

is very high and the lignite mines are not as dry as bituminous; there was a certain amount of adhering moisture and moisture contained in the coal.

It is possible to get a new black powder with less flame than that now used; how serviceable it would be witness could not answer; absolutely flameless powder had yet to be found. Experiments with the gelatine and water cartridge showed there was absolutely no flame, at any rate none showed on a photographic plate. It was, however, rather a delicate thing to use; hardly fit for the hands of a miner. As to lamps, all the old style should be prohibited—the bonnet Clanny is probably the best of them. The illuminating power of the Wolf is higher than any lamp on the market—a good feature. The largest percentage of accidents were from falls of roof and good light is essential. The A. H. Gray has an illuminating power of 67-100 of a candle power; the Wolf claims one candle power. The self-lighting apparatus would not be dangerous except in case of breakage of lamps or glass or somebody tampering with it and igniting the match while in that condition. With that exception did not think there was any danger in the self-igniting process. All firemen should have that or some self-igniting lamp. Holes should be examined before charging; part of the shot-lighter's duty should be to clean out the holes and tamp the charge. Electric installation of any kind should not be in the return air-way, but if the mine is particularly fiery or known to contain large volumes of standing gas, the witness would not favour them at all; some sudden fall of roof or something of this kind might suddenly drive out the gas from the workings across the main road, or stoppings, hewed logs are the best—in case of creep they would tighten. Did not consider it possible to wholly ventilate or wholly isolated abandoned workings; it was very difficult to stop them effectually; the pressure of gas from coal means something enormous, having been found in some instances as high as 200 to 250 pounds to the square inch; would endeavour to ventilate as long as he possibly could. As to velocities, the high velocity of air combined with a heavy concussion would excite dust and with a blown-out shot might supply the conditions which would cause an explosion; any high velocity in the shaft or open part of the mine would not be so much a source of danger; would recommend to reduce the velocity by reducing the air-ways; a good velocity around the workings could not exceed probably 200 feet per minute. At Fernie the manager had testified it was going at 300 feet per minute from the face of McDonald's level to the face of Dever's level—that meant 30,000 cubic feet at a winning heading of the mine; such a velocity would have been absolutely dangerous with the atmosphere charged with fire-damp.

As to the panel system, you have less openings, so that in case of spontaneous combustion the plan of ventilation is more easily carried out; witness would recommend the panel system; the fields in Vancouver Island are not very suitable to the panel system.

The witness dealt at length with the various matters within the scope of the Commission, emphasizing an extension of the age at which a mine manager is now permitted to pass for that position, also considering that the present examination did not bring out the practical parts of a man's experience—was in fact too technical.

Mr. David Moffat, who had been forty-seven years in coal mines, told the Commission that coal dust will help or augment an explosion of fire-damp or gas was generally admitted, but he had failed to read of dust alone causing an explosion. When coming in contact with a naked light ventilate or remove the gas or dilute it with air, and we will not need to fear dust explosions. Old or abandoned workings should be sealed and proper pipes inserted in stoppings to allow the drainage of any gas that might accumulate; if not sealed should be ventilated.

Where safety lamps are used powder should be fired by battery and the use of squibs or fuse prohibited. Reducing the current of air during the time of firing shots might allow an accumulation of gas which might for the time being be rendered inexplosive for want of proper mixture, but would be dangerous when the air current was at its regular velocity, by bringing gas into contact with the miner's lamp.

Would recommend the removal of dust as far as possible and watering the roads. Dividing the air currents into two or more separate splits greatly reduces the danger of explosions and the return air from each split being carried directly into the main return air-way, the gas generated in one portion of the mine does not pass into another and an explosion which might occur in one section would not damage another. Also if one portion of a mine gives off more than others a larger current will be required in order to dilute them and render them inexplosive; this could be done by the use of regulators. Splitting air current and the use of over-casts reduced number of trap doors. Velocity of air current should be tested by aerometer in the most remote working place.

A fire-boss should not have more places than he can carefully examine, and such examinations should occur as short a time as possible before the miners go to work.

Dangerous causes exist to-day that did not formerly exist; mines are more extensive, coal is mined at greater depth and distances, liberating more explosive gas; mining machinery with their dust and noise are used and trains of coal are run at a high rate of speed with electricity at from 250 to 500 volts through bare wires. With all these and other dangers there are less accidents than took place twenty years ago. But fire-damp and coal dust while the miner's greatest foe are not productive of more than .48 per cent. of fatal accidents. Ignorant men are introduced by the hundred to mine coal, nearly as ignorant as the animals that haul the coal from them, and their ignorance of English prevents their proper instruction. Witness had been connected with three explosions in British Columbia, two at Wel-