
Thomas Junes aged 54 years.

Mr. Wynne thought the explosion was one of firedamp which was extended by coal dust and he came to his conclusions on the evidence presented, the positions of the bodies and the nature of their injuries. He said-

“With respect to five of the deceased, there is no room for doubt as to where they were and what they were doing. Commencing with the No.2 tophole, T.L. Hughes was working at the face his body was found on the level at the bottom of the tophole he had died from carbon monoxide poisoning and was otherwise uninjured. Thomas Henry Harry was working at the face of the crossing in No.2 tophole his body was found alongside that of Hughes his death was caused by carbon monoxide poisoning and he was otherwise uninjured. Henry Griffiths was boring a shothole at the face of the level his body was found in the parting not many yards from the slant he died from carbon monoxide poisoning and was otherwise uninjured. William Arnold Bennett had completed the filling of a tub at the foot of the No.1 tophole and had trammed it to a point halfway between Nos.2 and 3 topholes his body was found quite close to the slant a few yards further outbye than that of Griffiths his death was due to the effects of carbon monoxide poisoning but he had been severely burned about the hands, chest arms and face and marks on the arms and chest suggested he had been struck by small stones. Thomas Jones was somewhere in the level inbye of the parting. Although there is no direct evidence as to how far he had gone along the level, I think it is reasonable to assume that he was near the No.2 tophole, for, where he was more likely to find the timber he was seeking than near where other colliers work? His body was found about halfway between Nos. 5 and 6 topholes he died from the effects of carbon monoxide poisoning but he had been burned about the face, head, neck and chest and there was wound on the back of his head.

It remains to consider Edwin Harry and David Davies, both of whom, it was generally agreed, were working at the face of the No.1 tophole at any rate until Bennett had completed filling the tub already referred to. The body of Davies was found in the level some distance outbye and a few yards behind Jones. His death was caused by carbon monoxide poisoning, but he had been severely burned about the face, neck, chest, arms and hands and was otherwise knocked about the right side of his head was bruised his right knee was swollen his left forearm was cut and bruised and there was a cut on the left foot which had gone through the boot. The body of Edwin Harry was found lying in the level at the foot of the No.1 tophole. death in his case again was due to carbon monoxide poisoning but he had been severely burned about the head, face, arms and hands.

The skin of the deceased persons in every case was covered with a coating of black dust, and in this respect there was nothing to differentiate between them. On the other hand, it is to be observed that the three who were definitely at work in the cul-de-sac, viz. the face of the level, No.2 tophole and the crossing were not burnt

at all, whereas the four who suffered by burning two at least, viz. Bennett and Jones were definitely on the level and in the case of Bennett also definitely close to the bottom of No.2 tophole when the explosion occurred.

It is evident that Bennett, Jones, Griffiths and Davies travelled outbye a considerable distance along the level after the explosion before they were overcome by afterdamp. Hughes and T.H. Harry could get no further than the foot of the tophole in which they were working, while E. Harry, who was over 60 years of age and comparatively feeble, probably fell when the explosion struck him and was unable to move afterwards.

If the explosion originated, as was suggested by Messrs. Lewis Kane and Phillips, in the No.1 tophole, it is conceivable to my mind that Davies and E. Harry, whom they assumed to be at work there, could not have been so badly burned as they were and that no other traces of burning or even heating should have been found in the tophole. Even in the level itself immediately at the foot of the tophole the indications of heating were almost negligible.

How then was the burning of these two men accounted for? the explosion occurred at or about 7 p.m. or just about the time when, in the ordinary course of things, the men would suspend work to take their food. now, it was known that Edwin Harry acted as timekeeper for this purpose (his watch was in fact, found undamaged in a pcket of his waistcoat in No.1 tophole after the explosion). Again, and it is not unreasonable to assume that, Bennett having just filled a tub, Harry and Davies would consider it to be a suitable time to withdraw to the level, where their coats were later found hanging with food untouched in the pockets thereof, and have their meal. In my opinion, this is what happened.”

The inquest into the deaths of the victims was held by the Swansea County Coroner, Mr. C.J.C. Wilson at Penclawdd on the 14th. and 15th. January 1930 and the jury brought in the following verdict-

- “1). That death in each case was due to carbon dioxide poisoning.
- 2). That the explosion took place in the vicinity of the No.1 tophole.
- 3). That the nature of the explosion was unknown.
- 4). That no one was responsible and there was no negligence.”

