

DOWLAIS. Cardiff, Glamorganshire. 28th. April, 1906.

The mine was the property of Guest, Keen and Nettlefolds, Limited and the accident was caused by the big link of the chain attaching the haulage rope to a journey of trams breaking. The road on which the accident occurred was the main road from the shaft and it had a outward dip of 3.5 inches to the yard down to 1 in. per yard near the shaft.

About 1.45 p.m. on the 28th. April a journey of 24 trams of coal had been brought out, and had been held by the tail-rope about 160 yards from the shaft for about 15 minutes, as there was no room on the parting at the bottom of the shaft. The rider gave the signal to lower the journey, and as soon as it moved, the link broke. The journey ran down into a group of men at the shaft who were waiting to ascend and killed five and injured six of them.

Fifteen of the trams were on a dip 2.5 inches to the yard, and the last nine were on a 3.5 inch to they yard dip. The total weight of the journey would be 55 tons. The link that broke was 5 inches long by 2.5 inches wide and was made of one and one eighth diameter B.B. Staffordshire cable iron, with a breaking strain of 32 tons. The strain on the link would be about three tons. The fracture was across the weld, and showed crystallisation due to jarring.

The new chain was installed on 17th. April, so had been very little work. Mr. Gray, the Inspector, thought the journey was started with a jerk or the chain had been inured by under strain such as would be caused by a full journey becoming derailed while travelling at speed.

The men who died were-

Morgan Richards aged 39 years, engineman,

Henry Jones aged 38 years, airway man,

Herbert Moon aged 31 years, labourer,

Ernest Watts aged 31 years, labourer and

Alfred Harpur aged 37 years, assistant ripper.

The inquest was held before Mr. Coroner Rhys on the 1st. May at the Abercynon Police Court. when all interested parties were present.

Mary Jane Watts identified her husband, Ernest Watts, 91, Cardiff Road who, she said, died at a quarter to six on Saturday evening. Mrs. Emily Harpur, of Norton Bridge, said he husband, Alfred Alexander Harpur aged 37, died at 3.30 on Saturday. Herbert Moon aged 31, single of Wood Street, Clifynydd was identified by his brother, Robert Moon of Cardiff. The other two victims identified were Morgan Richards, airwaymen of Royal Oak, Abercynon and Henry Campbell Jones, airwayman of 38, Gerturde Street, Abercynon.

John Davies, rider at the South Pit for the past six or seven years told the court that he was in charge of the journey of 24 trams. It was the last journey of the day, and came from the Seven Deep. He was off the journey in front of the trams when it broke loose. The driver started the engine and Davies saw that it was going faster than usual and shouted to the men below. The journey sped quickly past him. He then ran back to see what had happened and found that a link at the end of the chain joining the journey to the rope had broken. It was the link next to the cap of the rope. When the journey ran wild most of the chain went with it. He picked up the broken link.

The Seven Deep was about 700 yards from the bottom of the pit and as the journey came out from there, the witness rode on the tail. At the place where it came to a standstill he put on the safety block and did not take it out until he saw that the road was clear. Davies' butto, Edward Lewis, and he attached a chain to the tail rope. Mr. Gray, the Inspector asked Davies how long they had been running trams of 24 tubs and he replied that this had been done for about two weeks, previous to that they were made up of 22 or 23 trams and only occasionally 24. The trams had been standing at the place for about a quarter of an hour before the accident and Davies did not notice whether it

started with a jerk. He told the court that the chain had been checked by tapping it with a hammer of Saturday morning.

Mr. Bruce Jones, the manager of the pit exhibited the plans of the site of the accident on the wall of the court and the leading features were explained. The weight of each tram was 12.5 cwt. and the load on each tram was 30 cwt. The link was made at the pit and was put on new, on the Wednesday before the accident. The ropeman occasionally brought up the chain and passed it through the fire to test it. Mr. Bruce said that he had had some trouble over the past two years by men rushing to the pit bottom long before the time for winding up. To counteract this he had stationed a man at the bottom of one heading to catch the level en and the heading men. he had also stationed a man at the pit parting to intercept men coming up the Big Deep. All were warned not to go into the main parting until the pt had ceased winding up. He had also put notices in the engine-room. The notices read:-

“Workmen are hereby strictly warned not to leave their working places too soon after finishing their day’s work. They shall be allowed just sufficient time to enable them to reach the pit bottom at 5 o’clock on Tuesdays, Wednesdays, Thursdays and Fridays, and 2 o’clock on Mondays and Saturdays. The penalty for infringement will be either one half-day deducted from their wages or instant dismissal.”

Mr. Jones said that a number of men had been dismissed and others fined for disobeying the rule, but some of the men had succeeded in dodging the men stationed to prevent them coming out early. he could not say what had made the link break.

Septimus Jones, the engine driver, described bringing the journey out of the Seven Deep. he said-

“It had stopped there a quarter of an hour before I received the signal from the driver to send the journey down into the landing. When I received the signal I raised the brake only two or three inches, and immediately I released the brake the level dropped, showing the journey had broken loose. An unusual number of men passed the engine-house that day about 1.30 on their way to the bottom. I had no instruction to warn them, but there was a man on the roadway to do that. Since the chain had been put on the journey had never consisted on more than 24 trams. The brake was in good order.”

Robert Grainger, the road examiner, said he had examined the rope at 7.15 on Saturday morning. He tested it by tapping it with a hammer and the sound informed him of its condition.. He told the court that the break in the link was a clean one and there was no flaw in the link. He had never known a link to break before this incident and he thought it had broken due to a twist.

The master haulier, John Thomas, stated that he ad instructions to stand by the engine to stop anyone going into the main parting before the haulage ceased. On Saturday a number of men passed before he got to the spot where he usually stood. It had been his duty to do this off and on for four years. On Saturday the men came out of the workings earlier than usual. He had reported men for going into the main road before the haulage ceased but he had not done this recently. The last time he reported a man was about two months before. Some of them had been fines and some dismissed. On that Saturday, he stood in the Big Deep and some men pushed past him and others used him rather roughly, while some slipped past by putting out their lamps and going behind some trams that stood there. William Thomas, the undermanager said that he had stood in another part of the workings keeping the men back and none had slipped by him. Mr. Rhys, the Coroner asked, ‘Are they frightened of you?’ He replied ‘Oh. I have little trouble with them myself.’ The remark prompted laughter in the court.

All the dead were daywagemen and William Stephens, a day repairer gave evidence said that he had known men reported for breaking the rules. John Vaughan, the chief mechanic at the colliery said that the broken link was made of Staffordshire cable iron.

This strain on the rope when the journey started would not be more than three tons and they were capable of taking much more than that. The chain might have been twisted and this would throw an extra strain on the link.

Mr. F.A. Gray, the Mines Inspector said that he did not agree that the break was caused by a twist. The link appeared to him to have become crystallised by constant jarring, but the crystallisation could not be seen by an examination nor found by the sounding with a hammer. He thought the weld was very good.

In summing up Coroner Rhys said that the link had proved to be in good order and the cause of the accident was merely guesswork and the men at the bottom of the pit had no right to be there. He pointed out that a great many colliery accidents happened because people would take this risk.

The jury returned the following verdict-

'We find that these men lost their lives by an accident caused by the snapping of the link in the chain connecting the trams to the rope. We are satisfied that every precaution had been taking in the material and workmanship of the same.'

Coroner Rhys said this was verdict of 'Accidental Death'.

COURT HERBERT. Neath, Glamorganshire. 1st. June, 1906.

The colliery was the property of The Main Colliery Company Limited, Neath Abbey, Neath and the Company owned three other collieries close by, Main No.1, Main Nos, 3 and 4 and Wainceirch but the Court Herbert Colliery worked quite separately from the others. At the Court Herbert Colliery there were two shafts, No.1 the upcast which was sunk in 1870. It was elliptical in shape, 19 feet by 12 feet and was sunk 154 yards deep to the Graigola seam and passed through the Victoria Seam at 125. No.2, the upcast, was 14 feet in diameter and 150 yards deep. Coal was wound from both seams from the lower landing in the Graigola seam.

The managing director of the Company was Mr. Henry T. Wales, mining engineer of Cardiff who was also the consulting engineer to the Company, a position he had held for 12 years. Mr. Rice Vaughan Price, who was formerly Mr. Wales' assistant had been the agent for six months. The manager was Mr. Thomas Jones who had been appointed in April, 1904. Mr. Thomas Williams had been the undermanager since 1880 but had been absent from work due to illness for some weeks prior to the explosion.

One overman and one fireman were employed on the day shift and a fireman on the night shift. About 128 men worked on the day shift and 50 on the night shift, most of the men being employed in repair work.

The explosion occurred in the Victoria Seam which mined bituminous coal and the workings in this seam had always been liable to gob fire was a result of spontaneous combustion. Above the Victoria Seam there was a little seam where, occasionally, large falls of bed rock occurred and in the cavities caused by these falls, gas sometimes accumulated. It was always difficult and sometimes impossible to clear these accumulations by the ordinary and proper means of ventilation..

During the previous seventeen years, gob fires had occurred, generally in the disturbed, faulty ground where the 'rashings' were thicker than usual. At one time these rashings were filled out, but as the fires continued, this practice was abandoned. All the fires up to that time had been dealt with no loss of life or personal injury.

In 1900 some 'gaugings' or stoppings which had shut off a gob fire were blown out as by an explosion but this occurrence was so slight that the officials thought that there had been a large fall within the enclosed area. Some of the officials were still of this opinion but Mr. Lewis, in retrospect, thought that there had been an explosion.

The ventilation of the Victoria Seam was produced by a Waddle fan, installed in 1870, 25 feet in diameter which usually circulated 22,000 cubic feet of air per minute at a water gauge of .9 inches while the fan running at 52 r.p.m. There were three ventilating districts

in the seam. The 1st Split went down No. 2 Dip, through No. 2 district, back to the lower end of No.2 dip over No.3 dip, by an air bridge and into the main airway at the main dip. The 2nd. and 3rd. Splits went down the no. 3 dip and divided at Edward Davies' heading, one portion of the current travelling through the stalls of the no. 4 district, which was where the explosion occurred, to the No.2 dip and back to the return with No.1 split. The other portion went west from No.3 dip through the main district and up the main dip to the return. The whole of the air was equally divided between these three splits. Although the ventilation appeared to be sufficient for the working places when everything was in good order, it was not always sufficient to prevent gas from accumulating in every cavity caused by the falls of roof.

The seam dipped to the north east at about 1 in 9 and was worked by the longwall system. No large faults had been encountered and the faces worked forward fairly regularly, except where a pillar had been left to protect the surface or for other reasons. The stalls were about 12 yards apart and all the seam was worked with the exception of 5 inches of bastard coal under the shale which was left to strengthen the roof. The gods were filled with the rubbish from between the two coal and the furthest point of the workings from the shaft was 900 yards.

The roads were dry but not dusty. In No.4 district they were damped by a water pipe from No.2 discharging water on the floor which found its way into the dip workings. Water was 'tanked' from the dip workings of the No.2 district and discharged into the No. 4 district.

Bonneted Clanny safety lamps were used by the men and they were secured by a lead rivet. The fireman used bonneted Davy lamps for their inspections. No blasting was carried out in working the seam.

When the first smell of a gob fire was detected, the manager had found, after trying sand and other substances, that a mixture of small coal and rubbish, finely divided and called locally, 'black-jack', was the best thing to put out the fire but excluding the air supply. If a fire occurred in a road which could be abandoned without much interference with the working, alternate packs of black-jack and rubbish were built in it to the mouth. The last four yards of packing was placed in a space cleared from the gobs on either side of the road. If it was impracticable to abandon the road, the gob was removed for 6 to 8 feet towards the fire and for 15 to 20 yards along the road and replaced with a thick packing of black-jack. It was not the practice to isolate the fire by driving roads through the gob on every side, but occasionally, where roads existed, a packing of black-jack was put in round the seat of the fire.

