

breasts may have been driven farther than the map shows, or the coal may have run since the breasts were driven, and this would cause the pillar to be less than the width represented at the points where the cracking of the pillar occurred. It was the intention of the Delaware and Hudson Canal Company to have the workings re-surveyed, in order to test their accuracy, but they were prevented by the accumulation of water.

At the close of the year the Lehigh and Wilkesbarre Coal Company was preparing to apply for an injunction to prohibit the Delaware and Hudson Canal Company from filling the Conyngham mine with water, lest it might burst the pillar and damage their property. Additional account of this trouble will be given in the report for 1892.

A DISASTROUS EXPLOSION OF GAS AT No 1 SHAFT, NANTICOKE.

Shaft No. 1 at Nanticoke, is the property of the Susquehanna Coal Company. It is a double shaft having four hoisting cages, two of which are used to hoist the coal from the Forge or Hillman seam, and the other two to hoist the coal from the Lee or Red Ash seam, three hundred feet deeper than the former. The Red Ash seam is known at Nanticoke as the Lee vein, and the Hillman as the Forge vein. The Ross seam lying between these two, is not worked directly from the shaft, but is worked from a horizontal tunnel driven through the overlying rocks from the Lee seam at a point 1,440 feet south of the main shaft. In order to enable the reader to understand the circumstances of this accident, a map embracing the scene of the disaster is herewith furnished. The workings in red are those of the Lee seam and the workings in black are those of the Ross seam, which are connected to the Lee workings by a rock plane and a horizontal rock tunnel, and also by an underground shaft, designated on the map as the Bore Hole shaft. Thus there were three openings connecting the workings of the two seams. The Bore Hole shaft extends from the Ross east gangway to the Lee seam, a depth of 180 feet. It has two hoisting cages; the engines are located on the surface and the ropes pass down through bore-holes to the Ross seam over the shaft. A second opening for this shaft was recently completed, leading down the bottom of shaft and connecting to old workings near the door 3, the vicinity of the disaster, all in the Lee seam. Near the upper end, this second opening enters in the upper member of a lap-fault, while for a distance of about 50 feet a passage was driven down to meet it from 5 to 6 in the lower member of the fault and enters beneath the upper one at a vertical distance of about 12 feet. Connection was made at this point by a short rising passage through the rock (see fault). The passage from above (5 to 6) dipped at a pitch of about 30 degrees towards the fault, and the passage from the shaft up, was rising all the way and had an increased pitch as it approached the fault, terminating at the fault in a rising pitch of about 40

degrees. At the upper point of this passage where the rock-hole driven up through fault connected, a small quantity of gas was standing, which the air current in making a short turn from the rock hole failed to reach.

Preparations were being made to make this second opening the permanent return airway for the borehole shaft workings. Several wall stoppings had to be built in order to effect the desired changes in the courses of the air currents, which could not be effected with safety during working hours. Hence it was decided to have this work done between Saturday night and Monday morning, when the mine would be idle. By Sunday afternoon, November 8, all the wall stoppings were completed, except the one at B, which was not yet plastered. The two masons, Caleb Gething and Thomas R. Powell, were working at this wall when the accident occurred. Prior to this time an air current came in through the passage C and passed through B, but an opening was made at A leading directly to the return airway passing over the air bridge, hence B was closed as soon as A was sufficiently opened.

At about five o'clock p. m., William J. Williams, Sr., William J. Williams, Jr., Thomas R. Thomas, Edward D. Williams and Daniel R. James, were all at work cleaning a gob at A, which partially filled the passage. They were at the upper side and David T. Smith, Joseph Robofski and Thomas Bozak were throwing the gob back on the lower end towards B. The two masons, Gething and Powell, were plastering the wall B. Thomas Lloyd and the three fire-bosses, Henry R. Jones, William Jonathan and John Arnott, had gone back from the others towards C shortly before the accident. All had safety-lamps and no one used naked light. There was a strong current of pure air coming in directly from the main shaft and passing the men at A, over the gob which they were removing towards the air-bridge. Suddenly and unexpectedly the men at A noticed their lamps filling with gas, and instantly called one another's attention to it. All reached for their lamps and instantly they were surrounded by a burning flame which filled the whole passage.

One man, a Polander, who was unloading a car of rock some distance away escaped uninjured, but all the others that have been named, were either killed or severely injured. The three fire-bosses and Lloyd were found near the door at C. Arnott, Jonathan and Lloyd were evidently killed instantly. Jones lived about one hour, but was unconscious all the time. The others except Daniel R. James and Edward D. Williams died within forty-eight hours. The two named, after a period of intense suffering, finally recovered.

It is not known with certainty where the gas came from nor how or from whose lamp it was ignited, but it is reasonably evident that it ignited from one of the safety-lamps. The current of gas was swift, and a sharp movement of a lamp against it would cause the flame to pass through the meshes of the gauze. Smith and his two companions on the lower side of the gob at A would have to go against the current, and

if they made a move towards escaping, it was certainly made in that direction. Any of the others also might have moved a lamp quickly against the current, either of which under the existing conditions would most certainly have ignited the gas by the flame passing through the apertures of the gauze.

The gas may have accumulated at either the old breast marked on sketch "roof fallen" or at the lap or fault in the second opening. The old breast mentioned is only twenty-five feet long between the wall stopping shown, and its intersection with the passage A, B. The roof had fallen to quite a height, leaving a large cavity. The cross cut H, though hidden by a gob along the rib of the passage C, was open. The opening of the breast was also partially closed by gob along that side of the passage B. Owing to the existence of the gob a stranger would not be likely to notice the cross cut "H," nor the breast, but the fire-bosses knew of its existence and had been in it frequently prior to this time, making examinations. Yet the circumstances seem to show that they had overlooked it at this time. The cross cut "H" would have to be closed before the desired change in the course of the air could be fully effected, but it was not closed, nor was there anything showing an intention of doing so. The door at C was erected several days before, and was fastened open to prevent it being closed until everything was ready for the change. They had about six hours work to finish clearing the gob at A. Now the question is, did the fire-bosses take off the temporary stoppings 5 and 6 and close the door at C? If they did, and if there was gas in the old breast on top of the fall, the air current would pass through the cross cut "H" and move the gas upon the men at A; or, if there was a body of gas in the "lap fault," the air would also pass up the second opening and sweep that gas directly upon the men. Under these circumstances the gas may have come from either or both places. It is not known that the door was closed or that the stoppings 5 and 6 were taken off, but it is supposed that they were. The fire-bosses were all intelligent and were experienced in this kind of work, and in the absence of a motive we cannot conceive a reason for closing the door and effecting the change without taking the precaution of withdrawing the men from the path of the return air-current. This precaution is invariably taken when work of this kind is being done. Some contend that if the stoppings 5 and 6 were practically removed, the air current might have reverted in the second opening without closing the door, and unexpectedly to the fire-bosses. A careful study of the situation suggests the probability of it doing so under conditions that might have existed at that time, but subsequent experiment failed to verify this. It was indeed a deplorable accident occurring when it was thought that every chance for an accident had been foreseen and provided against. Nearly all the men were the best and most experienced for this class of work, and we cannot believe that it occurred through any recklessness on the part of any of them.