The inquiry into the causes and circumstances attending the explosion which occurred at Wernbwl Colliery, Penclawdd, on the 28th. November 1929, was held by by F.H. Wynne, B.S.c., H.M. Deputy Chief Inspector of Mines, on the 18th. and 19th. February and the 18th. and 19th. March 1930 at the Llewellyn Hall, Swansea. All interested parties were represented and evidence taken from twenty five witnesses.

The scene of the disaster was extensively investigated after the event and signs of intense heat were observed from the evidence of partially coked coal dust, charred wood and singed clothing. The force of the explosion had derailed trams in the parting near the slant and an empty tram was lying on it' s side at the top of No.3 tophole, pieces of stone were found embedded in timber supports and a bar at the entrance to the crossing that was being driven from the No.2 tophole to join the No.1 tophole was displace. The brattice stopping at the topholes outbye of No.2 tophole was displaced and it was thought that this had resulted in a build up of gas which extended from the face to the tophole, a distance of 15 feet. This firedamp was quickly dispersed when the brattice was replaced.

There was a divergence of opinion as to the point of origin and the immediate cause of the explosion. Messrs J. Dyer Lewis and John Kane, mining engineers, who were called as expert witnesses by the owners of the mine thought that the explosion had started in the No.1 tophole and it was caused by a cloud of coal dust coming into contact with the flame of an acetylene lamp and they were confident that firedamp played no part in the explosion. Mr. D.L. Davies, Miners' Agent gave evidence of behalf of the South Wales Federation and was unable to rule out the possibility that firedamp was ignited but

he thought the main explosive agent was coal dust. He placed the point of ignition in the level between Nos. 1 and 2 topholes. Messrs. Lea, Waldin and Finney, H.M. Inspectors of Mines agreed with Mr. Davies as to the point of origin but they thought the initial cause was firedamp on the high side of the level between Nos. 1 and 2 topholes and that this explosion, which was probably small, was extended by coal dust in the level and the Nos. 2, 3, and 4 topholes.

Mr. F.H. Wynne came to the following conclusions-

"I am of the opinion that this explosion originated in the No. 13 level somewhere between Nos. 1 and 2 topholes and that it was caused by the flame of an open acetylene lamp coming in contact with an explosive mixture of firedamp which had accumulated at the rise side of the level which was thickly timbered. The volume of the explosive mixture was probably small, but lying on the timber there must have been very fine and very pure coal dust with which the gas was in very close contact and this dust was the cause of the explosion spreading along the level and into the No. 2 tophole.

No precautions were taken against the dangers of coal dust. Some parts of the mine were undoubtedly extremely wet on the ground, according to the evidence given by the mine officials, they did not consider it was necessary to take precautions against coal dust. In my opinion, the levels and the crossings between the topholes should have been treated with stone dust, in accordance with the provisions of the General Regulations of 30th, July 1920 and amended 20th November 1924. It is probable that had this been done the explosion would have been confined to narrower limits and fewer lives have been lost as a result of it.

The method of ventilating the faces of the levels and the immediate adjacent topholes by compressed air is no doubt much more convenient than the use of either bratticing or air pipes for this purpose. But, although there is nothing in the Coal Mines Act to preclude its use and, apparently, until the day of the explosion it had been proved to be an adequate means of ventilation, in my opinion, it is not to be recommended, the supply, especially where, as in this case, quite a number of machines depend upon it for their motive power, it is apt to be spasmodic and irregular. For this reason it is unreliable and if, as I consider was the fact here, firedamp is being emitted constantly, even if only slowly, a temporary cessation or interruption of the normal air supply of compressed air is likely to result sooner or later in contamination of the atmosphere.

I have already discussed the possibility of the ignition of coal dust at the flame of an acetylene lamp and given my reasons for thinking that such an occurrence is extremely unlikely under mining conditions.

At an early stage of the investigation of the explosion the Miners' Agents, Messrs. S.O. and D.L. Davies, raised the question of the possibility of the explosion having been initiated by the explosive mixture of acetylene and air, produced by the escape of acetylene from the burner of an extinguished lamp or from a defective generator coming in contact with the flame of another lamp. Apparently, suspicion was aroused by a damaged lamp which was said to have been found attached to clothing on the body of Thomas Hughes at the foot of the No. 2 tophole. A seam of the generator of his lamp had split open part of the way round and carbide inside was exposed. It is, of course, not known when or how this defect in the lamp developed, but there is little doubt that Hughes came hurriedly down the tophole probably in the dark after the explosion and if, which is not at all certain, he was carrying this lamp it is not unlikely it was damaged in the descent or by falling from the chute onto the floor of the level. I do not think acetylene had anything to do with the explosion. There remains however the general question of the possibility of the danger of acetylene lamps in mines."