In the previous may, a gob fire was known to exist on the upper side of the return, on Gregory's Road. The fire was dealt with by raising the road above the seam and filling in half its width along the side next to the fire, a distance of 20 yards, with a packing of black-jack. No heat or gob smell was detected on the lower side of the road.

On May 23rd., a fall occurred in D. Davies' road which gradually extended towards the face. Gas appeared in the cavity and the working place was stopped and the road 'crossed off'. The manager and the overman had a consultation at the place on the 31st. May when it was decided to close off the road by gaugings.

On the night shift of that day a gauging was built three and half feet high, on the face side of the fall at 9 p.m. On the following morning, repairers were sent into the place to build another gauging on the outer side of the fall and it was intended to complete the two gaugings. During that day there was gas in the cavity above the fall to within about 5 five feet above the level of the rails, and as the hole was about 15 feet high, and several feet in length and width, it must have contained a large volume of gas. While these operations were being carried out there was no smell of fire near the place.

At 3.45 p.m., when the second gauging had reached a height of three and a half feet, and the two repairers, Fred Jenkins and George Folland were resting near the parting of Elias Jones' stall, an explosion took place, presumably between the gaugings. Folland heard a slight report and then saw flame coming towards him. he lay down and as the

flame passed, he rose and ran long George Richards' heading. A lay down again and remained until George Richards came to him. Folland had kept his light all this time.

George Richards worked in the straight road and he and other colliers felt a rush of air in their faces and ran out. he came up the road and met Fred Jenkins. When they reached the returning to D. Davies' road, he saw flame at the inner end of it and immediately a rush of flame came out, knocking him down and passing over him. Both these men were badly burned.

The flame of the second explosion appeared to have come through the faces as wells as out on the road and in passing through the face burned Elias Jones, Isiah Jones, William Jones, Hopkin Jenkins, John William and William Thomas.

The men working in the faces of J. Rees' heading felt a slight gust of wind and thought a fall had occurred. The force of the explosions seemed to have been slight. Mr. Price, the Agent was quickly on the spot and went through the workings with an hour or tow of the explosion. He saw lamps hanging on timbers and brattice sheets and timbers undisturbed. Although some dust was raised by the explosion, it had little effect in intensifying the explosion..

Most of the injured stayed in the face of William Jones' stall until the afterdamp cleared and afterwards were assisted out to the No.3 double parting where they were attended to before being taken out of the mine by men who came from other districts and from the surface.

Those who died were all listed as colliers. They were-
Hopkin Jenkins aged 51 years,
John Jenkins aged 19 years,
Elias Jones aged 62 years,
Isaiah Jones aged 31 years and
William Jones aged 37 years.

Mr. Lewis, the Inspector, made an inspection and tried to reach the workings of No.4 by way of the No.2 dip but had to return as there was excessive heat in the return after about 30 yards from the probable seat of the explosion. It was clear that there was standing fire and the ventilation of the No. 4 was disarranged. The Inspector decided to flood the district to extinguish the fire.

The inquest into the men's deaths was held before Mr. Edwards Powell, Deputy Coroner of Neath. Mr. Kenneth Williams barrister appeared for the Home Office and Mr. S. T. Evans, M.P., K.C. for the owners and managers and Mr. Nicholas, solicitor for the workmen.

There was no doubt that an accumulation of gas had reached the gob fire and exploded. The Inspector commented-

"It would have been more prudent for the manager to have stopped coal working in the district while the gaugings were being erected but as the same kind of operation had been carried out from time to time for several years without anything happening, he appeared to have thought that there were no special risks being run in so ding so again."

The jury returned the following verdict-

"(1) That the five persons died from shock due to an explosion of gas at the Court Herbert Colliery.

(2) That the explosion took place at David Davies' stall owing to the gas accumulated there coming into contact with a fire originating in that portion of the working."

The jury added a rider to the effect-

"That if gas were found at any place in this colliery, then the management should clear that part of the workings and withdraw the workmen in future."

ALBION. Pontypridd, Glamorganshire. 10th. November 1906.

The colliery was the property of the Albion Steam Coal Company, Limited and was in the Taff Valley about two and half miles to the north of Ponytpridd. There were two shafts 19 feet in diameter which were used for coal drawing. The coal from the Nos. 1, 2 and 3 seams was drawn at the downcast and the coal from the seven feet was drawn at the upcast. The downcast was sink to the No.2 seam, 552 yards deep and the Nos 1 and 3 seams were won by rise and dip cross measure drifts and one staple pit fitted with gages. the Seven Feet Seam was 628 yards deep. All the coal was high quality steam coal.

The workings in the Nos. 2 and 3 and Seven Feet Seams were not in any affected by the explosion which took place in the C District of the No.1 Seam. The manger of the colliery and the resident agent was Mr. William Lewis and Mr. Phillip Jones as the certificated manager with Mr. Edward Francis, the certificated undermanager who was in charge of night shift operations. Mr. William Jones, the manager's son who held a second class certificate was assistant to his father. All the seams were worked by the longwall method.

Like all others steam coal collieries in the district, the seam produced a considerable quantity of firedamp and large volumes of air were required to dilute it. The ventilation was produced by a Schiele fan, fifteen and a half feet in diameter, which exhausted about 238,379 cubic feet of air per minute at a water gauge of 3.5 inches with 18,709 cubic feet passing along the main level which then ventilated the C district in the No.1 seam. There was no accumulation of firedamp reported in the No.1 seam on the day of the explosion. Cambrian lamps with an automatic lock which could be opened only with a powerful magnet were used exclusively by the workmen and the firemen use Cambrian fireman's lamps. The lamps were lit and re-lit by electricity by an apparatus that consisted of a square iron box with a hinged door which locked. On top of the box there was dish on which the lamp was placed. In the box there was a double accumulator, charged to four volts and an induction coil which delivered 10,000 volts.

To light a lamp, it was placed on the dish with an insulated pit resting on a spring bolt which was connected to the coil by a wire. A bottom was then pressed and the contact made, the current passed up the insulated pit to the lamp wick and ignited it. if the lamp was not place on the dish correctly, sparking between it and the spring bolt took place. The shaft bottom and the engine houses were lit by electricity.

When the coal was worked large quantities of coal dust were produced and more was blown off the loaded trams as they were being drawn to the shaft. There was a disastrous explosion at the colliery in 1894 which was, in the opinion of Mr. Gray, an explosion of coal dust and since then every attention was given to the dust problem and water pipes had been laid in the roads.

In experiments made by H.M. Inspector of Mines, Henry Hall in June 1893, dust from this colliery produced violent explosions. Mr. Gray wrote-

"In compliance with instructions from the Home Office in 1903, I wrote to the owners of collieries in my district, drawing attention to the desirability of closing the ends of trams, to prevent loss of coal on the roads. The owners of this colliery took up the matter seriously and all the trams were provided with doors at the ends instead of cross bars."

Various kinds of sprays had been used but have been given up, and now the watering is done by hose pipe, which as proved the best system. This colliery has for some years been, and is, one of the best watered in the district. The main level on which the explosion occurred was said to have been watered that morning."

The coal was worked on the day shift and most of the repairing of the roads down on the night shift. about 1,240 tons of coal were drawn by day and 440 on the night shift.

The number of men employed underground in the several seam was 1,150 by day and 440 at night.

No shots had been fired in the No.1 seam since it was started five years before as the roof was weak and the use of explosives was not necessary. No shots were fired in the colliery on week days with one exception. There was hard heading and the shots were fired between shifts. Any other shots were fired on Sunday mornings when all the men are out of the mine.

The explosion occurred at about 3.10 p.m. on the 10th. November which was a Saturday and the working shift had ended at 2 p.m. At the time there was repair work being carried out with about 50 men in the No.1 seam, 53 in the No.2 and 40 in the No.3. There were no signs that anything was wrong at the surface until a haulier, who felt a rush of air, and thinking there had been an accident at the shaft went to see. He found everything all right there he telephones the surface to say that there had been a heavy fall somewhere in the C district of the No.1 seam. The undermanager sent Henry Hill, the overman, down to see what had happened and when Hill was away for along time, he followed him.

He found repairers at work on at a fall on the main level which completely blocked the road. He went up Russell's heading and after passing through the doors, he noticed the smell of afterdamp and concluded that there had been an explosion. Near the top of the heading, he met Hill and two men who were helping a man out who had been affected by the afterdamp. He went down Aitkin's heading to the main level and along to the parting at the mouth of Gill's heading. There he found two men alive and the bodies of three others, all of them badly burned. medical aid was summoned and the living attended to before they were taken to their homes. The men were so badly burned that one died the following day and the other two days later.

A search was made for Hill, the missing overman and his body was discovered. He had died from the effects of afterdamp. The man who accompanied Hill said-

"We had gone some distance from Russell's heading in the direction of the main level when I told him I could not go further as my legs were failing and I would stop there. Hill went on, and when he returned he said, '*all badly burned I am going for assistance.*' We started to walk out. I was holding on to his waistcoat but I soon dropped to the floor and my light was extinguished. He continued on his way but soon after I heard him say, '*I have lost my way.*' I was unable to move until some men came to assist me."

The reason that Hill died and the man lived was explained because where he fell there was air and was getting purer each minute and Hill went into a place where the afterdamp had not been diluted since the sheets ad been blown down. He should have gone through the crosscut but had missed it.

Mr. Gray was not well enough to go to the colliery but he sent his assistant, Mr. Trump, but was able to go on Monday. He heard from the men who were working at the fall on the main level. It was large fall and about 150 trams were involved. The men thought they heard a heavy 'pouce' which was accompanied by a rush of dust laden air which extinguished their lights. They thought a fall had taken place further along the level. They sent their lamps back to be re-lit and carried on working.

Some of the men were working at the parting on Russell's heading at the mouth of Nelson's heading, felt a strong rush of air but heard no noise and saw no flame but for a few minutes the air became hot. These men were the nearest on the return side to the seat of the explosion.

Mr. Gray inspected the site of the fall which had then been cleared but another fall further along prevented him progressing in that direction. He travelled up Russell's heading and down Atkin's heading to the main level, and out along it to the parting. At the mouth of Gill's heading was the rubbish which the deceased had drawn down and on it was lying the body of a horse and near it a tram that had been partly filled.

In Gill's heading, a lamp station had been built for the district. The roof had been taken down to lengthen the parting and the relighter was taken out of its brick building and placed on the side of the parting for fear the roof would fall which would take place when the timbers were taken out. The man in charge of the spot was helping with the operations and would have remained until the end of the shift when it would have been replaced and locked up.

After the explosion his body was found within a few feet of the relighter and a few feet from him there were three lamps on the ground as if someone had been carrying them and had dropped them. One lamp was hanging on the belt of the man in charge and the fifth was found three to five feet from the relighter. All the lamps that were found were in perfect condition.

Those who died were-

William Morris aged 40 years, fireman,
George Bennett aged 30 years, collier,
Henry Hill aged 53 years, overman,
John Jones aged 36 years,
Richard Hughes aged 39 years, repairer,
Abraham Lloyd aged 21 years assistant repairer,
Francis Strong aged 40 years, assistant repairer and
Thomas Prosser aged 41 years, master haulier.

The formal inquest was opened on the 13th. November at the Commercial Hotel, Cilfynydd before Coroner R.J. Rhys of Aberdare and E. L. Reece of Cardiff.

In the opinion of the Inspector the explosion was caused by the falls. In the interval between the first and second fall, gas was liberated and carried to the second fall which extinguished the lamps. The men would not know why their lamps went out and went to the relighting station and in putting them on the dish did not put them in the right position. Pressing the bottom would cause a spark which would ignite the gas.

After considerable deliberation the jury returned the following verdict-

"In view of the theory advanced by Mr. Lewis, the agent of the colliery supported by H.M. Inspectors, that the explosion was probably caused by the emission of sparks from the electric battery, we are agreed upon that theory and that there no fault or negligence can be attached to any persons concerned."

