

burned in the No. 6 bord where Martin was found. I agree generally with the statements in the card produced, 'How to test for firedamp.' An average miner would not be able to detect the presence of gas in less quantities than 2 or $2\frac{1}{2}$ per cent. It would require careful practice to detect gas in less quantities than that. It is only in recent years that systematic tests have been made on the explosion of coaldust on the large scale.

"Q. Do you think that a competent manager ought to have known that dust was present in this mine in a dangerous condition and quantity?—A. I think very few managers would have recognized that dust existed in this mine in dangerous quantity, and unless they had been interested in the dust question and made experiments on it I do not think they would have been aware of the dangerous character of lignite-coal dust. Falls are sometimes produced by the gas-pressure. The variations in barometric pressure have some influence on the presence of gas in a mine, but not a very large influence. If a man were testing for gas by himself it would be a great temptation for him not to put the light in the lamp too low for fear it might go out. This would prevent it being an effective test for small percentages of gas. We went over the fall in No. 6 bord, but we could not get over the big fall in No. 5. In No. 5 there was a considerable accumulation of gas above where we were. It put my lamp out. If the gas were present in any quantity you could test for it by holding the lamp over your head, but not if it were present only in small quantities. You would then have to be level with the light. There could not have been a great accumulation of gas over the big fall when Wear inspected it on the 9th September, judging by his evidence. We did not inspect it until the 29th September. There was then some ventilation, which must have swept away some of the gas. On the 29th September no one could have stood on the top of the fall. I was only 5 ft. up when my lamp went out. I think if the old workings are left as open as they are now they should be treated with inert dust. No fresh dust is accumulating now, and one dusting with inert dust should be sufficient for a long time. Water would be always drying up.

"By Mr. Northcroft: Under 2 per cent. of gas would be too slight for even an official of the mine to detect with an ordinary oil-lamp. It would require to be a larger percentage of gas to be detected by holding the lamp above the head. I should think Wear might have detected $2\frac{1}{2}$ per cent. by holding the lamp a foot above his eyes.

"By Mr. Napier: To secure safety by the use of inert dust it is necessary to mix with the coaldust an equal weight of finely divided incombustible dust so that the dust-cloud raised into the air by a blast or concussion will contain rather more incombustible than combustible matter. Such a dust-cloud cannot be ignited by the flame of a blown-out shot or by a small gas-explosion.

"By Mr. Bennie: The percentage of firedamp in air must be at least 5·6 before you have an explosion. I do not suggest that a blown-out shot caused the explosion on the 12th September, as I understand no shots were fired that morning. All the evidence seems to me to point to the fact that the explosion was caused by the ignition of a quantity of gas. I have not heard that sufficient evidence has been adduced to show that there was a considerable quantity of gas at the fall in No. 5 before the explosion, but there is no doubt that there has been a considerable quantity of gas at that fall since the explosion.

"By Coroner: The particular bord where Martin was found must have been filled with gas from the point where he fired it to the roof.

"By Mr. Bennie: It is possible that sufficient gas might have been held in the cut-through between 5 and 6 to have caused the explosion on Martin passing with a naked light. I think Martin must have gone some little way in after going through the door before he ignited the gas. There was a rise from the body to the door. If Martin came through the door the assumption is that there was not a large quantity of gas in No. 6 bord.

"By jury: There must have been over 7 per cent. of gas in No. 5 when my light went out. The sample of coal I tested with was fresh from the face. Fresh dust would be falling in the haulage-way out of the tubs. There are more delicate methods of testing for gas—for instance, the hydrogen-lamp, with which you can see if there is $\frac{1}{2}$ per cent. present, and $\frac{3}{4}$ per cent. you can find quite easily. I am not suggesting that it should be used here. Life-saving appliances should always be within reach, and miners trained in their use. I think each large mine should have some of their men trained in the use of life-saving apparatus, as the men who explore the mine after an explosion must be accompanied by some one who knows the workings."

6. Is there anything you wish to add to that?—I wish only to make it quite plain that the first letter, the one to the Minister of Mines, was written in answer to certain specific questions.

7. *Mr. Wilford.*] May I at the outset ask that consideration which the uninitiated requires of a professor. Please use as simple terms in your replies as possible, so that I may understand them?—I will try.

8. The first point I want to discuss with you is the question of an examination of gas. Supposing a man is sent down the mine by the Taupiri Company to examine the mine with the idea of reporting whether it is safe for work, can that examination be efficient in a mine such as this one unless a ladder is used to reach the high places?—Do I understand you to mean in the working-places or generally?

9. Wherever there are high places which a man cannot reach without putting a lamp up, say, 20 ft.?—Clearly you cannot examine for gas 20 ft. above the floor unless you have some means of getting a lamp there.

10. Can an examination be efficient unless a ladder is used to reach the high places?—If there are high places it requires a ladder.

11. If a place is so high that it cannot be reached by a man standing on the ground, is it possible to make an efficient examination without a ladder?—Personally I think not. You mean, of course, with a lamp?