

gazetted for a few mines of this class, so far; but I think it my duty to call attention to the unnecessary character of the proceeding to avoid its continuance in the future. It is, of course, necessary to have a record of these mines, in event of their at any time opening out to larger concerns; but, so far as inspection is concerned, it would seem to be not only an expensive luxury, but at the same time next door to useless.

To pass on now to my report of the coal mines inspected during my trip through the South Island.

*Shag Point Coal Mine.*—I visited this mine on the 25th April, and found that the area on fire, which is to the rise of the workings, is not yet walled off from the main workings of the mine, but is closed in by screens, a small dribble of air being allowed to pass through for the purpose of carrying off the foul gases evolved. This air is regulated by a small hole, about one foot square, in the casing of the air-shaft, and this it is proposed to close when the walling-off has been completed. This is being carried on in such a way, that, when finished, the whole of the area on fire will be enclosed, pillars and all, by a double wall, the intermediate space being filled in with sand, and it should prove a most efficient check on the fire. In the meantime, this fire, I consider, constitutes an important element of danger, from the fact that, burning as it is with a limited supply of air, a large quantity of coal gas is being evolved, which may at any time, from atmospheric causes, or in the event of a fall blocking the present air-course which carries it off, force its way into the workings. The ventilation, generally, is only very moderate, owing to the fact that at present the two downcasts, by the mine and the new shaft, are, if left to themselves, liable to fight, and that, practically, the incline current is overpowered and converted into an upcast; an occurrence which might result in a serious catastrophe, if not guarded against. As it is, the air from the shaft is regulated so as not to overcome the other supply, which ventilates some of the dip workings, and so the total quantity of air passing is less than it would otherwise be. The air current, as directed at present, would not be sufficient to cope with the gases evolved from the burning area, in the event of their forcing themselves into the workings from the causes specified above; but it is fortunate that, by simply opening a door, a very good current of air can at once be brought to play round the boundary line of the burning coal, and would, I think, be amply sufficient to carry off whatever gases are likely to find their way into the workings. I have thought it necessary to write and specially caution the manager on this point, and have impressed upon him the importance of constant inspection of the roadway in question, and of coursing the air in that direction whenever any indications of its necessity be observed, even should it necessitate withdrawing the men temporarily from the dip workings. I found an impression existed at the mine that the gases evolved from the burning area were inexplosive, although it was admitted to me that they had at times behaved in the same manner as fire-damp when examined with a Davy and, moreover, that gas had been seen to burn with a blue flame from slack heaps, dying away at a short distance. I expressed myself in writing to Mr Williams that this was unreasonable, and that any gas which would burn would also explode, should the conditions be such as would favour it. You have since shown me Mr Binns's letter\* upon this subject, stating that the gas found in this mine is probably carbonic oxide, and quoting experiments to show that it would be inexplosive, and only burn quietly; but here I must in part differ from him. An explosion, as it must be understood in a mine, means the sudden ignition of a gas which may, by its combustion, greatly expand in volume, or may not. It will, in either case, be attended with the formation of carbonic acid or choke-damp, which is admitted to be even more deadly than the explosion itself. Moreover, it is a moot point now whether the secondary explosions, which occasionally occur in mines, are not principally due to the carbonic oxide which was formed by incomplete combustion at the first explosion. Be that as it may, however, I do not myself consider that carbonic oxide is the only gas evolved from the burning area which is capable of forming an explosive mixture; for any coals, whether lignite or otherwise, when exposed to destructive distillation at any temperature over 300° Fahrenheit, as must be the case at present in the Shag Point Coal Mine, will give off greater or less quantities of coal gas, which would not be less explosive than fire-damp when mixed with the proper proportion of air.† It is to avoid danger from this source that I have cautioned Mr Williams, and should have taken the same precautions whether any sign of explosive gas had been seen or not, since the conditions under which the fire is burning, viz., with a limited supply of air, are such as very closely assimilate to a coke oven or gas producer. The presence of this gas in the mine can, fortunately, be readily detected, as it would be seen in the form of smoke, and, accordingly, a very substantial guarantee exists against accident if due precautions are taken, and Mr. Binns reports that Mr. Williams is paying every attention to the case.

*Walton Park Mine.*—The air in this mine was by no means excessive when I visited it on the 26th April, but Mr. Lindsay informs me that it is generally much better. I have little doubt, however, that the ventilation could be improved by confining the current instead of allowing it to spread through the workings. I am afraid that a certain amount of trouble is in store for this mine in its new pit workings, where the coal is not standing at all well. The principal cause appears to be a number of vertical joints along which the coal falls, the result being that it frequently assumes the form of a gothic arch in the bords, and, in one or two instances, has gone as high as the roof. This has again occurred in the lowest level, which is only driven 6 feet wide; and, at one place, where the work has cut the floor, a certain amount of creep has ensued. From this, I am inclined to think that the behaviour of the roof is not entirely due to the nature of the coal, but may also find an assistance in the fact that the march of the colliery has necessitated a somewhat irregular system of working, the bords to the rise being carried farther in than the main level. Wherever the roof shows any sign of breaking in the manner described, the drives are being kept narrow, and this appears to be the best thing that could be done.

*Saddle-Hill Colliery.*—Since Mr. Binns's annual report an air-shaft has been sunk to the rise of

\* See end of Appendix.

† Dr. Hector mentions (New Zealand Exhibition, 1865, Jurors' Reports and Awards, p. 384) that "the Shag Point coal may be considered to hold the same relative position among the brown coal series that cannel does to the true or older coals. It burns freely with a rich oily flame; upon distillation it gives off a rich gas at a low temperature." This appears to point to the fact that the Shag Point coal is peculiarly apt to give off gas under the conditions which I have mentioned.