The Inspector thought that it was an explosion of firedamp and dust played little part. After the disaster the management moved all the relighters near the downcast shaft.

WINGATE GRANGE. Wingate, Durham 14th. October, 1906.

The colliery was the property of the Wingate Grange Colliery Company which was owned by the executors of Mr. John Gully and the Estate administered by the Court of Chancery. Of the Trustees of the Estate only Mr. Molloy was living and he had never taken an active part in the administration of the colliery. It employed 1,200 men and boys in the various shifts and was near the edge of the northern Coal Field.

There were two shafts at the colliery, an upcast and a downcast each of fourteen and a half feet in diameter and five seams had been worked at the colliery. They were The Five Quarter seam at 74 fathoms, the Main Coal seam at 89 fathoms, the Low Main seam at 110 fathoms, the Hutton seam at 129 fathoms and the Harvey seam at 153 fathoms. Both shafts were sunk to the Harvey seam and the upcast about 4 fathoms below this seam.

The downcast was the Lady pit and was 44 yards to the north of the upcast shaft and it was sunk to the Harvey seam. The shaft was traversed by two pairs of cages running in wooden guides. One pair ran between the Harvey seam, and the surface and the other pair between the surface and the Hutton seam.

The downcast, the Lord Pit, was also sunk to the Harvey seam and continued further. It was only fitted with wire guide ropes to the Low Main seam. Immediately below this there were three scaffolds, the cages rested on the first, the second was used in connection with the wire guide ropes and the third was protecting scaffold. A little air ascended past these scaffolds. Both shafts were cased with cast iron tubing through the limestone.

In addition to the main shafts there were subsidiary shafts or staples between the seams, the most important of which were the staples between Main Coal and the Harvey seams, the staple between the Low Main and Harvey seams and the staple between the Low Main and Main Coal seams. Twenty five yards from the downcast a staple 10 feet in diameter between the Main Coal and Harvey seams acted as an upcast for the Harvey and Hutton seams as far as the Main Coal seam. At the top of this staple in the Main Coal seam was a winding steam engine. This staple was capable of being used in conjunction with a kibble or bucket, not running in guides, for the ascent and descent of men between any two of the four seams.

A staple between this one went from the Low Main and Harvey seams and had a steam winch to the Low Main seam to raise and lower men in a kibble between the seams. This staple was not used for ventilation and was called the '*dumb staple*'.

A staple between the Main Coal and the Low Main seams was about 110 yards north of the downcast shaft, by the side of the main haulage road. This was 10 feet in diameter and used to lower coal from the Five Quarter and Main Coal seams to the Low Main seam from where it was taken to the upcast shaft and raised to the surface. The Main Coal seam was not being worked at the time of the explosion and coal only from the Five Quarter seam was dropped down the staple. The coal was run down a self-acting incline in a stone drift between the Five Quarter and Main Coal seams and then led by horses along a road in the Main Coal for 380 yards to the top of the staple. The staple was fitted with a drum and two cages, each holding one tub. The cage and full tub raised the other cage and an empty tub.

Two ranges of steam pipes to supply the underground engines in the Low Main and Harvey seams as well as a small pumping engine in the Harvey seam entered the upcast shaft at the surface. The range for the Low Main left the upcast shaft at the Main Coal and was then continued down the staple to the Harvey seam as far as the Low Main seam. The range for the Harvey seam left the upcast shaft at the Main Coal seam and was then carried down the downcast shaft.

A range of pipes extended down the downcast shaft from the surface to the Hutton seam and supplied a pumping engine. A branch from this pipe supplied a pumping engine in the Main Coal which provided the village with water and also a winding engine at the top of the Harvey seam staple. Another pipe left this range at the Low Main seam and supplied a steam winch at the top of the dumb staple.

Considerable water feeders amounting to 650 gallons per minute were met in the upper seams and ran down staples to the Hutton seam and the water was forced to the surface by the pumping engine in that seam. This was the main pumping engine in the colliery.

Both seams were worked on the longwall and bord and pillar system. The workings in the Five Quarter were extensive and the Main Coal had been worked over a large area but operations in this seam had been suspended for about two years. The Low Main was also worked over a large area. The Hutton had not been worked as extensively as the other seams and it had stood for forty years before operations started again about two years before the disaster. At the time the Harvey, which had been worked over a large area, gave the largest output.

Hauling engines were placed near the shafts in the Low Main and Harvey seams and an engine roof for a hauling engine in the Hutton seam was being prepared. The coal was taken from the various working faces by ponies, then by horses or self-acting inclines and finally by engine power on ropes on the main and tail rope system. The

engine haulage roads were the intake roads in all cases. One hundred and seventy horses and ponies were in the mine on the day of the explosion.

There were four kinds of tubs used, iron ones carrying 8 to 10 cwt. were used in the Harvey and Hutton seams respectively, wooden tubs carrying 8.5 cwt in the Low Main and 10 cwt tubs in the Five Quarter seam. All the tubs were well constructed. There was no travelling or hauling in the return roads. Miners going to and returning from their work used both shafts and the main haulage roads. During the interval between the coal winding shifts, only a winding engineman at the Harvey steam engine was on duty.

A Guibal fan, 36 feet diameter and 12 feet wide producing about 102,000 cubic feet per minute at a water gauge of 1.8 inches had ventilated the colliery up to three years before the disaster. At that time, the colliery was partially flooded by surface water and this damaged the foundations of the fan. It was replaced by a Waddle fan, 25 feet in diameter, running at 85 r.p.m. on the surface 25 yards from the upcast shaft to which it was connected by an arched tunnel. During the evening of an ordinary working day, the pit was not occupied by hewers and at weekends, the speed of the fan was reduced. This fan was capable of producing 193,478 cubic feet but on the day of the disaster it was measured at 155,138 cubic feet at a water gauge of 3 inches.

So that the top of the upcast shaft should remain closed while either cage was at the surface, there was a suitable wooden casing with sliding doors and a similar arrangement was provided at the Low Main seam to make the best advantage of the fresh air near the shaft. The ventilating currents left the downcast shaft at the various seams in which they were to circulate with the exception of the current for the Five Quarter seam which left the shaft at the Main Coal seam, passed along the road in that seam and then up the stone drift to the Five Quarter seam.

The return from the Harvey seam went up the staple between that seam and the Main Coal and then to the upcast shaft. Part of the return air from the Hutton directly entered the upcast shaft and the remainder passed up the staple between the Main Coal and Harvey seams. The Low Main seam return also passed up this staple. The discontinued workings in the Main Coal were ventilated by scales from air from the tale passing to the Five Quarter seam. The return air from the Five Quarter seam entered the upcast shaft directly.

The stoppings, doors, air crossings and regulators were of the usual type but the crossing in the Low Main with the exception of two, one of which was brick arch and the other a point of crossing when the return airway was in strata above the intake air way were fitted with flat topped wood. The ventilating air for the Low Main seam left the downcast shaft by three short roads leading on to the main haulage road and one small current passed to the upcast shaft to provide the onsets with fresh air.

The main current amounting to 36,348 cubic feet per minute passed in by past the drop staple which communicated with the intake in the Main Coal seam above and with the intake to the Low Main seam below and the air in it sometimes moved up and sometimes downwards and it was described by the undermanager as being '*on the balance.*'

On arriving at the Stable way junction the current split into the Stable Way and the remainder continued to the north. There are doors in the haulage road beyond the landing in the 1st. East way and only a scale of air passed up this road. The current continued north and passed the faces of the 2nd East way and on its way back to the upcast shaft, ventilated the working places on the 1st East way.

All the working faces in all the seams only safety lamps of the Marsaut or Donald type were used by the workmen locked by means of a lead plug. The officials used tin-can type Davy lamps secured by a screw lock. Near the shafts in the intake airways incandescent electric lamps were used during ordinary working hours supplied by current brought from the surface by a cable in the downcast shaft. A limited number of naked lights were used only in the Low Main seam by the wagonway man and other persons working on the main haulage roads in the intake ways up to the caution roads. At the

caution boards, a lighted tin-can Davy lamp, with red glass was hung during the time the hewers were in the pit.

Explosives were used in both coal and stone in all seams. For the most part, permitted explosives were used fired electrically but in the Low Main seam compressed gunpowder fired by the deputies using a wire heated in a safety lamps to light a squib, was the explosive used by the hewers in the coal. Geloxite with a fuse and detonator fired electrically was used for charges in stone. Explosives were rarely used in the Low Main seam except at the working faces. No person was allowed to use explosives in ten mine or carry detonators without and authorisation, partly printed and partly in writing, signed by the undermanager.

The shift for the workmen were arranged as a fore shift for the hewers which went down at 4 a.m. and worked up to 10.30 a.m. when the places they occupied were filled by a similar number of hewers in the back shift who went down at 9.30 a.m. and finished work at 3.30 p.m. A shift of haulage man and lads went down at 6 a.m. and loaded the coal produced by the hewers. They stopped work at the same time as the back shift hewers. A repairing and stonework shift went into the mine at night. On ordinary nights, the shift in the Five Quarter seam was from 8 p.m. to 4 a.m., in the Low Main seam from 9 p.m. to 5 a.m. and in the Hutton and Harvey seams from 10 p.m. to 6 a.m. but on Sunday nights this shift went down together at 10 p.m., being proceeded by a shift of examiners.

The general control of the whole mine was exercised by Mr. W. Armstrong which acted both as agent and manager. He was a mining engineer and was President of the North of England Institute of mining Engineers in 1898. He was also a senior partner of the mining engineer firm of Messrs Wm. Armstrong & Sons. The undermanager was Mr. Robert Owen who had worked at the Wingate Grange colliery in various capacities for 40 years. there were also four overmen, three back overmen, a master wasteman, three master shifters, forty two deputies and fifteen examiners in the night shift. Mr. T. Robson, a competent mechanical engineer, had charge under the manger of al the machinery and boilers both above and below ground.

The workmen last made an inspection under General Rule 38 during the month before the explosion. This examination was made by two miners and lasted over 10 days. The report was satisfactory and that referring to the Low Main seam was as follows-

“5th. September-

we have examined the inlets and return airways, pony ways, engine plane and all working places in the North Flat, 1st. East Flat in the 1st. East district also 2nd. Flat, South Flat and West Flats in the Stable way district and we have found them satisfactory.

7th. September-

We have examined the inlets and return air ways, pony ways, engine plane and all working places in the 5th North and 6th North in the 2nd East district and have found them satisfactory.”

The colliery had not had a serious accident for the 67 years that it had been established and the men working in the Low Main seam prior to the disaster were working as follows- thirty six including the master shifter, the official in charge of the seam and an examiner were in the Stable way district. All were at or near the working faces with the exception of a shifter named Bloomfield who was working with a pony and tub, cleaning up the engine plane. Of this number, two lost their lives, Bloomfield by violence and the others by afterdamp. Four were working in the 1st. East way including an examiner, thirteen were in the 2nd. East way district with an examiner and nine of them lost their lives by afterdamp including a shifter named Metcalf who was the only person with a naked light in the seam and was bailing water from a sump by the side of the engine plane. A shifter named Elliott was at the down cast shaft and was blown into the shaft and killed. A stoneman, Maddison was on the engine plane between the Stable way and the 1st. East way and was skilled by violence and burning.

At the moment of the explosion there were four men. Three lost their lives and a shifter named Dixon was killed close to the downcast shaft but a man with him escaped. A mason and a labourer who were repairing a door near the foot of the incline in the stone drift to the Five Quarter seam lost their lives to afterdamp. Twenty persons were in the Five Quarter seam at the time working near the faces and five of them were killed by the afterdamp. In the seams below the Low Main seam all the men were near the working faces at the time of the explosion, except three. Two were attending the pumping engine in the Hutton Seam about 100 yards from the downcast shaft and a rapperman in the Harvey seam who was close to the shaft.

The explosion caused the death of twenty five persons, twenty four who were killed on the spot and one who was rescued alive but died on the 24th. November from pneumonia brought on by the cold and exposure in the pit while waiting to be brought to the surface.

The effect of the explosion at the surface was small but it was clear that something serious had occurred and all the officials were quickly in attendance. The downcast shaft was not damaged at the surface with the exception of some sheets being displaced. Ten panes of glass in the windows facing the shaft in the Harvey winding house were broken. One Harvey seam cage was a fathom or two below the flat sheets at the surface and the other a corresponding distance from the bottom and the Hutton Seam cages were clear in the shaft. The casing around the top of the upcast shaft sustained little damage and the cages in the Low Main shaft were not damaged at all.

Doors in a short arched road isolating the Guibal fan from the Waddle fan were displaced but this was not discovered for some days and until it was put right, the full ventilation was not obtained in the mine. The fan was not damaged but the engineman, who was close by, and had raised the speed of the engine at the moment of the explosion, looked at the water gauge and found it had dropped. This was due to the short circuiting of the air in the Low Main Seam as a result of the explosion. At once he gave the engineman steam until the water gauge was raised to the normal three inches.

Only the winding engineman for the Harvey Seam winding engine was in attendance at the time of the blast but the other winding enginemen were quickly summoned. When the Harvey and Hutton engineman tried to raise their cages, they were unable to do so but the cages in the upcast shaft were free and a descent was made by that shaft.

When the Main Coal was reached the rescue party were able to go in by and found Dixon's body near the downcast shaft. They found the top of the drop staple wrecked but were able to proceed to the stone drift in the Five Quarter Seam and round the workings in that seam.

Twenty two men and boys were rescued from the Main Coal and the Five Quarter seams and the bodies of eight of the victims were sent to the surface. During the exploration of the Main Coal and the Five Quarters the ambulance knowledge of some of the rescuers was used to good advantage and several men owed their lives to the prompt application of artificial respiration.

Before the Low Main was reached, shouts were heard from below indicating that there were men alive in the Hutton and Harvey seams. The Low Main was reached about 1 a.m. on the 15th October and it was soon evident that this was the scene of the explosion. No living person was seen near the shafts nor were there any bodies. Elliott's body was found on the 23rd. October in the sump of that shaft at the Harvey Seam. The casing at the upcast shaft in the Low Main was destroyed and the bulk of the air was passing directly from the downcast shaft to the upcast shaft. heavy timbers in the sides of the shaft had been displaced but, owing to the strong nature of the roof, there were large falls of stone which impeded the rescue work.

The Low Main was rapidly explored but owing to the state of the shafts and the fact that the explosion had wrecked the steam pipes and no use could be made of the winding engine in the Main Coal Seam at the top of the Harvey staple or the steam winch at the top of the staple between the Low Main and the Harvey seams, the men in the

Hutton and Harvey seams who were alive and uninjured had to wait until the necessary repairs had been completed. refreshments were lowered to them from time to time down the downcast shaft by means of a rope and a small engine at the surface.

In exploring the Low Main it was found necessary to erect canvas stoppings between the shafts and as the exploration proceeded, to repair some of the doors and stoppings which had been displaced. The work went on smoothly and there was no problem with afterdamp. Work went on remorselessly to recover all the bodies except that of Elliott and the safe rescue of the living. The work was completed by 9 a.m. on Tuesday the 16th. October. Elliott's body was found after a long search and found on the 23rd. October in the sump of the shaft.

During the rescue work the shafts men man, both regular hands at the colliery and some sinkers and shaft men from adjoining collieries volunteered their services and performed the most dangerous and disagreeable duties. Mr. F. Coulson, a mining engineer in the district who was an expert in shaft sinking was called in by the owners and under his direction, the restoration of the shafts was safely accomplished.

Fifty six horses and ponies were killed in the stables in the Low Main Seam by the afterdamp. At the time of the blast eight ponies were reworking in the Low Main Seam. Two were killed on the Stable way engine plane, one in the Main Road and six others working on the stable way survived. Two other ponies were killed between the downcast shaft and the drop staple in the Main Coal.

Those who lost their lives were-
The miners.

John Dixon aged 61 years,
William Studham aged 51 years,
Lord Bentley aged 65 years.,
Edward Hardy aged 63 years,
Nat Farnworth aged 58 years,
Alfred G. Harris aged 51 years,
George Broomfield aged 43 years,
Joseph Grafton aged 66 years,
Thomas Kay aged 55 years,
Thomas H. Elliott aged 46 years,
James Morrison aged 45 years and
Joseph Grafton aged 66 years.

The shifters.

James Mason aged 49 years,
Henry Pace aged 46 years and
Thomas Maddison aged 24 years.

The stonemen.

George Baylis aged 58 years, and
Thomas Bainbridge aged 53 years.

Examiners.

William Hockday aged 55 years and
Charles Stockdale aged 32 years.

The sinkers at the staple.

Isaac James aged 43 years,
Patrick Dinlavey aged 62 years, and
James Ainsley aged 21 years, mason and
Thomas Metcalfe aged 56 years, pumper,

George Smith aged 46 years, sump emptier and
George Mason aged 60 years, shifter.

The mine was thoroughly examined after the disaster and Mr. Atkinson said-

“From the indications of the direction of the force there was no difficulty in coming to the conclusion that the explosion had come outbye to the shafts from some point on the main road to the north, by its junction with the Stable way and then passed into the shafts and into the Stable way.”

All the evidence showed that the explosion was one of coal dust and air alone and was neither caused nor aggravated by firedamp. The theory was put forward that Maddison had fired a shot, without authority, in the main haulage road. Some Geloxite and a length of fuse was missing from the shotfirer's box which was discovered intact in a refuge hole close to the scene of the explosion and near the shotfirer's body. It was found that a shot had been fired to blow down a small piece of stone on the side of the road. The stone was no way dangerous and had been in the place for over 25 years and no orders had been given for its removal. The man who fired the shot was killed in the explosion and was a licensed shotfirer and was stated to be a very steady man. He had no drilling gear and had placed the explosive on a ledge of stone and fired it with drilling and stemming which was in direct contravention of the Explosives Order and Mines Act and without special authorisation, a shot should not have been fired on the engine plane.

The road in question was not one that was considered dry and dusty as the floor was damp but some very fine coal dust was deposited on the rough stone of the walls, the pack walls and timbers. This was the accumulation of many years and was ignited by the explosion. The Inspector commented-

“Had the regulations been observed the shot could have been fired with safety and the explosion would not have occurred.”

In his report, Mr. Bain said-

“The danger of coal dust alone without and a mixture of firedamp has not been fully recognised until recent years, and even now is not admitted by some mining engineers, and by many officials and workmen.

There can be no doubt about it this was clearly at Timsbury and Camerton Colliery explosions in Somersetshire some years ago, and now again at Wingate.

It had been argued that if this danger exists to the extent now claimed, that explosions would be of daily occurrence where gunpowder is used in the coal faces but the argument is not sound. The dust in the faces in nearly all cases is coarse and heavy and would not lend itself to the propagation of an explosion.

The danger lies in the very fine particles of dust, often as fine as the finest flour, which are carried down the shafts from the screens or blown off the top of the tubs in their transit to the shaft and which settles, almost unobserved, on the sides, roof, timbers and floors of the engine planes, and it only requires a small initial explosion whether of gas or some explosive to cause an explosion which may extend throughout the mine.

A great deal had been done in this district and is still being done to remove this danger. Many miles of water pipes and suitable standards and hose pipes at fixed distances have been laid down, water tubs with sprays of various sorts are in use and a system of spraying the tubs automatically with water before leaving the landings for their journey to the shaft has been found to act very beneficially. Methods of dealing with dust on the screens have also been successfully applied at some collieries. Brushing away and clearing the dust from the main roads has been done for a considerable time in places where watering seriously affects the roof and sides as it does with certain classes of stone.

Given an area free from dust or a zone of road perfectly wet, if an explosion should occur from any cause, the evil effects of it will be greatly reduced and the area

much circumscribed, and I hope this is now being more fully realised by the persons responsible for the safety of mines

None but the most efficient men, and the fewer the better, should be appointed shotfirers and care should be taken to see that they thoroughly understand their duties and responsibilities before being authorised to act in such a position. I am glad to say that steps are being taken in this direction.

Something might be done with a view to reducing the number of shots fired, and firing the between shifts or when the majority of men are out of the mine.

At the same time I do not wish it to be inferred that there is not great danger from an ignition of firedamp alone, many lives have been lost from this cause and every precaution must be taken to keep working places, returns and all parts of the mine free from an inflammable mixture of gas and air. This has been understood for many years but what I want to point out is that an additional danger exists which has not been recognised but which is a stronger factor in the safest working of a colliery."

The jury which included several practical miners brought in the verdict-

"That the said Edward Hardy aged 63 years of the Row, Wingate Grange Colliery, shifter in coal mine was on the 14th. day of October killed in the Five Quarter Seam of the Wingate Lord Pit by an explosion, caused by the firing of a shot in the main haulage way in the Low Main seam of the Wingate Lord Pit, some 676 yards or thereabouts from the shaft, on the said 14th. October last and we leave the question of the future management of the pit in the hands of miners, inspectors, the owners and the representatives of the Miners' Union and therefore say that Edward Hardy, in the manner aforesaid, accidentally came to his death"

In his report, Mr. Ruegg said-

It will be noted that the jury did not find that the shot was fired by Maddison and did not say whether the explosion was caused by coal dust or not. When it is remembered that the jury contained a large element of men with practical experience of mining, this omission in the verdict is very significant of the attitude still held by miners with regard to coal dust explosions.

I think, if a circular was sent from the Home Office to the managers of all coal mines, pointing out that the Home Office has ascertained from its Inspectors and from reports, as to the danger of coal dust, and requesting the managers to bring this in turn to the notice of all miners engaged in the mine, it would be attended with considerable advantage.

I also think it would be advantageous if the Home Office required that every licensed shotfirer should have the General and Special Rules as to shotfiring printed on his authorisation form.

I would also recommend that the attention of the mine owners should be called to the risk of coal dust being carried into the haulage ways by means of the downcast shaft when, as was the case at the Wingate Grange Colliery, the coal is screened quite near the top of the downcast shaft.

My strongest recommendation, however, is that all main haulage roads should, as far as possible, be kept clear of coal dust. I think this should be made compulsory."

WAUNHIR TRIMSHARAN. Kidwelly, Carmarthenshire., 16th. February, 1907.

The colliery was the property of the Trimsharan Company Limited and was worked by means of a drift, 100 yards long which dipped 1 in 4. and there had not been a fatal accident at the colliery despite the fact that it worked the most dangerous and thickest seam in the district. As a journey of tubs full of coal weighing 9 tons. were being brought up, by some means unknown, one of the tubs tilted just as the journey reached to top and the hitching plate broke causing the remaining tubs to career down the slant just at the time that the men were making their way to the surface after finishing their shift.

Some of the men were knocked down and killed while the trams reached the bottom they knocked out props which caused a fall of roof 6 yards long which buried 11 men in the debris.

Those who lost their lives were-
Benjamin Davies aged 30 years, of Waenyglyn,
Albert Lilley aged 18 years of Kidwelly,
John Rees aged 16 years of Capel,
David Lodwick aged 28 years of Waenyglyn,
David Davies of Pwll and David Price of Trimsharan.

The inquest was held by Mr. D.A. Sanders when it was stated that there were six manholes on the slant which was 11 feet high and 5.5 feet wide. The strain on the plate was about 7.75 tons and the total weight of the coal wagons was 8 tons. 12 cwt. The safe working load would be about six tons this.

Thomas Evans who had been manager of the colliery from September, 1904 and was previously undermanager at the Gwendraeth Colliery, said it was the duty of the riders to couple up the trams and make sure that a bar was placed at the end of the journey. He had known a bar to break. This had happened about 15 months before when the journey ran about 130 yards down the slope. This incident occurred at the same place where the present accident occurred. From questioning by Mr. Dywer Lewis, the Inspector it was established that there were only two bar hooks in the pit and the manager admitted that it would have been an advantage if there had been one at each parting.

The coupling plate was made of white steel secured by four rivets. It was the duty of the mechanic to inspect these plates. There were some new trams introduced about eight months before but the plate that snapped was on an older tub.

J.D. Daw, engineer, inspected the hitching bar and came to the conclusion that it was continually strained when it came to the top of the brow due to the angle over which the journey had to pass. The continually passing over this point would weaken the bar and he was doubtful of the accident would have been prevented by inspection.

John Treherne, the rider of the journey, said that he had been doing the job for two years and a few months before he had sent up a journey without a bar and had been censured by the manager. On the day of the accident he did not put the bar and hook on because he did not have one. It had been sent up on the previous journey and had been lost on the slant. There was another about 100 yards away but he did not have time to go and get it as they wanted to finish work before 1 p.m.

Mr. Lewis said he had no criticism of the bars that were used but he was critical of the angle of the brow which was too acute.

The Coroner summed up and told the jury that Mr. Robson, the previous Inspector, some time ago had tried to get rules established with regard to hooks and bars but there was a great deal of opposition. The Coroner thought the management of the colliery wanted a bar and hook to be used on every journey.

A verdict of 'Accidental Death' was returned and the jury said no person was responsible of the accident but recommended the arrangements suggested by Mr. Lewis should be adopted, especially the lowering of the angle at the top of the slant.

GENWEN. Llanelli, Carmarthen. 5th. March, 1907.

The colliery was the property of ?? and consisted of two shafts which were 10 yards apart, one upcast and one downcast, which were sunk to the Four Feet seam at 76 yards in the downcast and 90 yards in the upcast. The downcast was the pumping pit and was fitted with a Cornish engine, pump rods and columns of pipes which took the water to the surface. A large hand crab and steam engine was available to raise men through the shaft if it was required and there was a ladderway in the shaft.

The officials at the colliery were Mr. Harry David, certificated manager, Mr. John Benyon, certificated undermanager, Messrs John Evans and Benjamin Evans, firemen. There were shifts of miners or miners and trammers constantly in the pit and the arrangement of the attendance of the firemen meant that there were three hours, from 5.30 to 8.30 a.m., when there was no fireman in the pit, Mr. Benyon examined the faces of both headings about 4 p.m. on the day of the explosion and found that all was safe then.

The upcast shaft wound coal and was fitted with cages in which the men ascended and descended the pit. Close to this shaft there was Waddle Fan, 25 feet in diameter which worked at 45 r.p.m. and delivered about 13,142 cubic feet per minute through the mine. This figure was the last measurement before the explosion.

The Four Feet seam which was worked at the colliery was in the Upper Pennant Series, a series which contained more fully developed coal seams in the Llanelli district than in any other part of the South Wales coalfield. The average section of the seam was a shale roof, 2 feet 9 inches of coal, 1 inch of soft shale, 3 feet 3 inches coal, 1 inch soft shale, 1 foot coal, and a fireclay floor.

The colliery was small and employed only 37 men at the time of the accident, 26 of whom worked underground. The mine was worked by three shifts of miners and all were engaged in driving a pair of narrow headings, 17 yards apart with 'topholes' or connections between them for ventilation. The faces of the headings were about 1,364 yards from the shaft.

The intake air went down the pumping shaft, down an inclined road dipping 25 degrees to the north, on to the upper of the two parallel headings and along this road to the last holed top hole. It returned by the lower level which was also the haulage road along which the coal was drawn by horses. The working faces of the level and the top holes were ventilated by canvas brattice sheet tubes, 18 inches in diameter from the levels and 15 inches in diameter for the inbye top hole. The air was properly conducted to the faces and the fan had ample ventilation power. Both the levels had a large sectional area and were well driven and timbered. The coal was got without blasting and there was no question of the explosion being caused by explosives.

Bonneted Clanny flame safety lamps were used and were locked by a screw. It was well known that this type of lock could be opened with a simple tool and relocked without fear of detection. This method was universally condemned by the Mines Inspectors but it had never been declared illegal but progress had been made and at the time of the disaster, only nine percent of lamps in the Swansea District were locked by this method.

The lamps were kept in a small room near the top of the upcast shaft but no lampman was employed to oil, clean, repair and keep the lamps in good order as was required by the Special Rules. The miners looked after their lamps and took them, unlocked, to a station underground where they were examined and locked by the fireman. The station was in the intake airway, but to reach it the men had to descend the pit and travel 76 yards in the return and it was possible to travel by the return to the face without going through the lamp station. To comply with the 4th. general Rule, the station should have been at the surface.

The separation doors between the intake and the return were not doubled but consisted of a wooden door and a canvas sheet. This again, was a breach of the rules.

At the time of the explosion the seam was producing gas freely at the face of the headings but for about two thirds of the distance of the headings no gas was to be found. To keep the faces gas free, the ventilation pipes had to be kept about three yards from the face and any derangement of the ventilation resulted in a rapid build up of gas.

At the inquest the undermanager and fireman stated that gas had been found on several occasions but no report appeared in the report books. It was said that gas that was cleared by the pipes need not be reported. On 9th. November, 1906, Mr. F Napier White, Assistant Inspector found gas while accompanied by the manager and the undermanager in the face of the upper level and in two places in the lower level.

The explosion occurred about 6.15 p.m. when only four people were in the mine who were miners employed at the face. At this time, the only person At the surface was the winding engineman who 'felt a tremble' and saw smoke and dust coming from the fan. He summoned Mr. Benyon, the undermanager who lived nearby and Benyon and four others went down at once to see what had happened, Benyon left a labourer, Calan, in charge at the pit top with instructions not to allow anyone down without Benyon's permission.

This party found no disturbance at the pit bottom and the separation doors, which were in crosscuts 26 and 76 yards from the shaft were not disturbed. Afterdamp was detected in the return air and they had some difficulty in getting through to the intake where the air was clear and taking its proper course. They found the first indications of the force of the blast on the upper heading near the junction with the slant where timber was blown out. they proceeded without difficulty to the 10th. tophole in which the stopping had been blown out which was causing the air to short circuit.

The undermanager saw that assistance was required and materials needed to restore the ventilation and sent a man named Phillpots to the surface for help. In this way the instructions that he had given Calan were set aside and for some time after men descended indiscriminately.

Phillpots returned with five men whom he guided to the undermanager. Shortly afterwards twelve others went down including some men not belonging to the colliery and without instructions or guidance. These men instead of going into the intake, proceeded down the main slant. They met the afterdamp which was being forced out as the ventilation was being restored. They were all seriously affected, rendered unconscious and had to be carried from the pit.

By 8 p.m., David Poyntz, the regular banksman was at the pit head and took charge from Calan. Roderick Davies and Edward Harry asked leave of him to go down. he ultimately consented although he used considerable persuasion for them not to do so. Mr. David Harry, the manager, arrived between 9 and 10 p.m. and went down the pit without making any arrangements for the safety of the explorers.

About 11.30 p.m. Mr. Knoyle, the manager of the neighbouring Broadoak Colliery, arrived and took charge of the arrangements at the surface. He saw that the fan was working properly and placed a man in charge of the lamp room. he also gave orders to the banksman not to allow any one down without his orders. He arranged relays of explorers and instructed them how to proceed and sent guides with them. He also made arrangements for the men who were suffering from the affects of the afterdamp.

About 3 a.m. he was told that Davies and Harry were missing and he at once took steps to prevent others going in by the return. Davies and Harry lost their lives.

Mr. Atkinson, the Inspector commented-

"Great credit is due to Mr Knoyle for his able assistance and of the steps he took to organise the exploration had take place earlier, the two explorers would not have lost their lives Whist credit is due to Mr. Benyon, the undermanager, for the energetic way in which he conducted the exploration, it would appear that his anxiety to reach the men at the face of the headings caused him to overlook the danger of other explorers trying to travel along the return airway."

Mr. Lewis, the Mines Inspector and Mr. R.G.M. Prichard, Assistant Inspector arrived at the colliery and having gained all the intelligence they could about the situation, formed a party of explorers. The ventilation in the upper heading had been restored for about half the distance to the face and temporary stopping had been erected in the top holes.

The parties of explorers worked for four hours and then were relieved as falls were overcome and the firedamp gradually cleared away. Early on the morning of the 7th, the body of Llewellyn Evans was reached. He was lying full length, head outwards on the lower side of the upper heading, fourteen feet outbye from the last tophole. The bonnet of his lamp was found five feet from him on the other side of the roadway. The oil vessel was missing and was found, covered with small coal at the top of the ventilating top hole.

Shortly afterwards Thomas Howell was found in the top hole. He was found on his knees, leaning forward with his head on the ground covered by his hands. The upper part of his lamp was found near to him and the lower part found a few feet away later.

The explorers worked their way up the top hole and reached the lower heading where they found David Phillips and David Thomas, 28 yards outside the tophole. They were within two yards of each other and appeared not to have moved from where they were believed to have been working before the explosion. Their lamps were found lying close to David Phillips. One lamp was tightly locked but the other could be opened with a little effort. All the bodies were burned.

A few hours later explorers travelled down the return airway from the shaft bottom and recovered the bodies of Roderick Davies and Edward Harry. They ere found 182 years inbye of the bottom of the slant on the lower level. They were eight yards apart and their lamps were found close to them.

The Inspectors made a careful examination of the explosion area on the 13th. when all the firedamp had been cleared. They found that the force of the blast probably travelled most of the upper heading and spurts had been blown up in the lower heading as the stoppings had been blown away, there were two large falls and several small ones on the upper heading where the timber had been blown away. From the ventilating tophole inwards, a little coked dust was found o the upper side, a few yards beyond the tophole and a charring of the surfaces of the timbers nearest the roof at the head of the ventilating tophole but the face was clean and the coal quite bright. The brattice tubes had not been displaced and no force what so ever exerted beyond blowing down the canvas sheet fixed across the roadway outside the tophole. Portions of the sheet were found 20 feet outbye of its original position.

On the lower heading there was some evidence of force right up to the face where there was a fall. The brattice tubes which hung near the roof had all been blown down and the surfaces of the timber and coal covered with a sooty deposit up to and over the face. Outwards from the fourth tophole from the face a large force was evident. Flame had travelled to within 200 yards of the slant and outbye of this the flame had been stopped by the wet conditions.

Immediately before the explosion all the men had been away from the face having their meal and those in the upper heading were probably returning to the face when the explosion was started by one of the open lamps they carried. It was not possible to say what caused the gas to be present but this could have easily been brought about by a displacement of the ventilating sheets.

Those who lost their lives were-

Llewellyn Evans,
Thomas Howell,
David Phillips,
David Thomas and the two explorers,
Roderick Davies and Edward Harry.

The inquest into the men's deaths was opened by W. Buckley Roderick Esq., Coroner fro the Honor or Lordship and Liberty of Kidwelly on the 7th. March when evidence of identification and cause of death was taken. the inquiry took place on the 22nd, 25th. and 26th. March. when all interested parties were represented.

On conclusion ofthe evidence and after a careful summing up by the Coroner, the jury were asked to consider their verdict. After and hour and three quarters they returned the following verdict-

"1). The cause of death in the cases of Thomas Davies, Llewellyn Evans, Thomas Howells and David Philips was burns and injuries caused by an explosion of gas and inhalation of carbon-monoxide gas.

2). The explosion was caused by a sudden emission of gas coming in contact with the naked light of one of the open lamps.

3). There was not sufficient evidence to show which lamp

In the cases of Roderick Davies and Edward Harry the jury find the cause of death was the inhalation of carbon-monoxide gas.

We return a verdict of 'Accidental Death' in all cases."

The inspectors thought that the explosion could be accounted for by other factors other than a sudden emission of gas.

For the breaches of the Rules, proceedings were taken against the manager at Llanelli Police Court on the 1st. May, 1907 when he was convicted and fined £5 and costs in each case.

The report concludes-

"The explosion resulted in serious financial loss to the owners, as, whilst the mine was being reopened, a fire due to spontaneous combustion was found to have broken out in one of the large falls of coal in the upper heading, 200 yards from the face and the conditions were so dangerous that the owners decided to abandon the colliery."

FOGGS. Tyldesley, Lancashire. 4th. October, 1907.

The colliery was owned by Andrew Knowles and Sons Limited and the accident occurred as ten men were being taken up the pit when their cage collided with the descending cage. The rope drew from the capping and the Owen's safety catches did not hold the cage which fell to the bottom of the shaft killing all the men.

The shaft in which the disaster occurred was the downcast and was very old. It was 10 feet 6 inches in diameter with the two cages back to back running on pitchpine conducting rods which, when they were new, were 5 inches square. The bearers, buntons or horse trees were of American Oak, 5 inches square and placed 15 feet apart. Before Easter, 1907, the two cages were single decked but at that date, double deck cages were fitted. There were two shoes to each end of the cage, one at the top and at the bottom, guiding the cages by the conductors.

The cages were 6 feet three inches long, 3 feet 5 inches wide and 10 feet deep. The top deck was 6 feet high and the bottom deck, 4 feet high. Where the cages passed each other in the shaft, at the meetings the clearance was three and half inches. Owen's safety catches were provided on each cage to grip the conductors in the case of the rope breaking or the becoming detached from the cage. The winding engine was a single cylinder vertical engine with the valves worked by vertical tappet rods. The ropes were attached to the cages by cappings, 2 feet 6 inches long, formed by turning back the wires of the rope end to form a bulge, taper wedges on each side, the whole enclosed by a three hooped iron capping.

The winding engine was described as an old fashioned one with a single vertical cylinder. The drum was hidden from the view of the engineman and was fitted with a steam brake which was in working order at the time of the accident. Mr. Redmayne stated that-

"One is frequently able with this type of engine when riding in the shaft, to determine the 'dead' points of the stoke, specially when going slow, owing to the variation in the speed, which imparts a somewhat jerky motion to the cage and I found this engine no exception. It was customary when just about bringing the cages to meetings for the engineman to partially cut off the steam."

The accident happened just after four in the afternoon which was the time the men started to ascend the pit. The onsetter at the bottom, Jacob Fletcher, had sent away six cageloads of men. The cage was on the Office side of the shaft and the descending cage on the Canal side. Two of the men who came up in the last cage on the Office side. Albert Smith and James Cowburn said that they observed nothing unusual. At the time of

the accident there were 10 men in the upper deck and two full tubs in the lower. There were four empty tubs in the descending cage. The first indication that something was wrong was a metallic sounding crash heard in the shaft followed by a second as the descending cage crashed into the wooden scaffolding and into the sump.

The winding engineman noticed an oscillation of the rope but felt nothing on the engine and he ran the cage about 20 yards before he pulled up the engine. They heard a crash and when they went to the door of the engine house, he saw that the rope on the office side was off its pulley. The banksman heard the collision and described it '*as like a gun going off*' and also noticed that the rope was off the pulley.

After the accident. Britland, Greenhalgh and William Angrove went down the shaft in a pit-box, slowly lowered by a capstan engine down the office side and when they were about 20 yards above the meetings they found the end of the rope that had been attached to the descending cage drawn from its socket and dangling loose. A little further down they found the descending cage leaning over from the canal side to the office side of the shaft, its openings upwards and the four empty tubs still in the cage. Not being able to pass the cage they came to the surface.

Another party consisting of the colliery manager, Mr. Jones, Britland, Greenhalgh, Angrove and Baxter made a descent and decided to straighten up the cage. This they did and a third party made up of Britland, Morris, the enginewright and the manager then went down when Britland observed that part of the No.3 conductor had penetrated the bottom of the hanging cage. He pulled out a piece about half a yard long and nearly all the remainder was missing

Those who died were-

John Bithell snr. aged 58 years, collier,
Alfred Thomlinson aged 43 years, collier,
James Mullineaux aged 42 years, collier,
James Berry aged 28 years. collier,
Peter Bleakley aged 23 years, collier,
John Bithell jnr aged 27 years, drawer,
William Taylor aged 28 years, drawer,
William Bond aged 60 years, dataller,
Thomas Yates aged 18 years, dataller and
John William Lambert also known as Baldington, aged 37 years, collier.

The inquiry into the accident was held at the Town Hall Bolton on 18th. December. After the accident it was found that the rope of the ascending cage was hanging free with the wires pulled out of the capping. the descending cage was ten or twelve yards below with its bottom wedged against the sides of the shaft with a broken wooden conductor end protruding through the bottom. The top of the cage leaned over towards the centre of the shaft. Four wooden conductors were broken for a distance of 30 to 40 feet at the meetings.

Mr. Gerrard, the Inspector, said-

"In my opinion the colliding of the cages was caused by one of the wooden conductors rods breaking from the vibration of the ascending cage, one of the cages became free and very shortly before meeting the other cage, so the shock of the two cages to that extent coming into collision drew the rope from the capping. Owen's catches failed to hold the cage, it fell to the bottom of the shaft. Instances are on record of these catches operating successfully and failures are also on record. In this cast the wooden conductors, having broken, or the derangement of one of the iron cage rods from the collision or from the detached capping, safety hook and cage chains falling thereon, may have hindered the catches from, operating."

Mr. Gerrard went on-

“The cause of the accident was simple, the remedy if simple. The distance between the bearings, 15 feet was too great by introducing bearers half way between, so reducing the distance by one half, the vibration of the cage is reduced and therefore less chance of a conductor being broken. If this were done for a distance above and below the place where the cages pass, the travel of the cages would be safer. This has been proved at more than one shaft in the district, notably in the shafts at Mossley Common.”

SEVEN SISTERS. Merthyr, Glamorganshire. 10th. November, 1907.

The colliery was the property of Messrs. Evans and Bevan of Neath and an explosion at the colliery killed five men and injured three others. The colliery had two shafts, an elliptical upcast, 12 feet by 9 feet and a downcast which was 14 feet in diameter. Both shafts were sunk to the Nine Feet Anthracite coal seam which was found 200 yards from the surface. The downcast was used for winding coal and the upcast for winding only men

The ventilation was provided by a Waddle fan, 30 feet in diameter at the upcast shaft. the fan ran at 62 r.p.m. and circulated 58,830 cubic feet per minute through the workings at a water gauge of 1.7 inches. The colliery employed 407 men employed underground and 37 on the surface. The mine was worked exclusively by safety lamps and the coal gave off gas very freely. Before the explosion there were 85 screw locked, 237 lead plug locked and 101 pneumatically locked lamps in use by the workmen and 12 screw locked firemen's lamps, 2 Gray No.2 screw and six Wolf magnetically locked lamps used by the officials. After the disaster the screw locked workmen's lamps were replaced by lead plug lamps.

The manger was assisted by an undermanager, two overmen, four firemen and four shotmen during the day shift and two overmen and four firemen during the night shift.

On the 10th. November, a party of repairers entered the East Side workings in the charge of and accompanied by William Smith, fireman, Owen Gethin, bratticeman and authorised shotman. It was proposed to repair a part of the main return airway near the place where Gethin was later found, dead and the work had been commenced by two repairers. Owen Gethin was also employed at the place, renewing and setting brattice along a new opening intended to cut off a portion of the return airway. This work had disturbed the nature of the roof which, it was found, was difficult to keep in good repair.. Evan Jones, haulier and Phillip Williams were filling timbers for the use of the repairers, into a tram in the return airway. William Smith fireman was examining the main Barry heading and testing for firedamp in a cavity. The gas in the cavity fired at his lamp and there was an explosion. He was badly burned by succeeded the haulier and his assistant further outbye on the heading. These men were not seriously burned. Smith helped these men to grope their way along the engine plane to a place where the repairers met them at the junction of the Barry main road with the main straight dip of the engine plane.

The repairers in the return airway saw no flame but heard the report of the explosion and saw smoke from burning timbers travelling in the air. They decided to leave by the return airway and arrived at the junction of the two engine planes shortly before the fireman and the injured men arrived. The repairers were not injured and gave assistance to the injured to help them to the bottom of the shaft.

After the injured had reached the surface they were taken home and given medical attention. At the pit, an exploring party was organised and found the woodwork of the door and some timbers supporting the roof on fire in the Barry Main Level. The fires were extinguished and the party went on and found the Wolf lamp which had been used by William Smith, the fireman, a few yards outbye of the cavity in the roof in which he had been testing for gas. They saw that the oil vessel had not been screwed up far enough to engage the spring bar locking device which left a gap of about one quarter of an inch.

They discovered two more fires and extinguished them. Each of the fires was found near cavities in the roof. The ventilation was restored and a search was made for Owen Gethin who was found in the return airway. An air door was then closed to allow the workings south west of the main road to be cleared of firedamp and explored. The work was directed by William Williams, undermanager, Morgan Hugh Jones and Evan Harris, overmen. The air door was closed by the men and they proceeded up the main south west heading as the firedamp was being swept away by the air current. They had reached the first heading to the south side when another explosion, more violent than the first occurred. The overmen were killed and two others injured. Their bodies were found on Monday night under a large fall of roof. The second explosion was probably caused by a small fire lurking in part of the district which could not be explored. There were several indications of fire when the district was explored after the second blast. The first explosion was caused by a Wolf lamp improperly used by the fireman.

Those who lost their lives were-

Owen Gethin aged 55 years, shotman,
Morgan Hugh Jones aged 33 years, overman,
Evan Harris aged 39 years, overman,
Phillip Williams aged 17 years, collier and
Edward Jones aged 45 years haulier.

Mr. Lewis commented:-

“A small safety lamp testing apparatus was placed at my disposal and, accompanied by the owner and the manager of the colliery, as well as by two representatives of the Wolf Company. I made several tests of the lamp in the exact condition it was used by the fireman. In each case the outer gas was ignited. When the lamp was properly screwed up and the lock engaged, the behaviour of the lamp was all that could be desired, and no ignition of the outer gas took place. The safety lamps used by the workmen were all examined carefully after the explosion and were found in perfect condition except one screw locked lamp, the screw of the oil vessel having been so badly worn, that the vessel and the upper part of the lamp could be put together without any screwing up being required. This lamp should not have been used. The manager prosecuted the fireman for having an unlocked lamp in the mine and the surface lampman for permitting a defective lamp to be given out. Convictions were obtained in both cases.”

BARROW. Barnsley, Yorkshire. 15th. November, 1907.

The colliery was owned by the Barrow, Hematite Steel Company, Limited and the cage accident caused the deaths of seven men. The shaft in which the accident occurred was 17 feet in diameter and was an upcast which was used exclusively for winding men to and from the Parkgate, Thornccliffe and Silkstone seams at 372, 410 and 480 yards respectively. There were two cages in the shaft each running on three wire rope guides. A balance rope was attached to the bottoms of the cages which, according to all accounts, ran with remarkable smoothness.

The shaft was a large and there was ample clearance between the cages and the sides. To bridge the 12 inch gap between the cage and the mouthings on the insets, where there were two stagings, hinged sheets of iron were fixed to the edge of each staging. They were known as ‘flags’ and were fitted with two spikes which dropped into holes in the decks of the cages and so anchored it. The man in charge of the top stage, which was 6 feet above the bottom stage, gave the signals and was solely responsible for this operation.

On the day of the accident, a cage containing 17 men, 12 on the top deck and 5 on the bottom was lowered from the Parkgate to the Thornccliffe seam, 38 yards below so

that a man in the top deck could get off at the Thorncliffe and then the rest of the men raised to the surface. The man stepped across the space at the top staging without waiting for the flag to be dropped and the onsetter gave the signal for the cage to be raised without making sure that everything was all right at the bottom staging. In the mean time the onsetter on the bottom staging had dropped the flag without telling the top onsetter. The result was that the cage was raised by the engineman in response to the signal.

It was held for a moment by the spikes of the flag and when it swung free, it oscillated so violently that it struck the girder of the Parkgate inset and another girder above before the engineman could stop the engine. Seven of the men were thrown out and fell to their deaths down the shaft.

Those who died were-

Frank Dobson aged 40 years, chargeman of the staple pit,
Walter Lewis Goodchild aged 35 years,
Thomas Rathmell aged 23 years, hanger-on,
William Adams aged 28 years, brakeman,
Isaac Farrar aged 20 years,
Thomas William Jennings aged 18 years haulage lad and
Byas Rooke aged 22 years, haulage lad.

The Inspector, Mr. Pickering, commented-

“Both onsetters were to blame for the accident, for both were in too great a hurry to get the cage away. The rope, capping and shaft fittings were in excellent condition and of first class materials and stood the enormous strain placed on them. This saved the lives of the rest of the men in the cage. The cage was crumpled with the impact and the fence chains at the ends broken, but it is quite possible that some of the lives might have been saved if the cage had been fitted with properly designed gates.”

The inquest into the deaths of the men was held by Mr. Maitland, the West Riding Coroner and the jury returned the following verdict-

“That the seven men met their deaths through negligence, being thrown out of the cage to the shaft bottom, owing to the flat sheet being fast to the lower deck when the cage was signalled off. The two hangers-on were guilty of carelessness and negligence, but not criminal negligence, and are very censurable.”

A formal inquiry was conducted by Professor Redmayne under Section 45 of the Coal Mines Regulation Act, 1887 which found that the accident was caused by the ‘carelessness and hurry on the part of the two onsetters.’

The ends of the cages were subsequently fitted with gates and it was noted that the agent had decided to do this before the accident.

WILLIAM. Whitehaven, Cumberland. 26th. November, 1907.

The colliery was worked by the Whitehaven Colliery Company and at about 1.50 p.m. on Tuesday 26th. November an explosion occurred in a stone drift known as No.6 or Taffy's Drift which was being driven from the air intake and endless rope haulage road leading to the Lowca and Countess districts in the workings which were under the sea in the Main seam at the colliery. As a result five men were killed and seven were injured.

There were 623 men and boys employed underground at the colliery. 369 hewers in three almost equal shifts which were worked as follows, the morning shift from 6 a.m. to 3 p.m., the afternoon shift from 2 p.m. to 11 p.m. and the night shift from 10 p.m. to 7 a.m. The others that were employed underground were the putters or trailers, haulage men, joiners, drifters or stoneman an officials which were spread over the various shifts.

The only seam that was in production at the colliery was the Main Band which was a 9 foot thick seam which gave a daily output of 800 tons of coal. The downcast shaft was the drawing shaft and was 12 feet in diameter and sunk to the Main Band, 200 yards below, near it was the upcast shaft 13 feet in diameter and sunk to the same depth of the Main Band. At the top of the downcast there was a Walker's Indestructible fan which exhausted the air from the mine at a rate of 115,000 cubic feet per minute. Both the shafts were sunk 76 yards further down to the Six-quarters Band. The seams at the colliery dipped to the sea westward and encountered several upthrow faults so that the depth from the sea bed at the point where the explosion occurred was approximately 202 yards with the depth of the sea at high water being 80 feet.

The haulage system was by endless rope with the rope running below the tub. There were also self-acting inclines with hand-trailing or putting. There were no horses or ponies in the mine. The endless rope travelled at about 3 m.p.h. and sets of 20 tubs with a clutch bogie at each end of the run intervals. The workmen rode inbye and outbye over certain lengths of the rope road. One rope 13,599 yards long extended as an endless rope haulage from the shafts into the Countess District. The haulage of the Delaval and Lowca Districts was performed by compressed air engines stimulated at a point called the friction gear.

Except near the downcast shaft where there were acetylene gas lights, there were no other lights in the mine except locked Marsaut lamps, magnetically locked and fitted with electric relighters. Twelve electric relighters were placed at different points in the workings and there was one at the bottom of the No.6 drift.

No explosives were used in getting the coal but it was used in driving the stone drifts. Saxonite, which was a permitted explosive, was fired by No.6 detonators by an electric battery.

In order to replace a section of the haulage and intake road which included a right angle return and had a small cross sections at various gradients, it was decided some years before to make a new straight road with a larger cross section and a uniform gradient. The road was started from the inbye end and was known as the No.5 drift and was driven with a dipping gradient of 1 in 17 for 900 yards. Some water was encountered and the operations were suspended in June 1904. The water filled the drift for 100 yards from the face and the road remained in this condition until August 1907 when the water was pumped out by a compressed air driven pump. No.5 drift left engine the plane and for 450 yards was driven directly beneath it, the distance gradually increasing until the drift turned more to the north.

From the inbye end, the drift known as Taffy's drift or No.6 was started about eleven months before the explosion and had been driven for 438 yards which left 150 yards to be excavated to complete the road. At the time of the disaster operations were being carried on from this end. The drift was being driven by a contractor, Mr. Rowland William which found all labour and put in all timber and girders. He had eighteen drifters employed at the face and twelve hands for taking away stones. These were spread over three shifts and there was usually an interval of an hour between shifts when no men were actually at the face. The outgoing shift passed the incoming in the haulage road.

There was a hand worked fan in the drift and the men working in it were understood to change at the fan being paid overtime for doing so. They were employed and paid by the Colliery Company and the Company's officials inspected the drift in accordance with the General and Special Rules and a shotfirer for each shift was provided and paid for by the Company which also provided the explosive and stemming clay.

The 'station' was at the foot of the drift at a point known as 'McAdam's turn'. The haulage road from which the No.6 drift started was started in stone and rose at a gradient of 1 in 17 which was almost the same as the rise of the strata and the drift did not cross cut and rocks until it crossed a fault at 200 yards. The fault had an upthrow of 36 yards in the direction in which the drift was being driven. Before reaching the fault there was no coal in the drift, but after crossing it was associated with two coal seams,

an upper on 17 inches thick which was either in the roof or just below it and a seam 7 inches thick, 6 feet below the upper one which was either removed in forming the drift or was just below it.

There were workings in the Main Band above Nos. 5 and 6 Drifts that had been abandoned 25 years before and above the inner portion of the No.6 drift, the pillars had been partially robbed. No.6 Drift was completed to its full size, thirteen and a half feet wide by seventeen and a half feet wide. For about 200 yards from the start of it, the roof was supported by iron girders resting on props at each end and lofted above. Further on it was continued for about 238 yards, 10 feet wide and 5 feet high and timbered with legs and wooden crowns, the intention being to make it full size later.

Two hundred and ten yards from the bottom of the drift there was 14 inch incline wheel and up to this there were two sets of rails laid to form a self-acting incline. The loaded tubs of stone from the face ran on the south side. From the top of the incline to the face, the tubs, which were ordinary coal tubs were run by hand.

At the time of the explosion the No.6 Drift was ventilated by a range of iron air pipes which acted as the return airway. There were two entrances to the drift separated by a small triangular pillar. One of these entrances was a curved road called the 'shunt' which led outbye and was used to bring out the loaded tubs of stone and a split of fresh air which reached this point passed into it, up the drift and back down the iron pipes. To divert some of the air current into the drift, a canvas sheet extended to within 1 or 2 feet of the floor was hung across part of the haulage road lying between the two entrances of the drift. The other entrance to the drift, the continuation of the drift itself, was closed by a brick wall 14 inches thick. In there was a wooden door five feet by four and a half feet which opened towards the face of the drift and through it rails were laid to bring the empty tubs into the drift. At the upper left hand corner of the wall two iron pipes 16 inches in diameter were inserted. One was not extended and closed off with canvas and the other continued on the left side of the drift in 6 foot lengths fitting into each other with joints sealed with putty and carried near the roof by wire attached to the girders and crowns. The pipes continued as 16 inch pipes for 239 yards and then were carried on as 20 inch pipes for 136 yards to a hand fan 56 yards from the face beyond which they were continued as 20 inch pipes for 51 yards. At the time of the explosion they were within 15 feet of the face of the drift.

The air ventilating the drift joined the current it had left met the outbye side of the canvas sheet. The hand fan was 18 inches in diameter and 9 inches wide geared 11 to 1 and was placed in connection with the pipes so that it both exhausted air from the face and forced it to the other end of the range. A fan man was at the fan only when men were engaged or about to be engaged at the face of the drift. When the fan was working the handle revolved at about 44 r.p.m. and the fan at 484 r.p.m.

On the 24th. September 1907 an inspection was made of the working places and roadways leading to the Lowca District, the No.5 drift and the Lowca return and the two representatives of the miners employed at the pit reported that 'all was safe and in good working order'. On Sunday 24th. November work in the drift ceased about 4 a.m. At 5 a.m. James Bigrigg a deputy, was at the face and stated that it was clear of gas. He made a written report of his inspection. About 10 p.m. Bigrigg came on duty again and reached the drift with a fan man about 11 p.m. He examined first as far as the fan and found it clear he then called the fan man forward and the fan was worked for about three quarters of an hour. He then went to the face and found it clear of gas but he made no written report. The fan man was left in the drift and the other men came down about 10 p.m.. Bigrigg visited the face again at 5 a.m. on the 24th. and reported in writing that the face was clear. Soon after the ordinary workmen started work at the face.

On the day of the explosion Bigrigg examined the drift about 7 a.m. and found no gas. The fan man was at his post and no one was at the face at the time but the result of a round of shots lay ready to be cleared away by the next shift. He made a written report to say that all was safe and in working order. The oversman Wilson Graham, was in the

drift from 7.30 a.m. to 8 a.m. on the day of the explosion and also found it safe. The undermanager John Rothery was at the face shortly after the overmen and he also found nothing untoward.

The miner who worked in the Countess and Lowca districts were not allowed to ride on the endless rope road belong McAdam's turn or to the point where No.6 drift started as the manager did not consider it to be safe to do so. They had asked to be allowed to ride further inbye and the manager accompanied by the local Miners' Agent for the Whitehaven Collieries, and Mr. James Smallwood, a local check-inspector on behalf of the William Pit miners were down the pit on the morning of the explosion considering this request. The manager promised that when the new road was completed, an extension of the riding distances would be granted. at about 9.40 a.m. they visited the No.6 Drift face to see the progress.

At about 10 p.m. owing to the neglect of William Cowan to attach 6 loaded tubs to the incline rope, the ran amok and collided with some loaded tubs standing at the bottom of the drift. Cowan went to the face to report the mishap and the contractors' chargineman, Evan Evans and all the face men except one went to the bottom of the drift to put matters right. The one man remaining at the face was the shotfirer. Shots were ready to be fired as the tubs went down the incline.

Evan Evans was present when the holes were drilled and charged and he described them as follows-

"Two opening or sump holes started in the coal about the centre of the drift 2 feet apart and were drilled 6 feet inclining downwards and leaving the coal seam and also converging so that the ends of the holes were 9 inches or 1 foot apart in each of these holes six 4oz. cartridges of Saxonite were placed. To the right of these holes 5 to five and half feet deep were also drilled, starting with the coal and in the same line as the course of the drift and they were charged with five 4oz. cartridges to the left of the opening holes were two holes of similar depth and charge to those on the right. At each top corner of the drift was a hole four and half to 5 feet deep each charged with six or seven 4oz. cartridges. All the holes were stemmed for 9 inches to foot with clay."

Evans went on to say that he fired two sumping hole simultaneously and had left his watch at the face and retired to get it and saw Burns examined the face and found it free from gas. Evans the let for the bottom of the drift and was about half way down when he heard the third hole fired. He was close to the bottom of the drift when the explosion occurred and he was knocked over and rolled up in some discarded canvas from the inner gallery. He saw no flame but felt the heat although he was not burnt.

The face men who had preceded Evans to the bottom of the drift were busy with the wreck and two of them were killed by the violence. They were dead when found and both appeared to have died from fractures of the skull but the bodies showed no signs of burning.

At the time when Evans left the face to go down the drift. William Cannon and John Kirkpatrick, both of whom were injured and Joseph Kennedy who was killed remained in a refuge hole 125 yards from the face and a conversation took place in which they decided to stay there and put their clothes on until the next shift came down. While this discussion was going on and after some shots had been fired, Burns came back from the face and said that the last shot had not done it's work. He made up another charge in their presence and went down the face to recharge the hole and the others left to go to the bottom of the drift.

Thomas Moore one of the injured men, said aid he was at the bottom of the drift when he heard the third shot and he noticed that the door at the bottom of the empty road was open about 18 inches to two feet and it did not close again. When he tried to close it he found it jammed. He also said that the door was open 10 to 15 minutes before the explosion. William Cannon said he remembered seeing door open but closed it. Moore

saw Burns examine the drift for gas outbye from the fan and told him, "There is a bit there Tom".

The overman passed the foot of the No.6 drift about 1.25 p.m. and saw there had been a runaway set and hear the sound of shot fired in the drift. He went inbye to a cabin at the turn known as the 'friction gear' where there was telephone to the surface and two compressed air engines. He was in the cabin when the explosion occurred. He immediately came out when the air which had been reversed or checked by the explosion took up its normal course and was laden with clouds of coal dust. He thought there had been a large fall in the haulage road and he sent men in that direction to investigate. Soon after some men came out from the direction of the drift without lights and the overman went at once into the drift.

A riding set was standing on the haulage road at the foot of the drift waiting for the morning shift hewers and trailers, some of whom were near at the time and some on their way. A panic ensued among the men. Most had lost their lights and some ran inbye and some outbye. The dust raised on the haulage road nearly choked some of these people.

Word went to the surface by telephone and the Manager, who was in the office near the pit top and had just come out of the pit was soon at the spot. The drift was found to be full of afterdamp and nearly all the air tubes were blown down. No timber had been displaced and there were no falls in the drift. One empty tub was broken by the force of the blast and the body of Fitzsimmons was found under it. A short distance up the drift was the empty set and rails had been forced through the tub. Kennedy was found mixed up with the tubs above the wooden doors.

After removing the tubs and the two bodies and sending injured out on stretchers who were attended by Dr. Harris who had come into the drift, a new canvas sheet was hung across the haulage road and the wooden doors replaced by canvas. The air pipes up the drift were placed so that the bodies at the face could be recovered.

Progress was rapid until smoke was encountered which was being driven back by falls of roof which could be heard further in. This alarmed the explorers who feared a second explosion and preparations were made to build a brick stopping 60 yards up the drift. Eventually, 140 yards a sleeper 4 inches thick was found to be on fire and near it some burnt and smouldering brattice cloth. This was extinguished with water and the problem of the smoke receded.

Mr. Atkinson tested the air coming through the pipe at the end and found no gas but on going beyond the point where the pipes had been removed several of the workmen were affected. In a refuge hole a locked box of Saxonite cartridges was found. The bodies of the people near the face were reached about 7.20 p.m. on the day following the explosion. Burns, the shotfirer, lay between the tub and the right hand side of the road and his face was covered by his hands. Hanlon and Rowe were lying across the road against the inner tub. These men were severely burned.

An extinguished safety lamp was found besides the bodies and a cartridge box was ground under Hanlon's body. Two yards nearer the face was battery with the cable uncoupled but the handle still on. On the tubs coke was observed. When all the bodies had been recovered the area was thoroughly examined.

The men who lost their lives were-

Joseph Kennedy aged 22 years, trailer,
Alfred Burns aged 26 years, shotfirer,
William Hanon aged 30 years, drifter,
James Rowe aged 24 years, trailer and
William Vincent Fitzsimmons aged 22 years, trailer.

The inquest into the deaths of the men was held on the 27th. and 28th., November, the 3rd. December and the 7th. January 1908. After hearing the evidence the jury returned the following verdict-

“The jury are of the opinion that the five men lost their lives in the No.6 Drift, William Pit, by an explosion of gas, but how it occurred there is not sufficient evidence to show but we are also of the opinion that there was not sufficient ventilation.”

The inquiry also heard that when the hand fan was working the ventilation was satisfactory but during the fanman's absence on Sundays from about 4 a.m. to 10 p.m. gas accumulated at the face of the drift and it was usual to work the fan for an hour or so before work started. When work stopped it was assumed that there was gas at the face and the fireman did not make an inspection by the fan was worked for some minutes before work continued.

The ventilation of the drift came under the criticism of the inquiry and it was found that there had been breaches of the Coal Mines Regulation Acts 1887 and 1896. The breach of the rule on the part of the deputy in allowing workmen to pass the station on Sunday nights before they had made the statutory examination required by the Act had some justification, but Mr. Redmayne stated that-

“In any case they were clearly not justified in allowing a body of the workmen to pass the station until the drift had been found by them to be in a safe condition.”

DINAS MAIN, No.3. Gilfach Coch, Glamorganshire. 14th. December, 1907.

The colliery was the property of the Britannic Merthyr Coal Company Limited and was in the Little Ogmere valley. The owners also worked the adjacent Britannic Colliery and house coal at the Dinas Main Level. Mr. David Bowen Jones was the manager of both collieries. Mr. Enoch Jones was the undermanager of the Dinas Main Colliery and under him were two firemen, Joan Davis on the day shift and David Meyrick on the night shift.

At the Dinas Main Colliery over 100 men were employed underground of whom about 93 were on the day shift and from 10 to 15 on the night shift. There was only one seam worked, the No.3 Rhondda which was a house coal which, at the shaft was at a depth of 79 yards.

The Dinas main shaft was the downcast and winding shaft and was 11 feet by 7 feet in section. It was a wet shaft. The upcast was the Britannic Colliery south shaft, where there was a Walker's Indestructible Fan, 26 feet in diameter and 8 feet wide which produced ventilation for both collieries. With the fan running at 95 r.p.m. it circulated about 115,000 cubic feet per minute at a water gauge of 3 inches. Of this 22,500 cubic feet per minute went to Dinas Main. As well as the two shafts that have been named there was an outlet from No.3 Rhondda seam at Dinas Main by way of an inclined roadway to the surface which started near the shaft and came to the surface about 450 yards away. This road was known as the horseway.

The workings in the No.3 Rhondda seam consisted of an intake and a main haulage road extending from the shaft to the west for 2,500 yards to the engine landing or double parting. Beyond this there were horse roads to the working faces which comprised 26 working places. There were also a few workings in a branch district called the air-bridge heading.

On the main haulage road, the trams in journeys of from 15 to 12 were drawn by the main haulage and tail ropes by an engine near the bottom of the shaft. The return air road was to the south of the main intake and a considerable distance from it, until near the outer end, it approached the downcast shaft and crossed the intake to reach the upcast shaft.

There was a chamber in which there was a boiler on the north side of the main intake and haulage road, 1,160 yards from the shaft used for generating steam for a pump fixed 30 yards further in on the opposite side of the main road. The smoke from the boiler fire was taken to the upcast shaft by a small section road, called the flue, which ran parallel

to and on the north of the main haulage road for most of its length. Trouble had been experienced in raising steam from this boiler owing to the condition of the flue and it had been decided to replace the pump with an electric one. In order to fix the cables along the main haulage road it was found necessary to widen the road in certain places and this work was in progress, by blasting off the side, at the time of the explosion.

The colliery was worked with naked lights and gunpowder was used for blasting in coal and Saxonite in stone. It was stated that no firedamp had been seen in the mine for many years and none was detected after the explosion.

The mine was not dry and dusty. the inner parts of the haulage roads, the working faces and the return airways were wet or damp and free from coal dust. The only part of the mine which was dry was the main intake and haulage road for a distance of 1,700 to 1,800 yards from the shaft and this was the only part traversed by the explosion. Even in this part of the mine, there were parts that were wet or damp and it was stated that just before the disaster, there had been an accumulation of water on the road and the men had to be taken into work in trams to keep their feet dry but the roof and side of this haulage road were dry and dusty.

On Saturday the 14th. December, the day of the explosion, the day shift miners came out of the pit at or before 2 p.m. and about 1. 30 p.m. a repairing shift of A fireman and 11 others went down. About 2.15 p.m. a loud report was heard at the surface followed by smoke coming up the shaft. The bottom and cover of the cage at the surface were blown out and planks over part of the shaft were displaced which gave a man who had just come up the pit a narrow escape from falling down the shaft.

Mr. Bowen Jones, the manager, was on the scene in a few minutes and an attempt was made to descend the shaft but this failed as part of the timber brattice in the shaft had been displaced. Mr. Jones returned to the surface and with others, went into the pit by way of the horse way slant. the effects of the explosion were found a few yards before they reached the shaft where a door in the horseway was blown outwards. Smoke and some small smouldering fires were seen but were quickly extinguished.

The explorers went along the main haulage road for about 100 yards where they were stopped by a fall and had to return. They then went by the return airway to a point where it crossed the intake by an undercast air crossing. They passed through here into the intake again. the crossing had been demolished by the explosion causing the ventilation to short circuit and the intake beyond was full of afterdamp.

Some smouldering debris was found near crossing and steps were taken to restore ventilation and the exploration continued until the bodies of the seven men were recovered the next morning.

The men who were in the mine at time of the explosion escaped by the return airway. These men were led by David Meyrick, the fireman who acted with great coolness and good judgement. At the time of the blast he was near stables, 1,700 yards from the shaft. He was blown down, losing his cap, lamp and stick but soon recovered himself and being a naked light pit, he had means of re-lighting his lamp. first, he made an attempt to reach a haulier named Phillips who was about 50 yards further out in the main road but was unable to do so because of afterdamp. He then went in opposite direction to where his son was found half conscious, and brought him back to better air in road leading to the return airway. Meyrick also made an attempt to reach place near boiler, where three other men were working but this was not possible because of afterdamp. He then led the men out by the return into which the afterdamp had not yet reached. They reached the surface about 5.30 p.m.

Those who lost their lives were-
Nichols White aged 45 years, ripper,
William White aged 24 years, ripper,
David J. Miles aged 32 years. labourer,
John Jenkins aged 65 years, roadman,

Richard Evans aged 33 years, rider,
Watkin Evans aged 39 years, ripper and
William David aged 40 years, ripper.

As the victims lived in the districts of two Coroners, a joint inquest was held by S.H. Stockwood, Coroner for the Manor of Ogmere and David Rees, Coroner for East Glamorgan. Two theories were put forward as to the cause of the explosion. The first by the manager and mining engineers representing the owners was that the explosion was initiated by the ignition of firedamp by a naked light on the main haulage level but the Mines Inspectors thought the explosion caused by a shot of compressed gunpowder fired on the main haulage level.

At the conclusion of the evidence and a careful summing up by the two Coroners the following verdict was recorded-

“That the jury are of the unanimous opinion that Dinas Main Colliery Explosion, on the 14th. December, 1907, was caused by the firing of the so-called disputed shot igniting coal dust and the verdict is accidental death under those circumstances.”

In the opinion of Messrs. Atkinson and Lewis, the Inspectors, the cause of the explosion was the firing of a charge of compressed gunpowder which was probably stemmed with coal dust which ignited coal dust on the roads.

There were breaches of the regulations with respect to the use of explosives. The use of gunpowder or any other explosive other than permitted explosives was illegal on the main haulage road as the mine was not ‘naturally wet’ throughout and the use of coal dust to stem a shot hole was also illegal

The question arose whether the haulage road was dry and dusty. The manager contended that it was not and said that the dust that was found came from the flue but all indications were, that it did not. Mr. Atkinson commented-

“Exact experimental investigation on the subject of dust explosion is urgently needed and some means of convincing working miners of the danger would be also of the greatest advantage. There is little doubt that none of the men engaged about the firing of these shots at Dinas Main were aware that there was any particular danger connected with the operation.”